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**SOCIAL BARRIERS AND TRANSPORTATION SOCIAL EXCLUSION ISSUES
IN CREATING SUSTAINABLE CAR-SHARING SYSTEMS**

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Abstract. Currently, increasingly car-sharing systems are implemented in the area of urban transport systems. This type of development brings many benefits to cities and operators providing services, but above all, following the principles of sustainable development, it should improve society's quality of life. With this in mind, it is particularly important to monitor users' opinions on the services offered and take into account the problems and complaints reported by them. Monitoring opinions on services may contribute to the improvement of the quality of services, but most of all contribute to eliminating transport barriers related to the use of car-sharing services. This study aimed to identify transport barriers, accessibility issues, and transport social exclusion reported by users of car-sharing services. The purpose is to present the phenomenon of social exclusion in car-sharing services based on the Church's conceptual framework. The article identifies seven main categories of social exclusion, including economic, physical, geographic, spatial, fear-based, time-based, and facility-access barriers related to the use of car-sharing services. Moreover, the article includes presentation of remedial measures limiting the phenomenon of transport, social exclusion and barriers, consistent with the principles of sustainable development. The article supports operators who want to create services better suited to the needs of the society. It is also a response to a research gap dedicated to transportation social exclusion and aspects of responsible business in the car-sharing industry. The work supports eliminating the phenomenon of social exclusion and the pursuit of creating socially and environmentally responsible car-sharing services.

Keywords: car-sharing; social exclusion in car-sharing; barriers to using car-sharing; sustainable car-sharing services; corporate social responsibility

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Additional disciplines: transport engineering

1. Introduction

Nowadays, due to the efforts of cities to achieve a sustainable level of transport and the trend of the sharing economy in urban transport systems, increasingly short-term vehicle rental services are emerging. One of the services defined by users as the most comfortable and the possibility of resigning from owning a car or limiting its use are car-sharing services (Cervero, 2020). Car-sharing, as a model consists of short-term car rentals offered by operators in urban areas (Midgley, 2011). Its concept is similar to car rental systems, with the difference that cars can be rented for less than an hour (Cervero, 2003; Cervero & Tsai, 2004). Car sharing is one of the possibilities that fit into the idea of the sharing economy and that can fit into Sustainable Development Goals (SDG) (COM 288, 2016; United Nations, 2021). In line with this idea, business models are based on the use of popular online platforms for the short-term use of services or goods (COM 288, 2016). Although car-sharing is a new concept for many cities and often described as innovative, the first written references in the literature date to 1948 (Doherty et al., 1987). However, a significant and, above all, more permanent development of car-sharing began in 2000, when players providing typical business services to short-term vehicle rental companies appeared on the market (Shaheen & Cohen, 2020). The decisive development of the car-sharing market is visible in the years 2014-2018 (Shaheen & Cohen, 2016; Shaheen & Cohen, 2020). Despite the earlier domination of the popularity of the system on the European market, the most intensive increase in the number of registered users of car-sharing systems and the number of rented vehicles was recorded on the Asian market (Shaheen & Cohen, 2020). Compared to 2009-2014, the number of registered users in Asia increased by 2275% (Shaheen & Cohen, 2016; Shaheen & Cohen, 2020). In turn, the number of available vehicles increased by 431%. Detailed data on the number of users registered in the systems in Europe, Asia, and North America were presented in Figure 1.

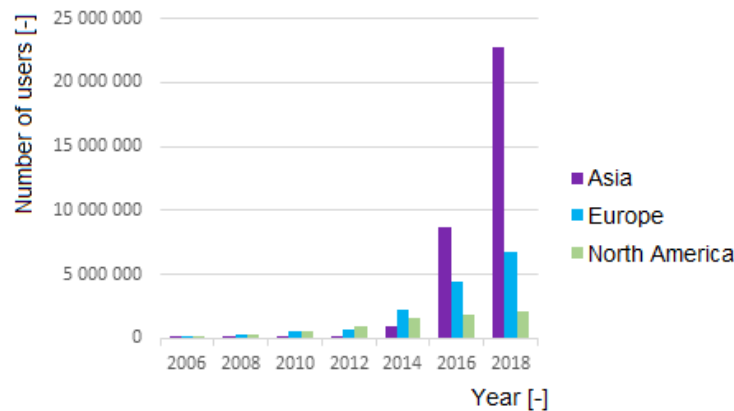


Figure 1. The number of users using car-sharing systems in Europe, Asia and North America in 2006-2018

Source: own study based (Shaheen & Cohen, 2016; Shaheen & Cohen, 2020)

The most recent data indicate that vehicle-sharing service systems are now operating in 59 countries worldwide (Movmi, 2020). They are offered by 236 operators and available in 3128 cities (Movmi, 2020). Statistics estimate that in 2025 the vehicle fleet will grow from the current 380,000 available cars to nearly 7.5 million, and the global car sharing market will be worth more than \$ 11 billion (Global Market Insights, 2018). Due to the fact that car shared mobility service systems are developing very dynamically, both in terms of the growing number of operators, vehicles, and users, there are also increasingly problems related to their proper and, above all, effective functioning in cities (Bieszczał & Schwieterman, 2012).

The proper functioning of systems is related to many groups of factors. Car-sharing researchers focus mainly on aspects related to economic and technical, transport, environmental, and legal problems (Balać et al., 2019; Ferrero et al., 2018). However, due to the correct implementation of the assumptions of the sustainable transport policy and modern mobility, it is particularly important to pay attention to the issues concerning the proper fulfilment of the requirements set by the society and adjusting services to their needs (Chatterjee et al., 2013; Andryeyeva et al., 2021). It would seem that car-sharing services are to increase transport accessibility, eliminate the need to have funds for the purchase and maintenance of a vehicle, and give society equal access to the use of a modern form of mobility (Firkorn & Müller, 2011). Despite the noble idea, there are many comments from the public that may constitute barriers to the development of services, which affect their incorrect development (Carmen et al., 2021; Tuominen, 2019), and, as a result, bring about services that are not fully related to the implementation of the assumptions of sustainable transport development. Therefore, the aim of this study was to identify transport barriers, accessibility issues and transport social exclusion reported by users of car-sharing services. Moreover, the article includes a presentation of remedial measures limiting the phenomenon of transport, social exclusion, and barriers, consistent with the principles of sustainable development.

The article supports operators who want to create services better suited to the needs of society. It is also a response to a research gap related to the aspects of transportation, social exclusion connected to sustainable development and responsible business issues in the car-sharing industry. The work supports eliminating the phenomenon of social exclusion and the pursuit of creating socially and environmentally responsible car-sharing services.

2. Theoretical background

Sustainable transport policies challenge cities with a set of guidelines that aim to improve the transport condition of urban transport systems while striving to improve the quality of life of their inhabitants (Benevolo, 2016). From the point of view of society, all changes in the sense of sustainable transport should aim to increase transport accessibility, introducing changes in the structure of urban travel to increase their effectiveness and efficiency and eliminate transport barriers (Jimenez, 2018). These aspects relate to two main concepts, which are transport accessibility and social exclusion.

Transport accessibility is one of the important aspects of perceiving the environment for humans (Spiekermann & Neubauer, 2002). It is the main product of the transport system, which determines the advantage of the location of a given area over the other one (Spiekermann & Neubauer, 2002). The transport accessibility also is directly related to the flow of people, goods, and funds - the greater the availability, the better the potential conditions for the society and the economic market (Spiekermann & Neubauer, 2002). That is why the transport accessibility is one of the main factors in the transport planning process (Spiekermann & Neubauer, 2002). It identifies places for the easiest, cheapest, and most affordable movements of society (Spiekermann & Neubauer, 2002).

The second aspect closely related to accessibility issues is transportation social exclusion. In that case, the phenomenon is connected to the mobility dimension (Kenyon et al., 2002). Research indicates that insufficient access to transport makes the society impossible to meet their social needs fully (Kenyon et al., 2002; Mackett & Thoreau, 2015; Preston & Rajé, 2007). Transportation social exclusion is related to seven main areas, which are economic, physical, geographic, spatial, fear-based, time-based, and facility-access aspects (Church et al. 2020). They are identified by Church et al. and are called “Church’s social exclusion framework (Church et al. 2020). Each type of exclusion was characterized and presented in Table 1.

Table 1. Social exclusion in transport

Exclusion type	Description
Economic	Limitations directly related to travel costs, the ratio of public services to private services. Moreover, the costs of business trips and travels determine the possibility of using other means of transport than the employee's vehicle.
Physical	Barriers related to the physical and mental difficulties of the society. They include barriers related to movement dysfunction and mental and educational barriers related to learning difficulties and difficulties in communicating in each language.
Geographic	Barriers related to the unavailability of a given transport service in a selected area, spatial isolation of some communities or district. These barriers affect the disruption of the labour market and the fair competition and free market in each area.
Spatial	Barriers resulting from the implemented local transport policies or the lack of them, related to, e.g., parking decisions, speed limits, traffic restrictions in specific places, etc.
Fear-Based	Fear of using specific means of transport, incompletely understood principles of operation of services, fear of the spread of infections and diseases in means of transport, mental fears, e.g., related to the lack of parking space, etc. Moreover, concerns about the lack of proper equipment of the vehicle or its condition.
Time-Based	Issues related to the travel time and all aspects affected by it, e.g., difficulties with the division of duties, childcare, etc. to be able to carry out a given trip longer. In addition, timetables or barriers with the possibility of accurately planning the time of arrival of a given means of transport.
Facility-Access	Barriers are related to the limited access to full use of vehicles through their inadequate equipment, etc.

Source: author's own collaboration based on (Church et al., 2000)

The framework proposed by Church is a scheme that can be used to define social barriers for any transport service (Church et. al, 2000). Its development has a chance to identify possible solutions that may serve to reduce transport problems in a given industry and, as a result, create a sustainable, socially responsible transport service (Church, 2000).

Analysing the approach to accessibility and social barriers in car-sharing systems, only single literature items were found. For example, the authors Meleen et al. indicate that the main problems in the development of car-sharing systems are architectural and infrastructural barriers that prevent the efficient functioning of the systems (Meeleen et al., 2019). They also indicate that there is a problem with integration with public infrastructure and municipal transport management systems (Meeleen et al., 2019). This statement is confirmed by Tchorek et al., who consider the lack of adequate access of system operators to the public realm to be the main barrier (Tchorek et al., 2018). In addition, Cass et al. focus on aspects related to spatial access (Cass et al., 2005). In turn, the authors of Tuominen et al. consider economic issues to be the main barrier (Tuominen, 2019). This sentence is confirmed by the authors of Carmen et al. who indicate that the services are used by high-income people from urban areas (Carmen et al., 2021). At the same time, they indicate that owning a company car is one of the main barriers to the development of car-sharing systems (Carmen et al., 2021).

While issues regarding barriers to car sharing services appear in the literature, issues related to social exclusion are not popular among scientists. During conducting a literature analysis taking into account leading databases of scientific articles such as Web of Science, Scopus, Springer Link, or Google Scholar, no articles that would be strictly devoted to transport or social exclusion in car-sharing services were found. What is more, also the idea of applying the Church framework concerning car-sharing systems has not yet been demonstrated in any scientific article. and social exclusion issues connected to sustainable development were not found in the current research. Therefore, due to the fact that the current car-sharing systems are required to make them more sustainable and socially responsible (Baptista et al., 2015; Hartl et al., 2018; Roblek et al., 2021), the author decided to fill the research gap and conduct her own research on social exclusion in car-sharing services.

3. Research objective and methodology

Due to the recognition of a niche in research related to accessibility and social exclusion concerning car-sharing services, it was proposed to conduct research based on the analysis of opinions regarding users of individual car sharing services systems available in Europe. The proposed research method was the Desk Research analysis, i.e., a method that boils down to analysing the records of available data sources, including their compilation, mutual verification, and processing. The Desk Research is a method that based on the use of existing (secondary) data (Kiecolt & Nathan, 1985). It is one of the analytical methods for nonreactive research (Babbie, 2002). The most important advantages of the Desk Research method include (Babbie, 2002; Bednarska, 2015; Hofferth, 2005):

- easy access to data,
- low cost of performing analyses compared to performing own research or generating reactive data,
- the ability to perform analyses on large samples if data is available,
- no influence of the researcher about the study,
- wider possibilities of comparing different research results concerning the same or a similar research area,
- enriching the existing inference mechanisms on a given topic.

Critically approaching desk research as a research technique, it is necessary to point out the limitations in the form of the possibility of comparing and combining data, as well as performing complementary analyses using various data sources (Babbie, 2002; Bednarska, 2015; Hofferth, 2005). It is also worth mentioning that when performing Desk Research analyses, particular attention should be paid to the credibility of the data (Babbie, 2002; Bednarska, 2015; Hofferth, 2005). Therefore, it is important to use data published by verified organizations, government, organizations or websites with a good social reputation (Hofferth, 2005). In addition, it is also important to check that the data is up-to-date (Hofferth, 2005). For example, in the case of social research, data may be published after a certain period of time associated with the need to prepare relevant reports, which in turn may make the results outdated, especially if the answers are concerned, for example, new technologies that change very quickly over time.

For the purposes of this article, the Desk Research were performed on the Google Play database related to mobile applications for car rental in car-sharing systems (Google Play, 2020). One thousand opinions were analysed regarding 74 mobile applications concerning systems operating in Italy, France, Spain, Germany, and Poland. The use of data from such a large application provider as Google made it possible to conduct research on a large research sample. Moreover, the researched database was placed on a socially credible portal. During the research, the focus was on unflattering comments to be able to indicate the barriers present in the systems. The study looked at user feedback in 2020, what means that the data was therefore up to date. The study considered opinions on systems providing various forms of car-sharing service station-based car-sharing, and free-floating car-sharing. When analyzing opinions on the use of car-sharing services, the focus was on the analysis of comments on the main issues related to the process of using car-sharing services, i.e., registration in the system, vehicle availability, infrastructure availability, user friendliness, fees, rental management from the user's point of view and

affordability. The obtained data were classified according to the seven main areas of social exclusion presented in Table 1.

The main limitation of the method used was, in contrast to the questionnaire surveys, the inability to obtain data on detailed information on respondents issuing ratings for car-sharing systems. The database does not have access to data usually determined in the demographics part of the survey, i.e., age, place of residence, wealth, or education. Despite this, Desk Research's analysis made it possible to conduct research with a large research sample. Moreover, they were people associated with car-sharing services. By carrying out classical research, it would be a very difficult and costly task to acquire a research group related to car-sharing services at the level of several European countries.

4. Results and discussion

Analyzes were conducted on 74 applications related to the operation of car-sharing systems in 5 European countries. A detailed breakdown of the number of applications from individual countries is presented in Table 2.

Table 2. Data on the analysed car-sharing systems

Country	Number of applications	Types of car-sharing systems	
		Station-based	Free-floating
France	13	8	5
Germany	16	11	5
Italy	28	16	12
Poland	8	-	8
Spain	9	4	5

Source: author's own elaboration.

From the point of view of gender, the received opinions were mostly expressed by men - 85% were male responses, which proves representativeness due to a very small percentage of women using car-sharing services in the world. During the analysis, 1000 negative opinions related to social barriers in car-sharing systems were identified. Subsequently, they were segregated to indicate the most frequent areas of complaint. 5 main areas of complaint have been identified regarding the system's maintenance, system's technology, system's policy, system's infrastructure, and local policies. Each of the areas of complaints was defined in Table 3.

Table 3. Definition of areas of complaint related to the functioning of car-sharing systems

Area	Description
System's Maintenance	Any issues related to the condition of the fleet of vehicles offered in the system.
System's Technology	All issues related to the application and technical requirements of the system towards users.
System's Policy	All issues related to the regulations for the use of services and price lists.
System's Infrastructure	All issues related to the availability of the system and the infrastructure necessary for the proper functioning of the system.
Local Policies	All issues related to local requirements and regulations that legally bind the functioning of car-sharing services in a given area.

Source: author's own elaboration

The percentage of each area of complaints reported by users was also defined. A detailed distribution of the answers is presented in Figure 2.

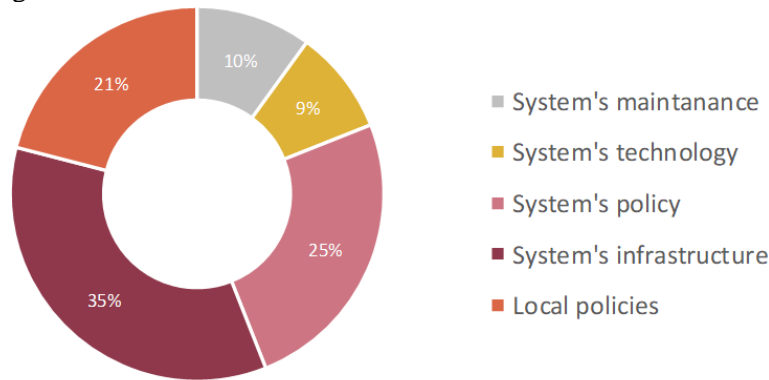


Figure 2. Percentage distribution of individual areas of complaints concerning social barriers in car-sharing systems.

Source: author's own elaboration

Then, for each of the five groups of complaints, complete statements of the most frequently repeated answers regarding barriers to the use of car-sharing systems were defined. A total of 20 most frequently typed social barriers related to car-sharing services have been defined. Table 4 presents the individual barriers concerning the groups of complaints and the number of replies provided by the respondents.

Table 4. Social exclusion in transport

No.	The defined social barrier of carsharing system	Complaint's area	Number of responses
1.	Too long distance to available vehicles (first/last mile)	System's infrastructure	84
2.	Too large area without the possibility of renting a vehicle - excluded district.		81
3.	Too few vehicles in car-sharing fleets and too little choice of vehicle types in fleet.		57
4.	Not enough charging stations for electric vehicles		48
5.	Lack of available vehicle in peak hours		41
6.	No additional equipment for transporting children (child seats)		23
7.	There are no dedicated vehicles, e.g., for the elderly with mobility limitations, or for parents who want to store a stroller in the large trunk of the vehicle conveniently.		16
8.	Too high cost of renting a vehicle	System's policy	75
9.	Too little price flexibility of journey fares (settlement per km or min)		69
10.	Too many formalities related to the rental process i.e., checking the technical condition of the vehicle, e.g., its cleanliness, equipment, and external conditions - the need to document the condition by taking photos, filling in additional questionnaires.		58
11.	No possibility of transporting animals.		28
12.	Limited working hours of stationary customer service offices.		20
13.	Areas without the possibility of returning / renting vehicles, i.e., at some railway or bus stations, offices, etc.	Local policies	99
14.	Areas excluded from parking (stop function) due to the lack of electronic payment for parking.		84
15.	Problems with the availability of parking spaces and operation zones at public facilities.		27
16.	Insufficiently charged electric vehicles.	System's maintenance	34
17.	Poor technical condition of vehicles.		66
18.	Too complicated registration process from a technical point of view, i.e., requiring access to the phone camera, connecting a credit card, etc.	System's technology	36
19.	System errors related to the inaccurate functioning of the GPS and the indication of vehicles that are not actually in a given place.		33
20.	Application errors, logging out, unnecessary notifications, and advertisements are displayed.		21

Source: author's own elaboration

Subsequently, the reduced opinions on social barriers in car-sharing were compared to the Church framework, taking into account the 7 main areas of social exclusion in transport. Moreover, for each of the groups of exclusions, the option of social transition has been proposed, which may affect the problem of a given exclusion, presented in Figure 3.

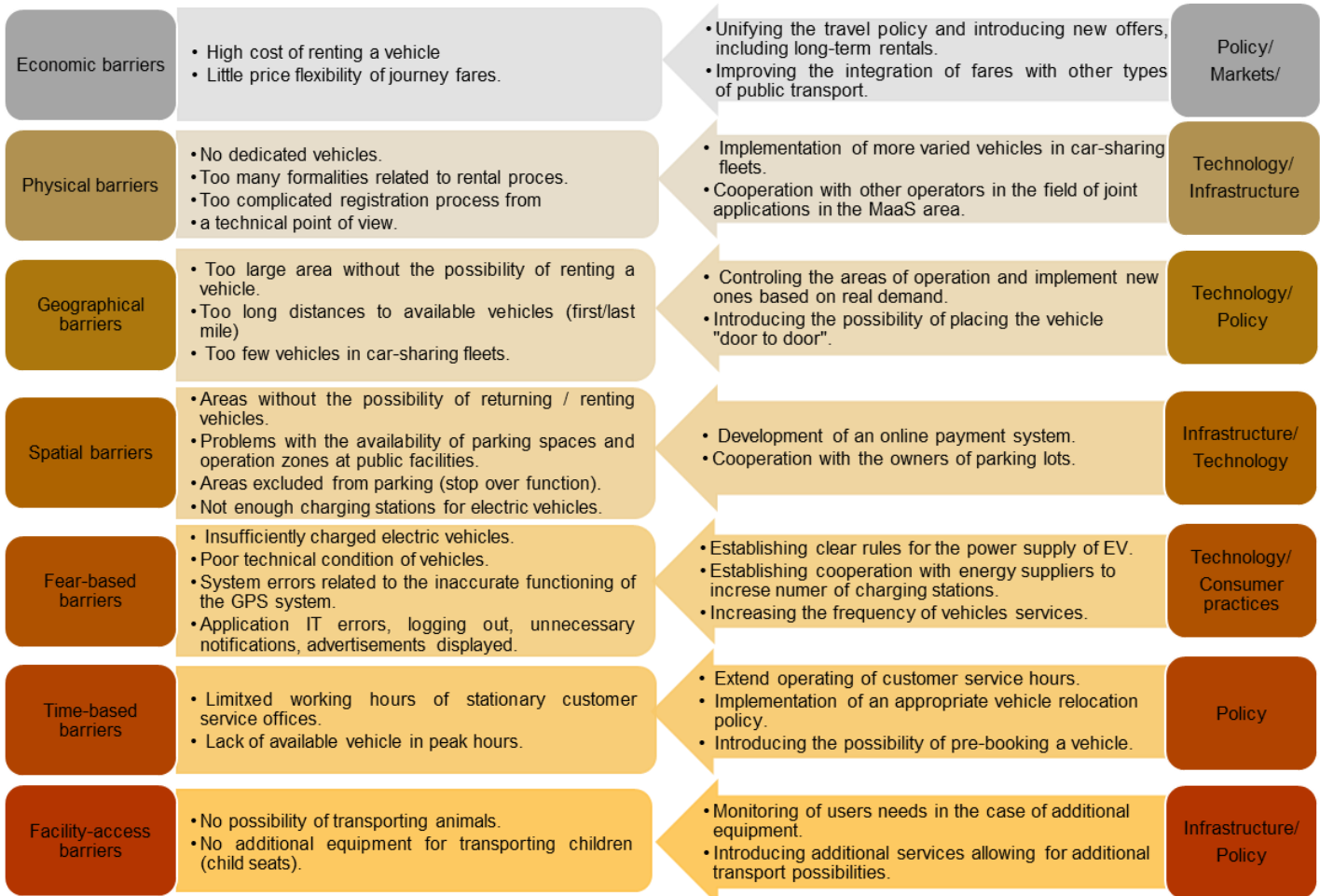


Figure 3. Social exclusion and possible socio-technical transitions in car-sharing systems

Source: author's own elaboration

5. Discussion

Based on the results obtained, it should be stated that the Desk Research analysis was successfully applied to obtain data on transport barriers and exclusions in car-sharing services. Moreover, the conducted study allowed for the first use of research on car-sharing Church's framework.

Moving on to the detailed analysis of the results, it should be emphasized that, most interesting conclusions of the study is that exactly the same opinions apply to all types of car-sharing systems, i.e., station-based and free-floating. Such a conclusion would indicate that users are not concerned with the type of business model of the system's operation but their specific functionality. Interestingly, most of the research related to the management of car-sharing systems focuses mainly on business models. Therefore, the conclusion is an important guideline for

operators, but also for scientists, to notice when developing the concept of sustainable car-sharing systems that service models may not necessarily match the specific consumer needs, which was confirmed by this study.

Moreover, it is worth noting that the people who expressed their opinions were mostly men. Admittedly, this conclusion is fully supported by the real imitation of care-sharing services by women, which is very inconsiderable (Benner, 2018). However, from the point of view of creating sustainable car-sharing systems, it is worth focusing on maintaining a balance of the appropriate diversity of customers and directing activities towards the appropriate promotion that would ensure the interest of the entire society. This barrier is closely related to the 5 SDG – “Achieve gender equality and empower all women and girls” (United Nations, 2020).

Next, it should be noted that the issues related to the infrastructure offered in the given systems turned out to be the leading social barriers. To eliminate the problems of the appropriate number of the fleet, its appropriate adjustment and distribution, it is suggested to carefully monitor the users' demand for journeys as well as to introduce additional services, such as the possibility of booking a vehicle in advance, as well as the possibility of delivering the vehicle directly to the customer, i.e., "door to door" service.

The second important barrier is the issues related to the appropriate policy of the operators. Price lists and regulations, and issues related to users' liability for offenses or possible damage and destruction of vehicles deserve special attention. A particularly important improvement, also from the economic point of view, is creating cooperatives of car-sharing services on public transport. Car-sharing has the chance to become a first-mile or last-mile transport, and further travel can be continued by public transport.

Users also point to the overly complicated process leading to the rental of the vehicle. Then the solution may be to propose graphic instructions containing instructions for renting a vehicle. It is also important that all promotional campaigns are conducted so that they allow to reach the message not only to young people but also to people who have concerns about using car-sharing services. These activities also perfectly fit prosocial activities as part of the corporate social responsibility strategy.

Attention should be paid to issues relating to the proper condition of vehicles and their maintenance. The research shows that cars with car-sharing systems are in poor technical condition. They often lack equipment tires that are not adapted to weather conditions and do not have regular daily inspections. From sustainable development point of view, these issues are particularly important because they directly affect environmental impact (United Nations, 2020). It should be emphasized that vehicles with sharing systems are often used only for one season; successively they end up in legal or illegal scrap yards, creating an additional environmental hazard (Yixin, 2017). Carrying out appropriate inspections of cars could increase their use in systems and extend the life cycle of the product and service.

In addition, the issues related to the operator's green fleet, i.e., all references to electromobility, should be taken into account. Importantly, at the moment, most of the world car-sharing market will be replaced by vehicles with a conventional fleet. Users' opinions in the field of electric vehicles indicate a high demand in this matter. From the point of view of operators' business practices, it is an important point to consider. Any action taken in this area will have a chance to translate into the achievement of 11. SDG. - "Make cities and human settlements inclusive, safe, resilient and sustainable".

Importantly, the sustainable development of car-sharing services is influenced not only by operators, but also by local authorities and local market conditions. Research indicates that the most important barriers are the inability to park, start or finish a rental in specific public places, mainly near the railway station or public administration facilities. What is more, the appropriate level of service availability from the point of view of cities may also be improved thanks to the introduction of online payments for parking lots, which, unfortunately, is not yet common

everywhere. What is more, it is also important to create own policies regarding the possibility of subscription payments for parking lots for sharing vehicles, arranging parking spaces for them or privileges, e.g., the ability to move in places excluding traffic for other vehicles. These issues mainly result from the lack of developing appropriate policies that would consider the services of new mobility such as car-sharing. Therefore, it is worth emphasizing that without the appropriate support of local governments in the field of car-sharing services, it will not be possible to obtain a fully sustainable and socially responsible system, because it will be possible to achieve 10. SDG - “Reduce inequality within and among countries”.

Conclusions

Summarizing, the conducted research allowed to achieve the intended work goal by identifying transport barriers, accessibility issues, and transport social exclusion reported by users of car-sharing services. It has also been confirmed that both the Desk Research and Church framework analyses can be applied to issues related to car-sharing services. The conducted research complements the existing research gap concerning transport exclusion of social exclusion in car-sharing systems.

The conducted research indicates that in current car-sharing systems, users encounter social barriers. These barriers are related to the five main areas of operation of car-sharing systems and are directly related to transport and social exclusion. Furthermore, exclusions are related to the two most popular business models of the car-sharing system, i.e., station-based and free-floating, and that they are present in leading systems, regardless of the operator's country of operation.

The social barriers and exclusions in car-sharing presented in the text were referred to sustainable development and corporate social responsibility issues. It was pointed out that many barriers concern the mismanagement of car-sharing systems. Therefore, a conclusion is drawn that if management systems were implemented in individual systems, taking into account the assumptions of corporate social responsibility, many currently existing problems could be eliminated.

From a practical point of view, a prepared list of transport barriers and exclusions as well as the proposed remedial actions with a list of good practices that can be implemented by car-sharing service operators during improving or optimizing their car-sharing services in a user-oriented manner with taking into account the principles of sustainable development. What is more, the presented list also supports other scientists and managers in the processes of modelling transport systems or analysing car-sharing services in terms of socially responsible activities. The article also points to the niche in literature in the field of research on social aspects, and especially social exclusion in car-sharing services, which may be a valuable indication during developing research plans and projects by other scientists.

In subsequent works, the author wants to analyse barriers extended to systems operating outside of Europe. Then it will be possible to obtain an interesting solution by comparing the functioning of car-sharing systems from the point of view of their relative functioning in the eyes of users.

Summing up, focusing on the indicated advisory activities has a chance to bring better functioning of car-sharing systems and obtain sustainable transport and socially responsible systems that are complying with the 12. SDG – “Ensure sustainable consumption and production patterns”.

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MOTIVATIONAL FACTORS AT WORK OF E-COMMERCE AND E-BUSINESS EMPLOYEES. WHAT IS THE DIFFERENCE BETWEEN GENDERS?*

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Abstract. The objective of this research is to understand gender differences in motivational drivers at workplace, with a focus on people with working experiences in the field of e-commerce and e-business. Special attention is devoted to the preference of the competitive and cooperative behaviour. We examined gender differences in the preference of eight motivational drivers on a sample of N = 429 (41 % females). Results showed that males ranked higher in motivation by professional challenge, preference of competitive settings and opportunities to develop. Females scored higher in the motivation by social support and physical working environment. Interestingly, there were found no gender differences in preference of financial reward and recognition, what supports the thesis of equal pay and equal treatment policies. The most pronounced gender differences occurred in the preference of competitive vs. cooperative behaviour. Males have significantly higher preference of competition when compared to females and vice-versa. In the analytical quadrant of motivation by high competition and low cooperation there was 35 % of males and 16 % of females. In the opposite quadrant of motivation by low competition and high cooperation there were 24 % of males vs. 45 % of females. Results have interesting implications for management of human resources and gender-based talent management.

Keywords: work motivation; gender differences; HR management; cooperative and competitive behavior

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1. Introduction

In today's corporations, the key pillar of the corporate success is people with appropriate motivation. The objective of this paper is to analyze gender differences in the motivational drivers. The results might be particularly interesting for better and more efficient design of motivational systems and talent management across organizations. Motivation can be defined as a theoretical construct explaining behaviour, notably the reasons for human actions. Motivation represents a stimulus to behavioral tendency or behaviour, on the repetitive basis (Elliot and Covington 2001). Work motivation may contain several dimensions, or attitude-based motives. There is a wider spectrum of theories explaining the nature of motivational dimensions and aspects. Pardee (1990) highlighted four theories that he calls “classics”: (1) Maslow's hierarchy of needs, (2) Herzberg's dual-factor theory of two factors, (3) McGregor's Theory XY and (4) McClelland's motivational theory (achievement, affiliation, power).

Some motivational drivers have neuropsychological correlates, both functional and morphological. Lee et al. (2012) demonstrated the differences between brain activity during intrinsic and extrinsic motivation. Takeuchi et al. (2014) found the correlates in the morphology and density of the grey matter in the respective areas of the brain, corresponding to the differences in the preferred type of motivation: achievement based on self-realization versus motivation on the social competition.

Biological determination of motivational processes and consequent behavioral tendencies advocates the idea to perceive motivational driver as a time-consistent personality trait. From the point of view of HR diagnostics, a motivational factor which is stable and consistent in time can be understood as a factor determining personality. Hence, this type of motivational factors can be looked upon as personality traits and can serve as a predictor of job performance and professional success.

Through the prism of the literature review, the objective of this research is to find out, whether there is a statistically significant difference between men and women with respect to the selected motivational drivers (professional challenge, financial reward, recognition of performance, motivation by competition, motivation by cooperation, social support, physical working environment and development opportunities).

We can formulate three research questions as follows:

1. Which motivational driver are more preferred by males (RQ1).
2. Which motivational driver are more preferred by females (RQ2).
3. Which motivational drivers do not generate significant differences between genders, gender-neutral (RQ3).

Special attention is devoted to the gender differences in the preference of competitive and cooperative organizational settings. The findings are supposed to provide interesting implication for the design of motivational systems in the talent-oriented organizations.

2. Theoretical background

Research in motivation at workplace is quite numerous. There are two basic approaches how to measure motivational drivers. First, some authors analyse how respondents rank individual motivational factors, and subsequently compare differences among groups, based on age, gender and job type, e.g. (Kovach 1987, Elizur 1994, Lorincová et al. 2019). Secondly, some researchers analyse the importance of the work values in relation to the overall work satisfaction e.g. (Eskildsen, Kristensen, Westlund 2004, García-Bernal et al. 2005) or happiness (Furnham et al. 2005). We use the first approach, based on the direct indication (ranking) of preferences for individual motivational factors. Furthermore, in this paper we focus on the selected motivational drivers, which might be used by the employers in almost all types of jobs: financial reward and recognition, personal

development and professional challenge, social support and physical work environment. Special focus is devoted to the competitive and cooperative behavioural preference.

Financial rewards and verbal recognition of performance

There are two forms of appraisals: the ones with the link to the financial outcomes and those without monetary consequences (Kampkötter 2017). Monetary award belongs historically among the most straightforward motivational driver, and one of the most considered since the beginning of the management history (Bernard, Walsh, Mills 2005). However, nowadays, the companies offer such a wide spectrum of motivational drivers as personal development, interesting and meaningful work, quality of personal interactions that the financial compensation become less important (Seiler et al. 2012).

Financial reward

Buelens and Van den Broeck (2007) found that men are significantly more motivated by the financial reward. Elizur (1994) found that men ranked higher values such as financial reward, influence, independence, and responsibility. Major and Konar (1984) found females' expectations on the financial remuneration at the beginning and at the top of the career significantly lower, when compared to man, but he adds, this might be due the different expected career paths. Interestingly, Smith and Tolbert (2019) point out that motivation by financial reward in the segment of individual entrepreneurs, however, can have different effects on the duration the small business, based on the race and gender.

Recognition for work

Verbal appraisal for a quality performance at work belongs among the most efficient tools in HR management (Judge, Ferris 1993). It serves as a form of a feedback, that's why it is important to comply with the aspect of fairness. At the same time, it is an important vehicle of social relation, even in formal settings. Kovach (1987) found women to be more sensitive to the appreciation at work, when compared to men. Gunkel et al. (2007) found no significant differences when it comes to the performance rewards and similarly, Lorincová et al. (2019) did not find statistically significant differences between genders in the formal appraisal related factors, fair appraisal system and information about the performance results. In the cross-cultural study by Elizur (1994), females ranked recognition higher in the group of Dutch participants. In the Hungarian group men ranked recognition slightly higher, however the difference was small.

We formulate hypothesis as follows:

Hypothesis 1a: Males rank the financial reward significantly higher than females

Hypothesis 1b: Males rank the recognition of performance significantly higher than females

Personal development and professional challenge

Personal development denotes a process where a person, in the frame of working life acquires a wide spectrum of skills and knowledge relied to the self-actualization and self-fulfillment, increasing the self-perceived value of the person. According to García-Bernal et al. (2005), personal development on the job (including various skills and professional enhancements) explains the largest part of variability in job-satisfaction when compared to other types of motivational drivers.

Professional challenge

Professional challenge could be understood as a tendency to develop one owns abilities, however in the course of specific, goal-oriented actions. Žiaran et al. (2016) showed that professional challenge is related with professional personality traits as ambitions, competitiveness, result orientation and inventiveness. As regards the professional challenge, it is relied with the readiness to take the risk. Research shows that this tendency might be biologically determined. Alarcón et al. (2007) found that risky task associated with money gains are more attractive for males and generate a more robust reaction in brain activity.

Opportunity of personal development

Elizur (1994) found, Hungarian women attributed a distinctly higher importance to the personal growth as compared to men, whereas in the Dutch sample personal growth was slightly more appreciated by the males. Interestingly, Hungarian group on average ranked the personal growth much higher when compared to the Dutch participants. Similarly, at the level of the whole sample average, Arnanie-Kepuladze (2010) found the opportunity for advancement more accentuated by females than by males, however in some sectors males had a somewhat more pronounced preference. In the study made by Lorincová et al. (2019) females ranked personal growth higher than males, however the difference in total value of ranking was minuscule and there was not a statistically significant difference in the preference of self-actualization among genders.

We formulate hypothesis as follows:

Hypothesis 2a: Males rank the professional challenge significantly higher than females

Hypothesis 2b: Females rank the opportunity of personal development significantly higher than males

Social relations and support and working environment

Social support at work

Good social relations and social support is undoubtedly an important aspect of well-being at work. Social support (from both, supervisor and co-workers) helps to mitigate the adverse effects of job stress and to increase the level of work performance (Sargent, Terry 2000). Social support also augments intrinsic working motivation (Van Yperen 2003).

Research shows that women perceive a higher working motivation in the frame of supportive environment (Buelens, Van den Broeck 2007). According to Lorincová et al. (2019), atmosphere at the workplace is more important for females as well as a good work team and communication at workplace. In the cross-cultural research by Elizur (1994) both, Hungarian and Dutch females ranked the importance of good relations with co-workers dramatically higher, when compared to males.

Quality of working environment (physical)

Workspace and its physical arrangement might affect employees' job performance and satisfaction (Vischer 2007). Knight and Haslam (2010) showed that nicely decorated offices with plants and pieces of arts improve productivity and well-being. When employees can contribute themselves to the decoration, the positive effects on work motivation is accentuated. Research showed that the quality of the work environment is more important for women (Lorincová et al. 2019, Elizur 1994).

We formulate hypothesis as follows:

Hypothesis 3a: Females rank the social support at work significantly higher than males

Hypothesis 3b: Females rank the quality of working environment significantly higher than males

Competitive vs. cooperative settings at work

Gender differences in the preference of the competitive setting by males and cooperative one by females manifest already in the early stage of human development and are observable since the age of three (Knight, Chao 1989, Sutter, Rützler 2010). In the series of behavioural experiments, Vugt et al. (2007) showed that males' tendency to contribute to a group was much higher when the group was competing with another one. Niederle and Vesterlund (2007), in an experimental environment, found that males-to-females proportion of preference of the competitive to cooperative settings was 73 % to 35 %. Research showed that women perform better in the cooperative settings as when compared to the competitive one, should it be in cognitive tasks (Gneezy, Niederle, Rustichini 2003) or in learning assignments (Rodger, Murray, Cummings 2007).

Hypothesis 4a: Males rank the competitive settings at work significantly higher than females

Hypothesis 4b: Females rank the cooperative settings at work significantly higher than males

Other factors than gender

Differences in gender values might be also related to the specific cultural environments in the respective countries. Research by Hofstede (2001) brought the notion of the cultural predetermination of values in the organizations around the globes. Yamauchi et al. (1994) carried out cross-cultural studies of gender differences in the European and oriental culture with the regard to seven work motivations and attitudes (work ethic, mastery, competitiveness, savings, achievement motivation, valuation for money, and achievement via conformity). The findings support the thesis that motivational drivers might correspond to cultural differences.

Rowe and Snizek (1995) in their extensive studies across the spectrum of occupational classifications suggest that type of work, education or age is a stronger predictor of work values than gender. Both genders rank the work values as feeling of accomplishment, high income, opportunity for advancement in the same order of preference. As one of explanation is the fact, that social roles for both genders are assimilating. Furnham et al. (2005) in his study on motivational and personality traits, on British and Greek employees, found that the only significant difference on matter of gender was that women ranked higher the autonomy, while other factors were not gender related.

Hauret and Williams (2017) analysed data for several European countries (European Social Survey) and came to conclusion that gender-related job satisfaction and work values are more related to the job specific characteristics. Kaufman and Feters (1980) enacted a study on a group of professional accountants working for the top international accounting firms. No significant differences were found between men and woman on any of the motivational variables. This might be due to the specific and highly determined nature of the job requirements, personality requirement, combined with the organizational environment and culture. In other words, it might be due to the fact that these companies systematically select personnel with strictly pre-defined motivational drivers, specific cognitive abilities and personality traits, all based on a specific competence model. Hence, the lack of gender differences in this type of organization could be regarded as a systemic exception.

3. Methodology***Sample and procedure***

The sample is based on the adult, economically active population of the Czech Republic, having working experiences in the field of e-commerce and e-business, N = 429 (176 females, 41 %). Age range for males was 20 to 41 years (mean 35.3), for females 21 to 38 years (mean 29.3). The data were collected via online questionnaires (convenient sampling).

Measurements and variables

In the research, we use the motivational factors described in table 1. The questionnaires are based on the methodology of the company Cut-e (Cut-e GmbH, 2008). In the questionnaire, the structure of motivation is measured as a verbalized cognitive view or attitude towards the relevant aspect of work or professional context. The variables are constructed to assess the motivational factors, values and interests that are crucial to a person's suitability to work in a particular company, department or team, in terms of corporate culture. The questionnaire gathers motivational factors into three groups: rewards, development, relations and environment. We also included preference of competitive and cooperative organizational settings, as these might be the main determinants of organisational environment.

Table 1 Verbal description of variables used

Reward Financial reward - Prefers a performance-oriented or adequate pay; considers it important that extra work is rewarded financially; is motivated by financial incentives. Recognition of performance - Would like to receive personal recognition for special achievements; considers it important that successful actions are acknowledged and also accordingly appreciated.
Development Professional challenge - Prefers jobs which challenge individual abilities; would like to be able to utilize special knowledge or skills; prefers a working environment which requires constant learning and initiative for thinking things through. Development opportunities - Considers it important that personal and career development is given enough latitude and would like to have enough opportunities to improve their professional skills.
Relations and environment Social support - Considers important the atmosphere of mutual support and trust, harmonic and supportive relations at the workplace. Working environment - Prefers well-arranged rooms and workstations; appreciates workplaces which are pleasant and functional.
Competitive vs cooperative setting Motivation by competition - Is motivated by the presence of competitive environment, based on the social comparison of the working results and success. Motivation by cooperation - Prefers a climate of cooperativeness; appreciates the willing support from others when this becomes necessary; would prefer that individuals put their own personal interests aside for the benefit of others

Source: based on Cut-e Czech s. r. o (2015)

The test results (ranging from 1 to 9) can be interpreted on the stanine nine-point scale, 1-3: below average, 4-6: average, 7-9: above average. Motivational questionnaires are an effective and valid selection method in HR because the structure of motivations and interests clearly and distinctly separate individuals to a large extent on a timely consistent basis. Table 2 provides an overview of the variables' basic values. Table 2 provides an overview of the variables (all values range from 1 to 9).

Table 2 Overview of the variables and their values

	Mean	Median	Std Dev.
Professional challenge	3.41	3	1.80
Motivated by the competition	4.13	4	2.03
Development opportunities	4.68	5	2.00
Recognition of performance	5.05	5	1.90
Motivated by cooperation	5.29	5	1.89
Need of support	5.36	5	1.79
Financial reward	5.42	5	1.84
Working environment	6.23	6	1.75

Source: own elaboration

Data analysis

We use the non-parametric Mann-Whitney U test to identify the gender differences in the preference of motivational drivers, testing the hypothesis H1a – H4b (chapter 4.1). Subsequently, we employ the correlations analysis (Spearman) to understand relations among the motivational drivers which appears to be gender neutral (chapter 4.2) and other drivers. Finally, by means of the Chi-quadrat and Fi-coefficient, we verify differences between the gender preferences of competitive and cooperative work settings (chapter 4.3).

4. Results

Gender differences in the motivational drivers

This chapter brings the key results. We employed the Mann-Whitney U test (number of valid observations is 176 for females and 503 for males) to analyse the gender-based differences in the preference of motivational drivers (table 3).

Adjusted Z-score could be interpreted as the intensity of preference of the respective motivational drivers. Negative Z-score value indicate higher preference of males and, vice-versa, for females. P-value higher than 0.05 suggests there are no significant gender differences for the given motivational driver.

Motivational drivers are sorted according to the Z- score, what allows to discern intensity of gender differences. In the very right column (table 3), the denotations of hypothesis are attributed accordingly.

Table 3 Motivation - gender differences (Mann-Whitney U test), sorted by the value of Z (adjusted)				
	U	Z (adjusted)	p values	Hypothesis
Males - higher preference of motivational factors				
Motivated by the competition	15925	-5.08	0.00	H4a
Professional challenge	19429	-2.28	0.02	H2b
Development opportunities	19486	-2.23	0.03	H2a
No significant difference between men and women				
Financial reward	21377	-0.71	0.48	H1a
Recognition of performance	22120	-0.12	0.91	H1b
Females - higher preference of motivational factors				
Social support	19921	1.89	0.05	H3a
Working environment	17937	3.49	0.00	H3b
Motivated by cooperation	16703	4.47	0.00	H4b

Source: own elaboration

According to the results of the Man-Whitney U test we can confirm the following alternative hypotheses (p-value < 0.05): H2a (Males rank the professional challenge significantly higher than females), H3a (Females rank the social support at work significantly higher than males), H3b (Females rank the quality of working environment significantly higher than males), H4a (Males rank the competitive settings at work significantly higher than females), H4b (Females rank the cooperative settings at work significantly higher than males).

Hypothesis H2b (Females rank the opportunity of personal development significantly higher than males) was not confirmed, as our results show the opposite; since it was males who manifested statistically significant higher preference for this motivational driver (Z-adjusted is negative, p-value < 0.05).

Hypotheses H1a (Males rank the financial reward significantly higher than females) and H1b (Males rank the recognition of performance significantly higher than females) were not confirmed (p-value > 0.05); we accept the null hypothesis, what suggests there is not a statistically significant difference between genders.

For better clarity, we summarize the results also according to the research questions (RQ1 - RQ3) as follows. Motivational drivers can be divided into three groups:

- Motivational drivers with significantly higher preference by males (RQ1): motivation by competition, professional challenge and development opportunities.
- Motivational drivers with significantly higher preference by females (RQ2): social support, working environment (physical), motivation by cooperative organizational settings.
- Motivational drivers with no significant differences between genders, gender-neutral (RQ3): financial reward and recognition of performance.

It is interesting to note that the highest difference between males and females is in the motivation by competitive versus cooperative environment (table 3: Z-scores, -5.46 vs. 4.88).

Nature of the gender-neutral motivational drivers (financial reward and recognition of performance)

In this section we analyse the relations of gender-neutral motivational factors (financial reward and recognition of performance) with other motivational drivers; aiming to reveal the underlying psychological processes which shape the motivation at work. We employ the correlation analysis, using the non-parametric Spearman coefficients (tables 4 and 5).

Financial reward

As regards financial reward (table 4), there are two positive statistically significant relations, same for both genders: relations with the recognition for work performance ($r = 0.28$ for males, $r = 0.31$ for females, $p < 0.05$) and personal development ($r = 0.23$ for males, $r = 0.24$ for females, $p < 0.05$). And there is negative correlation with the motivation by cooperation for both genders ($r = 0.14$ for males, $r = 0.22$ for females, $p < 0.05$).

Table 4 Correlations financial reward vs. other motivational drivers, separately for both genders

	Financial reward		
	Males	Females	
Recognition of performance	0.28*	0.31*	Recognition of performance
Pers. development	0.23*	0.24*	Pers. development
Working environment	0.08	0.08	Working environment
Motivation by competition	0.06	0.04	Motivation by competition
Social support	-0.02	-0.05	Social support
Professional challenge	-0.07	-0.11	Professional challenge
Motivation by cooperation	-0.14*	-0.22*	Motivation by cooperation

*Note: Motivational drivers are sorted by the correlation coefficient (Correlations, Spearman coefficients), * $p < 0.05$*

Source: own elaboration

Recognition for work performance

When it comes to the recognition for work performance, two motivational drivers correlate positively in the same way for both genders: above mentioned financial reward and personal development ($r = 0.18$ for males, $r = 0.25$ for females, $p < 0.05$). The gender differences manifest for females in the form of a working environment preference (not significant for males, $r = 0.24$ for females, $p < 0.05$); and for males in two aspects: positive preference of the competition and negative preference of cooperation ($r = 0.9$, $r = -0.13$, $p < 0.05$).

Table 5 Correlations recognition of performance vs. other motivational drivers, separately for both genders

	Recognition for work performance		
	Males	Females	
Financial reward	0.28*	0.31*	Financial reward
Pers. development	0.18*	0.25*	Pers. development
Motivation by competition	0.13*	0.24*	Working environment
Working environment	0.09	0.11	Motivation by competition
Social support	0.02	0.08	Social support
Professional challenge	-0.05	0.03	Professional challenge
Motivation by cooperation	-0.13*	-0.10	Motivation by cooperation

*Note: Motivational drivers are sorted by the correlation coefficient (Correlations, Spearman coefficients), *p < 0.05*

Source: own elaboration

Distribution of genders in the matrix cooperative vs. competitive settings

In this section we compare the distribution of genders in the matrix of four quadrants, based on the competitive vs. cooperative motivation. Both scales are divided by median to the high and the low sections (table 6).

Table 6 Distribution of genders into the matrix of four quadrants: cooperative vs. competitive motivation (high, low), by median

		Motivation by cooperation	
		Low	High
Motivation by competition	High	2 Males: 35 % Females: 16 %	4 Males: 15 % Females: 11 %
		1	3
	Low	Males: 26 % Females: 27 %	Males: 24 % Females: 45 %

Source: own elaboration

Quadrant no. 2 “high competition and low cooperation” clearly attracts higher proportion of males (males: 35 %, females: 16 %), whereas the quadrant no. 3 shows higher proportion of females (males: 24 %, females: 45 %). Difference in gender distribution between the two quadrants “high competition and low cooperation” vs “high cooperation and low competition” is statistically significant (Chi-square = 31,536, df = 2, p < 0.001), and the gender distribution between the two quadrants, expressed by Fí coefficient = 0.277, shows medium size effect. Interestingly, quadrant no. 4 “high cooperation and high competition” and quadrant no. 1 “low cooperation and low competition” do not manifest significant differences in gender distribution.

Discussion

Gender-neutral motivational drivers

Results of the Mann-Whitney U test showed that financial reward and recognition do not generate statistically significant difference in preference by genders (table 3). Hence, here, we confirmed the thesis of gender neutrality in line with Gunkel et al. (2007) and Arnania-Kepuladze (2010). The fact, that men and women have equal motivational preferences of the financial reward and recognition of work represent a strong argument supporting the initiative of the European Commission within the framework of gender equality and equal pay (European Commission 2018).

Interestingly, for both genders financial reward relates with all other motivational aspect in the same way and similar intensity, as measured by the correlation coefficients (table 4). Financial reward for both genders relates positively with recognition for work and personal development and negatively with motivation by cooperation.

We observe that the motivational aspects related to the financial reward do not constitute gender differences, what justifies the thesis of the equal pay, not only as a matter of ethical principles but as well as from the psychological point of view.

On the other the recognition for working performance generates gender differences. For males, recognition for work associates positively with motivation by competition and negatively with motivation by cooperation. For females, recognition relates with working environment (besides financial motivation and personal development). These findings might be interpreted as a different psychological perception of the recognition by both genders.

Gender based differences in motivation drivers

Opportunities for personal development (table 3) are slightly more important for males, what does not correspond to the findings of other authors (Elizur 1994, Arnanie-Kepuladze 2010, Lorincová et al. 2019). The absolute level of differences in preference in all the researches is minimal, we assume that the specific preference in this case might be more affected by the specific job type, education or age (Rowe, Snizek 1995, Hauret, Williams 2017). On the other hand, professional challenge is significantly more pronounced by males, what might be perceived as a support to the male-warrior hypothesis (McDonald, Navarrete, Van Vugt 2012).

As regards the quality of interpersonal relations and social support, a wide consensus prevails in literature, notably that women attribute consistently higher importance to this field (Elizur 1994, Buelens and Van den Broeck 2007, Lorincová et al. 2019), what is in line in our findings. This tendency is even more accentuated when it comes to the importance of the quality of the physical working environment, our results correspond to other authors (Lorincová et al. 2019, Elizur 1994).

Gender differences in the preference of cooperative and competitive behaviour

According to our research, the most important difference between genders, consists in the preference of cooperative vs. competitive behaviour. Our findings (table 3) showed that men are clearly much more propelled by the competitive settings; while women tend to be more motivated when cooperative aspects are involved, what corresponds to the literature which is again very consistent on this matter (Vugt, Cremer, Janssen 2007, Niederle, Vesterlund 2007, Sutter, Rützler 2010).

We also tested the preference of the work settings, defined by the matrix of four quadrants high, low competition vs. cooperation (table 6); where a distinct majority of males prefer quadrant with “high competition and low cooperation”; and females, vis-versa, manifest clear preference of the setting with “high cooperation and low competition”, what corresponds to the findings of Niederle and Vesterlund (2007).

Conclusion

In this paper, the main objective was to understand the gender differences in preference of motivational drivers and the nature of the gender-neutral motivational drivers. Special interest was devoted to the motivation by the competitive and cooperative organizational setting.

Our findings are as follows. Motivational drivers, significantly more preferred by males were: motivation by competition, professional challenge and development opportunities (however, here, the gender-based difference in preference was miniscule). Motivational drivers significantly highly ranked by females were: social support, physical working environment, motivation by cooperative organizational settings. Preference of financial reward and recognition of performance showed no gender differences.

The most pronounced inter-gender difference was in the preference of cooperative vs. competitive settings. That’s why we extended the analysis to the matrix of four quadrants (cooperative vs. competitive, high, low). Difference

in gender distribution was statistically significant; males are more attracted by the “high competition and low cooperation” and females vice-versa. Interestingly, quadrants “high cooperation and high competition” and “low cooperation and low competition” showed no significant difference in gender preference.

Further, we were interested in the underlying aspect of gender-neutral motivational factors (financial reward, recognition). Interestingly, both drivers were positively related with personal development for both genders. However, analysis showed, that recognition for work associates positively with competition and negatively with cooperation for males; and not for males. So, we assume the psychological processes underlying the motivational process in both genders might differ, even if both genders rank the importance of the recognition for work similarly.

On the other hand, we did not find gender differences as concerns financial reward what accentuates the need of equal pay and equal treatment for both genders.

We can conclude followingly. The literature on the gender preference of the motivational drivers is not consistent. When it comes to importance of motivational drivers at workplace, the difference might be caused by the job-type, age, education, socio-demographic background and certainly by the cultural country-specific environment, etc. However, the general findings support the thesis that gender does constitute a predictor of preference of motivational drivers at workplace; this might hold even for the drivers where there is no apparent significant difference in the preference by gender.

The most important implication, though, is surely the argument supporting the imperative of equal pay and equal gender treatment in the frame of rewards, as proposed by the current European Union policies in the matter.

The above-mentioned findings might have important implications for HR management, especially in the field of e-commerce and e-business employees, aiming to create a gender-efficient motivational system and establish effective talent management. Similarly, the confirmation of the significant gender difference concerning the preference of competitive and cooperative behaviour should be reflected in the organizational and leadership decisions for the sake of building the organizational efficiency.

In further research it would be worthy to scrutinize a wider spectrum of motivational drivers, as well as their mutual interconnection, with the aim to understand the complexity of mental processes underlying the work motivation. Another promising research approach should be based on the analysis of relationship between motivational drivers and personality traits, what might bring more interesting insights into the psychological processes shaping the motivation of individuals. Besides the focus on the employees in the field of e-commerce and e-business, it would be interesting to widen the research focus on other specific business environments.

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LOCATION FACTORS OF E-COMMERCE DISTRIBUTION CENTERS IN ZACHODNIOPOMORSKIE VOIVODESHIP BASED ON THE EXAMPLE OF A SELECTED COMPANY

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Abstract. The issue of enterprise location is one of the fundamental economic question. The problem is frequently undertaken in economists' research, especially in the context of industry and agriculture location, but there still remain numerous queries related to motives underlying location selection by entities operating in other sectors. Whereas factors underlying location of industry have been analyzed thoroughly and discussed in the literature, there still remains a lot to explore regarding factors underlying location of services. The purpose of the study was to identify factors which influenced adoption of location decision as well as comparison between Polish voivodeships in terms of elements playing a role in the decision making process related to location of an e-commerce distribution center. The analysis was based on the literature review. Moreover, the studies involved the in-depth interview technique and direct questionnaire interview. The research covered an enterprise with a foreign capital shareholding, whose business is connected with online sales. In the survey, representatives of the company's management performed a quantitative evaluation of the location factors in three Western Poland voivodeships which were taken into consideration as the location for the distribution center. Finally, the investment was located in Zachodniopomorskie voivodeship, and the analysis performed allowed identification of the factors which influenced the location decision adopted. Results of the analysis suggest that availability of workforce, technical infrastructure and cooperation with local administration representatives were of highest importance from the point of view of e-commerce center location.

Keywords: location; location factors; theory of location; distribution center; regional economy; foreign investment

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1. Introduction

In the era of globalization and technological development, sources of competitive advantages are being increasingly sought in enterprise location. Location is also an important element of the development policy; consequently, one may claim that business location is one of the most important decisions related to operation of any organization and the problem of business activity location is one of the fundamental economic issues.

The location decision is an outcome of the respective entrepreneur's location requirements and the possibility to satisfy them at the given place. Not only do characteristics of potential locations depend on geography of the place, but also on social and economic conditions prevailing in the respective area.

The location theories may be analyzed in a cognitive and normative perspective. The first approach focuses on identification of variables identifying the location, in search for an explanation of criteria followed by particular enterprises in their choices. In the normative aspect, rules of proceeding in connection with business activity location are sought (Smith 1966). Both approaches have been applied in the paper.

Actions aimed at identifying the optimum place for enterprise location may be performed at any stage of the enterprise development cycle. Location analysis is essential upon commencement of business activity, when enterprise location will contribute to successful launch, but also further development. The same applies if continuation of a specific type of business activity in the respective area ceases to be profitable and identification of a new location becomes necessary (Fierla et al. 2001, p.65).

Business entities strive to find a place which, thanks to its utility advantages, will let them satisfy their needs connected with business activity pursued. Each and every kind of business requires a different set of factors, while an entrepreneur's requirements result in different perception of the value of particular characteristics. That allows concluding that the notion of location factors may be defined as location related requirements and advantages (Budner 2004, p.27).

Nowadays, location related issues are perceived in a broader perspective; location selection involves consideration of new elements, including technological progress or population income growth. Varying rules of the economic play make investors' business location decisions dependent on a great variety of factors. New terms of companies' activity in the global economy, such as liberalization of international capital flows or new technologies have contributed to development of international enterprises in the form of corporations with different legal and organizational statuses, aimed at achieving the highest possible economic efficiency in the global scale (Tobolska 2011). In a globalized economy, location, understood as geographical location, no longer play a significant role in communication and conducting business (Nowicki 2015, Borck 2007). The decisions related to selection and acquisition of location specifications could have great effect on the ability of profiting and preserving competitive advantage play a significant role in communication and conducting business (Choo et al. 2003).

The purpose of this paper is to present location factors in the light of literature on the subject, as well as identification of the essence and importance of location factors underlying direct foreign investment (DFI), based on an example of a specific e-commerce distribution center in Zachodniopomorskie voivodeship. This paper reviews the literature about factors that drive decision-making on enterprises location. A literature review can add value to the academic discussion in several ways: it can identify gaps in the literature, reflect on dominant theories, or outline knowledge available for location factors. We compare classical theories and main approaches to location factors. The main research question for the literature review is: which factors determine foreign companies' decisions on a location?

Next to rich literature on the subject, the source base were the results of direct survey questionnaires and in-depth interviews performed at an enterprise which decided to choose Zachodniopomorskie voivodeship as the location of its business activity. In addition to the survey questionnaire, which was of a pilot nature, the study used other research tools, such as critical review of literature on the subject, as well as the induction and deduction method.

The paper consists of several sections: the second section describes main classical location theories. In Section 3 we present theoretical background of location factors. Sections 4 and 5 refer to the research methodology and research findings. Finally, the last section provides the results of the empirical study.

2. Fundamental classic enterprise localization theories

For many years now, the problem of enterprise location has been one of the fundamental economic issues. Most of the theories are developed explicitly from a microeconomic perspective: individual firms or establishments seek to reach an optimum, usually defined as a profit-maximizing or cost-minimizing function (Dube et al. 2016). Discussion on the location theory has continued in the economic debate since the 18th century. Its foundations were laid by Smith and Ricardo – creators of the classical economic theory. Precise definition of the location theory may only be referred to since the times of von Tünen, who in 1826 presented a model of spatial agricultural production organization (Capello 2014). Basing on the theory of land rent, von Tünen pointed to the relation between reduction of the rent and growth of an agricultural farm's distance from the sales market and related transport costs. The theory of circles states that more efficient production directions are located near large city sales markets. According to von Tünen, in conditions prevailing in the first half of the 19th century horticulture and dairy farming, followed by silviculture, crop and livestock farming developed closest to the sales market, namely the city (Brdulak et al. 2014). The theory was based on a number of simplifying assumptions, which led to the conclusion that the heaviest and least durable agricultural products ought to be produced closest to the market, while the graphical model was reduced to a system of zones (circles) of agricultural business types around a centrally located market (Rokicki et al. 2018). The system of agricultural business around a central city which is expected to constitute a consumption center still constitutes a stimulating starting point for research in this field. Guided by von Tünen's agriculture location theory, Weber built his theory of the location of manufacturing industry, first published in 1909 – *Theory of the location of industries*. The theory had great influence onto all subsequent studies Predohl (1928). Weber continued the studies of Launhardt, who had already dealt with the problem of optimum location of an industrial enterprise earlier. The author based his analysis on the assumption that consideration concerns location of a single enterprise, which manufactures a single product in a specific quantity, location of the places of consumptions and sources of raw materials is known, costs of transport are proportionate to the weight of goods and distance, technical coefficients remain fixed, optimum location is based on an aspiration to achieve minimum costs of transport (Rokicki 2018, pp.14-22). As a result of the assumptions made, the author identified three factors influencing location of industrial plants, i.e. transport factor, labor factor and agglomeration factor, where optimum location is established as the lowest sum of multiplication products of weight and transport distances of all raw materials and semi-finished products to the plant and of finished goods to the point of sale; therefore, the point in space which ensures the most beneficial location is a point with minimal transport costs (Budner 2004, p.57). Weber calculates the transport cost based on the weight to be transported and the distance to be covered. All other factors connected with transport costs are recalculated into weight and distance with the use of additions or deductions from actual weights and distances. This is why location of the manufacturing process would be determined by the lowest number of ton-kilometers (Zarębski 2012). Weber observed that the ratio of product weight to the weight of all raw materials used was different in various industries. On this basis, he identified three possible situations influencing location (Budner 2004, p.58):

1. Raw material orientation – from the economic perspective, it is justified to locate a plant at or nearby the raw material source in order to minimize raw material transport costs;
2. Market orientation – due to economic aspects, it is justified to locate a plant nearby the sale market, with a view to minimize the transport costs of finished goods which are characterized with higher weight than raw materials;
3. Neutral orientation – from the economic perspective, locating a plant nearby the raw material source or sale market is neutral, as distances to those places have minimal influence onto the amount of transport costs.

Just as Weber explains the point of the lowest transport cost with the use of weight and distance, he correspondingly uses weight and distance to explain the influence exerted by a favorable workplace onto the manufacturing process. On the one hand, he confirms that the attraction of a favorable work center depends on the relation of labor cost in the manufacturing industry to product weight: he calls this the “labor cost index”. On the other hand, he claims that the manufacturing industry’s ability to change the location depends on the weight to be transported throughout the manufacturing process. This he calls the “location weight”. Moreover, he states that whether or not the industry is actually relocated depends on both these factors jointly (Zarębski 2012).

Another factor which makes company location more remote from the point of minimal transport costs are agglomeration benefits, which originate from concentration of manufacturers and consumers in a respective area. The benefits may compensate for increased labor and transport costs at the respective location (Budner 2004, p.60].

Another economist dealing with the enterprise location theory was Lösch. He based on a hypothesis on spatial variability of sale prices and adopted maximization of profit as the optimum location criterion (Brdulak et al. 2014). The place which meets this criterion is a point ensuring maximum sales at minimum manufacturing costs (Szymańska et al. 2014). According to Lösch, an enterprise will locate itself as close as possible to a sufficiently receptive sale market (Brdulak et al. 2014). Lösch introduced the demand factor into his location considerations, basing the market analysis on the classical demand curve identifying the relation between the price and demand, as well as a new dimension – distance (Budner 2004, p.61). This approach took into account at the same time distribution costs, market area and demand volume, claiming that locations of different kinds of business activity would not be distributed evenly. Economic benefits of specialization and mass production cause concentration of companies within a region. The number of enterprises within a region is limited and, consequently, they will disperse to a certain extent with transport costs playing an important role in this phenomenon (Brdulak et al. 2014).

Based on the theory created by Lösch, studies of the subject area of location were pursued by the American researcher Isard, who defined the role of transport outlays, defining them as transport of a unit weight per unit distance (e.g. ton-kilometer). Transport efforts are a set of services needed to move production factors (Brdulak et al. 2014). In the manufacturing process, transport efforts are treated equally with other production factors (land, capital, labor, entrepreneurship). Moving goods from one point to another involves delivery of a certain quantity of transport effort. Change of the destination of two efforts, assuming unchanged sources, is considered by Isard as substitution of transport efforts of different goods. One may distinguish substitution between transport efforts and expenditures and revenue in production, substitution of different sources of the same goods and substitution of destinations where the goods are sent. Substitution of different production factors enables substitutions of areas as manufacturing locations. In this manner, Isard presents the overall balance model whose solution determines an optimal enterprise location as well as optimal combination of the quantity of efforts used to the results obtained (Budner 2004, p.65).

Several years ago a group of researchers realized that although there is a vast literature of papers and books in location theory, a common theory is still missing (Nickel et al. 2005).

The first regional development theories undertook an attempt to explain the location of manufacturing – both agricultural and industrial – in a spatial perspective. Transport costs and access to sale markets were assumed as the main factors of manufacturing location. Along with evolution of views onto spatial manufacturing planning, attention began to be paid not only to costs, but also to demand and potential profits of the enterprise. Also tax incentives have become an efficient tool to attract firms in some location, especially in depressed areas (Mayer et al. 2017). Development of new technologies of manufacturing, transport and information flow resulted in changed perception of manufacturing space (Zarębski 2012).

None of the classical location theories concerned enterprises conducting service activity. In the field of services location theories only few researchers have covered this topic (Jirásková 2013). Nonetheless, service industries have received more attention in the past decade of research but still not enough in proportionality to the real world (Brown 2011). One ought to emphasise, however, that any kind of manufacturing activity contains elements which may be characterized as service activity.

Services seem to be driven by different determinants compared with the manufacturing sector. The specific nature of services make location decisions to be primarily affected by market-seeking motives. By contrast, manufacturing is likely to be driven by efficiency-seeking motives as well, as manufactured goods are potentially exposed to international price competition. Hence, seeking for sectoral differences might be important for analyzing location factors at the aggregate level. (Riedl 2010).

3. Location factors - theoretical background

New trends in the location theory are based on the assumption that non-economic factors also play an important role in selecting the location. In fact, location decisions include a material element of uncertainty and risk which ought to be treated as a kind of costs borne by entrepreneurs (Godlewska 2001, p.41). The changes having been appeared in economy, described as a transition from Fordism to post-Fordism, from economies of scale to economies of quality, from mass and standard production to flexible production, from cost to quality competition, from a reliance on basic raw materials to knowledge as a key factor, required a new look at the location factors of economic activity (Olejniczak 2005). Locational attractiveness is the use value of a region as a place to locate a company, which consists of hard and soft factors. The total of these factors creates the value of the region as a place to locate a company. The totality of these factors creates a picture of the conditions in terms of business location decisions (Leśniewski 2012).

Each and every enterprise strives to find an optimal location for conducting its activity, allowing the best possible satisfaction of its business related needs. Advantages of the specific region are of significant importance in locating a given kind of business activity. One ought to bear in mind that other enterprises located in the area also influence the quality and kind of such advantages (Szymańska et al. 2014).

Enterprise location is determined by location factors, which act as location stimulators, because they attract and stimulate specific kinds of business in the respective area (Budner 2011, p.241). Location factors are the result of accumulation of theoretical concepts and findings of industry specific independent studies done over many years. These factors are classified in different ways in different literatures so as the numbers; definition and the importance of factors. Also these factors are interdependent and can be attained at divers degrees at different locations and so subjective judgments and attitudes of entrepreneurs become important factors in the location decision-making (Towhidur Rahman 2019, Cissé et al. 2020).

One may observe a variety of perspectives and definitions of location factors in the literature, both Polish and foreign. In Polish literature on the subject, an attempt to define a location factor was undertaken by Fierla and Kuciński (2001, p.65), who considered a location factor to constitute unique and specific characteristics of particular places, which directly influence the development of costs and prices of manufacturing processes conducted at such places. Godlewska (2001, p.54) defines a location factor as specific characteristics of particular places, which have direct influence onto development of investment outlays during construction of a company's facility and net profitability (sales and capital) of business activity pursued at such places. Pakulska (2005), in turn, defined location factors as specific characteristics of particular places, which impact development of costs and prices of current and future production conducted under a corporate business strategy.

An important aspect of the location analysis is division of location factors and assessment of their influence onto location decisions. One of the primary divisions applied is differentiation among hard factors (measurable, objectively identifiable), such as: transport costs, labor costs, taxes, and soft factors (subjective, difficult to measure), such as: attractiveness of the place of residence, security, favorable social attitudes (Tobolska 2011).

In the synthetic perspective, Budner (2004, pp.28-29) distinguishes the following location factors:

- environmental – resources of the geographical environment, namely the total of natural conditions in the given area, influencing business activity, e.g. mineral resources, waters, soil;
- economic – connected with the social and economic situation in the area, including economic stabilization, level of inflation and prices, labor costs, etc.;

- spatial – factors including the shape and size of the area, distance, accessibility and location towards other areas;
- social and cultural – factors related to awareness of the community residing in the area, its attitude and opinions on social and economic transformations, activity and level of entrepreneurship, aspirations, level of education and culture;
- political – factors determined by the character of the authorities and opinions represented by them, competences, manner of exercising power and political stability of the country;
- legal and administrative – factors closely connected with political factors and activities of the administration governing company establishment procedures, accounting rules, etc.;
- technical and technological – factors originating from scientific and technical progress which is demonstrated in technical and organization innovations.

Performed analyses of factors and modifications of classical location theories, which contained significant simplifications, revealed certain deficiencies. It was impossible to create a universal set of factors influencing the enterprise location decision. With time, factors which had not been taken into account before became included in the studies, which also got to consider completely new factors, emerging with technological development, frequently accompanying new forms of business activity (Szymańska et al. 2014).

In the contemporary perspective, location factors may include: quality of human and social capital, access to information, capital of knowledge and creativity, business services and advantages of the surroundings which – next to natural environment – include the social capital and local authorities' policy. Access to information becomes particularly important. The flow of information is inextricably linked with development of contemporary economy and information society (Szymańska et al. 2014). Traditional cost and demand factors have material influence onto location decisions, but other economic and non-economic factors may play an important part in certain circumstances. The assumption of profit maximization is too restrictive to analyze location decisions. Nowadays, most empirical studies refer to the theory that companies choosing the optimal location, are motivated by the criterion of maximizing the value of the profit stream, the value that is influenced by the characteristics of regions where business activity is located (Cieślak 2007).

In order to understand the process of business activity location, one should take into account some other preferences next to the aspiration to maximize profits only (Pilewicz et al. 2018). Mueller and Morgan (1962) emphasise that the scope of studies on the location factors should take into account not only the cost and market perspective, but also the non-financial perspective (e.g. quality of schools, personal preferences) as well as factors which influence costs and revenue indirectly, but cannot be easily expressed in terms of quantity (e.g. business contacts, business environment). Based on studies and analyses related to the location factors, Dziemianowicz stated that their evaluation depended above all on specific characteristics of the enterprise and of the persons adopting the location decision, while the location factors were not fixed and did not constitute a finite set. Growing importance of new factors may be observed over years (Dziemianowicz, 1997).

It should be emphasized that the activities of large and dynamic organizations today are increasingly linked to the international and global environment (Matejun et al. 2013). According to Wierzbicka (2015), there have been changes in the perception of enterprise location factors. The importance of "situation" has decreased, as there has appeared the "place" defined as a set of development conditions not connected directly with transport and labor costs, but with the local quality of life, level of education and efficiency of local elites. The place of quantitative location criteria has to a large extent been taken by qualitative criteria, among which one may refer to workforce qualifications, efficiency of administration or differentiation of the economic structure.

Similarly to the authors referred to above, Płaziak and Szymańska (2014) confirm in their studies that the decision making process related to business activity location involves a complexity of factors influencing the final decision. What is more, the weight of particular factors is different, depending on the kind of activity, enterprise size and stage of the decision making process.

4. Research methodology

Different approaches and multiplicity of location factors in the literature on the subject constituted a significant challenge in empirical study preparations. There could be numerous factors that might be taken into consideration while making the location decision, but only a few of them can constitute an actual difference. At the same time, it is impossible to recognize and evaluate all possible locations suitable for a firm according to chosen criteria. For this reason, the process of making the location decision is intended to be limited to the most important factors for the most likely locations while making sure all viable alternatives are considered (Vlachou et al. 2015).

Critical analysis of literature on the subject resulted in development of an original questionnaire used in the pilot study conducted to evaluate the location factors in Poland's three voivodeships – Zachodniopomorskie, Wielkopolskie and Dolnośląskie. The study concerned an enterprise with the share of foreign capital, which was considering selection of the above voivodeships to locate its e-commerce distribution center. The company's analyses and considerations resulted in selecting Zachodniopomorskie voivodeship as the location of the undertaking. In spite of a very limited sample, the intended research carried out, considering it as a start for further research activities.

The purpose of the study was to identify factors which influenced adoption of this decision, as well as comparison between the above voivodeships in terms of elements which play a role in the decision making process related to location of an online sales distribution center. Empirical analysis of the essence of location factors in decision making by entrepreneurs with respect to online sales distribution centers was performed by way of direct marketing study. Moreover, the studies involved the in-depth interview technique and direct questionnaire interview.

The interview questionnaire contained a list of location factors most often referred to in the literature. The substantive base was the company location attractiveness evaluation form, developed by Godlewska-Majkowska (2001, pp.160-165). For the study, the form was adapted – location factors were modified and factors which did not appear in the original version were added. Based on direct interviews with experts in the field of operation of online sales distribution centers, the authors extended the list of location factors with items which could materially impact the location decisions. Moreover, to ensure greater data legibility, certain location factors proposed by Godlewska-Majkowska were expressed in a more precise manner.

The study applied a five-step scale to evaluate importance of a specific factor in each of the voivodeships: “5” – very important, “1” – least important, while “0” meant that the respective factor was not considered at all in connection with investment location. What is more, the study anticipated the possibility to mention other location factors, which were important from the point of view of the company's representatives replying to the questionnaire questions. The approach followed to collect information on location factors enabled quantitative evaluation thereof as well as comparison in terms of occurrence of factors which may be essential to locating an e-commerce distribution center. Also, weight of evaluations obtained for all factors belonging to the same group as compared with the maximum possible evaluation in the group was determined. The weight was calculated as percentage share of the sum of evaluations obtained in the maximum possible sum of evaluations, i.e. “5” multiplied by the number of factors in the respective group.

The survey study involved grouping of the list of location factors. The questionnaire contained 102 factors included in 16 main groups. Members of management of the enterprise taking part in the study were asked to evaluate importance of particular location factors which influenced the decision to select the specific place within the business space as the target location of the distribution center.

The conducted survey allowed to identify the factors which played an important part in the process related to selection of the given location and those whose importance was negligible.

Interesting results of empirical research comparing to theoretical studies are worth publishing. Obtained results are not sufficient to make theoretical generalizations. They will be verified in further research studies.

5. Research results

Research results are being presented in Table 1 make reference to weights of location factors for selected voivodeships. Based on results of the survey, one may conclude that:

1. a significant share of the location factors listed was not taken into consideration by the company at the stage of making the decision on location of the e-commerce center. Factors which the enterprise considered insignificant (the respective factor/group of factors was not considered in connection with selecting the location in any of the voivodeships) include: sales market, natural environment, availability of materials and energy, technical infrastructure, local financial environment and costs of running the business;
2. the most significant part was played in selecting the location by the following factors: human factor, transport, local material capital, cooperation with local administration and local legal regulations;
3. among the groups of factors which were important in selecting the location, these factors were more important in Zachodniopomorskie voivodeship than in Wielkopolskie and Dolnośląskie voivodeships.

Table 1. Weights of location factors of selected voivodeships (in % of the sum of maximum evaluations of all factors in the respective group)

No.	Groups of location factors	Zachodniopomorskie	Wielkopolskie	Dolnośląskie
1.	Subjective factors	31%	14%	14%
2.	Sales market	0%	0%	0%
3.	Human factor	67%	44%	44%
4.	Natural environment	0%	0%	0%
5.	Availability of materials and energy	0%	0%	0%
6.	Transport	65%	48%	45%
7.	Other technical infrastructure elements	0%	0%	0%
8.	Local assets (material capital)	100%	40%	40%
12.	Science and education	27%	27%	27%
10.	Geographical factors	48%	40%	30%
11.	Cooperation with local administration	100%	0%	0%
12.	Local legal regulations	57%	34%	34%
13.	Local financial and economic environment	0%	0%	0%
14.	Services to residents	17%	17%	17%
15.	Special location factors and characteristics	15%	0%	0%
16.	Costs of running the business	0%	0%	0%

Source: own study based on questionnaire survey with representatives of management of foreign capital enterprise

The survey conducted suggests that factors contained in group 12. Local legal regulations, i.e. fiscal incentives, exemptions and reliefs in local charges, flexibility of legal regulations on employment of staff and factors related to transport: presence of an airport in the voivodeship, transport connections, flight connections, as well as access to schools and kindergartens played an important role in locating the e-commerce center. In all voivodeships, these factors were identified as very important.

A specification of evaluations assigned to particular factors is presented in table 2. The table only mentions those factors which were taken into account by the enterprise in evaluating the location, namely those which obtained evaluation greater than zero in at least one voivodeship. In terms of subjective factors, i.e. those connected with the investor's previous experience, Zachodniopomorskie voivodeship obtained a better evaluation as compared with the other voivodeships.

Survey results suggest that the human factor played an important role. The enterprise particularly emphasized easy access to unskilled labor, easy team selection and participation of the community in social life as factors significant to the location.

Factors connected with transport infrastructure make another group which was a very important location element. Zachodniopomorskie voivodeship obtained a very high evaluation in this respect. Land prices and access to unoccupied manufacturing/office facilities were other factors identified as very important for selecting the location, especially in Zachodniopomorskie voivodeship. High importance was also assigned to factors linked to geographical location of the voivodeships. The survey suggests that spatial situation towards the borders, network of national roads or sales markets played an important role in Zachodniopomorskie voivodeship, although the difference as compared with the other voivodeships was insignificant.

The analyzed entity evaluated importance of cooperation with local administration as very high, especially in Zachodniopomorskie voivodeship, as well as local legal regulations. One ought to emphasise that, as a result of in-depth interview with the management, assessment of this group of factors was a problematic issue due to lack of experience in the other voivodeships; consequently, these factors were evaluated as “0” in the questionnaire. The other factors which the Company identified as important in the decision making process included access to kindergartens and schools, and good image of the voivodeship.

Table 2. Evaluation of location factors in Zachodniopomorskie, Wielkopolskie and Dolnośląskie voivodeships

Location factor	Zachodniopomorskie	Wielkopolskie	Dolnośląskie
Subjective factors			
Reputation of the place or region	1	1	1
Sense of security	1	1	1
Experiences of other business entities	3	1	1
Previous experience of the investor	3	1	1
Attitude of the community towards the investor	3	1	1
Human factor			
Labor costs	5	3	3
Work efficiency	3	3	3
Access to specialists	4	4	4
Availability of management staff	4	4	4
Access to unskilled labor	5	3	3
Easiness of staff recruitment	5	2	2
Participation of the community in public life (participation in social consultations, social campaigns, membership in social organizations, etc.)	5	1	1
Demographic structure	5	3	3
Mindset of the community	1	1	1
Transport			
Presence of an airport in the voivodeship	5	5	5
Presence of a seaport in the voivodeship	5	1	1
Presence of a railway station in the voivodeship	5	5	5
Presence of an inland port in the voivodeship	5	1	1
Transport connections – roads	5	4	3
Transport connections – railroads	1	1	1
Transport connections – flight connections	5	5	5

Convenient public transport system (in terms of accessibility and frequency of bus and railway connections)	3	3	3
Transport costs	5	4	3
Local assets (material capital)			
Unoccupied manufacturing facilities (supply, price, technical condition)	5	2	2
Unoccupied office facilities (supply, price, technical condition)	5	2	2
Land – supply, price, condition and possibility of adaptation for investment purposes	5	2	2
Costs of rental, hiring or lease of properties	5	2	2
Science and education			
Presence of professional education centers for the required specializations	4	4	4
Geographical factors			
Distance from country borders	5	4	3
Situation within the network of national roads	4	4	3
Situation towards attractive sales markets	5	4	3
Proximity of cooperating entities	5	4	3
Cooperation with local administration			
Competences of officials	5	0	0
Authorities' working style – quality of service at the authorities' office	5	0	0
Authorities' working style – attitude of local authorities	5	0	0
Initiative and cooperation of local authorities	5	0	0
Local legal regulations			
Tax incentives, exemptions and reliefs from local charges	5	5	5
Time and costs connected with procedures related to adaptation of the building to suit business activity conducted	5	1	1
Time and costs connected with obtaining the building permit, connection of utilities	5	1	1
Flexibility of legal regulations related to employment of staff	5	5	5
Services to residents			
Access to schools, kindergartens	5	5	5
Special location factors and characteristics			
Good image of the region	3	0	0

Source: own study based on questionnaire survey with representatives of management of foreign capital enterprise

As emphasized above, many of the factors contained in the questionnaire were not identified by the company as factors important in the location decision process.

Table 3 presents a list of factors which were not taken into account in any of the voivodeships in connection with location of the e-commerce distribution center. These factors included purchasing power of the residents, raw material base, environmental restrictions, access to materials and semi-finished products, equipment with technical infrastructure elements, presence of universities or prices of community services.

Table 3. Factors evaluated as “0” in all voivodeships

Factors not important in all voivodeships
1. Subjective factors: <ul style="list-style-type: none"> - Place of origin of the investor or their relatives - Place of residence of the investor or their relatives
2. Sales market: <ul style="list-style-type: none"> - Purchasing power of residents (residents' income) <ul style="list-style-type: none"> - Consumption habits - Social structure of consumers (e.g. age, education) <ul style="list-style-type: none"> - Low competition from local companies - Possibility to establish beneficial cooperation with competitors <ul style="list-style-type: none"> - Presence of other leading companies of the sector <ul style="list-style-type: none"> - Good access to other markets
3. Human factor: <ul style="list-style-type: none"> - Health condition - Presence of trade union organizations
4. Natural environment: <ul style="list-style-type: none"> - Raw material base – access to raw materials, including prices of raw materials, quality of raw materials, proximity of suppliers) <ul style="list-style-type: none"> - Access to water (supply, price, quality) - Environment cleanliness, including air quality - Natural landscape advantages (esthetics) - Environmental restrictions applicable to investors <ul style="list-style-type: none"> - Liberal environmental requirements
5. Availability of materials and energy: <ul style="list-style-type: none"> - Access to materials and semi-finished products (supply, prices, quality) <ul style="list-style-type: none"> - Access to electricity (supply, price, supply reliability) - Access to gas supplies (supply, price, supply reliability) - Possibility to cooperate with suppliers of materials and energy <ul style="list-style-type: none"> - Availability of conventional sources of energy - Access to alternative sources of energy
6. Transport; <ul style="list-style-type: none"> - Transport connections – inland water connections <ul style="list-style-type: none"> - Availability of parking spaces - Technical condition of road surface and their throughput
7. Other technical infrastructure elements; <ul style="list-style-type: none"> - Equipment with particular elements of water supply and sewage network infrastructure (please specify the most important element or missing important infrastructure element) <ul style="list-style-type: none"> - Equipment with gas supply network (please specify the most important element or missing important infrastructure element) - Equipment with heat supply network (please specify the most important element or missing important infrastructure element) - Equipment with electricity supply network (please specify the most important element or missing important infrastructure element) <ul style="list-style-type: none"> - Access to water supply and sewage network infrastructure - Access to gas supply network infrastructure - Access to heat supply network infrastructure - Access to electricity supply network infrastructure
8. Science and education: <ul style="list-style-type: none"> - Presence of universities - Presence of research and development centers
9. Geographical factors: <ul style="list-style-type: none"> - Situation towards regional and local roads - Situation towards transport changeover points - Distance from scientific and research centers - Spatial structure of the settlement unit (spatial order, land management)

<p align="center">10. Local legal regulations:</p> <ul style="list-style-type: none"> - Other economic incentives (please specify) - Membership in organizations associating local authority units - Consistence of local legal regulations with national ones
<p align="center">11. Local financial and economic environment:</p> <ul style="list-style-type: none"> - Banks or branches thereof - Other financial institutions (please specify) - Economic and legal advisory (please specify) - Support from other business entities - Support from other institutions (industry unions, chambers of commerce, etc.)
<p align="center">12. Services to residents:</p> <ul style="list-style-type: none"> - Availability of flats - Availability of health services - Availability of cultural offer - Possibilities of leisure and relaxation - Availability of law enforcement and order services (police, fire services)
<p align="center">13. Special location factors and characteristics:</p> <ul style="list-style-type: none"> - Political factors - Social and economic activation of regions with poor economic development level - Availability of information on the region
<p align="center">14. Costs of running the business:</p> <ul style="list-style-type: none"> - Rates of taxes and local charges - Prices of municipal services (electricity, water, gas) - Prices of outsourced services (e.g. accounting) - Prices of advisory and consulting services

Source: own study based on questionnaire survey with representatives of management of foreign capital enterprise

Based on the location factors of industrial enterprises mentioned in the literature and grouped in a different way, the location factors that seemed most appropriate for the distribution activities of e-commerce centers were collected and grouped. The conducted empirical study allowed for the preliminary conclusions that may have scientific value. Thus:

1. The number of factors which are taken into consideration in location decision is limited.
2. Indicated key factors are:
 - availability of infrastructure, including transport,
 - availability of labor, despite the increasing mechanization/robotization of work,
 - the existing legal regulations (including their stability),
 - smooth cooperation with local administration.

All these factors are undoubtedly a prerequisite for the success of a service venture. We can agree that the assumption of profit maximization is too restrictive for the analysis of location decisions. Albeit properly selected factors indicated in this study can significantly contribute to the reduction of operating costs and, as a result, to higher efficiency (higher profits). Based on the results obtained, it can be concluded that the scope of research on location factors should include not only the cost and market dimension, but also the non-monetary dimension, which indirectly affects costs and revenues and cannot be easily quantified.

The conclusions of the study will be subject to verification in the course of further scientific research.

Conclusions

Results of the empirical study, obtained at the selected enterprise of the e-commerce industry prove that entrepreneurs who select a specific location for an e-commerce distribution center mainly consider factors connected with access to workforce, including in particular unskilled workers. This may be caused by the character of duties performed at the distribution center. A great majority of tasks are simple activities which do

not require special qualifications. Higher evaluation of this location factor in Zachodniopomorskie voivodeship as compared with the other voivodeships considered may result from easier access to workforce in this region than in Wielkopolskie and Dolnośląskie voivodeships. One ought to remember that, in terms of economic development, these voivodeships are among the country's leaders. They house a high number of enterprises with foreign capital shareholding. This results in more difficult access to unskilled workforce and higher labor costs.

Research suggests that another important location aspect for the e-commerce industry is transport accessibility of the region and its situation towards the border. Access to the sea in Zachodniopomorskie voivodeship was an important location factor. Presence of an airport and a seaport were other factors which were important to the company surveyed, as well as access to road transport infrastructure. For e-commerce, fast deliveries to customers are among the most important business aspects; consequently, the transport aspect is one of the key factors for locating a distribution center to handle the deliveries. The survey suggests that access to an airport is another factor important from the perspective of a company with foreign capital shareholding, which is connected with necessary visits of the company's representatives from abroad.

The research allows concluding that local legal regulations and cooperation with local administration are other factors which impact the decision on locating the investment in the respective region. From the enterprise's point of view, efficient cooperation with authorities and local offices in the area of local and administrative requirements related to initiating business activity may influence selection of the region for commencement of the investment.

Summing up, one may conclude that the analyzed enterprise selected Zachodniopomorskie voivodeship to locate its e-commerce distribution center because of access to workforce, transport aspects, including in particular access to a seaport and airport, as well as proximity of the western country border and previous experience of the investor in the region.

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OBSTACLES FACED BY OWNERS OF TOWNSHIP MICRO, SMALL AND MEDIUM ENTERPRISES TO ACQUIRE FUNDS FOR SURVIVAL AND GROWTH (2010-2020)

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Abstract. It is the belief of many governments that the development of micro, small and medium enterprises (MSMEs) will stimulate economic growth, create jobs and assist in the obliteration of poverty. However, the achievement of these envisaged benefits is dependent on healthy and growing MSMEs as well as the provision of funds to facilitate and stimulate growth. Despite various interventions by the SA government, many MSMEs have failed due to a lack of support from the financial institutions tasked with providing capital and funding to these enterprises. This article focuses on the obstacles that restrain business growth and identifies the challenges that owners of township MSMEs face and need to overcome to acquire funds from financial institutions and government support programmes. Exploratory research, conducted among 498 MSMEs located in South African townships, revealed that the obstacles, which are restraining growth relate to the economic climate, business environment, personnel and finances. The challenges to access funds can be grouped into three possible constructs: institutional requirements, administrative aspects and perceptions of financial institutions. Despite the many obstacles in the path to acquiring funds for their survival and growth, MSMEs have continued to operate on a small scale. However, the reality is that, without much needed funds and financial support, it will be difficult for MSMEs to grow and reach their full potential, which will hinder their ability to bear the envisaged fruits of economic growth and the obliteration of poverty.

Keywords: MSMEs; finance; obstacles restrain growth; financial institutions; acquiring funds; South Africa; challenges to access funds

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JEL Classifications: M10, M21, M31, M38

1. Introduction

The role and importance of micro, small and medium enterprises (MSMEs) is widely valued and acknowledged. In South Africa, it is a stated objective of the government to support and develop MSMEs, especially as these businesses are seen as a key element of the South African government's economic rejuvenation programme to stimulate economic growth, alleviate poverty and create jobs (Mpahlwa, 2008; Beck & Demirguc-Kunt, 2006). In order for government to achieve the aforesaid, a number of financial and non-financial support programmes have been developed and launched, with the specific aim of making capital more accessible to MSMEs. Typical institutions that are tasked to support MSMEs with funding include the GEP, SEFA, SEDA, DTI and Ntsika (Booyens, 2011). Institutions such as Ntsika, Khula and SEFA were specifically created to offer financial support to SMMes (Mago & Toro, 2013), as well as a number of other government support programmes, including the following: Small Enterprise Development Agency; Centre for Small Business Development (CSBD); National Empowerment Fund; Industrial Development Corporation (IDC); National Development Agency (NDA); Umsobomvu Youth Fund (UYF); Community and Development Association (CEDA); and South African Microfinance Apex Fund (Agwa-Ejon & Mbohwa, 2015; Rogerson, 2004; Botha, Smulders, Combrink & Meiring, 2020).

Even though these programmes are available, there seems to be a reluctance or a wariness to participate on the part of the MSMEs (NCR, 2011; Mago & Toro, 2013). This can, to some extent, be attributed to a lack of awareness on the part of the MSMEs with regard to the services provided by these programmes and support organisations (*FinScope*, 2010).

To compound this situation, research have indicated that, even though there may be some awareness of the programmes, there is a lack of understanding about how these programmes work (Mago & Toro, 2013). This was, in part, again attributed to a lack of proper communication to MSME owners regarding the qualification criteria for the programmes and a consequent rejection of applications, where such applications for funding were attempted. In some instances, it was also found that the applicants did not clearly understand what was required from them, how to complete the forms or in what format supporting documentation should be submitted. The lack of the needed infrastructure, for example, an inadequate number of support centres, the cost of services, lack of knowledgeable service providers, excessive red tape, poor government services and support, and poor business support to assist MSMEs in the application process were identified as challenges when acquiring funds (Agwa-Ejon & Mbohwa, 2015; Mago & Toro, 2013; NCR, 2011). The rejection rate for bank loans, according to the NCR (2011), is very high - as high as 75 to 80% of applications - with the primary reasons being lack of a properly construed business plan and cash flow projections, applicants having no collateral or unable to make a personal contribution, presentation of a poor business idea or lack of a formal business structure (Chimucheka & Rungani, 2011).

According to the various authors, the obstacles that MSME owners faced in acquiring funds, which has been highlighted in the preceding section, reflected the situation about a decade (pre-2010) ago. Various support programmes were developed and implemented to assist MSME owners in dealing with these obstacles. The key question however remains:

Over the past decade (2010–2020), to what extent has the government's focus on the development of MSMEs and the availability of support programmes assisted in eradicating the obstacles that have restrained growth as well as the challenges that township MSME owners had to face when acquiring funds from financial institutions?

The objectives of the research are to explore the obstacles that restrain the growth of township MSMEs and the challenges faced by MSME owners when acquiring funds from financial institutions and government support programmes.

This article sets out to explore the challenges faced by MSME owners when applying for funds from financial institutions and government support programmes. It commences with a literature study followed by a brief outline of the methodology used in this study, the empirical results, a discussion and, finally, the conclusion.

2. Literature study

The literature study, for a common understanding, will start by defining MSMEs, in a South African context, followed by a brief discussion of township economies and funding of MSMEs.

2.1. Micro, small and medium enterprises (MSMEs) defined

As the acronym for micro, small and medium enterprises (MSMEs) differs from country-to-country, so does the definition. In the absence of a universally acceptable definition, it is vital to define MSMEs by referring to the policies of the country. In South Africa, a MSME refers to a separate and distinct business entity, including any branches or subsidiaries that might exist, as well as cooperative enterprises, that is managed by one owner or more, operating in any sector or subsector of the economy (Department of Small Business Development, 2019). According to the revised schedule 1 of the national definition of small enterprise in South Africa, two criteria, namely number of employees and annual turnover, are used to define a MSME. Regardless of the industry, the number for employees for micro- enterprises is 1 to 10, for small-sized enterprises it is between 10 to 50, and for medium-sized enterprises the number is capped at 250 employees. The annual turnover differs between industries and varies between R5 million and R220 million (+/- \$0.33 and \$14,7 million; exchange rate 15:1) (Department of Small Business Development, 2019; De Wet, 2019).

MSMEs operate in the formal as well as informal sectors of the economy. Informal MSMEs operate in an unofficial and undocumented format due to the cost of doing business in the formal sector such as collateral requirements as well as the multiplicity of regulators and prudential regulations that do not support MSMEs (Ramakrishnan, 2018; BER, 2016, p.5; Imbadu, not dated, p.2). On the other hand, a formal MSME, is an officially recognised and documented entity that is highly regulated and taxed (Charman et al., 2017, p.36). Formal as well as informal businesses operate in diverse locations, from demarcated commercial areas to residential areas and street corners. Apart from the distinction between formal and informal businesses, MSMEs can be further classified into four categories, according to their development (Bvuma & Marnewick, 2020; Malefane, 2013, p.673):

- A survivalist enterprise: The income that survivalist enterprises receive is usually below the minimum income standard (Marnewick, 2014, p.2). Owners of these businesses are often those that cannot find paid employment and include, among others, street vendors and subsistence farmers (Njiro, Mazwai & Urban, 2010, p.8). Survivalist enterprises are strongly linked to the informal economy (Malefane, 2013, p.673) and usually form a large percentage of economic activity in developing countries (Ligthelm, 2013, p.59). A survivalist enterprise, per definition, is classified as micro.
- A micro-enterprise: These businesses are usually unregistered informal businesses and they generally generate a turnover lower than the registration threshold of R1 million (\$66 667; exchange rate 15:1) for value added tax (VAT) (Njiro et al., 2010, p.8). Examples include businesses such as minibus taxis, household

industries and spaza shops (a camouflaged or hidden shop in a township) (Marnewick, 2014, p.3), and they also usually have up to 10 employees (De Wet, 2019).

- A small enterprise: These businesses operate in the formal sector, with 10 to 50 employees (De Wet, 2019) and have more complex business practices in comparison to preceding categories. They are usually better established and tax registered (Njiro et al., 2010, p.8; Marnewick, 2014, p.3), with a maximum annual turnover that ranges between R17 million to R80 million (+/- \$1.13 million to \$5.33 million; exchange rate 15:1) (De Wet, 2019).
- A medium enterprise: These businesses employ a maximum of 250 people and operate in commercial areas (Malefane, 2013, p.673). These businesses have multiple management levels within their organisation (Njiro et al., 2010, p.8) and their turnover is between R6 million and R25 million (+/- \$2.33 million to \$14.66 million; exchange rate 15:1) (De Wet, 2019).

In the context of South Africa, the majority of MSMEs are seen to be informal, survivalist enterprises, regarded as having very little growth potential and the owners usually do not employ a lot of staff (BER, 2016, p.5).

2.2. Township economies

Defining a township is the first step in understanding the township economy. A township in South Africa is highly populated urban settlement usually on the outskirts of towns and/or cities, away from the centres of commercial and industrial activities. During South Africa's apartheid era, the townships were developed as dwellings for non-white workers, with no logical economic and infrastructure layout, and limited social services (CITIES, 2018a). The residents were barred from owning businesses (Marnewick, 2014, p.3). Even years after South Africa became a democracy (in 1994), the townships still suffer from neglect, isolation, overcrowding, lack of investment, poor infrastructure and unemployment (Wiid & Cant, 2021).

The term, "township economy", refers to business entities and markets based in a township. Township entrepreneurs manage and operate these entities, which are diverse in nature and mainly informal. The township economy is consumer-driven with the primary aim to provide products and services to meet the needs of the township's residents and beyond. These entities operate mainly in the economic sectors of manufacturing, transportation and services including business, personal and household services, agriculture as well as retail (Wiid & Cant, 2021; McGaffin et al., 2015; Infrastructure Dialogues, 2015; Gauteng Province Economic Development, 2014).

2.3. Access to funding

While the government is focused on the establishment and growth of MSMEs, Schaefer (2019) reported that in South Africa, on average, half (50%) of all start-up businesses cease to exist within the first two years (24 months) after the business was established.

Traditionally a small business is established to provide income for an individual, family or small group of employees. As a small business grows, it moves through four main growth phases, namely the start-up, growth, stable and exit phases (for external investors, in the case of big companies). In the start-up phase, the small business relies mainly on insider finance - monies sourced from the owner, family and friends. According to Noko (2019), 66% of MSMEs' funds come from self-funding in the form of personal savings and loans, 20% of the monies are investments from family and friends, while 12% of the monies come in the form of loans and investments from private entities.

In the growth phase, when trading is established, the business requires more external funding in the form of asset-backed finances such as bank debt and trade credit. In the stable phase, the business should be in a position to reimburse part or all of its debt. In the last phase, when external investors (in the case of a big company) exit, the business has direct access to public markets (Maroela Media, 2021).

In many Third World countries, more and more attention has been given to the relevance and importance of MSMEs in the creation of jobs (Rogerson, 2004). However, these MSMEs face a myriad of challenges, which include, among others, a lack of available funds or access to funds that further complicate their ability to survive and exist (Maphalla, Niewenhuizen & Roberts, 2009; Rogerson, 2008; Booyens, 2011). A study by the Small Business Survey (Agwa-Ejon & Mbohwa, 2015) ranked lack of access to finance (8,7%), competition (12,6%) and lack of space to operate (16,2%) as key obstacles to the growth of MSMEs. This ranking is based on the fact that there is an unwillingness by formal institutions to provide credit to smaller companies due to the perceived risk involved (Falkena, Abedian, von Blottnitz, Coovadia, Davel, Madungandaba, Masilela & Rees, not dated).

This state of affairs and the associated problems encountered by MSMEs have led governments, private institutions and even international aid organisations to start a number of financial and non-financial support programmes, with the specific aim of making capital more accessible to MSMEs. However, even though these programmes are available to MSMEs, there seems to be a reluctance or wariness to participate. This may be attributed to government institutions, which are supposed to make the acquiring of funds easier, but, instead, have become stricter and more focused on collateral from small businesses, much in the same way as banks. To compound this situation, it was also found (Ramnath, 2010) that, even though there may be some awareness of the programmes, there is a lack of understanding of how these support programmes for MSMEs work. This was, in part, again attributed to a lack of proper communication regarding the qualification criteria for the programmes and, consequently, the rejection of applications, where applications for support were submitted (Mago & Toro, 2013). It seems that there is a gap regarding the access of funding due to the fact that many MSMEs are not aware of support programmes or not properly equipped, from a business educational point of view, to capitalise on these programmes.

Based on the literature, it seems that government support programmes are moving closer to mirroring the financing criteria of commercial banks, which negates the advantage or purpose of government support programmes (Chimucheka & Rungani, 2013 Maphalla et al., 2009).

From the financial institutions' point of view, for instance commercial banks, the applications from MSMEs for funds are rejected primarily due to a lack of a properly constructed business plan and formal business structure, insufficient collateral or inability to make a personal contribution or provide personal guarantees from the applicant or the enterprise is considered a poor business idea (Chimucheka & Rungani, 2011). Many more do not qualify due to lack of a consistent cash flow, debt income ratio, insufficient credit, an insufficient operating history and inexperienced management team (Goldin, 2014).

It has been pointed out by a number of authors that MSMEs are in a less fortunate position than larger companies to acquire the needed finance for their business. Previous research emphasised the fact that MSMEs have a serious lack of financial management skills, which has a negative impact on their ability to secure loans for their businesses. This situation is further exacerbated by the fact that many qualified employees in small businesses tend to move on to other bigger businesses, once they have gained some skills in the field of business and financial management. To manage an MSME is not regarded as overly complicated, but it is generally accepted, by both financial and governmental institutions, that it requires a basic understanding of the fundamentals of business to stand a chance of success (Choi & Nazareth, 2014). The fundamentals of business include the management of debt, cash flow, supply and demand of the business services and products, marketing and public

relations, and so forth. MSMEs do not have the luxury of a large and skilled staff complement to manage the various business functions and it is therefore left to the owner, who is, in many instances, poorly equipped to do so. The lack of an experience and well-equipped management team is one of the reasons mentioned as to why financial institutions reject MSME funding applications. Due to this, it would be a challenge for the poorly equipped owner of the MSME to acquire funding.

In South Africa, MSMEs find it particularly difficult to secure any type of funds. This can be attributed to the social, economic, financial, legislative, political and banking systems of the previous dispensation, which, combined, have created an adverse financial environment for the MSME sector (Beyers & Ndou, 2016; Maphalla et al., 2009).

3. Research methodology

The study followed an exploratory approach using a self-administered questionnaire to gather data during the fourth quarter of 2019 from the owners of township MSMEs located in Gauteng, which is regarded as the economic hub of South Africa. Convenience sampling was used, as township MSMEs are mainly informal and not documented (Bureau for Economic Research, 2016; Gauteng Province Economic Development, 2014). Trained fieldworkers hand delivered and collected the questionnaires. On delivery, the fieldworker explained the aim of the study, informed the owner of the MSME that participation is voluntary and he/she can withdraw at any stage. They were also informed that by handing in the completed questionnaire, they agree that they were informed and have given consent to participate to the study. A total of 498 of the initial 500 questionnaires, a response rate of almost 100%, were answered and handed back to the fieldworkers. A limitation of the research is the fact that the researchers were reliant on the respondents that they could find as no data base existed where the respondents could be drawn from. It is however not assumed that the responses would have been much different from what was received.

Content analysis was performed on the open-ended questions to extract items. Text that on first impression and meaning appeared to represent an item were grouped together. Basic descriptive analysis was performed to calculate frequencies and percentages to construct tables for data presentation.

3.1. The profile of the sample

The overall sample for the study consisted of 498 respondents (n=498), with the majority being African (n=377, 75,7%). In terms of gender, 60% (n= 299) were male and 37,1% (n=185) female, with 2,9% (n=14) missing responses. The majority, 41,6% (n=210) of the respondents were between 31 to 40 years of age and 27,7% (n=138) were 30 years or younger. The sample consisted predominantly (89,4%, n=445) of micro-sized enterprises, with a staff complement of less than 10 employees (ave 5.5) per establishment. Less than one percent (n=1) could be classified as a medium enterprise, having more than 50 employees.

The main businesses sectors identified are services, retailing and food. About a third (37.3%; n = 186) of the respondents operate a service-related business such as vehicle maintenance and repairs, transportation, furniture repairs and upholstery; metalwork such as welding, gardening, day care, hair and beauty salons, funeral services and the provision of business services such as communication technologies, accounting and printing. Almost a fifth 20.2% (n = 101) of the MSMEs are involved in retailing by operating general and electronic retail stores, as well as tuck-shops and spaza shops. 15,7% (n=78) of the MSMEs operate businesses in the food industry such as catering and restaurants as well as taverns and pubs. A few respondents are involved in construction (2,8%; n = 14); manufacturing (2,6%; n = 13); entertainment (1.6%; n = 8); and accommodation (1.6%; n = 8).

The response regarding the obstacles that restrain growth in townships and ease of access to funding and financial support are reported on in the findings below.

4. Findings

In the section that follows, the focus is on the views of township MSME owners regarding obstacles that restrain growth and access to funding.

4.1. Obstacles that restrain the growth of townships MSMEs

With regard to obstacles that restrain growth in township MSMEs, the respondents were asked to indicate all the obstacles that restrain the growth of their businesses from a list of possible obstacles. They were also required to respond to an open-ended question that would enable the respondents to indicate unlisted obstacles that restrain growth. The findings are indicated in table 1 below.

Table 1: Greatest obstacles that restrain growth of MSMEs located in townships

Themes	n	Percentage
High levels of unemployment	380	76.3
Shortage of finance & credit	286	57.4
Lack of business training	284	57.0
Inadequate infrastructure	251	50.4
Shortage of qualified staff	242	48.6
Lack of managerial, business and admin skills	238	47.8
Inadequate levels of service delivery	237	47.6
High levels of competition	217	43.6
Shortage of reliable supply sources	212	42.6
Poverty and lack of buying power	202	38.8
Legal requirements	197	37.8
Tendering	193	37
Distance and access to market	189	36.3
Other	14	2.8

*Respondents indicated indicate all relevant options thus total n > 498 & total percentage > 100%

In terms of the obstacles that restrain the growth, “high levels of unemployment” emerged as the main obstacle, with 76,3% (n=380) of the respondents highlighting this as an obstacle. High levels of unemployment means that the spending power of consumers is limited, which adds to funding needs and sustainability of MSMEs. “Shortage of finance & credit” emerged as the second most important factor, with 57,4% (n=286) of the respondents highlighting this factor, followed closely by “Lack of business training for MSMEs” (n=284, 57%).

Although many other obstacles were identified by the respondents, it is clear that “Shortage of finance & credit” constitutes one of the main obstacles that restrain growth of small businesses in the townships.

The next section will focus on the ease of accessing funding that will enable a township MSME to deal with the obstacles that restrain growth of small business.

4.2. Access to funding and financial support

In order to assess the history and use of outside funds in their business, the respondents were asked whether they had used outside funds previously and at which institution they had received these funds:

The results show that 31% (n=155) of the respondents have utilised outside funding previously to finance their business, with 65,5% (n=326) of the respondents not having used outside funding. A total of 3,4% (n=17) of the respondents did not answer the question.

The majority of respondents (n=75, 48,4%), who have utilised outside funding previously, indicated that they received this funding from the banks, with 25,2% (n=39) of the respondents indicating that they have used a combination of institutions in order to secure finance for their business. About a quarter 26,5% (n=41) of the respondents, who indicated that they made use of outside funding previously, did not answer the question.

With regard to the ease of access to funding and financial support, the perceptions of respondents were examined by firstly asking whether they agree with the statement, “MSMEs find it easy to get financing”. The results show that 84,5% (n=421) of the respondents indicated that it was not easy, with only 11,6% (n=58) indicating that they were of the opinion that it was easy, while the missing responses totalled 3,8% (n=19). Based on these findings, it is clear that the majority of the respondents were of the opinion that accessing funds or financial support for their business is not an easy endeavour.

In order to further investigate the opinions of the respondents regarding the ease of accessing funds, the respondents were also required to provide a reason for their answer to the above statement.

The main themes that emerged from the responses of the respondents, who indicated that they did find accessing funds easy, included “banks/government” (n=10, 17,2%) and “good business plan and business administration” (n=5, 8,6%), while half (n=29, 50%) of the respondents did not provide reasons for indicating that obtaining funds is easy. The reasons offered by the respondents – who aligned with these themes - centred on the notion that it was easy to access funds if you approached banks and the government and qualified for financial assistance, and that gaining access to funds is easier if you have a good business plan and vision for your business. The latter was described by the respondents as a critical element to ensure ease of access to funds.

In order to further investigate the opinions of the respondents in regard to the notion that it is not easy to access funds, the respondents were required to provide a reason for their answer. Almost two-thirds (58,7%; n=267 out of 421) of the respondents who indicated that obtaining a loan is not easy did not provide any reason as to why they indicated that accessing funds is not easy. It can be speculated that these respondents have not applied for any funds to assist in growing their businesses. Their initial responses are based on negative stories they have heard and/or read about regarding obtaining funds.

Table 2 below captures the reasons provided by those respondents (41,3%; n=174 out of 421) who indicated that obtaining funds are not easy, to further clarify their response to the question.

Table 2: Reasons to support the opinion that it is not easy to access funds

Response	Frequency (n)	Percent (%)
Meeting requirements & No security/collateral	54	31.0
Long/Complicated process	48	27.6
Lack of willingness	24	13.8
Legal aspects	14	8.0
Lack of knowledge	13	7.5
Corruption & nepotism	12	6.9
No faith in small businesses	9	5.2
	174	100

With regard to respondents who indicated that they did not think accessing funds or financial support was easy, the main theme that emerged centred around the difficulties associated with meeting the criteria and necessary requirements for loans and financial support (“Don’t meet requirements”). The results show that 31% (n=54) of the respondents indicated that the reason they were of the opinion that accessing funds was difficult was because of all the criteria and requirements they had to adhere to in order to qualify for loans or financing (see table 2). This included lacking the necessary security to receive a loan, lacking credit worthiness and the strict legal requirements. The following responses were recorded:

“Credit worthiness is what makes it not easy”; “Criteria for funding very difficult”; “Too many legally documents required”; “Need too much security. Nobody wants to give money without surety”; “No security, no loan”; “We must provide financial statements which we don’t have”; “You need to meet certain requirements to qualify for funds (e.g., bank loan)”

Furthermore, 69% (n = 120) of the respondents indicated reasons other than institutional requirements which, in their opinion, made it difficult to obtain funds. These minor themes included the following: a lack of knowledge as to where to acquire funds; the processes and a lot of paperwork; too much red tape; the impact of corruption and nepotism on accessing funds; and investors’ unwillingness to invest in the business, along with a lack of belief in the business by investors. Respondents also highlighted the high costs associated with paying back loans and the difficulty in obtaining funds or financing for non-South African citizens. On these themes, the following comments were recorded:

“No support structure. Don’t have knowledge; don’t understand what I have to do”; “We don’t know where to go in the first place, to who must we talk to”; “Corruption is too high”; “Because you have to be connected to get funds”; “One needs to be in a political group to have access to funds”; “Nobody wants to give money to new businesses”; “It’s hard to find someone who believes in your dream and actually funds it”

5. Discussion

The article focused on obstacles that restrain the growth of township MSMEs and the challenges faced by MSME owners when applying for funds from financial institutions and government support programmes. In the theoretical discussion, reference was made to the reasons as to why MSMEs find it difficult to acquire funds. The data suggest that the obstacles that restrain the growth of MSMEs in townships can be grouped in four areas: the economic climate; the business environment; finance and personnel.

- The economic climate relates to unemployment and inadequate infrastructure. Unemployment is a macro economic indicator and affects the buying power of consumers. An indicator of economic growth and activity is the construction of infrastructure and, therefore, the lack thereof in the townships indicates a poor or weak economy.

- The business environment is reflected by high levels of competition, a shortage of reliable supply sources and poor levels of service. Levels of service refers to services received from other businesses.
- Personnel relates to training; the shortage of qualified staff; lack of skills on the part of the owner, staff and management.
- Shortage of finance and credit bears reference to the topic of finance.

The areas, described above, wherein obstacles are encountered, tie in with the reasons highlighted by the authors, Falkena et al. (n.d.), Choi and Nazareth (2014) and Noko (2019), as to why MSMEs find it difficult to acquire funds. The findings also support the research of Maphalla et al. (2009), Beck and Demirguc-Kunt (2006), Maphalla et al. (2009), Tsoabisi (2014) and Botha et al. (2020)

The data revealed that, while some MSMEs may find it easy to access funds and financial support, the majority find this difficult, predominantly due to the stringent requirements associated with obtaining funds or financial support for businesses, which MSMEs are not able to adhere to, as well as the complexity and length of time associated with obtaining finances for the business. This seems to be exacerbated by notions of the process being tainted with elements of corruption as well as a general lack of knowledge, on the part of MSME owners, as to the sources and processes associated with obtaining financing for the business. This confirms the research findings by Kushnir, Mirmulstein and Ramalho (2010), who stated that corruption is a challenge for MSMEs in obtaining funds.

The data suggests that the reasons why it is not easy to acquire funds can be divided into three possible constructs. The first construct relates to the risk associated with lending money or the institutional requirements. These requirements include aspects such as lacking security to receive a loan, lacking credit worthiness and adherence to strict legal requirements. The research by Chimucheka and Rungani (2011), as well as Goldin (2014), into the reasons why banks do not approve loans is thus supported. The findings support the research findings by, among others, Beck and Demirguc-Kunt (2006), Maphalla et al. (2009), Tsoabisi (2014) and Botha et al. (2020).

The second and third possible constructs focuses more on the challenges related to the MSME owners, rather than the institutional requirements for funding or financial support.

The second possible construct relates to administrative aspects that the respondents find difficult to deal with. These include aspects such as long and complicated processes, specifically related to the lack of information and knowledge with regard to application and approval process to acquire funds as well as the amount of paperwork and excessive red tape. This construct is supported by the research conducted by Mago and Toro (2013) and IOL (2019).

The third possible construct deals with MSMEs' perceptions of financial institutions and these include aspects such as the impact of corruption and nepotism on accessing funds, a lack of willingness to invest in the business from investors, along with a lack of belief in the business by the investors.

Previous research revealed various reasons as to why it is not easy to acquire funds, the research does not only confirm the reasons but goes further to identified MSME owner specific (personal) aspects that affect the acquisition of funds such as the ability to complete a form by him or herself. While it is easy to blame financial institutions or the government for the lack of funding, the MSME owner should do introspection and acknowledge his or her own personal short comings to which can be addressed through support programmes.

The study at suggests that the identified reasons can be grouped in constructs and opines that it would be possible to measure the proportions amongst the identified constructs.

6. Conclusion

It is clear that MSMEs in townships face a myriad of obstacles that restrain their growth, ranging from high levels of unemployment within their client base to inadequate infrastructure and lack of business training as well as high levels of competition. The lack of financing and financial support permeates this environment, which is exacerbated by a lack of business training in financial management and culminating in an expressed need for financial support. In line with this, the difficulties associated with gaining access to funds and financial support and the factors that hinder ease of access to financing may play a pivotal role in hampering the growth and survival of MSMEs in townships. Township MSMEs will need to focus on raising the skills levels of owners, managers and staff; have the ability to develop and produce a viable business model and well-formulated business plan; and maintain good business and office administration practices such as keeping record of trading and financial records/statements.

About 5% of the MSMEs are involved in value-adding businesses such as construction and manufacturing. Unless policymakers focus on the growth of these types of businesses, the township economy will remain consumer-driven.

It is evident that over the past decade (2010–2020), and even before plans were made and programmes announced to develop and support township MSMEs, nothing had changed for the MSMEs. The MSME owners experience the same challenges such as inadequate infrastructure, lack of business training, unattainable legal requirements to qualify for funding, distance and access to markets, unemployment, and so forth, and, therefore, funding remains problematic. Local authorities and policymakers need to address those issues that are under their control such as the inadequate infrastructure, the stringent legal requirements and corruption, if they want to change the conditions within the township economy and accelerate growth and development of township MSMEs.

People in power, i.e., the authorities and policymakers are elected to office by the residents of the area to serve the people. Office bearers who are prepared to walk the talk should be elected and not on the basis of popularity. The focus of office bearers and policymakers should be on improving the economic climate and external business environment such as construction of infrastructure, trade associations, and mentorship programs. The residents and business owners in townships are trying to move forward, but they need demonstrable support from authorities, policymakers and other stakeholders to excel.

MSME owners on the other hand have to attend to the internal environment such as management and staff development. Support and development are available and should be utilised and the knowledge gained needs to be applied to the business and ploughed back into the community.

The research was of an explorative nature and convenience sampling was used to select MSMEs within townships. Due to this limitation, the findings of the research cannot be generalised. It is recommended that the topic be researched further to ascertain the effect that these challenges have on the MSME and the scope of the various challenges.

Despite the many obstacles in the path for growth and the many hindrances to acquire funds, the township MSMEs are still surviving and operational. These MSMEs might continue to operate on a small scale, but, without much-needed funds and financial support, it will be difficult for MSMEs to grow and reach their full potential. Without this much-needed assistance, MSMEs will not reach their full potential and their efforts will not bear the fruit, that is, the envisaged economic growth and the eradication of poverty.

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ACCESSIBLE TOURISM – CURRENT STATE IN SLOVAKIA*

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Abstract. The number of people with disabilities in the world is growing every year. When traveling, they encounter various barriers. The article focuses on Slovakia, a country in which accessible tourism has not yet been examined. It is the result of extensive research carried out in the years 2016 to 2020. The scientific goal of the article is to examine the tourism demand and the degree of adjustment of the tourism supply for visitors with physical disabilities in Slovakia and to find out the connection between the accessibility of the tourism facilities and the destinations attendance. Article emphasizes the need to improve the country's accessibility in tourism for visitors with disabilities. Research is based on the theoretical research methods, exploratory statistics, and correlation analysis to evaluate the accessibility of the supply in all self-governing regions in Slovakia. It analyzes the demand of the visitors with disabilities based on the results of a qualitative survey carried out by the method of sociological questioning using the standardized interview technique with the representatives of associations for people with disabilities (19). The results of the research show that people with disabilities want to travel and urge the lack of accessibility of tourism attractions and facilities and on the various types of barriers. The research sample consists of 11,281 tourism supply facilities in Slovakia. The results of the research points to an insufficient rate of accessibility of the country (19.7%)

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for visitors with physical disabilities and the need for higher investments in debarrierization of the environment, which can make the whole country more attractive and increase its importance on the international tourism market.

Keywords: accessibility; demand; disability; supply; tourism

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1. Introduction

Evaluation of the tourism demand of the visitors with disabilities and the tourism supply for visitors with disabilities in Slovakia is a current topic, as the number of people with disabilities is constantly growing. Discussions at the national and international level focus on the need to remove barriers of various kinds. We want to emphasize the need to change the current situation in tourism to suit everyone without distinction. Healthy, disadvantaged, young, seniors, people with sudden and temporary restrictions to the possibilities of movement and orientation, parents who accompany a child in a stroller, people with optimal weight, but also the overweight. We want to contribute to the scientific and professional discussion on the importance of adapting the primary and secondary supply of tourism for the most vulnerable so that not only the target group but also Slovakia as a country will be competitive in the international tourism market benefits from new opportunities.

2. Theoretical background

More than 15% of people in the world suffer from some health disadvantage (WHO 2011, 2020, <https://ec.europa.eu>, 2018). According to the data of the European Health Survey EHIS 2014, almost 54% of the population of Slovakia suffers from long-term chronic diseases or health problems (Statistical Office, 2015) and their prevalence is increasing (<http://www.who.int>, 2018). It is related to the prolongation of the average life expectancy of the world's population, which increases the incidence of chronic non-transferable diseases, however, modern medicine offers better options for diagnosis, control, and registration of the people with disabilities (Repková & Sedláková, 2012). They are still a minority in society and are often marginalized. Daily, they face barriers that prevent them from carrying out normal activities and integrating with healthy people. The World Disability Report (www.who.int, 2011) highlighted the need to destigmatize the lives of people with disabilities. The need for debarrierization also affects tourism, as disabled visitors is a large segment and their participation in tourism presupposes a specific approach to the creation of infrastructure and tourism products. In addition to a human approach, adapting tourism supply also represents a business opportunity that will ensure the success of the stakeholders in the competitive market environment.

The integration of people with disabilities into society, the adaptation of the environment and the travel possibilities of this segment of visitors have been among the topics discussed at the European Union level, but also in the international context for decades (Burnet & Bender-Baker, 2001; Lobożewicz, 2001; McKercher et al., 2003; Yau et al., 2004; Westcott, 2004; Buhalis, 2005; Hitsch, 2005; Ambrose & Michailidis, 2007; Chang & Sing, 2007; Darcy, 2010; Minnaert et al., 2009; Doubled, 2010; Pezzo 2010; Buhalis & Darcy, 2011; Linderová, 2011; Minnaert, 2011; Petruchová, 2011; Buhalis et al., 2012; Gheorghe et al., 2012, McCabe et al., 2012; Minnaert et al., 2012; Steinfeld & Maisel, 2012; Minnaert et al., 2013; Minnaert, 2014; Özogul & Baran, 2016; Polat & Hermans, 2016; Souza & Post, 2016; Agovino et al., 2017; Lyu, 2017; Altinay et al., 2019; Sanchez-Aarnoutse, 2019; Zhang et al. 2019; Cochran, 2020; Wong et al., 2020; Cochran & Chatman, 2021).

It is indisputable that people with disabilities are interested in traveling and have the right to travel, which is contained in the Global Code of Ethics for Tourism (UNWTO, Article 7, 2020), which calls for tourism for all

people without distinction and for access to travel for families, young people, students, the elderly and people with disabilities. The adaptation of tourism supply for people with disabilities is apart of social tourism, accessible tourism, resp. tourism for all. Definitions of social tourism are inconsistent and are subject to development. Minneart et al. (2013) perceive social tourism as a moral added value, which focuses on the benefit of the host and visitor from tourism. Šimková (2014) emphasizes the need for benefits not only for visitors and hosts, but also for the tourism destination. In terms of the benefits of social tourism for the destination, it can be about taking advantage of business opportunities by introducing innovations in the form of specific products, adapting tourism facilities and their products (Zenko & Sardi, 2014). Comprehensively, it can be stated that social tourism enables the participation in tourism of such groups of the population that are disadvantaged in the society (Linderová & Scholz, 2019). The available information and statistics show that the majority of visitors with disabilities are apart of a socially weaker class in society (WHO, 2016).

Accessible tourism, sometimes referred to as barrier-free tourism, resp. universally accessible tourism is defined as a form of tourism that makes travel destinations accessible to visitors with limited mobility, resp. with limitations of sight or hearing and allows them to function independently, with dignity, with their own capital through universally designed projects and products. It also affects seniors, visitors who travel with children in prams, and its aim is to preserve the three basic pillars of travel: independence, equality, and dignity (Darcy & Dickson, 2009). An important representative of accessible tourism in Europe is ENAT - European Network for Accessible Tourism (Accessible Tourism in a Nutshell, 2010, p. 3). It seeks to develop accessible tourism, in particular by providing a wide range of information for visitors and experts in the field (www.accessibletourism.org, 2016).

The European Union most often deals with the concept of tourism for all, which includes the participation of all people with or without disabilities in tourism. It concerns low-income families, young people, the elderly, and people with disabilities, meaning people with physical, visual, hearing, cognitive, intellectual, or psychosocial disabilities that may be permanent or temporary (Takayama Declaration, UNESCAP, 2009). The members of the European Union's advisory body - the European Economic and Health Committee (EEIG), concluded in 2003 that it was essential to develop sustainable tourism for all and called on NGOs to bring together disadvantaged citizens, European institutions, national governments, regional and local authorities, as well as tourism businesses to join the effort to make Europe a world tourism center that is a barrier-free and a sustainable space accessible and open to all. Emphasis is placed not only on the accessibility and sustainability of tourism, but also on the need for changes in people's mentality, the need to provide up-to-date information, awareness, and management of tourism for visitors with disabilities (ENAT, 2007, p. 12). The European Commission and the European Economic and Social Committee have recognized not only the societal value of tourism for all, but also its potential economic value in terms of income generation, job creation and regional development (Griffin & Stacey, 2011).

From the previous definitions, the link between social tourism, accessible tourism, and tourism for all is clear. We understand tourism for people with disabilities as a part of social tourism (Linderová, 2011), as well as accessible tourism. We again perceive social tourism and accessible tourism as subcategories of a broader concept - tourism for all. Its aim is not only to create specific conditions for disadvantaged groups of visitors, but also to create uniform conditions for participation in tourism for all groups of visitors - even for those who have individual needs due to a certain disadvantage (Leidner, 2006).

We define tourism visitors with disabilities as a complex of activities aimed at satisfying the demand of people with disabilities associated with travel and stay of such persons outside their place of residence, usually in leisure time in order to achieve a comprehensive experience. This segment has the potential to grow and with it a willingness to spend more on tourism than non-disadvantaged visitors (Yau et al., 2004; UNWTO, 2015). This assumption is not valid in terms of tourism participation in Slovakia which is the result of the frequent inclusion

of people with disabilities among socially disadvantaged visitors. The requirements of the segment of visitors with disabilities in tourism relate mainly to better access to transport, accommodation, catering, access to water, national parks and cultural attractivities. Accessibility not only concerns people with physical disabilities. Care must be taken to make facilities and objects accessible to the blind, hearing, and otherwise disadvantaged visitors (Özogul & Baran, 2016).

The World Tourism Organization (UNWTO) defines people with disabilities as individuals “whose handling and orientation ability, respectively movement in a normal environment is limited. These are people who have special requirements when traveling, choosing accommodation facilities and other tourism services. They include people who require special care due to their state of health” (www2.unwto.org, 2005). The definition of people with disabilities and their classification is complicated and inconsistent. The World Health Organization (WHO) distinguishes between health handicap and health disability (www.who.int, 1976). Disability is defined as a restriction or loss of ability to perform normal activities in a way that is normal for a person; handicap is understood as a disadvantage of an individual resulting from his disability and restricts or prevents the performance of activities that are perceived as normal by reason of sex, age, hygienic and cultural factors.

The World Tourism Organization (UNWTO) also defines people with disabilities as people who are prevented from full and effective participating in social life at the same level as healthy individuals due to environmental and attitude barriers (architectural barriers that hinder the people with disabilities, barriers for the visually impaired, such as the absence of a Braille menu, or barriers for the hearing impaired, such as lack of textual interpretation in the museum, a guide that does not speak sign language) (UNWTO, 2013, p. 14). These are obstacles by travelling, accommodation, and the provision of other tourism services. If a person with a disability is a representative of tourism demand, has a disability, he or she becomes a visitor with disabilities in tourism.

Although debarierization is aimed primarily at people with disabilities, it also benefits people who carry luggage or pushes a pram. Debarierization does not in any way limit the most numerous group of people without disabilities, on the contrary, it increases their safety and the overall attractiveness of the environment (Ministry of Transport, Construction and Regional Development of the Slovak Republic, 2011). However, it is most often associated with the removal of architectural barriers. The most common problems perceived by visitors with disabilities include insufficiently adapted exteriors and interiors of accommodation and catering facilities, insufficiently accessible sanitary facilities, lack of barrier-free transport options, lack of reliable information on the accessibility of tourist attractions, resp. insufficiently trained staff in the question of the accessibility of tourism facilities (Clery et al., 2017).

Tourism supply in destinations and its aspects were addressed by several authors. Foreign authors Morachat (2003) and Manoj & Babu (2008) divide tourism supply into primary and secondary (Table 1).

Table 1. Objects of the primary tourism supply

primary supply given by nature	arboretum, botanical gardens, protected areas, caves, mineral and thermal springs, nature trails, natural and artificial water areas watercourses
primary anthropogenic supply	castles, chateaux and manors, sacral buildings and monuments, prominent buildings, monuments, memorial buildings and rooms, objects of folk architecture, open-air museums, technical monuments, archeological sites, cultural and educational facilities
organized events	cultural, sporting, business, religious, socio-political events

Source: Own elaboration according to Morachat, 2003; Manoj & Babu, 2008; Gúčík, 2010

The secondary supply represents the material and technical support for the development of tourism. It includes accommodation and hospitality facilities, sports and recreational facilities, cultural and educational facilities, civic amenities. It represents the resources of tourism, which include reproducible goods created by man that require labor and capital to provide them (Mihalič, 2013). In order to satisfy the needs and expectations of visitors and a certain market segment, it is necessary to constantly develop and innovate the secondary supply of tourism.

The successful development of tourism for people with disabilities is conditioned by the legislative regulation of accessibility. Adherence to it significantly affects the attractiveness of the primary and secondary supply at the destination, which needs to be constantly developed and innovated. The basis of the competitive advantage of the destination is the primary supply (tourist attractions) and the secondary supply (tourism infrastructure and quality of its services). While the primary supply takes the form of a competitive advantage in the uniqueness of the tourist attractions, the secondary supply represents a competitive advantage in terms of price level and quality of services (Gúčík, 2010). A destination may be competitive for one segment of visitors while not others. In the conditions of demand, the preferences of visitors, awareness of the destination and the image of the destination resonate (Dwyer & Kim, 2003). The conceptual apparatus of competitiveness of tourism destinations includes a number of indicators of local, regional, and national character. The most important interpret the relationships between the attractiveness of the destination and potential visitors, demand, and supply of services, as well as the attitudes of individual business entities operating in tourism. In addition to the mentioned indicators, there are other factors, and therefore we must approach the evaluation of the competitiveness of the destination comprehensively and interdisciplinary (Bucher, 2015). Competitiveness of the destination is therefore not a matter of one or two factors. This is a complex problem with a large number of variables. Key factors include attractiveness, macroeconomic factors, innovation, strategic planning, destination image and branding, destination management, partnerships and cooperation, tourism prioritization, service quality and, last but not least, accessibility (Vanhove, 2017). If a destination wants to be competitive in the tourism market, accessibility is an important condition to achieve it.

We identify a significant gap in research when talking about accessibility of tourism destinations and their attendance in the context of competitiveness. The academic interest of this issue is being disregarded thus at local, regional and national level. The tourism destinations either at regional and national level face an unprecedented competition. It is at utmost concern to cover all the factors influencing their competitiveness at the international tourism market. Beside the security, political stability, openness of cross-border movement, positive image, appropriate marketing communication, mutual lingual understanding, legislative factors influencing business environment, the accessibility of tourism destinations belongs to the common factors. When being adapted and accessible to all visitors, including the segment of people with disabilities and being able to effectively communicate these changes of facilities and attractivities at regional and national level, the tourism destinations will augment their attendance and become more competitive at the international tourism market.

3. Research objective and methodology

The scientific goal of the article is to examine the tourism demand of the visitors with disabilities in Slovakia, the degree of adaptation of tourism supply for the visitors with physical disabilities in Slovakia and to find the connection between the accessibility of the tourism facilities and the attendance of the destinations with the Slovak example.

The demand of the visitors with disabilities is the result of the analysis of information obtained from a qualitative survey carried out by the method of sociological questioning using the technique of semi-standardized interview with representatives of associations (19 organizations) associating persons with disabilities (45,600 persons) in all Slovak self-governing regions. We assume that it is the representatives of the associations of the people with disabilities who are in daily contact with them, who have an overview of their needs, comments, problems, opinions, and requirements. Through them, we find out the satisfaction of visitors with disabilities with the current tourism supply in Slovakia. As it is not possible to address specific visitors with disabilities individually due to the personal data protection and we are interested in the most comprehensive results that summarize the satisfaction and requirements of the target group in all self-governing regions of Slovakia, we focus on organizations which are in daily contact with them and represent their interests and preferences. We perceive the members of individual organizations as real and potential visitors to tourist destinations in Slovakia. The list of organizations that are focused on helping disabled people is drawn from the website ives.minv.sk, for the content of which the Ministry of Interior of the Slovak Republic is responsible. We deal with the question whether people with disabilities in Slovakia are interested in participating in tourism and how they evaluate the current supply of services. We identify barriers to the participation of the people with disabilities disabled in the tourism. We are interested in the opinion of the association on the current legislation on the rights of the people with disabilities in Slovakia and what support from the state would be acceptable for them, respectively desirable.

This research evaluated the possibilities of visits of barrier-free accommodation and hospitality facilities, barrier-free public transportation, sport and recreation facilities, cultural-historical and cultural-educational facilities, ZOO and botanical gardens, caves, bike trails, tourist trails, slopes and cross-country ski trails, organized events for visitors with disabilities and travel agency offer, which specialize on visitors with disabilities throughout the territory of Slovakia on the supply side. The research focused in each category on facilities with a summarization of their total number, the number of barrier-free and partially accessible objects and facilities and their percentage share of the total number of objects (Table 2).

Table 2. Evaluated objects and facilities in the context of the primary and secondary tourism supply

Evaluated objects and facilities	Assignment to the elements of the primary or secondary tourism supply	Degree of accessibility
Accommodation	Secondary supply	- completely and partially barrier-free
Hospitality facilities	Secondary supply	- completely and partially barrier-free
Transportation (station buildings, platforms)	Secondary supply	- completely and partially barrier-free
Sports and recreational facilities (swimming pools, aqua parks, football, hockey stadiums)	Secondary supply	- completely and partially barrier-free
Cultural-historical and cultural-educational facilities (castles, chateaux, churches, museums, galleries, open - air museums, theaters, cinemas)	Primary supply	- completely and partially barrier-free
ZOO and botanical gardens	Primary supply	- completely and partially barrier-free
Caves	Primary supply	- completely and partially barrier-free
Access to bike paths and hiking trails, ski slopes and cross-country trails	Secondary supply	- completely and partially barrier-free
People with disabilities associations	Primary supply	- supply of organized events for people with disabilities
Travel agencies	Secondary supply	- a specialized supply for the people with disabilities

Source: Own elaboration according to Linderová, 2012

When evaluating accessibility, we took into account the information provided on relevant websites, which were compared to eliminate duplication. We verified the obtained information by a personal visit, by phone, resp. by photo documentation available online. In the survey of accommodation facilities, we included only hotels, boarding houses and apartment houses as the most numerous categories of accommodation establishments in Slovakia, the numbers of which are listed by the Statistical Office of the Slovak Republic on the website statdat.statistics.sk in the category Capacity and performance of accommodation establishments. The survey was conducted continuously over a longer period of time (2016 - 2020) in all (8) self-governing regions of Slovakia (Figure 1).



Figure 1. Division of Slovakia into the self-governing regions

Source: www.opensource.com , 2021

We consider all objects and facilities in which there is no barrier to access for the visitors to be barrier-free. We consider as partially accessible objects and facilities in which there is a small barrier to access for people with disabilities, so it is accessible only for some of them, or access requires the assistance of another person (such as overcoming a step).

In the analysis, we evaluated the percentage of accessible objects and facilities to the total number of evaluated objects and facilities in the region according to individual groups, as well as the total percentage share of all accessible objects and facilities to their total number. We added one point for each barrier-free, resp. partially accessible object or facility. We call such objects and facilities accessible. The maximum number of points determines the number of examined facilities in the region. We evaluated how many examined buildings and facilities are wheelchair accessible and partially accessible and we transformed the values into a percentage. Then we integrated the level of accessibility of supply for visitors with physical disabilities in the various regions to one of five possible levels (Table 3).

Table 3. Scale of the degree of adjustment of the tourism supply for visitors with physical disabilities in the self-governing regions of Slovakia

Share of accessible facilities and objects in their total number in the region (in %)	Qualitative evaluation
0 – 20	unsatisfactory level
21 – 40	basic level
41 – 60	average level
61 – 80	above average level
81 – 100	excellent level

Source: Own elaboration according to Linderová, 2012

We assessed the level of adjustment of the tourism supply for the visitors with physical disabilities in Slovakia by a weighted arithmetic average, which takes into account the number of evaluated objects and facilities in the self-governing regions of Slovakia and the achieved level of adjustment of the supply in them. The sample consists of evaluated objects and facilities of primary and secondary tourism supply with the number of objects and facilities by region which are: the Bratislava Region (1,989); Trnava Region (1,881); Trenčín Region (845); Nitra Region (614); Žilina Region (1,760); Banská Bystrica Region (924); Prešov Region (2,663); and the Košice Region (605); a total of 11,281 objects and facilities of tourism supply in Slovakia.

In addition to the method of observation and questioning, we used exploratory statistics (to express the absolute and relative frequencies of accessibility of objects and facilities in specific regions and in Slovakia in general and made a correlation analysis. From theoretical methods of scientific work, we used content-causal analysis, analysis and synthesis, induction and deduction, and comparison. We used the correlation analysis (calculation of the tightness depending on the monitored variables) to detect dependencies between several variables. We were interested in the influence of the number of barrier-free accommodation (to December 31st of the specific year) in various regions on the number of visitors in accommodation establishments in the regions (for a specific calendar year). In the case of confirmation of dependence, we state that in the examined areas, it is important to focus on the availability of accommodation facilities, because their accessibility is related to their attendance.

We found a dependence between the number of accessible accommodation facilities and accessible hospitality facilities, respectively other facilities within the primary and secondary supply of individual regions. We have supposed that in regions where there are more accessible accommodation facilities for visitors with disabilities would also have more dining options, more options for time spent freely and generally can be better adapted. If the addition has not been confirmed, it could mean that the offerings of accommodation facilities does not correspond with dining options and leisure possibilities in the region.

We were interested in the relationship between the number of visitors in regions (for a specific calendar year) and the level of accessibility of regions (in %), as well as the relationship between GDP, expressed per capita in the regions, expressed in current prices in a particular calendar year (in %), which would express the relationship between the economic performance of regions and the level of their accessibility.

We consider it important to determine the impact (direct or indirect impact) of the examined variables and its intensity (strong, average, weak impact), or to identify variables that are not affected. To verify the agreement of the detected state and the assumption (we always examine the assumption that the characters A and B are independent) we use the method of Spearman's nonparametric correlation coefficient, which also verifies the degree of intensity of the dependence of the examined characters.

4. Results and discussion

A tourist destination becomes attractive for visitors with disabilities if it has significant and diverse potential with offerings that are adapted and accessible to them and its presentation on the market is capable of arousing interest. Slovakia is characterized by the diversity of supply, which in terms of international classification of tourist attractions according to IUOTO-WTO contains up to 38 of the 39 possible most sought-after tourist attractions (all except sea). The territory of Slovakia is divided into individual self-governing regions (8 regions: Bratislava, Trnava, Nitra, Trenčín, Banská Bystrica, Žilina, Prešov, Košice Regions).

Organizations willing to participate in the primary demand-side survey, carried out by the sociological survey method using the semi-standardized interview technique (19), agreed that people with disabilities have a strong interest in participating in tourism. However, in reality, they participate in it only to a limited extent due to the existing barriers. They consider insufficient debarrierization to be the biggest obstacle. They perceive the insufficient removal of physical barriers the most, not only in tourism facilities (especially accommodation facilities), but also in transport and in public institutions. They critically evaluate insufficiently elaborated and non-functioning legislation, the bad financial situation of the affected segment of people, or the non-empathetic approach of the healthy population, which is also reflected in the provision of tourism services. As a part of the removal of the barriers, associations would welcome the adoption of legislation concerning the obligations of transport operators, owners and operators of tourism facilities to make them available and to ensure strict compliance with existing legislation. They consider it very important to improve the awareness of the people with disabilities about their opportunities to participate in tourism. They would consider better social security of the people with disabilities by the state to be beneficial. The results of the qualitative survey, concerning the number of organizations and their members addressed, as well as the relative share of organizations that agree with the above statements, arranged chronologically, are summarized in the Table 4. We consider the results important especially with regard to the large number of people with disabilities in the survey, which the organizations associate and which they represented in their statements.

Table 4. Results of the qualitative research on the demand side

Parameter	Qualitative expression (absolute)	Quantitative expression (relative)
Number of participating organizations	19	100%
Number of persons with disabilities associated in organizations	45 600	100%
Number of organizations that perceive the existence of barriers (in general)	19	100%
Number of organizations that perceive the existence of physical barriers	19	100%
Number of organizations that perceive the tourism supply as adapted to a limited extent (partially)	12	63,2%
Number of organizations that perceive the existence of the legislative barriers	9	47,4%
Number of organizations that consider the level of awareness of people with disabilities about the level of the tourism accessibility in the region to be weak	9	47,4%
Number of organizations that perceive the tourism supply as insufficiently adapted	6	31,6%
Number of organizations that perceive the disproportionality of the debarrierization of the settlements in the regions	3	15,8%
Number of organizations that perceive a lack of funding for people with disabilities	3	15,8%
Number of organizations that perceive the tourism supply as sufficiently adapted	1	5,2%

Source: Own elaboration, 2021

We also present them with a word cloud, which is based on a frequency analysis of the occurrence of the words in the answers of representatives of organizations and allows to visualize the meaning of important statements of respondents (Figure 2).

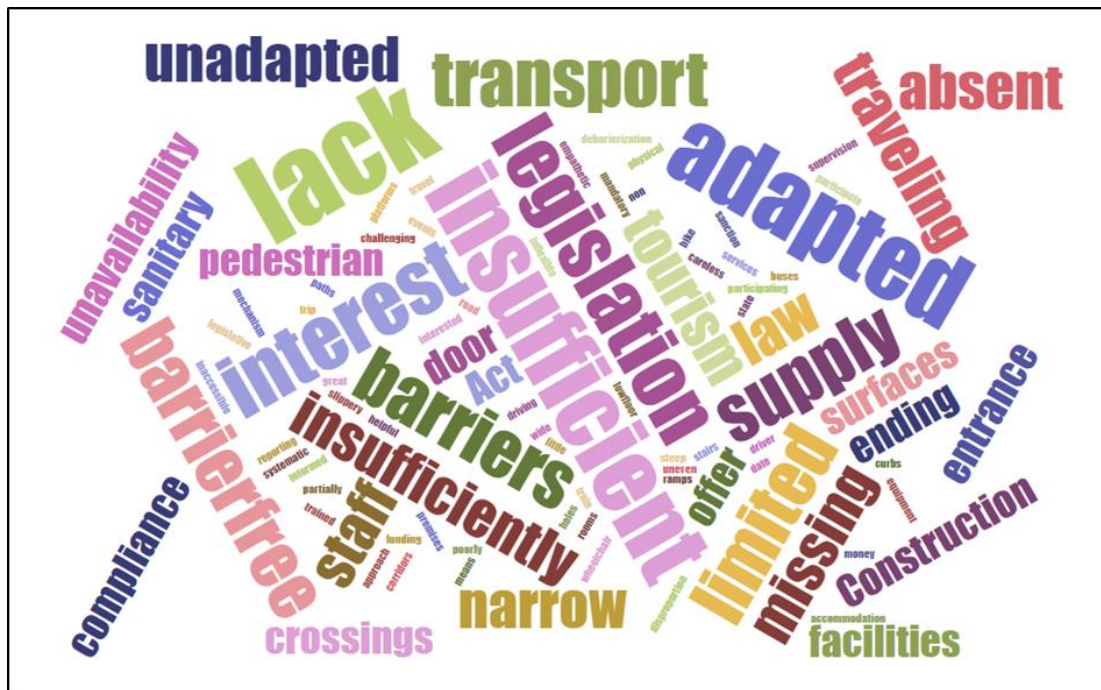


Figure 2. The result of the frequency analysis of the occurrence of words in the demand survey

Source: Own elaborating in World Cloud Generator, 2021

It is clear from the results that there is an interest of people with disabilities in participating in tourism. Expressions resonated in the statements such as lack, insufficient offer, insufficient legislation, lack of information, insufficiently adapted, unadapted, resp. absent, limited, which related mainly to the supply, but also to the legislation, resp. to the information.

Slovakia comprehensively achieved a 19.7% adjustment of the tourism supply for visitors with physical disabilities. This means that so far, the country has not even reached a basic level of adjustment, which can be considered an alarming situation that needs to be gradually changed. The comprehensive results of the adaptation of tourism supply for physically disadvantaged visitors in all regions of Slovakia are summarized in Table 5.

Table 5. Evaluation of the level of adaptation of tourism supply for visitors with disabilities in Slovakia by region

Name of the region	Number of evaluated facilities and objects of tourism (max. number of points)	Adjusted level achieved (%)
Bratislava Region	1989	18.6
Trnava Region	1881	20.6
Trenčín Region	845	29.8
Nitra region	614	19.1
Žilina Region	1760	13.3
Banská Bystrica Region	924	35.0
Prešov Region	2663	11.0
Košice Region	605	40.0
Offering in Slovakia total	11281	= 19.7

Source: Own elaboration, 2019

By statistical evaluation of the results of the primary and secondary survey, we determined the dependence between the variables, which we assumed to confirm the importance of achieving accessibility of tourism facilities with respect to the attendance of destinations. We were also interested in whether there is a statistical connection between the economic performance of the destinations at the level of self-governing regions and the achieved accessibility of facilities and objects in the area of the monitored destinations.

We verified the dependence of the variables using the statistical software IBM SPSS Statistics, version 25 (2020). We found out whether the influence is direct or indirect and what is its strength (strong, medium strong, weak). We used the Spearman rank correlation coefficient method to verify the impact and quantify it. It can range from -1 to +1. A value of -1 represents the highest negative and a value of +1 represents the highest positive dependence. If the dependence coefficient is in the range from 0 to 0.3, we speak of a weak dependence, in the interval from 0.3 to 0.6 with a medium strong dependence and in the interval from 0.6 to 1.0 with a strong dependence. We found a dependence between several variables: (1) the number of accessible accommodation facilities in the region and the number of visitors in the accommodation facilities in the region; between (2) the number of accessible accommodation facilities in the region, resp. (3) the number of accessible hospitality facilities in the region and other accessible facilities within the primary and secondary supply in the region; between (4) the number of visitors in regions in a specific calendar year and the level of overall accessibility of regions (in %); between (5) the economic performance of regions, expressed in GDP per capita in regions, expressed in current prices in a specific calendar year, and the level of overall accessibility of regions (in %).

The research results confirmed (in the calendar year in which the research was conducted) a strong direct dependence between the number of accessible accommodation facilities in the self-governing region and the number of visitors in accommodation facilities in the region (Table 6).

Table 6. Matrix of the correlation coefficient of the number of accessible accommodation facilities and the number of visitors in tourism in the regions

Researched variables	Number of accessible accommodation facilities in the region
Number of visitors in tourism in the region	0.642

Source: Own elaboration according to the results of IBM SPSS Statistics, version 25, 2020

The result can be interpreted as the more barrier-free, resp. partially accessible accommodation facilities were located in the region in a specific calendar year, the more visitors visited this region.

Spearman's rank correlation coefficient also confirmed in a specific calendar year a strong direct dependence between the number of accessible accommodation facilities in the region and the number of accessible objects of primary supply, which include cultural-historical and cultural-educational facilities, ZOOs and botanical gardens, caves, and organized events for people with disabilities in self-governing regions (Table 7).

Table 7. Matrix of correlation coefficient of the number of accessible accommodation facilities and the number of accessible primary supply objects in regions

Researched variables	Number of accessible accommodation facilities in the region
Number of accessible primary supply objects in the region	0.648

Source: Own elaboration according to the results of IBM SPSS Statistic, version 25, 2020

The result can be interpreted that the more accessible accommodation facilities in the region in the examined calendar year, the more there were also accessible objects of primary supply in the region, which means that the visitor who decided to visit a particular region had more opportunities to spend free time in accessible facilities of the primary supply in the region, where he also had the opportunity to find suitable accommodation.

The results of the research confirmed that in the examined calendar year, there is a statistically weak indirect dependence between the number of accessible accommodation facilities in the region and the number of accessible objects and facilities of secondary supply in the region after deducting accommodation and catering facilities. The objects of the secondary supply after deduction of accommodation and catering facilities include barrier-free possibilities of public transportation, sport and recreational facilities, cycling and hiking trails, ski slopes and cross-country trails, travel agencies (Table 8).

Table 8. Matrix of correlation coefficient between the number of accessible accommodation facilities in the region and the number of accessible objects and facilities of secondary supply in the region after deduction of accommodation and catering facilities

Researched variables	Number of accessible accommodation facilities in the region
Number of accessible facilities and secondary supply facilities in the region after deduction of accommodation and catering facilities	-0.223

Source: Own elaboration according to the results of IBM SPSS Statistics, version 25, 2020

A moderate indirect dependence was confirmed between the number of accessible hospitality facilities and the number of accessible secondary supply facilities after deduction of accommodation and catering facilities (Table 9).

Table 9. Matrix of the correlation coefficient between the number of accessible hospitality facilities in the region and the number of accessible facilities and secondary supply facilities in the region after deduction of accommodation and catering facilities

Researched variables	Number of accessible hospitality facilities in the region
Number of accessible facilities and secondary supply facilities in the region after deduction of accommodation and catering facilities	-0.559

Source: Own elaboration according to the results of IBM SPSS Statistics, version 25, 2020

In our opinion, indirect dependence points to a significant share of accommodation, but especially hospitality facilities in the total number of opportunities to use the secondary supply in the region in the period under study and points to the need to complete other accessible facilities to make the offer of accessible facilities in the region comprehensive.

At the same time, Pearson's correlation coefficient in the examined calendar year confirmed a moderately strong indirect statistical dependence between the number of visitors in the region and the overall accessibility of the region (in %) (Table 10).

Table 10. Matrix of correlation coefficient between the number of visitors in the region and the overall accessibility of the region

Researched variables	Accessibility of the region (in %)
Number of visitors in the region	-0.542

Source: Own elaboration according to the results of IBM SPSS Statistics, version 25, 2020

This result was surprising for us because we expected a moderate to strong direct dependence. Indirect dependence indicates insufficient marketing communication of specific accessible objects and facilities, as well as the entire region, which acts on the market as a destination not only for visitors with disabilities, but also for other target groups that can use accessible facilities. We consider the result to be an opportunity to streamline marketing communication at the level of the objects themselves, but also at the level of the destinations.

Weak indirect statistical dependence was also confirmed between the economic performance of regions in a specific calendar year, expressed in GDP per capita in current prices (in EUR) and the accessibility of regions (in %) (Table 11).

Table 11. Matrix of correlation coefficient between economic performance of regions and accessibility of regions

Researched variables	Accessibility of the region (in%)
GDP / capita at current prices (in EUR)	-0.189

Source: Own elaboration according to the results of IBM SPSS Statistics, version 25, 2020

Indirect dependence points to the need for higher investments in the debarrierization of the environment, which can make the area more attractive not only for the visitors with disabilities, but also for other target groups of visitors.

With regard to the achieved result, it is necessary to try to improve the offer of tourism for visitors with physical disabilities in all self-governing regions. Improving the conditions of travel and stay of visitors with disabilities in individual regions of Slovakia is conditioned by meeting the basic requirements. They emerge from the results of the primary research and are also supported by information available on the website of the National Council of Citizens with Disabilities (2011), socpoist.sk (2018) and employment.gov.sk (2018) and take into account the

document of the Ministry of Transport and Construction of the Slovak Republic (2011). The proposals relate to the most important barriers for the physically handicapped, on which we built by defining the basic preconditions for travel and the participation of visitors with disabilities in tourism. These are physical, mental, financial and information barriers. If a country wants to improve the accessibility of its services, objects, and facilities for physically handicapped visitors, it is important that barriers are gradually removed.

Physical barriers are perceived by all people with limited mobility. It applies to people who use wheelchairs, limb prostheses, walkers but also canes, crutches, various compensatory aids (after limb injuries), but even people with mental disabilities, the elderly, pregnant women, people accompanying a child in a pram or a small child under the age of three, people with luggage, with various diseases that have a negative impact on their mobility and obese people. This is an extremely large segment of existing and potential visitors in tourism. The advantage of debarrierization is also that it does not limit in any way the largest group of people in society who are free of malfunctions, but on the contrary, also improves the safety and attractiveness of the environment (Ministry of Transport, Construction and Regional Development of Slovak republic, 2011). At the same time, all objects preventing hassle-free access, movement and stay can be considered as physical barriers. The most important prerequisite for the development of tourism for people with physical disabilities is the absence of architectural barriers. In the offer of tourism, architectural barriers apply to all buildings of accommodation, hospitality, transport, spa and wellness, sports-recreational, cultural, and educational facilities, as well as buildings of service providers - travel agencies and tourist information centers.

In addition to removing architectural barriers, it is important to eliminate psychological barriers that arise as a result of society's prejudices against people with disabilities and are manifested in different treatment in situations where other treatment is not desirable. At the same time, psychological barriers often occur in the work area. The Amsterdam Agreement (1999) gave the European Community the right to take measures to prevent discrimination, which was enshrined in Article 13 of the European Communities. In 2000, the European Community adopted two amendments to the article, which were adopted as directives. They state that employers must remove barriers and make appropriate adjustments to the work environment. They include the adaptation of premises and technical equipment, as well as the change of time standards for the performance of work, the redistribution of work tasks and the provision of special training for employees with disabilities.

Psychological barriers can also arise in the process of providing tourism services due to insufficient preparation of employees for visit of visitors with disabilities. Employees should receive training/regular trainings to meet the requirements of this specific segment of visitors.

Financial barriers are perceived by most people with disabilities in Slovakia as the most significant problem. Financial problems relate to the lack of financial resources for people with disabilities, who have minimal employment opportunities. Under such conditions, there is only a small proportion of people with disabilities who can afford to realize their travel plans. We note that there is a large disproportion between the financial resources available to people with disabilities and the prices of the products and services needed to improve, facilitate, and simplify their lives. As to the date of December 30th, 2019, the average amount of the invalidity pension, including also partial invalidity pensions, was EUR 275.54, the amount of the invalidity pension up to 70% was EUR 209.85 and the amount of the invalidity pension over 70% was set at EUR 379.95 (www.socpoist.sk, 2020).

Because fewer traveling needs are met, participation of people with disabilities in tourism is extremely difficult. Most proposals to improve the offerings for people with disabilities are conditional on sufficient funding for their implementation.

Information barriers or the availability of public information for all people, including ones with disabilities, is a necessary condition for their full and equal participation for living in society. They help them with planning a specific goal of their trip, with time planning, with the selection of specific accommodation and hospitality facilities, with the planning of leisure activities, etc. For people with disabilities, it is not enough to know that the hotel has a wheelchair-accessible room, or the museum has wheelchair access. The physically challenged are interested in whether the object has a barrier-free access to all floors, whether access is only exterior or interior, to what extent is parking provided, whether handrails are available in sanitary facilities, etc. (Linderová, 2018). This information is often useful not only for the visitors with disabilities, but also for families with small children, with a stroller and other people with reduced mobility.

Examples of suitable information accessibility can be drawn from abroad (Table 12).

Table 12. Information on accessible facilities for disabled people abroad

Country	Web page
Austria	barrierefreierurlaub.at ; https://www.wien.info/en/travel-info/accessible-vienna
Spain	www.accessiblespaintravel.com
England	www.visitengland.com/plan-your-visit/access-all/accessible-england ; accessibleguide.co.uk
Poland	www.accessibletour.pl
Czechia	www.jedemetaky.cz ; vysocinounavoziku.ji.cz ; cestybezbarier.cz ; www.presbariery.cz
Greece	www.accessgreece.com
Israel	www.israel4all.com
New Zealand	http://travability.travel/content/about-us
France	http://en.parisinfo.com ; accessible.net
Countries of the USA, Canada, Europe, America, Asia and Africa	wheelchairtraveling.com

Source: Own elaboration according to accessibletourism.org (2018), Linderová (2018)

Information on the accessibility of tourism people with disabilities in the self-governing regions of Slovakia is currently not available in a comprehensive form on the Internet.

Conclusions

In the post-pandemic period of Covid-19, many countries will need to restructure their tourism product, which can be an opportunity for the development of tourism for the visitors with disabilities. This article focused on the analysis of the tourism demand side of the visitors with disabilities in Slovakia and finding the accessibility of tourism supply in Slovakia for visitors with disabilities. We tried to find out whether the demand for tourism services of the affected segment exists at all and if so, whether the satisfied demand indicates the satisfaction of visitors with disabilities with the current tourism supply in Slovakia. We used contact with people with disabilities through the representative organizations that associate them. We researched which problems in the current tourism supply they perceive as critical and what needs to be changed so that the supply is adapted to the requirements of all visitors without distinction. The results of the survey confirmed that people with disabilities are interested in traveling, use the current opportunities to an individual extent, but generally perceive the supply as insufficiently adapted, which significantly limits their travel opportunities. We found from the total number of 11,281 surveyed objects and facilities in Slovakia, less than 20% are fully or partially accessible. This means that the offering in Slovakia is still insufficiently adapted. In this paper, we used correlation analysis (calculation of tightness rates of dependence of monitored variables) to determine the dependence between variables in the analytical part of the publication, which we assumed to confirm the importance of achieving accessibility of tourism facilities with respect to attendance. We also searched for a statistical connection between economic performance of destinations at the level of self-governing regions and the achieved accessibility of facilities and

objects in the area of the monitored destinations. We achieved the set goal, which was to examine the degree of adjustment of tourism supply for visitors with physical disadvantages in Slovakia and to find out the connection between the accessibility of tourism objects and facilities and the attendance of destinations.

Due to the large representation of tourism objects and facilities in the country and the diverse requirements for their adaptation depending on the specific type of disability that causes disadvantages, this article focused on adapting the supply to visitors with physical disadvantages. Of all people with disabilities in the country, the people with physical disabilities are the most numerous. Requirements for customizing the supply for this segment of visitors need and will be appreciated by other groups of visitors, including seniors, people with weight issues, people accompanying a pram, or a person with a disability, all persons who are less physically fit (children, individuals with current movement problems due to injury, acute deterioration of health, which also results in movement restrictions, etc.). The adjustment of the supply for these segments of visitors does not cause any restrictions for healthy people, resp. for those who do not feel physical discomfort, on the contrary, such an adjustment generally makes the destination more attractive and enables better services provision. That is why the adaptation of tourism supply for visitors with disabilities in Slovakia is urgent and desirable.

Despite of an extensive research in Slovakia covering several years, we understand few limits of the research. The research focused on one country even if having examined all self-governing regions, and its research findings from national level cannot be compared to accessibility of adjacent countries. The research lasted continuously from 2016 up to 2021 and several facilities might have changed into accessible ones. The debarrierization and accessibility of tourism facilities and destinations represent a process which is financially, temporally and administratively challenging, therefore, we do not assume any distortion of the findings. Additionally, several planned investments have been postponed due to the current pandemic situation affecting Slovakia in 2020-2021. The research focused solely on accessibility of physically disabled visitors and does not cover other segments of disadvantaged people.

Apart of its limits, the paper enriches the academic discussion from theoretical and practical point of view. From theoretical aspect, the paper is the first one to reveal close links between tourism destination accessibility and attendance in context of competitiveness at the international tourism market. We hope to urge the academic community to include factors of accessibility into the understanding and definition of tourism destination competitiveness.

The unprecedented research findings from the point of view of its complexity within V4 countries region, may support the destination management organizations when addressing the sustainable tourism development and the augmentation of destination's competitiveness. The DMOs determine the number, timing and spatial distribution of supply in tourism destinations with regard to the requirements of visitors with disabilities and enhance the product accessibility of tourism destinations. The issue of accessibility is strongly appealing within the context of current COVID-19 pandemic as patients report health problems even several months after having overcome the disease which heavily decreases their mobility. We expect an increasing number of people with health disadvantage in the upcoming period, thus emphasising the need of specific approach to infrastructure development and to product development. The current pandemic situation represents a historical occasion for tourism enterprises in terms of modernization and augmentation of the tourism sustainability and accessibility to people with health disadvantages.

Further research is appropriate to focus on the accessibility of the tourism supply for other segments of visitors with disabilities, especially the visually and hearing-impaired visitors. Accessibility of the country in all aspects for various segments of visitors with disabilities can be a significant competitive advantage for the country on the international tourism market.

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THE IMPACT OF EMPLOYEES' JOB STRESS AND CAREER SATISFACTION OVER CORPORATE ENTREPRENEURSHIP MANAGEMENT LINKED TO SOCIAL RESPONSIBILITY

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Abstract. The purpose of the present study is to analyze how employees' job stress and career satisfaction impact corporate entrepreneurship management linked to social responsibility in a Colombian Information Technology company. For that purpose, we review the evolution of the corporate entrepreneurship concept, as part of innovation models and as an explicit research term, in a specific context, where organizations need to take into account stakeholders' needs. Once completed the review, we present the research methodology with a quantitative approach, where we triangulate or compare the results of an artificial neural network and classification tree, for the job stress and career satisfaction surveys' of 110 employees. The results finally suggest that only the job stress impact the corporate entrepreneurship management linked to social responsibility. At the same time, career satisfaction does not seem to have significant effects over it, in the IT Company.

Keywords: employees; corporate entrepreneurship; innovation; job stress; career satisfaction; social responsibility; machine learning methods; quantitative approach; classification tree; artificial neural network

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JEL Classifications: M1, M12, O31, O32

1. Introduction

Current research on business growth strategies, emphasizes corporate entrepreneurship (CE) (Garvin & Levesque, 2006; Morris, Kuratko, & Covin, 2010) that benefits innovation (Freeman & Engel, 2007; Kuratko, 2010). As a result, corporate entrepreneurship being part of entrepreneurship theory, has extended beyond change, strategic management, and innovation (McDougall & Oviatt, 2000). Despite its extension, the corporate entrepreneurship researchers have only focused on the competitive advantages, profitable and sustainable over time (Hornsby, Kuratko, Shepherd, & Bott, 2009; Kuratko, Ireland, Covin, & Hornsby, 2005; Kuratko, Ireland, & Hornsby, 2001; Morris et al., 2010), and on entrepreneurship behaviour (Wales, 2015), missing the opportunity of reviewing the topic as a holistic phenomenon (Ireland, Covin, & Kuratko, 2009; Wales, 2015) and link with the enterprise environment (Kuratko, 2010).

Some researchers recognized the holistic comprehension of the phenomenon, as necessary, and suggest their approach (Escobar-Sierra, Valencia-DeLara, & Vera-Acevedo, 2018). Fang (2013), for example, proposed the topic as a system with backgrounds or inputs (Zahra, 1986), transformations or process (Kuratko & Audretsch, 2013) and outputs or effects (Cao, Simsek, & Jansen, 2015; Zortea-Johnston, Darroch, & Matear, 2012). For him, the system is encouraged by the market triggers i.e., competition, dynamism and heterogeneity in market demands (Zahra, 1991)-, and the stakeholders' needs (Amaeshi, Nnodim, & Osuji, 2013; Carroll, 1999; Casson, 1982; Schwartz & Carroll, 2003; Shanne & Venkataraman, 2000). A context that turns on the system inputs, related to the organizational strategies i.e., governance policies (Bird, 1988), and organizational factors (Burgelman, 1983a) –i.e., culture, human resources practices (Hornsby et al., 2009), capacities and resources (Kuratko, Montagno, & Hornsby, 1990), leadership characteristics (Ling, Simsek, Lubatkin, & Veiga, 2008), information system (Kuratko, 2010), technological capabilities (Martín-Rojas, Fernández-Pérez, & García-Sánchez, 2016) and company features (Álvarez-Herranz, Valencia-De-Lara, & Martínez-Ruiz, 2011). Meanwhile, the process itself is related to the orientation or entrepreneurial behaviour, associated with innovation, risk-taking, and proactivity (Escobar-Sierra et al., 2018). Finally, the system outputs, associated with the stakeholders' satisfaction (Bedoya-Villa & Escobar-Sierra, 2018; Cao et al., 2015; Fang, 2013; Hernández Perlines, 2015; Zortea-Johnston et al., 2012), the main goal of social responsibility (Schwartz & Carroll, 2003). Once discussed the conceptualization of the corporate entrepreneurship, next we review the future recommendations of some authors that recently analyzed the topic. Among them are Franco & Haase (2017) who found that participative leadership style and job satisfaction has a significant effect over the collective entrepreneurship i.e., a conceptually more specific and detailed construct within the realm of corporate entrepreneurship. Moreover, he suggested it study into other geographical areas, paying particular attention to intercultural aspects. Urban & Wood (2015) that highlight the importance of fostering opportunity recognition behaviours within an organization and motivating employees to act innovatively. Kuratko, McMullen, Hornsby, & Jackson (2017) who first proposed and then suggested future validation of a new instrument that measures organizational antecedents for corporate social entrepreneurship. Hughes & Mustafa (2017) that provide an incipient depiction of the internal environment for corporate entrepreneurship in emerging economy SMEs, finding that cultural and contextual factors influence the extent to which they can produce corporate entrepreneurship activity. Chebbi, Yahiaoui, Sellami, Papasolomou, & Melanthiou (2019) that highlighted the vital role of internal stakeholders and internal marketing themes, as prerequisites for organizational change and the adoption of corporate entrepreneurship. Furthermore, Luu (2017) who relates corporate social responsibility, organizational citizenship behaviour for the environment, and corporate entrepreneurship as moderation mechanisms, finally suggests its future analysis, including value-based HR practices, among other things. Rexhepi, Abazi, Rahdari, & Angelova (2019) suggest the future inclusion of entities, identified as “helices” in the innovation models. Because the organization is an open system, thus it creates benefits for others but also can use benefits from others.

In this context, we question about how employees' job stress and career satisfaction impact the corporate entrepreneurship management linked to social responsibility in an IT Colombian company – classified as a big company - with presence in different countries. To that effect, the present study analyzes how employees' job stress and career satisfaction impact the corporate entrepreneurship management linked to social responsibility and present the findings in stages. This stage introduces the research context, the theoretical background, the problem, and the research question. The second stage presents a literature review and selection of the theoretical framework. The third section presents the methodological approach, where we compare or triangulate the results of artificial neural network and classification tree, and on the fourth stage presents the results and analysis. Finally, the fifth and sixth stages discuss the results with that of other authors and present the conclusions.

2. Literature review and selection of the theoretical framework

Despite the remote origin of entrepreneurship, that possibly emerge in the 16th century, only in the 20th century the official discussion about the concept began (Radović-Marković & Salamzadeh, 2012). It can be said that this recent discussion and the theoretical development of corporate entrepreneurship has two significant milestones. The first milestone was the implicit inclusion of the term while referring to innovation models, as Freeman and Engel (2007) suggest when dividing innovation models between startups and mature companies. Moreover, the second one, related to the explicit adoption of corporate entrepreneurship as a research term (Peterson and Berger, 1971), and its consolidation as a research field (Kuratko, 2010). In this context, next, we propose a literature review that begins with some innovation models that include mature companies process in its definition – the first milestone, to end with a tour through the concept of CE –the second milestone.

- Clark (1968) while analyzed institutionalization of innovations in higher education, criticized the traditional models -i.e., the organic growth model, the differentiation model, or the diffusion model-. To finally proposed the combined-process model that suggests as more appropriate for many situations.
- Langrish, Gibbons, Evans, & Jevons (1972) while studying innovation in the industry, present a general discussion about the topic, some quantitative results, and several case studies. They finalize with the proposal of the innovation push model - related to discovery, and the pull model - related to demand.
- Mulkay (1975) discuss three models of the processes by which science develops –i.e., the model of openness, of closure, and of branching-. And argue that the third model provides social factors to scientific knowledge.
- Von Hippel (1978) propose the 'manufacturer-active' paradigm for which the manufacturer has the role of assessing customer needs and developing a responsive product idea. And the 'customer-active' paradigm in which the customer develops the new product idea and takes the initiative to transfer it to an interested manufacturer.
- Tornatzky et al. (1983) defined the 'technology source-centred models', i.e. based on basic research, applied research, development, testing or evaluating, manufacturing or packaging and marketing or dissemination, and the 'technology user-centred models', i.e. related to awareness, matching-selection, adoption-commitment, implementation and routinization.
- Saren (1984) discusses the problems of a generalized innovation model, and review the advantages and disadvantages of the (a) Departmental-stage models, (b) Activity-stage models, (c) Decision-stage models, (d) Conversion process models, and (e) Response models. To conclude that more research needs to be concentrated on the nature of the innovation process within the firm itself.
- Pinch & Bijker (1984) outlined the need for a social constructivist approach towards the study of science and technology. To finally, describe in more detail the two approaches, one in the sociology of scientific knowledge (EPOR), and one in the field of sociology of technology (SCOT).
- Kline & Rosenberg (1986) criticized the models that consider innovation as a smooth and well-behaved linear process. To end, proposing innovation as a series of changes in a complete system not only of hardware, but also of market environment, production and knowledge facilities, and the social context of the organizational innovation.

- Ziman (1991) criticized the general discourse about innovation exclusively based on the linear model. He also proposed another way of viewing the situation with a neural net model which allows for 'learning' to take place much as in the human brain.
- Rothwell (1992) traces developments in the models of industrial innovation from (1) the linear 'technology push' and 'need pull' model, (2) the 'coupling model', (3) the 'integrated model'. Until (4) the 4th Generation innovation process that perceived innovation as a parallel process. And, (5) the 5th generation model that involves inter-company networking, and employs a new electronic toolkit.
- Newby (1992) qualify as incomplete the so-called 'linear model' of science and propose an interactive model that takes into account as multidirectional the relationship between science, technology, and society.
- Freeman (1996) argues that world economy can move to a new and sustainable pattern of growth, through a new innovation model that combine some features of the much-criticized linear model - common in mature companies - with features of the systemic innovation model.
- Tait & Williams (1999) defend the linear model of innovation as an essential driver of research and technology development (RTD) policies. And propose a linear-plus model which is reflected in policy initiatives such as (1) the promotion of industry-academic links, (2) special support for small and medium-sized firms and the (3) encouragement of more interdisciplinary approaches in the RTD process.
- Marinova & Phillimore (2003) presents a historical examination of models used to explain innovation. Their overview includes six generations of models, namely black box, linear, interactive, systems, evolutionary models and innovative milieux. For each one, they presented the conceptualization background, the model itself and its elements, explanatory power, related models and concepts, and further research directions.
- Hargrave & Van De (2006), when referring to institutional innovation, introduce a collective action model. That view institutional change as a dialectical process in which actors espouse conflicting views confront each other and engage in political behaviours to create and change institutions.
- Caraça, Lundvall, & Mendonça (2009) they showed the change from a linear to the chain-linked model. To finally proposed a new model that summarizes the current research on the nature of economically useful knowledge, the diversity of intervening players in learning and the outcomes of innovation.
- Doloreux et al. (2019) evidenced that there is relatively little that is genuinely new in the different 'Territorial Innovation Models' in terms of theory-building and related concepts. This kind of models is also known as industrial districts, innovative milieu, learning regions, clusters, regional innovation systems, local production systems and new industrial spaces.
- Rexhepi, Abazi, Rahdari, & Angelova (2019) described the triple helix that represents innovation system model where interact three 'helices' in knowledge production: universities-industry-governments.
- Soliman, Mogefors, & Bergmann (2020) proposed what they called "problem-driven innovation models" to refer a more evidence-based and empirical mindset to drive valuable innovations with increased efficiency ultimately.

Meanwhile, and concerning the second milestone, next, we present a general tour through the clear concept of CE that begin in 1970. A period where researchers devoted to understanding the entrepreneurship within organizations and the risk team involved in its process. Then, during the 80's decade, the efforts were focused on the design and redesign of CE in the company (Burgelman, 1983b, 1983a, 1984). On the '90s the researches, study the skills that promoted innovation (Zahra, 1991). And finally, during the last two decades, the researches have focused on the combination of previously developed approaches, to understand how organizations obtain sustainable, profitable and competitive advantages over time (Hornsby et al., 2009; Morris et al., 2010; Lichtarski et al., 2020; Laužikas, Miliūtė, 2020).

3. Methodology

Once defined the research problem and completed the literature review and selection of the theoretical framework, we present the research protocol proposed to solve the mentioned research question.

Table 1. Research protocol for the empirical verification.

Criteria	Quantitative approach
Role of the theory	Deductive
Research strategy	Case study
Unit of Analysis	Job stress and career satisfaction
Sample	110 employees of an IT company in Colombia
Variables	Dependent variable –i.e., y- (Idea quality measure related to company stakeholder's needs (in the social responsibility framework)) and independent variables –i.e., x- (employees' job stress, career satisfaction and other demographic variables).
Gathering of data	Variables: education level (Pernelle, Carron, Elkadiri, Bissay, & Marty, 2014:323–332), Quality metric for generated ideas (Reinig & Briggs, 2013:943–973) (Likert scale for SR criteria), gender, age and years of service (Chiavenato, 2008). Instrument: Shukla & Srivastava (2016) survey of job stress and Greenhaus, Parasuraman, & Wormley (1990) survey of career satisfaction.
Analysis of results	Machine learning methods: Artificial neural network (Nisbet, Miner, & Elder, 2009) Classification tree (Bramer, 2007)
Results	Employees' job stress and career satisfaction factors that influence idea quality related to social responsibility.

Source: created by the authors

The data was collected in 2018, between 110 employees of an IT company in Medellín-Colombia-South America, born between 1963 to 2001. 56.4% of the respondents have a professional career, and 60.9% correspond with men. During the fieldwork, all employees were asked a real problem of the company creatively, while other data was gathered.

4. Results and analysis

For the analysis of the results, we apply a triangulation, i.e. an alternative of validation where can combine multiple methods, empirical materials, perspectives and observers in a single study as a strategy that adds rigour, breadth, and depth to any investigation (Denzin & Lincoln, 2008, p. 3; Flick, 1992). Specifically, a method triangulation where we compare the results of an artificial neural network (ANN) and the classification or decision trees. Two techniques that deliver the importance of each one of the variables as results, once verified the significance and accuracy of the models.

The artificial neural network (ANN) is a computational system that works like the human brain, passing impulses from neuron to neuron across synapses (Nisbet et al., 2009). This technique can be configured to function as a binary classifier (yes/no or 1/0) or as a regression index (for numerical outputs) or and also to contain multiple output nodes for estimation, classification or even as a clustering algorithm (Nisbet et al., 2009). While the decision or classification trees, the most popular technique in data mining, help to generate classification rules through a treelike structure (Bramer, 2007), used to predict and compress data (Bramer, 2007). Next, we present the results of each technique.

4.1 Results and analysis of the artificial neural networks

The artificial neural network is configured as follow:

- The objective of the model is to discover how employees' job stress, measured with the test of Shukla & Srivastava (2016), and career satisfaction, measured with the test of Greenhaus, Parasuraman, & Wormley (1990), impact the quality of the idea, scores of Likert scale proposed by Reinig and Briggs (2013) related to social responsibility. Model in which job stress and career satisfaction act as independent variables, while the idea quality related to social responsibility acts as the dependent variable.
- Artificial neural network (ANN): multilayer perceptron.
- Sample: 110 employees
- The ANN configuration has 114 units, with 1 hidden layer and 15 units in the hidden layers. The activation function corresponds to the hyperbolic tangent with one dependent variable. The number of units is 4, the activation function is softmax, and the error function is a cross-entropy.
- Dependent variables: a measure of idea quality (Reinig & Briggs, 2013) defined as a Likert scale associated with social responsibility issues (denoted by the letter Y).
- Independent variables: 21 items of Shukla & Srivastava's (2016) test (denoted by the letter X) and five items of Greenhaus, Parasuraman, & Wormley's (1990) test (denoted by the letter Z).
- Demographic variables such as age, gender, education level and years of service.

Table 1 shows the results of the ANN that has a cross-entropy error of 37.497 during the training; the percentage of the incorrect forecast is 17.3%, and the stop rule is one time.

Table 1. Percentage of correct results that reaches the artificial neural network for each quality measure during the training

Quality measure	Correct percentage
Null	77.8%
Low	83.3%
Medium	86.7%
High	66.7%
Global	82.7%

Source: created by the authors using SPSS®

As a useful measure of accuracy, Figure 1 shows the plot of sensitivity versus 1- Specificity, known as receiver operating characteristic (ROC) curve (Hajian-Tilaki, 2013).

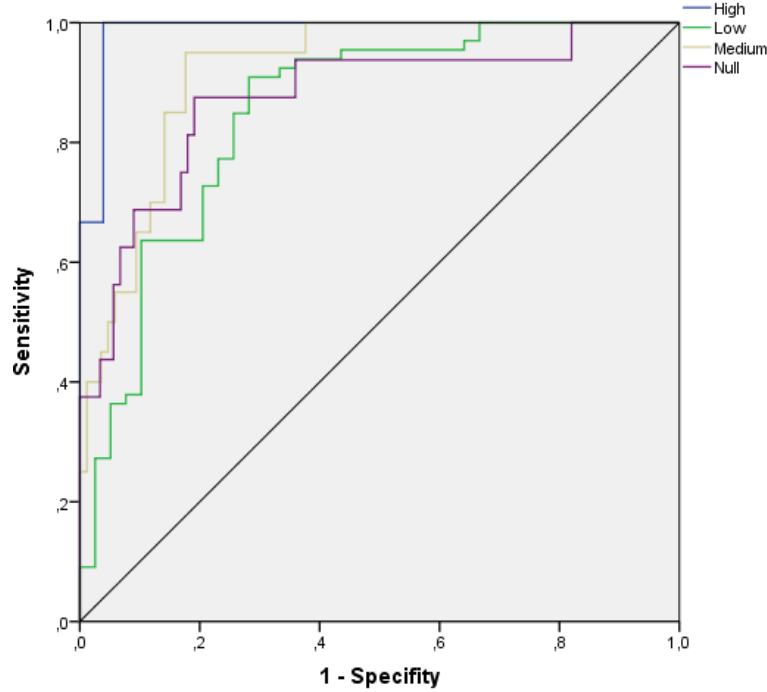


Figure 1. ROC curve for the artificial neural network

Source: created by the authors using SPSS®

Next, in Table 2, we present the area under the curve, shown in Figure 1, for each of the quality measures (null, low, medium and high).

Table 2. Area down the curve for each quality measure

Quality measure	Area down the curve
Null	.847
Low	.850
Medium	.918
High	.987

Source: created by the authors using SPSS®

Once verified the accuracy of the model, next, we present in Table 3, the estimated importance of each independent variable in the ANN.

Table 3. Importance of each independent variable in the artificial neural network

Independent variables	Importance
Gender	.026
Age	.057
Education level	.038
Years of service	.044
X1	.038
X2	.031
X3	.040
X4	.053
X5	.025
X6	.027
X7	.021

Independent variables	Importance
X8	,034
X9	,025
X10	,023
X11	,035
X12	,027
X13	,046
X14	,043
X15	,022
X16	,043
X17	,019
X18	,029
X19	,034
X20	,038
X21	,020
Z1	,039
Z2	,033
Z3	,036
Z4	,026
Z5	,028

Source: created by the authors using SPSS®

X1 - "I have much work, and I am afraid there is very little time to do it." X2 - "I feel so overwhelmed that even a day without work seems bad." X3 - "I feel like I never leave my job." X4 - "Many people in my office are tired of the company's demand." X5 - "My job makes me nervous." X6 - "The effect of my work on me is too high. Many times, my work becomes too much of a burden." X7 - "Sometimes, when I think about my work, I get a feeling that my chest is being squeezed." X8 - "I feel bad when I leave my job." X9 - "I am not able to satisfy the different requests of my bosses." X10 - "I cannot solve the conflicts with my colleagues." X11 - "I cannot satisfy my customers' requests, because they are opposite to each other" X12 - "My bosses' expectations are different from my subordinates" X13 - "I am concerned about the expectations of different people." X14 - "My co-workers share information with me, they explain." X15 - "My co-workers understand me. They give me advice." X16 - "I have received clear and useful recommendations about my work." X17 - "I have received help in my work." X18 - "I can balance time at work and time in other activities." X19 - "I have difficulty balancing my work and other activities". X20 - "I feel that work and other activities are currently balanced." X21 - "In general, I think my work and other activities are balanced." And Z1 - "I am satisfied with the success I have achieved in my career." Z2 - "I am satisfied with the progress I have made in achieving my professional goals." Z3 - "I am pleased with the progress I have made in achieving my income goals." Z4 - "I am pleased with the progress I have made toward my career goals." Z5 - "I am pleased with the progress I have made in achieving my goals for new skill development."

The first ten independent variables or demographic data (listed in Table 3 in italics font) represent the most critical variables, those that more contribute to the idea quality metric in the ANN analysis. These ten most influential variables of the ANN will be compared or triangulated with the ten most influential variables of the classification tree, in the next section.

4.2. Results and analysis of the classification trees

The classification tree is configured as follow:

- The objective of the model is to discover how employees' job stress, measured with the test of Shukla & Srivastava (2016), and career satisfaction, measured with the test of Greenhaus, Parasuraman, & Wormley (1990), impact the quality of the idea, scores of Likert scale proposed by Reinig and Briggs (2013) related to social responsibility. Model in which job stress and career satisfaction act as independent variables, while the idea quality related to social responsibility acts as the dependent variable.
- Growing method for the classification tree: CRT
- Sample: 110 employees
- Maximum tree depth, 10; minimum number of cases in a final node, 8; minimum number of cases in a parental node, 2.
- Dependent variables: a measure of idea quality (Reinig & Briggs, 2013) defined as a Likert scale associated with social responsibility issues (denoted by the letter Y).
- Independent variables: 21 items of Shukla & Srivastava's (2016) test (denoted by the letter X) and five items of Greenhaus, Parasuraman, & Wormley's (1990) test (denoted by the letter Z).
- Demographic variables such as age, gender, education level and years of service.

Finally, this stage presents the resulting classification tree that has 25 nodes, 13 terminal nodes and a depth of 6 and reaches correct results in the 79,1% of times, as is shown in Table 4, which shows the percentage of correct results reached for each quality measure.

Table 4. Percentage of correct results that reach the classification tree for each quality measure

Quality measure	Correct percentage
Null	50.0%
Low	91.3%
Medium	63.6%
High	66.7%
Global	79.1%

Source: created by the authors using SPSS®

Once verified the accuracy of the model, we present in Table 5, the estimated importance of each independent variable in the classification tree.

Table 5. Importance of each independent variable in the classification tree

Independent variables	Importance
X3	,046
X7	,045
Age	,045
X11	,038
X18	,034
X2	,031
X21	,031
Z1	,028
Years of service	,027
X19	,027
X16	,026
X9	,025
Education level	,025
X6	,025
X5	,024
X13	,024
Z5	,023
X4	,019
Z3	,014
Z2	,013
X1	,012
X14	,011
X12	,010
X17	,007
X10	,004
Z4	,003
X15	,001

Source: created by the authors using SPSS®

X1 - "I have much work, and I am afraid there is very little time to do it." X2 - "I feel so overwhelmed that even a day without work seems bad." X3 - "I feel like I never leave my job." X4 - "Many people in my office are tired of the company's demand." X5 - "My job makes me nervous." X6 - "The effect of my work on me is too high. Many times, my work becomes too much of a burden." X7 - "Sometimes, when I think about my work, I get a feeling that my chest is being squeezed." X8 - "I feel bad when I leave my job." X9 - "I am not able to satisfy the different requests of my bosses." X10 - "I cannot solve the conflicts with my colleagues." X11 - "I cannot satisfy my customers' requests, because they are opposite to each other" X12 - "My bosses' expectations are different from my subordinates'" X13 - "I am concerned about the expectations of different people." X14 - "My co-workers share information with me, they explain." X15 - "My co-workers understand me. They give me advice." X16 - "I have received clear and useful recommendations about my work." X17 - "I have received help in my work." X18 - "I can balance time at work and time in other activities." X19 - "I have difficulty balancing my work and other activities". X20 - "I feel that work and other activities are currently balanced." X21 - "In general, I think my work and other activities are balanced." And Z1 - "I am satisfied with the success I have achieved in my career." Z2 - "I am satisfied with the progress I have made in achieving my professional goals." Z3 - "I am pleased with the progress I have made in achieving my income goals." Z4 - "I am pleased with the progress I have made toward my career goals." Z5 - "I am pleased with the progress I have made in achieving my goals for new skill development."

The first ten independent variables or demographic data (listed in Table 6 in *italics font*) are the most influential, those that contribute the maximum to the dependent variable in the classification tree analysis. Five of these 10 influential variables are common or recurrent between ANN results and classification tree results (green highlighted variables of Table 3 and Table 5). Methodological triangulation that suggests the following independent or demographic variables (1) X3 “I feel that I never take a leave”. (2) X7 “Many times, my job becomes a big burden”. (3) Age. (4) X2 “I feel so burdened that even a day without work seems bad”. Moreover, (5) years of service as the most influential variables over the idea quality associated with social responsibility issues.

Where we can highlight the incidence of job stress i.e., with three of the five commons, and most influential variables- and the absence of career satisfaction factors on idea quality. The job stress survey that we applied was proposed by Shukla & Srivastava (2016, p. 10). It is divided into different scales, as follows (a.) job stress, (b.) role expectation conflict, (c.) co-worker support and (d.) work-life balance. The most influential variables are all on the first scale, related to the job stress. And, concerning the demographic variables, age and years of service acts as an inhibitor or promoter of the corporate entrepreneurship, showing a real influence.

5. Discussion with other authors

The present study focuses on the innovation process within the firm itself, as Saren (1984) suggests, and consider the social context of the organizational innovation that highlights Kline & Rosenberg (1986). Our analysis of the impact of job stress and career satisfaction over the corporate entrepreneurship management linked to social responsibility agrees with the recent recommendations of Franco & Haase (2017) that proposed the future inclusion of intercultural aspects while analyzed the job satisfaction. Kuratko, McMullen, Hornsby, & Jackson (2017) that talked about corporate social entrepreneurship, bridging this kind of entrepreneurship with the social context. Chebbi, Yahiaoui, Sellami, Papasolomou, & Melanthiou (2019) that highlighted the important role of internal stakeholders as employees, also recognizing the externals (Rexhepi et al., 2019). Caraça, Lundvall, & Mendonça (2009) that promoted the diversity of intervening players in learning and the outcomes of innovation. And Luu (2017) that has also related social responsibility with corporate entrepreneurship. Our methodological proposal responses to Ziman (1991) recommendation of modelling innovation through a neural net model. And, the independent variable also attends to Soliman, Mogefors, & Bergmann (2020) recommendation, of including a problem-driven innovation.

Nevertheless, the obtained results disagree with the proposals of other authors like Urban & Wood (2015) that favours only the opportunity recognition behaviours among employees. Hughes & Mustafa (2017) that study emergence economies – like the Colombian one, but only focused on the corporate entrepreneurship in SMEs. Hargrave & Van De (2006) for whom innovation is a dialectical process in which actors espouse conflicting views confront each other. And Von Hippel (1978) who propose the ‘manufacturer-active’ paradigm i.e., for which the manufacturer has the role of assessing customer needs and developing a responsive product idea, and the ‘customer-active’ paradigm, i.e., in which the customer develops the new product idea and takes the initiative to transfer it to an interested manufacturer.

6. Conclusions and recommendations

Only the job stress impact the corporate entrepreneurship management linked to social responsibility, while career satisfaction does not seem to have significant effects over it, in the IT Company. The job stress mentioned refers, in this case, to the physical stress derived from the work, not to the stress resulting from the role expectation conflict, the co-worker support, and the work-life balance. In the selected case of the IT Colombian company, the corporate entrepreneurship management linked to social responsibility also seems related to demographic variables like the age and the years of service. A meaningful finding for the corporate entrepreneurship and social responsibility field that can be taken into account in future meta-analysis reviews. Furthermore, a useful finding for managers that believe in employees as the main actor of cooperative innovation models.

The methodological triangulation - like the one applied - where can be combined, between others, multiple methods, results as an efficient strategy to add rigour, breadth, and depth to research. In our case, we compare the results of the artificial neural network (ANN) and the classification or decision trees, once verified the significance and accuracy of the models. During this triangulation, we compare the ten most important independent variable in the artificial neural network model with the ten of the classification trees, where we find five common variables in both models.

Despite the remote origin of entrepreneurship, that possibly emerge in the 16th century, only in the 20th century the official discussion about the concept took place. This discussion about the topic has two big milestones, the first one related to the implicit inclusion of the term while referring to innovation models, where it is important to highlight the absence of a generalized model. And the second one related to the explicit adoption of corporate entrepreneurship as a research term, where the focus is on understanding how organizations obtain sustainable, profitable and competitive advantages over time.

The link that we propose between corporate entrepreneurship management and social responsibility consider the different stakeholders' needs during the idea generation process, as part of a problem-driven innovation. Our conception of social responsibility takes into account legal, economic and environmental issues, in a particular context where ethical and sustainability values are essential in the resolution of stakeholders' needs. However, in our research, the evaluation of social responsibility only considers the idea generation process, so for future research, it could be taken into account other corporate entrepreneurship phases, as design, production, commercialization, after-sales, and disposal phases. Another gap in our research relates to the inclusion of only one stakeholder, the employees, who tried to solve different stakeholders' needs. In the future, we can consider the perspective of different stakeholders.

For future researches, we suggest the verification of other backgrounds of corporate entrepreneurship related, for example, with organizational strategies, and with different organizational factors to those analyzed here. In this sense, it would also be possible to review the corporate entrepreneurship process with behaviours associated with the risk-taking and proactivity. And with the corporate entrepreneurship outcomes, related to the organizational performance link to the satisfaction of different stakeholders. Finally, we highlighted the inclusion of different stakeholders in the corporate entrepreneurship management, for example, the shareholders, the suppliers, the clients, the academies, and the state.

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AUDITING AS AN EFFECTIVE MEAN OF COMMUNICATION ON ENVIRONMENTAL, SOCIAL AND GOVERNANCE ISSUES IN BRAZIL

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Abstract. The study investigates the understanding of the relationships between the adoption of the sustainability standards by the organisations, audit role and the effective communication based on Environmental, Social and Governance (ESG). The ESG has evolved over time in several countries and has attracted some concerns on the part of stakeholders. Thus, our research responds to the question of what the understanding of the relationship between audit communication and ESG risks is. Data was constructed from the Symposium organized by the Brazilian Central Bank addressing the future of sustainability and from interview of experts. We used the discourse analysis to work on the data corpus. Our results reveal that to comprehend the relationship between auditing and communication on ESG issue, understanding risk analysis and the matrices, planning and rules of effective communication turns *sine qua non*. *De facto*, a well written report and communicated in a timely manner instils confidence in the auditee by procuring response and giving remedies to weaknesses without fear or favour. Results also indicate that auditing will have a key role to play through their methodologies noting that they are competent to carry out the work. Overall, our study contributes to research on ESG, auditing communication and stakeholders' relationships.

Keywords: ESG; sustainability; audit, effective communication; auditing; stakeholders; SDG; Brazil

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JEL Classifications: O30, O44

1. Introduction

The United Nations (UN) has 17 Sustainable Development Goals (SDGs) (Leal Filho, 2018). This said goal worked on by the UN would meet the most urgent environmental, political and economic challenges of our time. In view of the aforementioned, the coverage of our study is objective 16 - peace, justice and effective institutions. De facto, companies and organizations in general ought to be sustainable, in order to meet their social goal.

In the same vein, the world of financial investments can have significant changes, which consider sustainability criteria, or ESG – Environmental, Social and Governance (World Economic Forum, 2020). These criteria assume that companies need to demonstrate that more and more they are sustainably generating indicators and monitoring the performance of their actions so as not to compromise their new scenario of ESG.

In this said scenario, auditing will play a key role in this new sustainability and ESG context in the companies. In fact, auditing will have to improve their communication role in order to enhance their support of corporate governance.

Prior researchers, such as Nizam et al (2019), Batae et al (2020), Giudice and Rigamonti (2020), SASB (2021), Hargie et al (2002), Goldhaber (1977), Imoniana et al (2021) and United Nations Programme (2021), Qureshi et al (2019) and Garcia et al (2017) have ventured to address social and environmental sustainability, ESG, quality scores of ESG, sustainability accounting, auditing communication, sustainability technology and the financial market, respectively. However, no study has addressed ESG and auditing communication enblock so, this study therefore resolves to fill this research gap. In line with aforementioned, our research responds to the question: what is the understanding of the relationship between audit communication and ESG risks?

This study is arranged in the following order: the next section describes the background literature in the existing databases. Section 3 provides a description of the research methodology and data construction. Section 4 analyses the data and results, while section 5 paves the way for discussion, capitalizes on the reflexivity on the results and focusing on the main stakeholders. Section 6 gives the conclusion of the article.

2. Background

2.1 The ESG in the Corporate Environment

Today's corporate environment is undergoing significant changes owing to globally adopted standards to tackle the problem of sustainability; such as the 2015 Paris Agreement, which made it mandatory to decarbonize participating countries (Paris, 2021); China's national carbon trading system in 2017 (China, 2021); by 2030 India aims to make a country with a high proportion of renewable energy (India, 2021). Similarly, the Central Bank of Brazil launched a sustainability agenda in September 2020, with the objective of standardizing and monitoring the national financial system in sustainability aspects (BC#Sustentabilidade, 2020).

The achievement of the expected goals become more demanding, when inserted in the context of the ESG, which defined criteria to be followed. Nizam et al (2019) mentioned that establishing ESG policies is a process that incurs costs for setting the ESG framework, due diligence, and current disclosure policies.

However, as there is not just a symbology of how to measure ESG performance, an important role to be played is to crave an indulgence for the explanation of practices and results of companies that have ESG. In September 2020, the World Economic Forum in conjunction with the Big 4 (Deloitte, EY, KPMG and PwC) released a document entitled Measuring Stakeholder Capitalism Towards Common Metrics and Consistent Reporting of Sustainable Value Creation. This document brought to limelight the initiative for companies in general to seek a measurable and comparative form of the ESG criteria applied to their businesses. World Economic Forum (2020) defines a core set of “Stakeholder Capitalism Metrics” (SCM) and disclosures that can be used by IBC (International Business Council) members to align their mainstream reporting on performance with environmental, ESG indicators and track their contributions towards the SDGs (Sustainable Development Goals) on a consistent manner.

Another aspect to be considered today in the ESG criteria is the impact that the COVID-19 will play on the sustainability indicators of companies. According to Batae et al (2020) the ESG criteria and financial performance are expected to change significantly due to the pandemic.

As there is no universal standardization of ESG factors that apply to all companies the process of analysing the ESG criteria becomes even more complex. Chatterji et al (2016) and Delmas and Blass (2010) observed that there is evidence that ESG ratings tend to be different among the rating agencies. Thus, there is still a way to go to obtain measurable and comparable standards of the ESG criteria, considering their materiality, as well as centralizing on regulatory body for supervision.

Materiality principles definition (2021) states that an accounting standard can be ignored if the net impact of doing so has such a small impact on the financial statements that a reader of the financial statements would not be misled. This is true, inasmuch as no harm has been caused by material misstatement through the disclosure.

The investors' need for their assessment and scrutiny have created demand for specialized rating services (Giudice and Rigamonti, 2020); so also, will the use of indicators be imperative. For investors, the lack of a single reporting standard for companies can be a barrier when deciding where to invest. Following (Vodovoz et al (2020), the plethora of environmental, social, and institutional investors, asset managers, lenders, credit ratters, and insurers are increasingly relying on companies' ESG disclosures to make important decisions.

In any case, it is possible to highlight several regulatory instruments that will give clearance in the definition of the metrics of the ESG criteria, such as, The Ten Principles of the UN Global Compact (2021); Sustainability Accounting Standards Board (SASB, 2021); Global Reporting Initiative (Szczepankiewicz, 2021); International Integrated Reporting Council (IIRC, 2021); International Standards Organization (ISO 26000, 2021); Australian Stock Exchange, Listing Rule 4.10.17 (ASE, 2021); China State-Owned Assets Supervision and Administration Commission, Directive (CSASAC, 2021); Climate Disclosure Standards Board, The CDSB Reporting Framework (CDSB, 2021)]; France, Eccles et al (2011); Germany, Eccles et al (2011); Johannesburg Stock Exchange, Listing requirements (2021)]; Singapore Stock Exchange, Policy Statement on Sustainability Reporting (2021); Brazil, ESG Products and Services - Stock Exchange (B3, 2021) etc.

However, regardless of the form and communication channels used to report the ESG criteria, the important thing is to ensure the existence, integrity and objectivity of the information offered and allow it to be easily communicated to the stakeholders. Thus, drawing on Giudice and Rigamonti (2020), our inference may be different particularly when we take a second look at audited and yet to be audited financial statements.

Finally, the primary instrument to ensure the veracity of such information is for the company to use a good audit communication process, whether internal or external, while reporting to stakeholders. In line with this, evaluations by ESG rating agencies are made using complex questionnaires and analysis of public information sources (Escrig-Olmedo et al 2010).

2.2 The Communication of Audit Engagements and ESG issues

According to Hargie et al (2002), effective communication is central to business success, as such, it should be an integral part of strategic planning for all organizations. Where an organizational communication lacks effectiveness the results tend to be bad. What is currently the solution to avoid errors in audit communication is the professional standardization of reports, which is described in the International Standard for Professional Practice of Internal Audit. 2400 – Communicating Results (The IIA, 2017).

What is often found in the current literature is the discourse of the communication of audit papers that revolves around the writing of the report, and this is a matter of discussion (Chambers, 2017). Thus, making one to infer that a good report writing results in a call to action, while the opposite would lead to inappropriate actions or inaction. In other words, a well written report and communicated in a timely manner instils confidence in the auditee by procuring response, accordingly and giving remedies to weaknesses pinpointed without fear or favour. According to Bobek (2012), there is practice-oriented evidence on the importance of auditor interaction and auditee in successfully addressing and solving job challenges.

According to Golen et al (1997) for example, if an auditee is pragmatic and the auditor presents information that is theoretical and extremely complex, the auditee could become uncomfortable and be perceived as uncooperative. In this case, restructuring the message to be more practical can be the first step in removing a communication barrier. Similarly, Archambeaut and Morgen (2010)], to minimize interpersonal problems, the auditor must build an environment conducive to communication flowing objectively and without conflicts, such as using euphemisms in his verbal communications, pay attention to the body language of the participants, in order to perceive the reactions of the auditee and be able to minimize the language during a discussion. Sure, minimising communication error lag restores the auditor integrity. Thus, following Scott et al (1999) for an audit to be successful, it depends on the commitment of senior management, because without their support it becomes exhaustive to perform the audit. In addition, according to same authors, without the support of senior management, it is often difficult to convince other officials that the results of the audit will be taken seriously.

Thus, the audit report must fulfil its role in transmitting relevant messages to this public, correlating the weaknesses found with the sociological and political strategy Bobek (2012), in order to direct efforts toward the goals established by senior management. In addition, to Marks (2017), it is then perceived that one of the problems in the communication of audit work is directly related to the writing of the report, as an example: intensifying the problem encountered, using words that generate conflicts of understanding between the parties.

De facto, the communication of audit engagements begins before the fieldwork, determining the focus of what to achieve. Concerning this Shelby et al (1996) observed that the determination of the focus and scope of the audit considers what the audit client intends from the audit engagement, and also take into consideration the knowledge and skills that the audit team has, and what is possible within the allotted time.

According to Cohen et al (2007) all companies, regardless of size, should strive to maintain strong internal controls and provide a control environment that supports solid reporting.

However, for communication to stakeholders be effective, auditing and governance bodies must maintain a synergy of what is expected as an audit communication method aligned with the organization's business. According to Golhaber (1977), the results of the audit may be reported orally and in writing to the appropriate public. A summary of the report may contain conclusions and recommendations, being prepared to disseminate information in the company. Another report containing executive information can be forwarded to the audit committee, for example.

In any case, the auditors, with the necessary training on ESG issues, being strategically aligned with the company's business, following the best practices for risk analysis, preparation of audit planning, execution of the job, will be able to communicate effectively with stakeholders. Following Fornelli (2016), improvements in audit quality go hand in hand with efforts to improve audit communication and transparency. Finally, in so far as we draw upon the literatures our argument further expands on the understanding of the relationship between audit communication and ESG risks which can be minimised through collaborative auditing engagement. According to Roy (2013), collaborative auditing will increase value for the business, while reducing gaps and real risks.

3. Methodology and Data Construction

The methodology adopted is interpretative, based on a constructivist perspective, according to King (2004). Knowledge was constructed based on understanding, through social constructivism that emphasizes the importance of culture and context in focus (Imoniana et al 2021).

A qualitative approach was used to construct discourse analysis, based on the Discourse Theory (DT), which the discursivity of social interaction explains the political aspects and their respective agendas of the various actors involved (Laclau and Mouffe, 2001).

According to Derry (1999) the greatest importance of discourse lies in the construction of social life. A qualitative study was elaborated with data collected from publicly available sources, with the objective of analysing the focus of the research (Gill, 2000).

Firstly, we draw from the debate sponsored by the Brazilian Central bank, involving several participants of the financial market around the world, in which the BC# Sustainability agenda was launched. The aim of this debate, which lasted about two hours, was to highlight the importance of ESG and discuss the responses to the new challenge of the Central Bank of Brazil in the face of sustainability (Castka et al, 2020). This debate was attended by distinguished guests from the global financial sector, such as, Mark Carney, United Nations Special Envoy for Climate Action and Finance; Larry Fink, CEO of Blackrock; Carola Schuler, Managing Director of Banks for Europe, Middle East and Africa at Moody's; Marcio Lopes, president of the Organization of Brazilian Cooperatives (OCB); Isaac Sidney, president of the Brazilian Federation of Banks (Febraban); and Justine Leigh-Bell, Deputy CEO of the Climate Bonds Initiative (CBI).

The agenda of The Central Bank of Brazil, according to BC# Sustentabilidade (2021), is comprised of strategic and dynamic agenda for socioenvironmental (S&E) sustainability; promoting sustainable finance; Proper management of S&E and climate risks within the National Financial System (SFN); incorporation of sustainability variables in the Central Bank of Brazil (BCB) decision-making process. As a main focus, the agenda addresses socio-environmental responsibility initiatives; partnerships; policies; supervision and regulation.

Finally, we interviewed 10 experts in the field, in order to triangulate our constructed data. The interviewees were treated with their initials, because the interviews were kept confidential. Due to the home-office situation generated by COVID19, the interviewees were invited and, after permission for individual scheduling with date and time the interviews were conducted virtually through remote online meeting applications. Each interview lasted around 50 minutes and the interviewees authorized the recording of their answers for later transcription. The demographic characteristics of the respondents can be observed in Table 1.

Table 1. Profiles of the respondents.

Respondent	Gender	Age	Experience	Profile
(CAR)	F	32	14	Specialist in accounting process auditing and ESG. Career developed in the Big 4 and in the service sector.
(FFS)	M	40	17	Business Process and Support Audit Manager. Career developed in the Big 4 and financial services sector.
(FET)	M	42	18	Senior Manager for Latin America responsible for business, operational and ESG auditing processes. Career developed in the Big 4 and in the banking and finance sector.
(JED)	M	62	35	CAE – Chief Audit Executive. Career developed in banking and finance.
(JES)	M	38	16	Coordinating Auditor. Career developed in the Big 4 and in the banking and finance sector.
(MAG)	M	36	12	Information Technology Audit Manager. Career developed in the Big 4 and financial services sector.
(PCM)	M	56	32	Specialist in Information Technology auditing and Information Security. Career developed in the Big 4 and in the banking and finance sector.
(ROR)	F	47	22	Risk and Compliance Manager. for Latin America. Career developed in the Big 4 and in the banking and finance sector.
(RNA)	M	37	17	Operational Process Audit Manager. Career developed in the Big 4 and financial services sector.
(TIY)	M	64	38	CAE – Chief Audit Executive. Career developed in the banking and finance sector.

4. Analysis

The analyses of this study considered the use of discourse analysis, supported by discourse theory for sociological, economic and political research, with the objective of providing an understanding of the relations between effective audit communication and ESG risks. This follows Imoniana and Imoniana (2020) who adopted discourse analysis, highlighting sociological, psychological and political interpretations to critique the data constructed in their study.

NVivo software was used to support the qualitative analyses of the interviews. Table 2 shows the words most cited in the interviews.

Table 2. Most cited words from interview comments.

Word	Length	Count	Weighted Percentage
audit	5	154	2.85%
think	5	97	1.79%
esg	3	94	1.74%
risk	4	63	1.16%
communication	13	57	1.05%
issues	6	45	0.83%
right	5	43	0.79%
know	4	36	0.67%
environmental	13	32	0.59%
work	4	30	0.55%
important	9	29	0.54%
committee	9	28	0.52%
companies	9	28	0.52%
effective	9	26	0.48%
issue	5	26	0.48%
management	10	24	0.44%
auditing	8	23	0.43%
auditor	7	23	0.43%
related	7	23	0.43%
bank	4	22	0.41%
internal	8	22	0.41%
board	5	20	0.37%
external	8	20	0.37%
information	11	19	0.35%
knowledge	9	19	0.35%
report	6	19	0.35%

According to Table 2, key words highlighted with more than 1% frequency in interviews were audit, with 2.85%, ESG with 1.79% and risk with 1.16%, communication with 1.05%. As the words says it all, this confirms our understanding of the relationship between audit communication and ESG risks. In addition, we also observed in the Word Cloud Figure 1, generated by the NVivo software, the key words highlighted or most commented

during the interview showing the relationships between audit, communication, ESG and risk among other rightful thoughts.

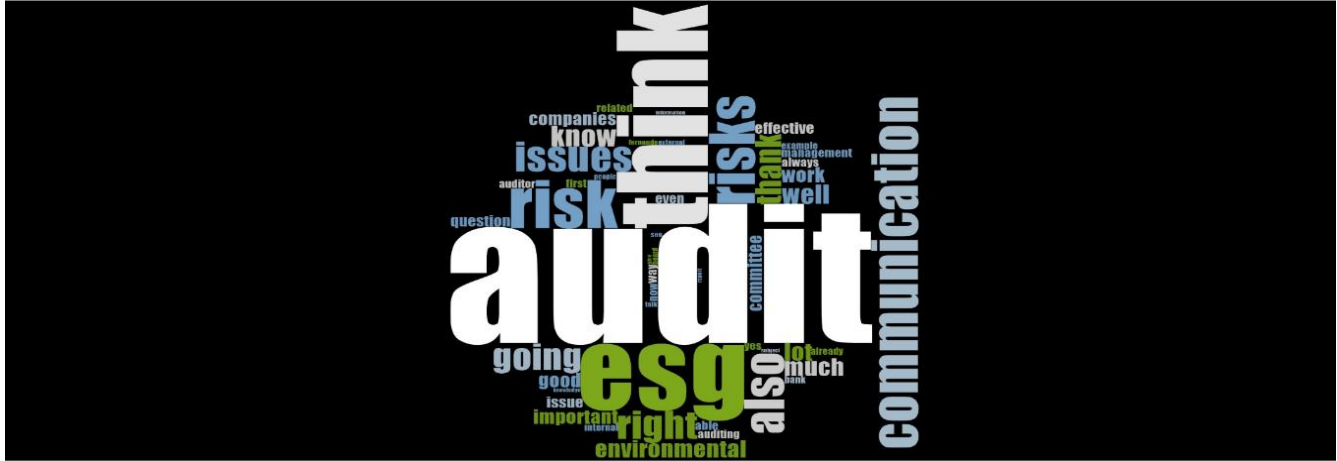


Figure 1. Cloud words on relationships between audit, communication, ESG and risk.

Additionally, we verified, through the coding generated by the NVivo software, the main themes suggested by the interviewees, grouped according to Figure 2, which we highlight here, and which will be discussed in the sequence are: Audit, Risk, Plan and Effective Communication. These suites the representation of this study according to Merriam (2002) and King (2004) on categorical analysis that manifests the following reflexivity.

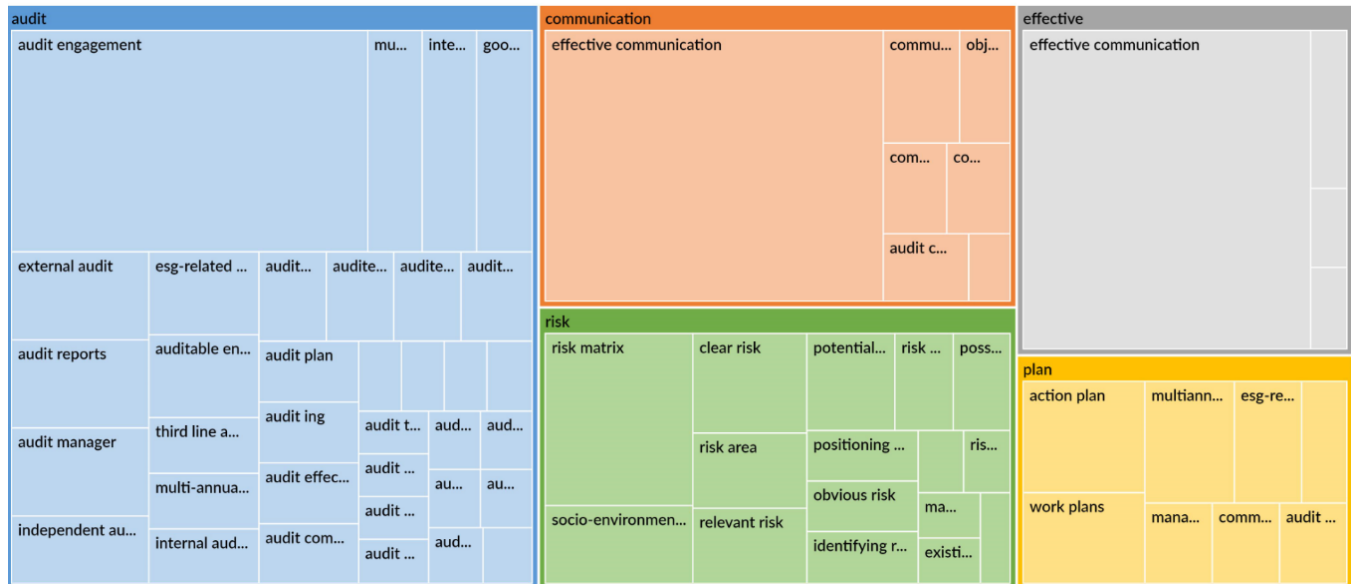


Figure 2. Main themes suggested by the interviewees.

4.1 The Auditing Engagement and the relationship with ESG

The audit engagement, whether for internal or external audit, analysed in general, comprises the actions of the audit in the field work that will result in the final communication to stakeholders. In addition, when the subject dealt with is ESG, the effective communication of audit engagements is also related to the knowledge of people and audit teams. In the interviews, the themes highlighted in Figure 3 generated by the NVivo software spotted variabilities of auditing involvement.

audit								
audit engagement	multiannual audit plan	audit reports	auditable enti...	third li...	multi-a...	internal...	audited...	audited ...
	internal audit	audit manager	audited area	audit effective...	com...	audi...	audit...	audit ...
	goodwill auditing	independent auditing	audit process	audit communi...	audit team		audit ...	audit ...
	external audit	esg-related audit plan	audit plan	audit people				
			tack audit	audit informati...			audit committ...	
			audit ing	past audits	audit environ...		audit committee	

Figure 3. Variabilities of auditing involvement.

For ROR the methodological process of audit engagement should be:

In general, the auditor should have knowledge of ESG, training in business processes and audited matters, follow the action plans, evaluation, implementation and communication to senior management and the audit committee.

Another relevant subject that arose during the interviews was about ESG training for people and audit teams.

According to FFS:

Having an auditor trained in the subject, I think it is the first big step, he knows very well the topic in its essence. The second step is to know the risks of the business, focused on ESG.

RNA also follows the same reasoning:

Auditor should seek to carry out specific training with those who know a lot about the subject, has published materials that can also stress and get a lot into the detail, because, only then, knowing in depth the content is that you can apply this in all audit work.

JED thinks that:

Auditors may not be prepared to identify this risk, which is why ESG training is important. And from there, apply the normal audit program, which auditors know how to do very well.

MAG understands that:

Auditors will have a big challenge; they will need people specialized in socio-environmental risks. Initially they will hire consultancies specialized in the subject to carry out the work.

4.2 Audit Risk Matrix

The risk matrix for the preparation of audit work is one of the phases of the methodology that aims to prioritize the execution of audit engagements of greater relevance. In this context, the NVivo software coded the themes of the interviews according to Figure 4.

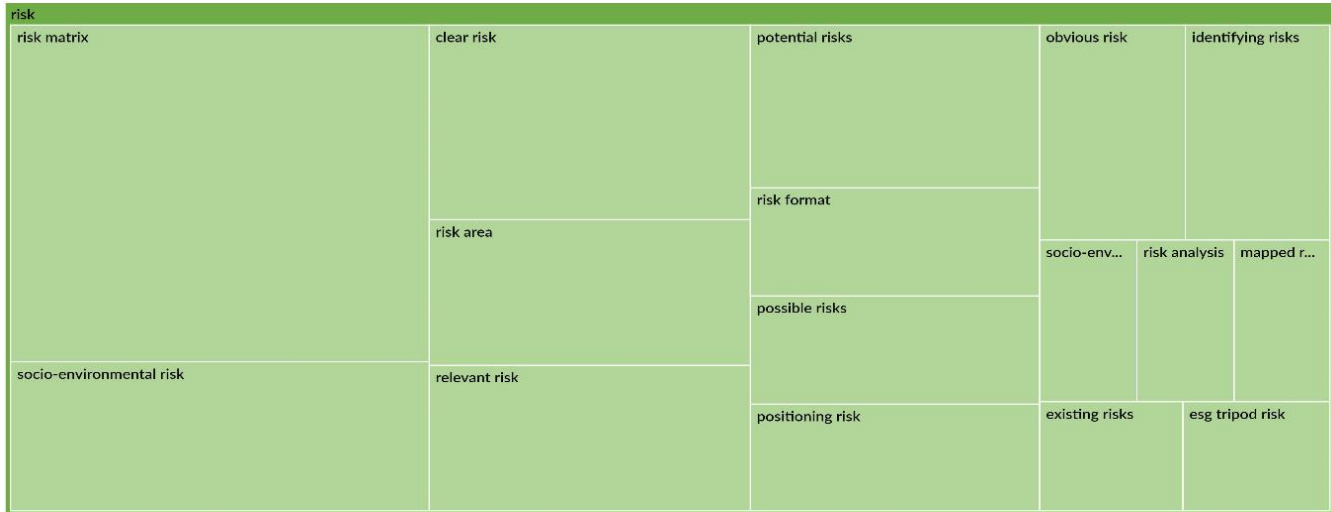


Figure 4. Risk types and matrix.

The interviewees generally expressed concerns about the issue of knowledge and the survey of ESG risks by the auditors.

According to TIY:

For these issues to be addressed strategically and consolidated in the organization, and especially in audits, a good start is to have this vision already in its risk matrix. And by the relevance that the subject is being addressed, it is very likely that the risk matrix will show a more severe graduation than previously for the ESG.

For MAG:

We need to do the exercise indoors, to map these risks, and verify that we really have any ESG risk in the company, go through the entire value chain and all auditable entities, and identify whether the risks can impact ESG issues.

According to JED, the risk matrix preparation phase is important to identify the risks of ESG:

When the audit makes the survey of the risks of the company, at this time it has to have the vision of all risks, including those related to ESG.

JES thinks that:

When we do the entire annual audit plan, we have to set up, first, a risk matrix and within this risk matrix we include an Item of ESG and evaluate if this risk is in all the pillars there within the risk matrix.

The same thought for FET:

If you do not have an effective mapping of the risks, you will hardly find any expressive conclusion.

RNA suggests having open communication between the areas of risk and compliance and auditing:

So, it is important to know the controls and concerns that the company also has, then do all the mapping of what the company has to mitigate risks of ESG.

4.3 Audit Planning

The audit planning usually takes place after the result of prioritizing audit engagements, according to the risk matrix. Audit planning can be divided to have a multiannual plan and a plan for each audit engagement, to be executed by the audit team. The NVivo software brought important planning spectrum mentioned during the interviews and demonstrated in Figure 5.



Figure 5. Planning spectrum.

For JES the result of the risk matrix is the starting point for planning ESG jobs:

Classifying the risk of ESG between high, medium or low, then we will do the audits, according to the annual plan, according to the identified risk.

Likewise, TIY, the process of communicating ESG issues can begin at this stage of audit planning.

As is recommended in best practices, the audits discuss their multiannual audit plan, at various levels of the organization, with the responsible units and with the responsible boards, committees involved, audit committee if any, and finally, with the board of directors. Here is an important channel for audits to communicate ESG issues to organizations at these various levels.

For FFS the execution of the planning of the works depends on the budget planned.

I think that the company mainly has to have a specific budget focused on ESG, clear investments, a board of directors that also looks at this topic very carefully, and that understands the risks there, which involves the company's business.

4.4 Effective Audit Communication

The theme effective audit communication appeared expressively during the interviews, demonstrated in Figure 6 extracted from the NVivo software, both the aspect of means of communication itself and its effectiveness. This is because the completion of the auditor's engagement is summarized in his communication after already negotiating with the auditee.



Figure 6. Effective communication and types.

The tone, the strategy, hegemonic or not Laclau and Mouffe (2001) of the communication or whether political and sociological must be harnessed so that the user of the report is able to derive from the communication the expected interpretation.

For TIY it is important that the company has a strategic vision for ESG issues, thus permeating communication at various levels of the organization:

And audits can observe whether there is a consensus or not of uniformity on the importance and approach of each ESG tripod risk. Especially if the board already has a clear, strategic vision on the treatment of ESG. So, all the reports of your results are discussed at the various levels of the organization.

For MAG:

Reporting ESG issues to the audit committee, raising awareness of company directors, and informing the board of directors is an extremely important issue.

For JED:

Eventually, if any ESG-related weaknesses are identified, you should write this in the reports and get to the right people in the company.

JES understands that:

Having independence and actually being able to report either in report or verbally is paramount. So, when we talk about effective communication, I think the primordial is independence and objectivity.

Yet, according to PCM:

Effectively communicating what is wrong or deviating, sometimes the auditee takes it personally, maybe the communication has not been effective, or perhaps creates a barrier.

In the same line of thought FET observes:

Effective communication not only for ESG, I think is the great challenge of the auditor. I think it's more you understand, trying to find an ideal means of communication for that interlocutor, depending on what hierarchical level he is.

CAR brings innovative thinking, inserting the concept of agile auditing during the communication process:

It makes a lot more sense to me that communication is timely, just as agile auditing works. As soon as you add value, passing the information as it is identified. So, you don't have to have a formalization of a report, consolidating everything that has been identified, because in the meantime the company may be exposed to risks.

5. Discussion

The results of our analyses show that the ESG theme is still evolving, although there are already several measurement patterns and indicators to rule on criteria for adherence and understanding of the relationships between auditing communication and ESG risks. One of the ways to find a strength in the communication of the adoption of the ESG criteria by companies is to have an assurance by the audits. Thus responding to our research question that augmented on what is the understanding of the relationship between audit communication and ESG risks.

The Central Bank of Brazil with its agenda #BC Sustentabilidade (2020)] also brings the highest challenge of Brazilian financial institutions in the aspects of sustainability and, being this a regulatory body, will do the supervision within its standards of best practices. Thus, the governance bodies of companies, whether financial institutions, or others that depend on financial operations, such as fundraising in the financial market, will have to charge the various areas of organizations to meet the required ESG criteria. For this they can count on the support of the work of the auditing, acting as the third line of defense, communicating independently and objectively, thus ensuring the reports to stakeholders.

5.1 Planning as the Basis of Effective Audit Communication

The planning of audit engagement is the starting point for achieving effective audit communication. In the internal audit function, the audit plan is usually done based on annual audit cycles, so that the auditor can test all priority business processes and their respective internal controls.

A multiannual plan requires the audit team, first, the knowledge of the business in which the company operates, and this is also valid for the ESG criteria. Knowing the business and the environment are skills that are sine qua non for the effectiveness of the auditing (Chambers, 2017). This is important because the ESG criteria can be understood differently, considering the materiality of their exposure. For example, selective garbage collection from an accounting office in the service sector may have less materiality than the disposal of hospital waste from the health sector when the environmental criteria for garbage disposal are applied.

Another subject much commented during our research was the hiring of third parties to, at first, support the audit engagements of ESG. This support by third parties could be a specific training by situating the auditor in the business and ESG context, or other than a third-party audit engagement, with the possibility of field training of the contracting company's internal audit team.

Additionally, considering the motto *tone at the top*, understanding what the board of directors, the audit committee and the directors of the company expect about communicating the ESG criteria to the market. It should

also be considered that the non-adherence to such criteria can negatively impact the company's position in the market in which it operates. In other words, the loss of investors, for not being able to raise funds in the financial market, or even by the loss of customers, who will accept green products and services, which meet the ESG criteria.

For internal audits, according to The IIA (2017), the audit planning of the internal audit activity should be based on a documented risk assessment, carried out at least annually. The information provided by the senior management and the board should be considered in this process.

5.2 Risk Analysis for Prioritizing Audit Engagements

The stage of construction of the risk matrix and the prioritization of audit engagements is essential for the assessment of the necessary resources that the internal audit will need for the subsequent execution of the audit engagements. This step should be aligned with the vision of risks and controls that the company has.

In the audit risk matrix, the risk variable named ESG should be contemplated for each auditable entity or for each business process of the company. This variable, as well as the others, should be evaluated according to the exposure to the risks that the company has, considering the inherent risk to the company's operation and the control risk, according to the level of maturity of its internal controls, focused on the ESG criteria, thus resulting in the residual risk that can be classified as high, moderate or low risk.

However, when talking about the ESG variable, it is worth opening all the criteria adopted for each letter of the ESG, considering the scenario of where the company is inserted. For example, an agro-industrial company should consider in its variable ESG, in its letter E, aspects such as forest deforestation, burning and carbon emissions, excessive use of pesticides, pollution of water sources, etc. For each letter of the acronym ESG, a series of sub-variables can be created, with the objective of seeking assertiveness in the analysis of the risk in question. After including the ESG variable in the risk matrix and reaching the graduated residual risks of each business process, the audit will be able to prioritize its audit engagements and also quantify the resources necessary for the execution of the work, and subsequent issuance of its reports.

5.3 Performing Audit Engagements

Whether internal or external, the audit must be inserted in a corporate governance environment that safeguards the hierarchical independence of the auditor, such as reporting directly to the board of directors. The auditor should also have proficiency in the subject focus of the audit, so knowledge about the business to be audited Chambers (2017) and ESG is essential at this time. However, during the planning of audit engagements this was taken into account, but during execution, auditors should delve into the details of the operation of internal controls that support the company's business processes. At this stage, the training of auditors in matters related to the business and ESG criteria should have already happened, because the gaps of knowledge of such issues have already been considered in the planning phase.

When one refers to the internal auditors, according The IIA (2017) they must possess the knowledge, skills and other skills necessary to perform their individual responsibilities. The internal audit activity must collectively possess, or obtain, the knowledge, skills and other skills necessary to perform its responsibilities.

During the execution of the audit engagement, the auditor must also act with professional zeal, considering the use of specific methods to be able to complete his job effectively. This is also very essential with the ESG criteria.

5.4 Effective Communication

The Figure 7, extracted from the NVivo software, provides a relational summary of the comments of the communication subject during our research. It is worth highlighting the aspect of having effective audit communication, with transparent information of the findings on ESG that were identified during audit engagements and that should be reported.

In general, an effective communication of the results of the audit should follow some essential attributes such as those mentioned in the performance standard 2420 cited in The IIA (2017), which says that communications should be accurate, objective, clear, concise, constructive, complete and timely.

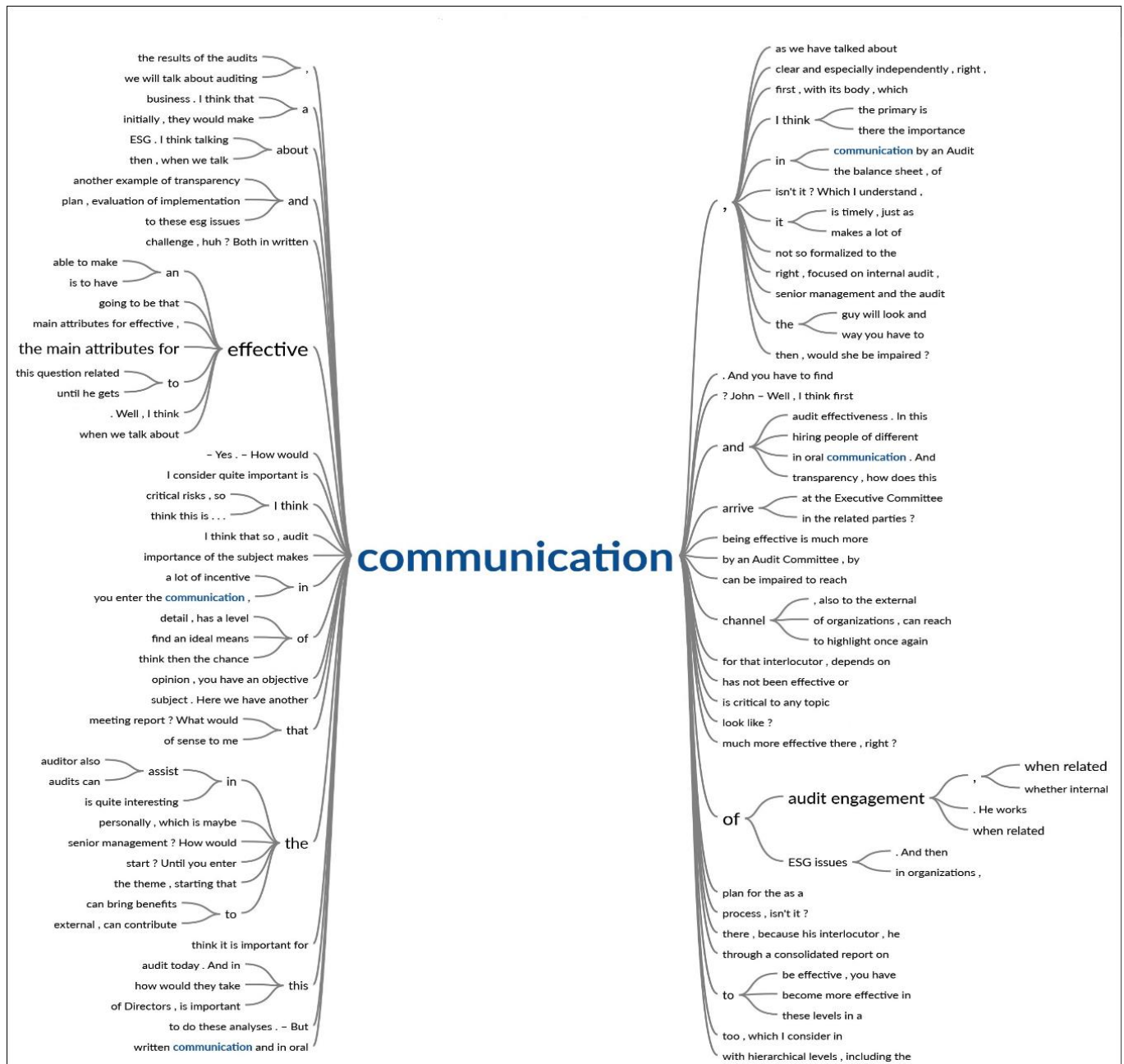


Figure 7. Relational summary between auditing communication and ESG

In other words, when the field work is finished, the auditor has as its next step the preparation of the audit report. This follows the methodological criteria and standardized by the profession of the auditor. It is usually sought to describe the attributes of an audit report in a clear, objective way and that adds value to the internal controls and business processes of organizations.

However, when discussing the effective communication of the audit on ESG issues, the subject goes beyond the report, going through questions of technical knowledge of how to audit, metrics and standards to be followed, organizational policies adopted, and how to report in order to obtain an efficient result, especially situations that require rapid adjustments so as not to harm the company's results, whether in the short, medium or long term. This timing fits into the current and rapidly adapted environment, which we are experiencing, like the home office work, which many companies had to adapt to, due to the new coronavirus pandemic. The agile method that emerged in the area of Information Technology for software development, was disseminated to other areas of the companies, including auditing, which brings to the auditors a greater reflection on how to report the results of their work quickly. According to Tysiac (2020), audits that adopt agile methodology accelerate their deliveries.

However, the attributes of independence and objectivity were considered essential for the practice of auditing, regardless of the current worldview. Noteworthy that such attributes are *sine qua non* principles for the existence of the audit and, consequently, of its effective communication. This will require the auditor, a greater competence to communicate orally and adapt the objective message to the various interlocutors. For PWC (2018) auditors need communication skills, but one skill in communication is to adapt the tone. In other words, the auditors are much more likely to achieve success in facilitating change if they avoid appearing accusatory or threatening in their communications.

Overall, the hegemonic discourse surrounding the communication of audit in ESG environment seems to be that which embraces all the required standards and also draws upon the possible interpretation stakeholders would make. This is the discourse that fits the majority of stakeholders' expectation on how the auditing communication should be developed to mitigate ESG risks.

6. Conclusions

This research provides an understanding of the relationships between the sustainability standards adopted by organisations, the role of the auditor and the effective communication of the audit on the ESG criteria. The evolution of the ESG theme in several countries has shown concern on the part of stakeholders to obtain healthy, measurable and reliable information from companies.

Thus, to comprehend the relationship between auditing and communication on ESG issue, understanding risk analysis and the matrices, planning and rules of effective communication turns *sine qua non* condition. In this same vein, a well written report and communicated in a timely manner instils confidence in the auditee by procuring response, accordingly, giving remedies to weaknesses without fear or favour.

Also, our analyses revealed that audits will play a key role in demonstrating, through their methodologies, assurance to the internal users and the capital market that they are competent to carry out the work related to the ESG criteria adopted by the companies and communicate them effectively. It is also worth saying that in the academic environment it has brought to light the issue of sustainability that recommends its inclusion in auditing course, since it is a subject that will have greater importance for the training of auditors in the new future.

Yet, regarding the training of auditors on ESG, the research reveals that there is a relationship between the knowledge that the auditor must have about the company's business, the economic sector to which it is inserted and the ESG criteria, with the objective of identifying the intersections and materiality of the subject of sustainability to be considered in the planning of audit engagements.

Noteworthy that the principles of independence and objectivity of the audit are the starting point for reaching the effective communication on ESG issues. In addition, methodology wise, planning requirements should be harnessed in the audit work, the preparation of a risk analysis, based on materiality and impact matrix, with the

appropriate variables of ESG risks, the execution of audit engagements with professional proficiency and zeal, until it arrives in effective communication to stakeholders, whether an oral or written communication, considering the technical attributes of a final audit report.

Another aspect to be considered in the process of communicating the audit engagements is the interpersonal relationship between auditors, auditee and related areas, thus providing a reliable environment for the execution and completion of work done. The communication between the audit team, directors, audit committee and board of directors and other governance bodies should be transparent, in order to maintain the alignment of the company's strategy and the vision of risks among all interlocutors.

All these findings allow us to envisage a new perspective in the audit work related to the ESG criteria, bringing the auditor as the protagonist in addition to ensuring the measurement of the sustainability indicators of companies, being an independent agent using a systematized language to bring effective communication of responses to ESG questions to stakeholders. Thus, this study contributes to reflexivity of aspects concerning the academia, practitioners and the general stakeholders thus abridging the existing understanding on the auditor and auditee relationship, communication and ESG criteria.

Finally, in our view, there can be new steps toward future studies, as the ESG theme follows the evolution of business trends. Therefore, deductive studies to identify in detail the impact of the variables of ESG risks for the various economic sectors and for companies in an individualized manner are necessary, so that it increases the level of assertiveness in the measurement of risk indicators.

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ICT SECURITY IN BUSINESSES – EFFICIENCY ANALYSIS

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Abstract. The purpose of this paper was to identify ICT security measures and to assess the level of ICT security in small, medium and large enterprises in spatial terms. The measures in the ICT security area were identified based on secondary data of European Union member states retrieved from the Eurostat database. The research used the CCR Date Envelopment Analysis (CCR-DEA) model to meet the research purpose. The research identifies countries where ICT security results were achieved with the optimum combination of expenditures, i.e. the so-called fully efficient countries. The authors demonstrate that the countries participating in the optimal shared technology are aligned to non-fully efficient countries and they can achieve their results at lower expenditures. In the optimal technologies of all non-fully efficient countries the volume of the achieved results of enterprises is slightly higher than the actual volume. Research conducted in the area of enterprise ICT security rarely focuses on the efficiency of actions undertaken. The authors of this paper examine the technical efficiency in the area of enterprise information security in spatial terms and formulate conclusions about enterprises in the EU member states. The application of the expenditure-oriented CCR-DEA model identifies countries that achieve their results fully utilising their expenditures and those that are able to achieve at least the same results as achieved by non-fully efficient countries but at lower expenditures. The technical efficiency analysis of actions undertaken represents the starting point for defining good practices and success factors in the area of ICT security, both at enterprise and country levels.

Keywords: businesses; efficiency analysis; ICT security; ICT risk management

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JEL Classifications: C80, C67, M15

Additional disciplines information and communication, mathematics

1. Introduction

Modern-day organisations are operating in the age of continuous real-time exchange of information. As information is the foundation of the decision-making process, effective competition requires organisations to have access to information and to be able to disseminate information among their stakeholders (Naicker et al., 2019). For this reason, it is necessary to ensure information security so that information can be used for making key business decisions. Indeed, while bringing numerous advantages to organisations, information technology has also made information security the main problem for organisations relying on the technology (Safa et al., 2018). Better understanding and acceptance of safeguards is an inherent element of the information security practice (Burdon & Coles-Kemp, 2019). Identification of good practices is needed (Brunner et al, 2020; Hoffmann et al, 2020; Tøndel et al, 2014), the more so as enterprises still fail to learn from security incidents (Ahmad et al, 2015). Security of computer information systems, commonly termed as cybersecurity, is an important operational issue for nearly each organisation (Solak & Zhuo, 2020). Security-related tasks can be very complex (Sönmez, 2019). For this reason, the literature on the subject includes models, which support the enterprise management process in terms of information security by raising awareness on security factors, which need to be taken into account in the decision-making process (Diesch et al, 2020). Furthermore, information security research focuses on information security data exchange, threat intelligence sharing or information security data sources, like vulnerability databases (Sauerwein et al, 2019).

However, there have been no studies assessing the level of enterprise security in geographical and structural terms in the context of the efficiency of the actions taken. Therefore, the following research questions have been asked:

Q1: How do the development of information society and digital economy affect the enterprise information security?

Q2: Does the available data allow defining measures which reflect the level of enterprise ICT security expenditure and achieved results in spatial terms?

Q3: Are there any tools which provide for assessing enterprise ICT security in spatial terms taking into account effects in this respect and expenditure incurred to achieve those effects?

Q4: Are there any differences in the level of the information security methods in small, medium and large enterprises?

To answer the questions, the following research hypotheses have been formulated:

H1: The ICT security methods in enterprises provide for creating a system of measures for assessing the ICT security in the context of expenditures and results in enterprises in terms of geography.

H2: An assessment of the enterprise ICT security level in spatial terms carried out with appropriate tools will allow identifying the countries where the enterprise ICT security level requires improvement and, most importantly, finding reference objects in the test group.

The proposed research method allows ranking EU countries in terms of ICT security taking into account the efficiency of actions taken respectively. The country ranking may in turn be used to facilitate best practices sharing which can constitute the foundation of national or international information security policies, to set priority goals in the area of ICT security practices and to identify the best means of achieving the goals. Furthermore, the analyses conducted will allow assessing the level of ICT security of enterprises active in specific markets, which can enhance trust in economic transactions made in those markets.

Considering the level of development and use of information and communication technologies, a comprehensive and scientific system needs to be created which will enhance technical breakthroughs, develop system recovery technologies and take various effective measures to prevent and respond to security risks (Guo & Wang, 2020). Best practices of enterprises with sound ICT security measures will serve as role models for other entities.

The study contributes to the literature on the subject in three following respects. Firstly, the variables that determine the outlays and effects in the area of ICT security of enterprises have been identified.

Correct identification of variables is a key stage in the efficiency analysis and ensures its credibility. Secondly, the usefulness of the set of variables in the diagnosis of information security activities of enterprises in individual states of the European Union was verified. A set of variables that measure inputs and outputs in information security was used to assess the efforts of enterprises to achieve results in the area of ICT security. Thirdly, research to date in the field of ICT security in enterprises rarely focuses on the effectiveness of actions taken. Moreover, technical efficiency in the area of information security in enterprises was examined, but in spatial terms, which allowed for formulating conclusions regarding enterprises operating on the markets of individual European Union countries.

2. Literature review

Context of the Information society and digital economy

The digital spread was revolutionary in the last decades with a wide range of opportunities that are available through the new technologies, the rapid growth of the internet, WAN. Information and communication technology (ICTs) sector is the pioneer of the digital economy. New technologies, particularly artificial intelligence (AI) reshape the labour market that comes on one hand, with creation of jobs in some sector but on the other hand, with disappearance of others.

Digital advances have generated enormous but concentrated wealth around minor number of individuals, companies and countries. New key risk areas have been created: cybersecurity, privacy concerns, facilitation of illegal economic activities or digital disruptions are amongst the major concerns (UNCTAD, 2019).

Information has become swiftly available and there is actual oversupply of information. Beyond the obvious positive impacts, this carries also some negative aspects. The quality of information might be questionable, the origin of sources may lead to confusion and as such can cause indecisiveness; overall this can result in higher information costs. The so called TIME markets – telecommunication, information technology, media technology, and entertainment – form the basis of the network economy or Net Economy. This Net Economy now coexists with and evolves next to the - physical products and/or services focused - Real Economy (Kollmann, 2006).

The orientation of information, communication and transaction processes within Net Economy have evolved from the supply-orientated Web 1.0, then to the membership-orientated Web 2.0, and to the demand-oriented Web 3.0. (Kollmann et al, 2016).

In the digital age, information and knowledge have central role; the concept of both information and knowledge society have been created. Information society describes the technological options related to the electronic age; knowledge society gives prominence to the problems and strategies of making sense of information (Krohn, 2001).

The concept of the new social structure promoted by Castells is the so-called network society: society made of networks in all the key dimensions of social organization and social practice. This network society is considered as a global system (Castells, 2010).

The Industry 4.0 refers to the fourth technological revolution and follows the third revolution known as “Information Age” that developed to “knowledge-based economy” (Pereira et al, 2017).

The term information society is defined in the EUR-Lex, European Union Law Glossary as a „society where a significant degree of activity focuses on the creation, distribution, use and reuse of information.” This happens through the means of Information and communication technology (ICTs) (EUR-Lex Glossary, n.d.).

„ICT covers all technical means used to handle information and aid communication. This includes both computer and network hardware, as well as their software” as defined in the European Commission Eurostat database (Eurostat Glossary, n.d.). ICT has economic contribution to growth (Goodridge et al, 2019).

ICTs – defined as the combination of all company’s audio-visual, telephone, and computing networks – used to be costly and were deployed by companies carefully, however, advances in connectivity, cloud computing, and other technologies are easier to be adopted. Services can turn IT into an affordable resource, regardless of company size (Bossert & Laartz, 2018).

In harmony with the requirements of the information economy an industrial enterprise need to define a strategy that consider automation, robotization and business processes (Kwilinski, 2018). This new era has brought numerous positive impacts, however, a number of challenges and new risks still are to be addressed. These challenges are basically round the digital vulnerabilities and the digital divide that arose as a result of the digital transformation. The digital sphere has opened up new opportunities for criminals; new security threats appear such as cyber-crime, data theft. The role of security measures and relevant control procedures at the enterprises focusing on mitigating these risks are fundamental and inevitable to maintain a stable operation.

With regards information society the inclusion and exclusion exists meaning that participation is not available unconditionally. In addition to the access to online information, the digital divide is about the different uses, misuses and abuses of information (Segev, 2010).

Identification of the ICT security problem - definition of ICT security

ICT is an extremely developing, innovative sector, which fulfils strategic role in the European Union. In the context of today's knowledge-based, resp. information society, the management and use of information has become the key to success, which can lead to competitive advantages in the market. The use of the ICT services is becoming more and more widespread amongst businesses. By now ICTs have become fundamental infrastructure and promote the knowledge-based digital society. The spread of information with the means of information communication has almost no boundaries. Networking is general. Information flows in and out. ICT systems are naturally vulnerable to security threats. In the digitalized world the connection is built through ICTs and this is a key concern if the system is compromised, misused or attacked (OSCE Cyber/ICT security, n.d.). The Internet threat landscape have changed, there is a significant shift toward well-organized cyber-crime carried out in a targeted manner circumventing common security measures (Skopik et al, 2016). Enterprises constantly experience information security related incidents, which are very likely to disrupt their business operations and threaten the information security (Ahmadian et al, 2020; Evans et al, 2019; Bartnes et al, 2016).

Internet of things (IoT) – that refers to Internet-connected devices such as sensors, radio frequency identification (RFID) chips that are embedded in objects enabling them to send and receive various kinds of data (Digital McKinsey, 2018) – is built on the basis of the Internet, thus security problems of the Internet will also show up in IoT devices. This requires customized security and privacy levels to be guaranteed, and solutions that ensure confidentiality, access control, and privacy for users and things, trustworthiness among devices and users, compliance with de-fined security and privacy policies (Tewari & Gupta, 2020). „Security is like a chain. It is as strong as its weakest link. Security depends on people more than on technology. Employees are far greater threat to information security than outsiders” (Technical Department of ENISA, 2006). The threat of humans to information protection can be minimized by ideal or strong information security culture (Veiga et al, 2020).

Information technology has widened the scope of management; in addition to organizational performance, productivity and human resources perspectives, information security should be considered as a responsibility of management, which has also an impact on the market position (Soomro et al, 2016). Entities need to build resilience to ensure smooth operation: to provide appropriate response to these threats, adequate control measures are necessary. The use of ICT services can generate value added in the operation of a business. However, all this

requires special attention from security point of view; security measures ensuring proper control are needed. Security measures play an important role in the security system of businesses, which are highly exposed to security risks related to ICT.

The e-commerce segment of business channels - depending on the volume of segment - underpin the need for adequate protection. The parameters of the process on ICT security measures can be described through a typical action plan – who does what, when, where and what evidence this – with the help of control operations. These security elements can be automatic, manual, or semi-automatic, semi-manual operations. The planning of activities shows who / what does it.

The implementation of the process is supported by an appropriate process documentation and operation, as well as by providing appropriate information to the stakeholders.

The model of information security factors for decision makers shows that there are key security-indicators, which directly impact the security-status of an organization while other indicators are only indirectly connected.

The identified key security-indicators are

- “Physical security” (in practice: physical protection of buildings, offices, servers, and hardware),
- “Vulnerability” (in practice: known vulnerabilities within systems and software),
- “Access control” (in practice: the management and regulation of access to systems, applications, data, and infrastructure),
- “Infrastructure” (in practice: knowing all systems, software and the connections between them and if they are secured or not; „strengthening” of all available systems, prepare threat models and secure the infrastructure in each network layer),
- “Awareness” (in practice: all topics that concern people and cannot be treated with technology) (Diesch et al, 2020).

The Castle Model that has „the defence as walls” approach on cybersecurity – with a safe inside and a dangerous outside – is also worth to be mentioned here. This approach leaves namely a blind spot. Organizations open up their walls and make their gateways more „leaky” so that they can do more, faster and better. Walls from the outside are increasingly destroyed by technological developments. The Millennial generation tend to mix professional and private life. All these factors call for a new approach to cybersecurity (Leuprecht et al, 2016).

„ICT security refers to relevant incidents as well as measures, controls and procedures applied by enterprises in order to ensure integrity, confidentiality and availability of their data and ICT systems” as defined by the Eurostat database. A set of security measures is also compiled to describe this (Eurostat, n.d.). Good practices are required to ensure that the processes of the enterprise are designed and operated in a way that the enterprise is resilient towards the ICT challenges.

Control measures related to ICT security

There is sound European approach on digital transformation that is covered underneath not exhaustively. The adoption of Regulation 1025/2012 on European standardization emphasised „the fast evolution of ICT and the way in which new products and services, such as ‘smart’ or connected devices (referred to as the ‘Internet of Things’ or IoT) or the Cloud, transform markets (Regulation (EU) No 1025/2012, 2012). The Commission has identified the following priority areas as the essential technology building blocks of the Digital Single Market: cloud computing, the internet of things (IoT), 5G communications, cybersecurity and (big) data technologies (European Commission, 2016). The so-called 2020 Rolling plan for ICT standardisation has a unique link between EU policies and standardization activities in the field of ICT (European Commission, 2020).

The Directive on security of network and information systems (NIS Directive) is the first EU level legislation on cybersecurity. The deadline for the transposition into national legislation was by 9 May 2018, and by 9 November 2018 for the identification of operators of essential services. Energy, transport, water, banking, financial market infrastructures, healthcare and digital infrastructure count among the sectors that heavily rely on ICTs. Businesses identified as operators of essential services have to take appropriate security measures and notify serious incidents to the relevant authority.

This is applicable also for search engines, cloud computing services and online market places as well as they are key digital service providers. A culture of security across sectors is in the focus (European Commission, NIS Directive, 2020).

Data has been defined as the fuel of digital economy. In the context of ICT the role of data protection becomes key issue. The EU directive 2016/679 – known as GDPR – meant to protect natural persons with regard to the processing of personal data and on the free movement of such data (REGULATION (EU) 2016/679, 2016).

The EU's digital strategy "A Europe fit for the digital age" count among the six Commission priorities for 2019-24 with policy areas of Data protection; Better access to online goods for consumers and businesses; The right environment for digital network and services; Economy and Society and the European Data Strategy. New rules on e-commerce were introduced which are key elements of the Digital Single Market Strategy: the revised Payment Services Directive and new rules on cross-border parcel delivery services (already in force), new rules to stop unjustified geo-blocking (entered into force on 3 December 2018), revised consumer protection rules (will enter into force in 2020), new VAT rules for online sales of goods and services (will enter into force in 2021) (European Commission, 2021).

The Organization for Security and Co-operation in Europe (OSCE) - that has 57 participating States from Europe, Central Asia and North America (OSCE, n.d.). - names the key challenge that ICTs made the offence easy and defence difficult. This organization has a special role in strengthening cyber/ICT security with particular focus on reducing the risks of conflict arising from the use of ICTs - with the so-called confidence-building measures (CBMs) - between its participating States. Protecting ICT-enabled critical infrastructure as part of enhancing cyber resilience in the OSCE region for the favour of all. The OSCE also pays particular attention to tackling cyber/ICT security threats such as organized criminals and terrorists (OSCE, n.d.).

Information security standards such as ISO/IEC 27001:2013 mark information security policies as mandatory. Albeit, there is little guidance on how to develop good and effective policies. Currently organization-specific information security needs are in the focus of information security policy development (Paananen et al, 2020).

ICT risks in the context of manufacturing industry, service-oriented organizations and e-commerce

The new technological solutions are usually associated with unexpected risks due to security vulnerabilities.

The different entity sizes – small, medium or large enterprises – and businesses may face and address the risks differently. The more so as the findings of studies conducted to date show that the current perception of information risk and readiness to take such risk are low, especially among small economic entities (Line et al, 2016).

Proper risk management process is necessary for each companies to ensure the stable operation. Due to their significant role, the author covers the risk areas of the manufacturing industry, the service-oriented organizations and the e-commerce business model.

ICT activities are adopted in most of the industry activities, but especially in logistics and production operations (Barreto et al, 2017).

The *manufacturing industry* – with its processes well supported by ICT - face increased security risks due to the new technologies, the spread of Industry 4.0, cloud-based systems, IoT, Big Data, BYOD (Bring Your Own Device) and CYOD (Choose Your Own Device) trends. The security implications of the evolving smart systems should be addressed. Employees need to be properly trained. The interconnected organizational systems pose significant security risks. Hackers with malicious intent benefit from software vulnerabilities. The era of Industry 4.0 is greatly exposed to cyber-espionage. High value assets should be protected with a security approach that contains data loss prevention solutions as well as encryption algorithms. The industrial sector run the risk of Denial-of-Service (DoS) causing that a system or an application is unavailable (for instance, overloading a server with massive number of requests to consume the available system sources); DoS attacks are very difficult to control; are often unforeseeable. These attacks cause not only operational issues but the remediation is usually expensive (Pereira et al, 2017).

In *service-oriented systems* the key issues of the security management process are identity management; proper security controls management; security management sovereignty; seamless connection to other organizations on a real-time basis (security of the communication protocols of the services) and protection of data in transit and rest (Dudziak-Gajowiak et al, 2019).

E-commerce is one of the components of the digital economy (UNCTAD, 2019). In the e-commerce context, the critical and vulnerable points of system security are hardware, software and environment. The basic security threats are

- Denial-of-Service (DoS) – see above
- SQL Injection – let a malicious user execute commands in the application's database by using the privileges granted to the application's login
- Price Manipulation – very common whereby the final payable price is manipulated by the attacker using a web application proxy.
- Session Hijacking – takes control of a user session after successfully obtaining or generating an authentication session ID.
- Cross-site script (XSS) – special case code injection; the hacker fold malicious content into the content being delivered from the compromised site which appears at the client-side web-browser as it has been delivered from the trusted source.

Viruses, worms, Trojan horse, bots, EXE file, browser parasites, adware, and spyware etc. are also used by attackers to compromise the security of the e-commerce systems. Secure site design – to be both proactive and reactive in handling security threats - is up to the development team and up to the shopper (Singh, 2014).

3. Research methodology

Data description

In order to verify the hypotheses, a database was constructed consisting of the following variables:

1. variables characterizing the results of DEA:
 - Enterprises did not experience any problem due to ICT security incident: unavailability of ICT services (OUT_unavailability),
 - Enterprises did not experience any problem due to ICT security incident: destruction or corruption of data (OUT_destruction),
 - Enterprises did not experience any problem due to ICT security incident: disclosure of confidential data (OUT_disclosure),
2. variables characterizing DEA inputs:
 - Enterprises using any ICT security measure (IN_measure),
 - Enterprises having insurance against ICT security incidents (IN_insurance),

- The enterprise's ICT security policy was defined or most recently reviewed within the last 12 months (IN_policy),
- Enterprises make persons employed aware of their obligations in ICT security related issues (IN_obligations),
- In the enterprises the ICT security related activities are carried out by own employees or external suppliers (IN_suppliers).

The "Enterprises did not experience any problem due to ICT security incidents: unavailability of ICT services" (OUT_unavailability) variable shows the share of enterprises which use computers and which in 2019 did not report any unavailability of ICT services due to overloads, failures and human errors occurring during introduction of updates (including in networks, applications, configuration). Continuous availability of ICT services can be ensured by means of adequately efficient hardware and systems as well as through creating redundant configurations, where key computer system components (including inter alia servers, network and security devices) are composed of many elements, so that when one element fails, another operational element can take over its tasks.

The "Enterprises did not experience any problems due to ICT security incidents: destruction or corruption of data" (OUT_destruction) variable shows the share of enterprises which use computers and which in 2019 did not report any destruction or corruption of data due to, mainly, software or physical destruction or damage of data carriers. Since the methods of destruction or corruption employed do not always allow recovery of data, enterprises should avoid situations which may lead to loss of data.

The "Enterprises did not experience any problems due to ICT security incidents: disclosure of confidential data" (OUT_disclosure) variable shows share of enterprises which use computers and which in 2019 did not lose any confidential data. Safeguarding information which is critical to further operations and the future of an enterprise is fundamental to running a business.

Confidentiality most often covers commercial and financial information, business development plans and strategies, customer and contractor databases, product and service information as well as the related know-how. The obligation to keeping such information confidential rests on employees as well as contractors and clients to whom it is provided when establishing cooperation (e.g. during negotiations) and thereafter.

Therefore, the effect-related variables express the security level achieved by enterprises for their computer systems with respect to individual functions of these systems as well as confidential information gathered and processed there. These effects are ensured by putting in place appropriate procedures and deploying methods and technologies which ensure correct and efficient implementation of these procedures. The expenditure-related variables express capabilities of enterprises on the expenditure front. One should remember that perpetrators of security incidents (including insider criminals) can use the cyberspace only to a limited extent to generate threats by using gaps and vulnerabilities in security systems (Szczepaniuk et al, 2020). Therefore, actions taken can reduce the number of security incidents even further.

The "Enterprises using any ICT security measure (IN_measure)" variable shows the share of enterprises which use computers and which in 2019 used any ICT security measure, in particular: keeping the software (including operating systems) up-to-date; user identification and authentication via biometric methods implemented by the enterprise; encryption techniques for data, documents or e-mails; data backup to a separate location (including backup to the cloud); network access control (management of access by devices and users to the enterprise's network); VPN (Virtual Private Network extends a private network across a public network to enable secure exchange of data over public network); maintaining log files for analysis after security incidents; ICT risk assessment, i.e. periodically assessment of probability and consequences of ICT security incidents; ICT security tests.

The "Enterprises having insurance against ICT security incidents" (IN_insurance) variable shows the share of enterprises which use computers and which in 2019 implemented the security method involving transfer of effects of security incidents onto other entities. Having such insurance allows minimisation of losses which may arise in the event of an incident or a series of incidents that directly jeopardise information security, especially such aspects as confidentiality, integrity and availability.

The "Enterprise's ICT security policy was defined or most recently reviewed within the last 12 months" (IN_policy) variable shows the share of enterprises which use computers and which in 2019 developed or verified their security policies. A key instrument to reduce information security threats is to create deploy and enforce information security policies (Jaeger et al, 2020). Information security policy is an internal document to ensure information asset and information technology security with a specific procedure to support the organization objectives (Angraini et al, 2019). A security policy includes a list of physical and technical safeguards, data processing locations, information on personal data processing software. A security policy includes also the assessment of information security threats, which is among key obligations of decision-makers in the area of information security (Schmitz & Pape, 2020), and it should take into account stakeholder feedback regarding the security methods deployed (Samonas et al, 2020). Employees' non-compliance with organisational information security policy have become the main reason for continuous security incidents (Liu et al, 2020).

The "Enterprises make persons employed aware of their obligations in ICT security related issues" (IN_obligations) variable shows the share of enterprises which use computers and which in 2019 implemented practices aimed at increasing their employees' awareness in ICT security related issues, e.g. by organising voluntary training or disseminating information within the company; organising mandatory training or obliging employees to familiarise themselves with information prepared by the employer; signing clauses or commitments. Information security training allows organisations to raise awareness among employees about ICT security best practices (Abraham & Chengalur-Smith, 2019). Training is important for the development of employees' information security behaviour (Karjalainen et al, 2020). Currently, in information security, employee behavior and social factors are as important as the physical and logical resources of an organization (Shameli-Sendi, 2020).

The "In the enterprises the ICT security related activities are carried out by own employees or external suppliers" (IN_suppliers) variable shows the share of enterprises which use computers and which in 2019 employed ICT security personnel.

Enterprises can employ various strategies – they can either engage their own employees to take care of ICT security or commission this task to external entities. Whatever strategy is employed by an enterprise, personnel adequately trained in security procedures ensures the security of its ICT assets.

The analyses were made for the year 2019 for small, medium and large enterprises. The enterprise structure approach will allow observing changes in the level of ICT security of enterprises depending on their size. Due to the availability and completeness of data, 28 EU countries for small and large enterprises and 27 EU countries for medium enterprises (excluding Portugal) will be analysed.

Stages of DEA modelling

Data Envelopment Analysis (DEA) is a non-parametric method for the measurement of efficiency in multi-dimensional situations. It allows evaluating the performance of a set of units called decision-making units (DMUs), which are characterised by multiple inputs and outputs (Zu et al, 2018).

DEA provides for finding the best combination of resources held within a specific technology (Anokhin et al, 2011) - i.e. determining the technical efficiency. At present, DEA is considered as one of the most effective approaches to evaluating unit efficiency (Chen, 2018; Premachandra et al, 2011).

DEA is a non-parametric method for the assessment of the efficiency of each set of comparable decision-making variants (Saen, 2010). DEA models provide for determining the efficiency of an object on the basis of an efficiency indicator taking into account multiple expenditures and results at the same time (Song et al, 2011).

In order to assess the technological efficiency European Union countries, the author has:

1. defined set J of objects assessed $O_1, \dots, O_J, J=28$,
2. defined set R of the results to be the basis for the efficiency assessment of the objects examined, $R=3$,
3. determined set N of expenditures which allow achieving the pre-determined results, $N=5$,
4. defined the volume of the object-specific results y_{rj} ($r = 1, 2, 3, j = 1, \dots, 28$) and expenditures x_{nj} ($n = 1, \dots, 5, j = 1, \dots, 28$),
5. defined the relative technological efficiency for respective objects.

One must bear in mind that expenditures are the amounts, which allow achieving certain operating results and do not have to be considered in terms of accounting, finances or productivity analysis. In other words, they are a physical quantity, which should *ceteris paribus* be increased in order to increase the result. In turn, the term "technological efficiency" means the effectiveness of transforming expenditures into results. The technology of an object will therefore be its vector of empirical expenditures and results.

The technological efficiency has been assessed on the basis of the indicator understood as the ratio of the results to the value of expenditures, calculated in accordance with the following formula:

$$E_j = \frac{\sum_{r=1}^R u_r y_{rj}}{\sum_{n=1}^N v_n x_{nj}},$$

where: E_j – the efficiency indicator of the j object,

u_r – valuation of the unit of the r result (the unit value of the r result where the market prices of the result are known),

v_n – valuation of the unit of the n expenditure (the unit value of the n expenditure where the market prices of the expenditure are known).

The resulting efficiency indicator:

- is standardised in the range $[0;1]$,
- its upper value represents the higher efficiency,
- determines at least the relative efficiency of an object.

With the expenditure and result sets defined, the efficiency of individual countries in terms of ICT security has been determined. The country efficiency ($\hat{\theta}_o$) has been determined by the optimal expenditure level factor with the use of the CCR model. The model assumes minimisation of expenditures of the o object realised by minimisation of the so-called expenditure level factor $\hat{\theta}_o$. The CCR model data includes the expenditures x_{nj} and results y_{rj} ($j=1, \dots, J; r=1, \dots, R; n=1, \dots, N$), while the decision-making variables includes the weights of intensity in the shared technology oriented to the o object $\lambda_{o1}, \lambda_{o2}, \dots, \lambda_{oJ}$ and the expenditure factor θ_o .

The target function takes the form: $\theta_o \rightarrow \min$, and the boundary conditions are as follows:

$$\sum_{j=1}^J x_{nj} \lambda_{oj} \leq \theta_o x_{no} \quad n = 1, \dots, N,$$

$$\sum_{j=1}^J y_{rj} \lambda_{oj} \geq y_{ro} \quad r = 1, \dots, R,$$

$$\theta_o \leq 1,$$

$$\theta_o, \lambda_{o1}, \lambda_{o2}, \dots, \lambda_{oJ} \geq 0.$$

Therefore, the CCR model involves finding such non-negative numbers θ_o and λ_{oj} so that:

- the expenditures of the shared technology represent the lowest possible portion of the actual expenditures of the o object,
- the results of the shared technology are at least the same as the ones actually achieved by the o object,
- the shared technology is acceptable.

4. Results

The results for the assumed variables are presented in Table 1. Due to the interpretation possibilities, only the optimal values of the expenditure level factor are given.

Table 1. Results of the expenditure-oriented CCR for small, medium and large enterprises

EU countries	Efficiency ($\hat{\theta}_o$)		
	Small enterprises	Medium enterprises	Large enterprises
Belgium	0,8948	0,909	0,9289
Bulgaria	1	1	1
Czechia	0,8853	0,8998	0,9298
Denmark	0,8791	0,9239	0,9524
Germany	0,8857	0,9508	0,9539
Estonia	1	1	1
Ireland	0,8904	0,9189	0,9297
Greece	1	1	1
Spain	0,911	0,9413	0,9594
France	0,9241	0,9091	0,9085
Croatia	1	1	1
Italy	0,9564	0,99	0,9815
Cyprus	1	0,9291	0,9707
Latvia	0,8421	0,9092	0,9193
Lithuania	0,9551	0,9775	0,9708
Luxembourg	0,9372	0,9364	0,9336
Hungary	1	1	0,971
Malta	0,875	0,9075	1
Netherlands	0,8971	0,9414	0,9396

Austria	0,9629	0,9481	0,985
Poland	0,9914	0,9453	0,9563
Portugal	0,9247	-	0,9923
Romania	1	1	1
Slovenia	1	1	1
Slovakia	0,9156	0,9373	0,9585
Finland	0,8876	0,9091	0,9001
Sweden	0,9042	0,9184	0,9011
United Kingdom	1	0,9737	0,9898

Source: own calculations.

The value of the optimal factor $\hat{\theta}_o$ lower than one means that the optimal expenditures of the shared technology necessary to achieve results at the level corresponding to those achieved by the object examined are not greater than the expenditures actually incurred by that object. Therefore, one can say that the object examined has achieved given results with the use of more expenditures than required, and thus it is not fully efficient.

The object's non-efficiency level can be defined as $1 - \hat{\theta}_o$. Where the optimal factor $\hat{\theta}_o$ equals one, the optimal expenditures necessary to achieve the effects which occurred in the object concerned are the same as the actual expenditures of that object, which means that the object is fully efficient. One can therefore say that the optimal expenditures are the expenditures of a fully efficient object.

On analysing efficiency indicators small, medium and large enterprises, one can say that most EU countries are non-fully efficient in the area of ICT security. The lowest value of the efficiency indicator is observed for small enterprises, where it ranges from 0.8421 to 0.9914, and therefore is close to one. However, it is the expenditures and results in small enterprises where the largest amount of fully efficient states can be observed. For all types of enterprises, fully efficient countries include Bulgaria, Estonia, Greece, Croatia, Romania and Slovenia. One can therefore assume that enterprises in those countries achieve their results in the area of ICT security through the optimal use of expenditures. Tables 2 – 4 show optimal technologies minimising expenditures in small, medium and large enterprises in non-efficient countries.

Table 2. Optimal technology (the optimal value as percentage of the empirical value) for small enterprises in non-efficient countries

Non-fully efficient countries		Belgium	Czechia	Denmark	Germany	Ireland	Spain	France	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Austria	Poland	Portugal	Slovakia	Finland	Sweden
Variable		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Inputs	IN_measure	89,5	88,5	87,9	88,6	89	91,1	92,4	95,6	84,2	95,5	93,7	87,5	89,7	96,3	99,1	92,5	91,6	88,8	90,4
	IN_insurance	71,1	88,5	8,7	64,1	12,9	34,2	24,3	77,3	84,2	95,5	52,3	21,4	61,4	31,9	99,1	92,5	91,6	15,9	9,8
	IN_policy	76,6	88,5	39,2	88,6	41,3	84,7	90,1	64,1	84,2	71,1	67	75,9	45,3	58,5	98,7	86,9	91,6	45,2	53,9
	IN_obligations	89,5	64,3	77,5	80	66,6	91,1	92,4	72	75,9	78,6	93,7	87,5	89,7	85,4	99,1	92,5	81,5	81,9	79,4
	IN_suppliers	89,1	88,5	87,9	88,6	89	91,1	92,4	95,6	80,3	95,5	93,7	87,5	89,7	96,3	89,9	82,5	91,6	88,8	90,4
Outputs	OUT_unavailability	114,6	105,9	101	100	110,5	100,5	102,7	100	100,3	100	104,1	109,9	103	100	100	100	102,5	104,6	130,6
	OUT_destruction	100	101,4	100	100	100	100	100	100	100	102,4	100	100	100	100	101,8	100	100	100	100
	OUT_disclosure	100	100	100,2	100	100	100	100	100	100	101,3	100	100	100,1	100	101	103,5	100	100,7	100

Source: own calculations.

Table 3. Optimal technology (the optimal value as percentage of the empirical value) for medium enterprises in non-efficient countries

Non-fully efficient countries		Belgium	Czechia	Denmark	Germany	Ireland	Spain	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Austria	Poland	Slovakia	Finland	Sweden	United Kingdom
Variable		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Inputs	IN_measure	90,9	90	92	93	91,9	94,1	90,9	92,9	92,9	90,9	97,7	92,8	89	93,6	92,8	94,5	93,7	90,9	91,8	93,9
	IN_insurance	33	63,6	50	62	17,5	24,2	17,6	65,5	82,3	69,9	97,7	26,8	24,9	94,1	63,5	92	82,7	29	21,2	39,3
	IN_policy	40,5	46,9	39,9	46,1	30,8	52,3	58,1	44,8	53,1	60,6	84,1	53,7	49,9	50,6	47,3	66,4	56,8	32,7	29,7	37,5
	IN_obligations	84,5	70,4	70,2	74,4	73,5	92,1	85,3	76,4	85	80,8	84,5	93,6	78,5	81,8	76,6	92,3	81,8	74,4	74,5	72,3
	IN_suppliers	90,7	89,8	92,4	95,1	91,7	93,1	90,7	99	91,1	88,9	97,3	93,6	90,8	94,1	94,8	93,6	92,6	90,7	90,7	97,4
Outputs	OUT_unavailability	110,7	113,7	100	100	106,1	100	101,2	100	100	101	100	106,2	104,3	100	100	100	101	104,9	150,2	100
	OUT_destruction	100,1	104,6	100	102,2	100	103,7	100	100	103,4	104,4	100,6	100	100,2	100,8	100	107,6	103,2	100	101,2	100
	OUT_disclosure	100	100	100,7	100	102,1	100	102,1	101,5	100	100	100	102,1	100	100,3	100,4	100	100	105,4	100	102,8

Source: own calculations

Table 4. Optimal technology (the optimal value as percentage of the empirical value) for large enterprises in non-efficient countries

Non-fully efficient countries		Belgium	Czechia	Denmark	Germany	Ireland	Spain	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Hungary	Malta	Netherlands	Austria	Poland	Portugal	Slovakia	Finland	Sweden	United Kingdom
Variable		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Inputs	IN_measure	92,9	93	95,2	94,8	93	95,4	90,8	96,4	97,1	91,9	97,1	93,4	96	97,9	94	98,5	95,6	99,2	95,9	90	90,1	98
	IN_insurance	91,2	93	95,2	95,4	57,8	38,9	65,7	98,1	97,1	91,9	97,1	93,4	97,1	77,6	94	98,5	95,6	99,2	95,9	90	88,5	58,3
	IN_policy	51,5	62,1	48,8	64,5	43,6	65,3	63,6	67	61	66,8	96,5	80,8	97,1	48,1	58,6	73,1	75	82	70,4	50	42,3	47,1
	IN_obligations	75,8	80,9	75,2	79,4	71,9	87	74,9	82,5	84,7	83,7	92,3	82,8	96,7	75,8	83,4	85,7	88,2	95,4	86,7	72,2	70,4	77,4
	IN_suppliers	92,9	92	95,2	95,4	92,9	95,9	89,9	98,1	96	90,2	97,1	93,3	97,1	100	93,8	97,1	94	97,7	94	89,8	90,1	99
Outputs	OUT_unavailability	127,3	116,9	109,4	101,9	121,7	103	113,2	110,4	100,9	108,8	100	115,3	111,9	137,3	102	104,8	100,1	103,3	108,9	117,5	227,4	103,2
	OUT_destruction	100	104,5	100	100	100	100	100	100	102,6	100,2	100,5	100	100	100	100	100	108,3	100	104,4	100	103,9	100
	OUT_disclosure	102	100	111,4	100	105,4	100	100,8	100,2	100	100	100	104,3	102,3	103,1	102,2	102,5	100	102,7	100	110,7	100	106,4

Source: own calculations

Countries which participate in an optimal shared technology oriented to non-fully efficient countries can together achieve their results at lower expenditures, while:

- In optimal technologies of all non-fully efficient countries, the physical quantity of results of small, medium and large enterprises is slightly higher than the actual quantity. In the said optimal technologies, most results are at the same level as the one observed, and this applies particularly to the enterprises which were not affected by disclosure of confidential data. Deployment of an optimal shared technology in non-fully efficient countries would in turn cause the highest increase in the share of enterprises which did not report any problems with availability of ICT services compared to the actual value of that share.
- Among non-fully efficient countries, the calculated optimal expenditures related to having insurance against ICT security incidents and defining or reviewing the security policy within the last 12 months account for less than 50% of the empirical expenditures in a number of countries. This is true mainly for small and medium enterprises in such countries as Denmark, Ireland, Spain, France, Malta, the Netherlands, Austria, Finland, Sweden (for small enterprises) and Belgium, the Czech Republic, Denmark, Germany, Ireland, Spain, France, Italy, Luxembourg, Malta, the Netherlands, Austria, Finland, Sweden, the United Kingdom (for medium enterprises).

Based on the optimal technology, the authors evaluated surpluses and deficits of results with respect to the optimal amounts in non-efficient states, and the findings are presented in Tables 5 – 7. Slacks mean the difference between the optimal expenditures and $\hat{\theta}_o$ -proportional expenditures. The expenditure slacks for the acceptable and optimal technologies result of Pareto non-optimality. In turn, the surplus of empirical expenditures is the difference between the empirical expenditures and $\hat{\theta}_o$ -proportional expenditures.

Table 5. Slacks and surpluses in expenditures of small enterprises in non-efficient countries.

Non-fully efficient countries	Slacks	Actual IN_measure	Actual IN_insurance	Actual IN_policy	Actual IN_obligation	Actual IN_supplier
Belgium	Expenditure slack	0,0064	4,4152	2,8456	0,0044	0,3868
	Surplus	9,79	6,94	5,16	5,58	9,96
	Surplus as percentage of optimal expenditures	0,117654	0,4068	0,306413	0,117672	0,122902
	Surplus as percentage of empirical expenditures	0,105269	0,289167	0,234545	0,105283	0,109451
Czechia	Expenditure slack	0,0035	-0,0029	-0,0034	17,9022	0,0064
	Surplus	10,9	0,8	2,52	26,39	10,1
	Surplus as percentage of optimal expenditures	0,129608	0,129032	0,129363	0,554295	0,129653
	Surplus as percentage of empirical expenditures	0,114737	0,114286	0,114545	0,356622	0,114773
Denmark	Expenditure slack	-0,0073	45,1687	18,5158	6,9897	-0,0028
	Surplus	11,72	52,06	23,11	15,09	11,12
	Surplus as percentage of optimal expenditures	0,13743	10,53846	1,552048	0,290695	0,137488
	Surplus as percentage of empirical expenditures	0,120825	0,913333	0,608158	0,225224	0,12087
Germany	Expenditure slack	-0,0014	4,6483	0,0011	5,5048	-0,0027
	Surplus	11,2	6,82	2,63	12,82	10,17
	Surplus as percentage of optimal expenditures	0,129032	0,559934	0,129111	0,250488	0,129012
	Surplus as percentage of empirical expenditures	0,114286	0,358947	0,114348	0,200313	0,11427
Ireland	Expenditure slack	-0,002	28,1748	18,6156	17,3108	-0,004
	Surplus	10,41	32,23	22,89	25,75	9,86
	Surplus as percentage of optimal expenditures	0,123064	6,756813	1,420857	0,502439	0,123035
	Surplus as percentage of empirical expenditures	0,109579	0,871081	0,586923	0,334416	0,109556
Spain	Expenditure slack	0,002	17,07	1,422	0,001	-0,003
	Surplus	8,19	19,74	3,38	4,54	7,74
	Surplus as percentage of optimal expenditures	0,097721	1,923977	0,181525	0,097718	0,097653
	Surplus as percentage of empirical expenditures	0,089022	0,658	0,153636	0,08902	0,088966
France	Expenditure slack	0,0013	25,1817	0,3515	0,005	0,0044
	Surplus	7,06	27,99	1,49	3,8	6,38
	Surplus as percentage of optimal expenditures	0,08215	3,106548	0,110289	0,082251	0,082195
	Surplus as percentage of empirical expenditures	0,075914	0,756486	0,099333	0,076	0,075952
Italy	Expenditure slack	-0,0048	2,1968	8,2064	17,2672	-0,0052
	Surplus	4,05	2,72	9,34	20,45	3,57
	Surplus as percentage of optimal expenditures	0,045531	0,293103	0,560624	0,389153	0,045518
	Surplus as percentage of empirical expenditures	0,043548	0,226667	0,359231	0,280137	0,043537
Latvia	Expenditure slack	0,0079	0,0052	0,0004	5,4886	3,89
	Surplus	15,64	1,9	3,79	15,91	19,68
	Surplus as percentage of optimal expenditures	0,18762	0,188119	0,187531	0,317628	0,24502
	Surplus as percentage of empirical expenditures	0,15798	0,158333	0,157917	0,241061	0,1968
Lithuania	Expenditure slack	-0,0008	-0,0047	4,882	10,6313	0,0033
	Surplus	4,13	0,13	5,78	13,46	3,73
	Surplus as percentage of optimal expenditures	0,047001	0,045296	0,40647	0,2717	0,047054

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	Surplus as percentage of empirical expenditures	0,044891	0,043333	0,289	0,213651	0,04494
Luxembourg	Expenditure slack	0,0024	9,9428	4,8096	-0,0016	0,0076
	Surplus	5,78	11,45	5,94	2,95	5,22
	Surplus as percentage of optimal expenditures	0,067038	0,912351	0,492537	0,066969	0,067112
	Surplus as percentage of empirical expenditures	0,062826	0,477083	0,33	0,062766	0,062892
Malta	Expenditure slack	-0,005	17,845	2,54	-0,005	0
	Surplus	11,62	21,22	5,29	6,87	11
	Surplus as percentage of optimal expenditures	0,142787	3,67128	0,316577	0,142738	0,142857
	Surplus as percentage of empirical expenditures	0,124946	0,785926	0,240455	0,124909	0,125
Netherlands	Expenditure slack	-0,0055	7,0675	11,9917	-0,005	-0,001
	Surplus	9,77	9,64	14,77	5,14	9,26
	Surplus as percentage of optimal expenditures	0,114631	0,627604	1,207686	0,114579	0,114689
	Surplus as percentage of empirical expenditures	0,102842	0,3856	0,547037	0,1028	0,102889
Austria	Expenditure slack	0,001	10,9493	9,4625	6,4011	0,0049
	Surplus	3,34	11,58	10,39	8,59	3,01
	Surplus as percentage of optimal expenditures	0,038541	2,136531	0,711157	0,170403	0,038595
	Surplus as percentage of empirical expenditures	0,037111	0,681176	0,4156	0,145593	0,03716
Poland	Expenditure slack	0,0032	0,004	0,071	0,0044	8,0518
	Surplus	0,76	0,09	0,2	0,4	8,8
	Surplus as percentage of optimal expenditures	0,008712	0,009082	0,013514	0,008772	0,112532
	Surplus as percentage of optimal expenditures	0,008636	0,009	0,013333	0,008696	0,101149
Portugal	Expenditure slack	0,0006	0,0023	0,9946	-0,0003	9,9053
	Surplus	7,38	0,68	2,35	3,84	17,36
	Surplus as percentage of optimal expenditures	0,081439	0,081731	0,15016	0,081425	0,212641
	Surplus as percentage of empirical expenditures	0,075306	0,075556	0,130556	0,075294	0,175354
Slovakia	Expenditure slack	0,0052	-0,0008	-0,0036	6,2372	0,0028
	Surplus	7,77	0,59	1,6	11,47	7,43
	Surplus as percentage of optimal expenditures	0,092247	0,092044	0,091954	0,226994	0,092218
	Surplus as percentage of empirical expenditures	0,084457	0,084286	0,084211	0,185	0,084432
Finland	Expenditure slack	0,0072	19,6652	13,068	4,1736	-0,0012
	Surplus	10,91	22,7	16,44	11,03	9,89
	Surplus as percentage of optimal expenditures	0,126728	5,27907	1,212389	0,220732	0,126616
	Surplus as percentage of empirical expenditures	0,112474	0,840741	0,548	0,18082	0,112386
Sweden	Expenditure slack	-0,0052	30,6496	12,787	6,7262	-0,003
	Surplus	9	34,29	16,14	12,57	8,14
	Surplus as percentage of optimal expenditures	0,105882	9,242588	0,855779	0,25955	0,105907
	Surplus as percentage of empirical expenditures	0,095745	0,902368	0,461143	0,206066	0,095765

Source: own calculations

Among small enterprises in countries which are not fully efficient in terms of ICT security, one can observe fairly large differences in the surpluses of individual expenditures understood as the difference between the empirical and optimal expenditures. The surplus peaks for expenditures related to insurance against ICT security incidents. In the case of such countries as Denmark, Ireland, France, Malta, Finland and Sweden they should be reduced by more than 70%.

Table 6. Slacks and surpluses in expenditures of medium enterprises in non-efficient countries.

Non-fully efficient countries	Slacks	Actual IN_measure	Actual IN_insurance	Actual IN_policy	Actual IN_obligation	Actual IN_supplier
Belgium	Expenditure slack	0,002	15,633	22,176	4,825	0,164
	Surplus	8,92	18,09	26,18	11,65	8,9
	Surplus as percentage of optimal expenditures	10,01%	203,03%	146,91%	18,39%	10,22%
	Surplus as percentage of empirical expenditures	9,10%	67,00%	59,50%	15,53%	9,27%
Czechia	Expenditure slack	0,0002	3,6872	16,3724	17,632	0,1806
	Surplus	9,92	5,09	20,18	26,65	9,9
	Surplus as percentage of optimal expenditures	11,14%	57,13%	113,24%	42,07%	11,37%
	Surplus as percentage of empirical expenditures	10,02%	36,36%	53,11%	29,61%	10,21%
Denmark	Expenditure slack	0,4261	21,175	29,8923	19,0854	-0,0017
	Surplus	7,96	24,98	34,23	25,63	7,38
	Surplus as percentage of optimal expenditures	8,74%	99,84%	150,33%	42,45%	8,23%
	Surplus as percentage of empirical expenditures	8,04%	49,96%	60,05%	29,80%	7,61%
Germany	Expenditure slack	2,0692	9,2724	22,036	17,588	0,006
	Surplus	6,94	10,65	24,25	21,77	4,68
	Surplus as percentage of optimal expenditures	7,54%	61,38%	116,87%	34,43%	5,18%
	Surplus as percentage of empirical expenditures	7,01%	38,04%	53,89%	25,61%	4,93%
Ireland	Expenditure slack	0,0011	38,6828	36,0251	16,1732	0,1833
	Surplus	8,03	42,9	40,81	23,31	8,05
	Surplus as percentage of optimal expenditures	8,83%	471,43%	224,35%	36,03%	9,05%
	Surplus as percentage of empirical expenditures	8,11%	82,50%	69,17%	26,49%	8,30%
Spain	Expenditure slack	0,0048	33,5424	15,0668	1,3997	0,9735
	Surplus	5,64	36,36	17,18	5,45	6,55
	Surplus as percentage of optimal expenditures	6,24%	312,37%	91,29%	8,58%	7,41%
	Surplus as percentage of empirical expenditures	5,88%	75,75%	47,72%	7,90%	6,89%
France	Expenditure slack	0,0009	37,3641	10,1821	4,1825	0,1827
	Surplus	9	42	13	11	9
	Surplus as percentage of optimal expenditures	10,00%	466,67%	72,22%	17,19%	10,23%
	Surplus as percentage of empirical expenditures	9,09%	82,35%	41,94%	14,67%	9,28%
Italy	Expenditure slack	6,05	7,03	23,86	19,02	0
	Surplus	7,04	7,24	24,3	19,86	0,91
	Surplus as percentage of optimal expenditures	7,66%	52,62%	123,35%	30,96%	1,01%

	Surplus as percentage of empirical expenditures	7,11%	34,48%	55,23%	23,64%	1,00%
Cyprus	Expenditure slack	0,0027	2,112	15,1458	5,7843	1,7127
	Surplus	6,88	3,53	17,84	10,96	8,59
	Surplus as percentage of optimal expenditures	7,63%	21,43%	88,49%	17,67%	9,72%
	Surplus as percentage of empirical expenditures	7,09%	17,65%	46,95%	15,01%	8,86%
Latvia	Expenditure slack	0	2,7296	9,096	8,086	2,02
	Surplus	9,08	3,91	11,82	15,35	11,1
	Surplus as percentage of optimal expenditures	9,99%	43,01%	65,02%	23,74%	12,49%
	Surplus as percentage of empirical expenditures	9,08%	30,08%	39,40%	19,19%	11,10%
Lithuania	Expenditure slack	0,0075	0,005	3,9475	10,4625	0,375
	Surplus	2,19	0,14	4,6	12,24	2,49
	Surplus as percentage of optimal expenditures	2,31%	2,39%	18,85%	18,33%	2,72%
	Surplus as percentage of empirical expenditures	2,26%	2,33%	15,86%	15,49%	2,65%
Luxembourg	Expenditure slack	0,7972	23,394	13,5676	0,0016	-0,002
	Surplus	7,03	25,62	15,73	4,39	6,04
	Surplus as percentage of optimal expenditures	7,73%	273,13%	86,10%	6,79%	6,79%
	Surplus as percentage of empirical expenditures	7,17%	73,20%	46,26%	6,36%	6,36%
Malta	Expenditure slack	1,695	23,0425	14,3125	9,6525	-0,005
	Surplus	10,76	26,28	17,55	16,96	8,69
	Surplus as percentage of optimal expenditures	12,33%	301,38%	100,57%	27,34%	10,19%
	Surplus as percentage of empirical expenditures	10,98%	75,09%	50,14%	21,47%	9,24%
Netherlands	Expenditure slack	0,4972	-0,0008	20,0244	9,1236	0,0044
	Surplus	6,24	1,64	22,72	13,46	5,63
	Surplus as percentage of optimal expenditures	6,80%	6,22%	97,59%	22,23%	6,23%
	Surplus as percentage of empirical expenditures	6,37%	5,86%	49,39%	18,19%	5,86%
Austria	Expenditure slack	1,9238	6,5801	19,4621	15,1523	-0,0086
	Surplus	7,01	7,67	21,59	19,46	4,87
	Surplus as percentage of optimal expenditures	0,077041	0,575394	1,112313	0,306264	0,054639
	Surplus as percentage of empirical expenditures	0,071531	0,365238	0,526585	0,234458	0,051809
Poland	Expenditure slack	0,0041	0,4148	8,429	1,5457	0,8788
	Surplus	5,31	1,29	10,07	5,32	6,13
	Surplus as percentage of optimal expenditures	0,057913	0,087695	0,505268	0,083543	0,06821
	Surplus as percentage of empirical expenditures	0,054742	0,080625	0,335667	0,077101	0,063854
Slovakia	Expenditure slack	-0,0019	1,2203	11,8136	9,3967	1,0808
	Surplus	6,08	1,91	13,82	14,35	7,1
	Surplus as percentage of optimal expenditures	0,066872	0,210121	0,760176	0,221964	0,079865
	Surplus as percentage of empirical expenditures	0,06268	0,173636	0,431875	0,181646	0,073958
Finland	Expenditure slack	0,0009	19,1821	32,0005	14,1826	0,1827
	Surplus	9	22	37	22	9
	Surplus as percentage of optimal	0,1	2,444444	2,055556	0,34375	0,102273

	expenditures					
	Surplus as percentage of empirical expenditures	0,090909	0,709677	0,672727	0,255814	0,092784
Sweden	Expenditure slack	0,0048	29,6628	37,284	14,714	1,0664
	Surplus	7,92	33,09	42,18	21,65	8,9
	Surplus as percentage of optimal expenditures	0,088909	3,713805	2,367003	0,341752	0,102181
	Surplus as percentage of empirical expenditures	0,081649	0,787857	0,703	0,254706	0,092708
United Kingdom	Expenditure slack	3,42	38,9279	37,7031	21,5682	0,0015
	Surplus	6,05	40,69	39,36	23,83	2,5
	Surplus as percentage of optimal expenditures	0,064396	1,54656	1,664975	0,383304	0,027027
	Surplus as percentage of empirical expenditures	0,0605	0,607313	0,624762	0,277093	0,026316

Source: own calculations.

Fairly large differences in the surpluses of individual expenditures can also be observed among medium enterprises in countries which are not fully efficient in terms of ICT security. It peaks for expenditures related to having insurance against ICT security incidents and ICT security policy. In such countries as Ireland, France, Spain, Luxembourg, Malta, Finland and Sweden the reduction should be relatively larger than in the case of other expenditures.

Table 7. Slacks and surpluses in expenditures of large enterprises in non-efficient countries.

Non-fully efficient countries	Slacks	Actual IN_measure	Actual IN_insurance	Actual IN_policy	Actual IN_obligation	Actual IN_supplier
Belgium	Expenditure slack	0,0011	0,6938	27,7563	15,5599	0,0322
	Surplus	7,04	3,68	32,52	22,03	7
	Surplus as percentage of optimal expenditures	0,076555	0,096033	0,943155	0,319414	0,076923
	Surplus as percentage of empirical expenditures	0,071111	0,087619	0,485373	0,242088	0,071429
Czechia	Expenditure slack	0	-0,0034	18,2282	11,5908	0,9202
	Surplus	7,02	1,19	22,37	18,33	7,87
	Surplus as percentage of optimal expenditures	0,0755	0,075269	0,610702	0,235998	0,08636
	Surplus as percentage of empirical expenditures	0,0702	0,07	0,379153	0,190938	0,079495
Denmark	Expenditure slack	0	-0,004	34,85	19,2604	0,0776
	Surplus	4,76	1,9	38,42	23,83	4,79
	Surplus as percentage of optimal expenditures	0,049979	0,049869	1,050301	0,330193	0,050844
	Surplus as percentage of empirical expenditures	0,0476	0,0475	0,512267	0,248229	0,048384
Germany	Expenditure slack	0,63	0,0048	18,2001	15,0266	0,0022
	Surplus	5,24	1,48	20,92	19,36	4,52
	Surplus as percentage of optimal expenditures	0,055298	0,048493	0,54937	0,259378	0,048353
	Surplus as percentage of empirical expenditures	0,0524	0,04625	0,354576	0,205957	0,046122
Ireland	Expenditure slack	0	23,5499	39,516	20,4509	0,0403
	Surplus	7,03	28,26	45,14	27,27	7
	Surplus as percentage of optimal expenditures	0,075616	0,729479	1,294894	0,39108	0,076087

	Surplus as percentage of empirical expenditures	0,0703	0,421791	0,56425	0,281134	0,070707
Spain	Expenditure slack	0,5212	41,0568	16,867	7,639	0,0024
	Surplus	4,5	43,98	19,1	11,09	3,9
	Surplus as percentage of optimal expenditures	0,048128	1,569593	0,532033	0,150047	0,042345
	Surplus as percentage of empirical expenditures	0,045918	0,610833	0,347273	0,130471	0,040625
France	Expenditure slack	0,0015	14,3145	14,4205	14,315	0,9415
	Surplus	9,06	19,53	19,27	22,55	10
	Surplus as percentage of optimal expenditures	0,100734	0,521217	0,571302	0,334322	0,11236
	Surplus as percentage of empirical expenditures	0,091515	0,342632	0,363585	0,250556	0,10101
Italy	Expenditure slack	1,7185	-0,0035	18,9715	14,368	0,004
	Surplus	3,55	0,57	20,1	16,07	1,78
	Surplus as percentage of optimal expenditures	0,037192	0,018732	0,491443	0,211642	0,018892
	Surplus as percentage of empirical expenditures	0,035859	0,018387	0,329508	0,174674	0,018542
Cyprus	Expenditure slack	0	-0,0027	21,642	10,7509	1,11
	Surplus	2,93	1,14	23,4	13,3	4,04
	Surplus as percentage of optimal expenditures	0,030184	0,030111	0,639344	0,180461	0,042101
	Surplus as percentage of empirical expenditures	0,0293	0,029231	0,39	0,152874	0,0404
Latvia	Expenditure slack	0	-0,0033	13,5622	7,4963	1,76
	Surplus	8,07	1,53	17,92	14,84	9,83
	Surplus as percentage of optimal expenditures	0,087784	0,087579	0,496674	0,194853	0,109016
	Surplus as percentage of empirical expenditures	0,0807	0,080526	0,331852	0,163077	0,0983
Lithuania	Expenditure slack	0,02	-0,002	0,29	4,4644	-0,0016
	Surplus	2,94	0,29	1,75	7,18	2,86
	Surplus as percentage of optimal expenditures	0,030291	0,029866	0,036269	0,083663	0,030061
	Surplus as percentage of empirical expenditures	0,0294	0,029	0,035	0,077204	0,029184
Luxembourg	Expenditure slack	0	0,0004	5,642	9,1096	0,0964
	Surplus	6,64	2,59	8,63	14,82	6,67
	Surplus as percentage of optimal expenditures	0,071123	0,071134	0,237283	0,208205	0,072241
	Surplus as percentage of empirical expenditures	0,0664	0,06641	0,191778	0,172326	0,067374
Hungary	Expenditure slack	1,099	0,002	-0,002	0,336	-0,004
	Surplus	3,97	0,35	1,39	2,83	2,78
	Surplus as percentage of optimal expenditures	0,041776	0,030043	0,029822	0,034027	0,029822
	Surplus as percentage of empirical expenditures	0,040101	0,029167	0,028958	0,032907	0,028958
Netherlands	Expenditure slack	0	0,006	23,3636	9,3148	0,2004
	Surplus	6,04	2,12	27,35	14,63	6,18
	Surplus as percentage of optimal expenditures	0,064283	0,064477	0,707633	0,1994	0,06658
	Surplus as percentage of empirical expenditures	0,0604	0,060571	0,414394	0,16625	0,062424

Austria	Expenditure slack	0,005	0,005	15,77	12,03	1,425
	Surplus	1,49	0,38	16,7	13,44	2,91
	Surplus as percentage of optimal expenditures	0,01528	0,015435	0,368653	0,166832	0,030284
	Surplus as percentage of empirical expenditures	0,015051	0,0152	0,269355	0,142979	0,029394
Poland	Expenditure slack	-0,0063	0,0012	10,0887	6,4781	1,6137
	Surplus	4,32	1,05	12,23	10,28	5,94
	Surplus as percentage of optimal expenditures	0,045627	0,045752	0,332608	0,133994	0,06383
	Surplus as percentage of empirical expenditures	0,043636	0,04375	0,249592	0,118161	0,06
Portugal	Expenditure slack	0	-0,0017	10,1357	3,3824	1,55
	Surplus	0,77	0,16	10,59	4,06	2,32
	Surplus as percentage of optimal expenditures	0,00776	0,007678	0,218756	0,048368	0,023751
	Surplus as percentage of empirical expenditures	0,0077	0,007619	0,179492	0,046136	0,0232
Slovakia	Expenditure slack	0,0015	0,003	13,5005	8,3435	1,8415
	Surplus	4,11	0,75	15,7	12,12	5,95
	Surplus as percentage of optimal expenditures	0,043313	0,043478	0,420912	0,153651	0,063944
	Surplus as percentage of empirical expenditures	0,041515	0,041667	0,296226	0,133187	0,060101
Finland	Expenditure slack	0	0,0034	29,9875	17,4998	0,2099
	Surplus	9,99	3,4	37,48	27,29	10,1
	Surplus as percentage of optimal expenditures	0,110988	0,111111	0,998934	0,385943	0,113611
	Surplus as percentage of empirical expenditures	0,0999	0,1	0,499733	0,278469	0,10202
Sweden	Expenditure slack	-0,0011	0,6762	37,7369	18,6945	0,0278
	Surplus	9,79	4,83	45,55	28,09	9,72
	Surplus as percentage of optimal expenditures	0,109741	0,129944	1,361734	0,419818	0,110104
	Surplus as percentage of empirical expenditures	0,098889	0,115	0,576582	0,295684	0,099184
United Kingdom	Expenditure slack	0,96	28,446	40,4444	20,511	0,0004
	Surplus	1,98	29,16	41,24	21,48	1
	Surplus as percentage of optimal expenditures	0,0202	0,714006	1,121872	0,292165	0,010309
	Surplus as percentage of empirical expenditures	0,0198	0,416571	0,528718	0,226105	0,010204

Source: own calculations.

Among large enterprises in countries which are not fully efficient in terms of ICT security, one can observe much smaller differences in the surpluses of individual expenditures than in the case of small and medium enterprises. The surplus peaks for expenditures related to having an ICT security policy and actions taken to make persons employed aware of their obligations in ICT security related issues.

Conclusions

Key findings

All sorts of enterprises - including small, medium and large ones - need to be resilient and manage the risks that the challenging market conditions and the associated risks pose. In the era of information society and digital economy the organizations have internal response how they approach and manage the risks. Information and communication technologies (ICTs) call for sound security measures that requires resources.

The authors positively verified, by means of empirical studies, the hypotheses regarding the possibility of identification of a system of measures for the assessment of ICT security in enterprises and the assessment of the ICT security level in enterprises in spatial terms with the use of appropriate tools that allow identifying countries where the level of ICT security in enterprises requires improvement and that provide for identifying the threshold objects in the test group. To assess ICT security in small, medium and large enterprises in geographical terms, the authors used DEA models which allowed assessing the enterprise security system in a number of terms, in particular with multiple expenditures and results based on the technical efficiency. The technical efficiency has been determined through the relation between the productivity of the object concerned and the productivity of the object considered as fully efficient. The efficiency thus determined showed the actual relation between the benefits and expenditures with reference to the maximum level that can be reached in specific technological conditions. The studies allowed the author to identify both DEA expenditures and achieved results. The expenditures and results have been referenced to the share of enterprises, which did not report any security incidents, and to the share of enterprises, which deployed specific methods to prevent such incidents. The share of enterprises which did not report any ICT risks has been considered as the result of deployment of information security systems in enterprises because - although an increasing number of more and more sophisticated safeguards are being applied - organisations still experience information security related incidents.

The research allowed identifying countries where ICT security results were achieved with the optimum combination of expenditures, i.e. the so-called fully efficient countries. Countries which are fully efficient in terms of ICT security in enterprises are in the Central and Eastern Europe, and therefore are less economically developed than other EU member states. This fact should not come as a surprise since enterprises active in economically developed countries more often apply much more advanced technologies than less developed countries, which makes them more vulnerable to cyberattacks (Li & Wu, 2020; Hughes et al, 2017; Jorgenson & Vu, 2016). Consequently, these enterprises are exposed to more security incidents, which translates into the need to incur much greater expenditures on information security.

The studies are also very important from the perspective of technical efficiency of ICT security actions. Identification of the possibilities of more effective planning of expenditures to achieve a specific level of ICT security can contribute to the improvement of their information risk management systems deployed.

Furthermore, the findings of the studies can be used for identifying the best practices in determining expenditures and results in the area of ICT security. Indeed, it is highlighted that DEA is the best tool for identifying the best practices or success, as it allows finding the best combination of resources held within a given technology.

The efficiency of ICT security measures undertaken by enterprises is key concern for the management of entities. Digital technologies are spreading and enterprises need to be continually watched out for ICT security matters. ICT technologies open up numerous new opportunities for enterprises. However, management should focus on designing and maintaining effective security procedures to ensure adequate protection for their organization.

Limitations and future research

The theoretical deliberations and analyses regarding the ICT security level in the context of technical efficiency presented in this paper cannot be considered as exhaustive and closed. The multitude and variety of information security problems in economic entities, coupled with the lack of clear solutions in this respect, require further research and studies. In the future, it would be advisable to identify barriers and possibilities regarding the development of ICT security systems in small, medium and large enterprises. It would also be appropriate to analyse the level of the results and expenditures in the context of technical efficiency over the last several years. Taken dynamically, it would provide for observing changes in the level of ICT security in enterprises over the years. Future studies should also focus on defining good practices to provide enterprises with adequate safeguards against data security breaches.

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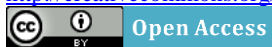
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DOES ENTREPRENEURIAL FACTOR INFLUENCE CREATIVE IDENTITIES' PERCEPTION?

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Abstract. The interdisciplinary research on the perception of entrepreneurs, managers, leaders, creators, and artists by individuals with and without entrepreneurial identity brings significant conclusions for understanding the way of thinking of entrepreneurs, their internal features, and motivations of their decisions. For this purpose, an international quantitative examination ($n = 160$) was undertaken. The research displayed that individuals with and without entrepreneurial identity perceive entrepreneurs, managers, leaders, creators, and artists statistically similar (the hypotheses were confirmed using the chi-square test of independence devoted to small samples without a normal distribution at $p < 0.001$). The negative verification of the hypotheses was astonishment and should be perceived as a novelty in the investigated area. The novelty can be perceived as an entrepreneurial potential existing in each individual (similar perception of the creative identities) that requires a specific spark and a fuel. The supplementary qualitative analysis of the variances among the 50 features constituting the investigated identities revealed that individuals with and without entrepreneurial identity see particular features of the investigated identities somewhat differently. Analysis of these differences was made, and the most important, the least important, and the most equally perceived were described and illustrated in detail. The results were discussed with the literature on the subject, confirming most other researchers' theses and revealing some contradictions. The conclusions reveal characteristics of an entrepreneur's identity perception by individuals with and without entrepreneurial factors and the meaning of all investigated identities in an entrepreneur's identity. The research outcomes may be used to understand the qualities of entrepreneurial identity and the perception of investigated identities by individuals, groups (with particular underlining of business organizations), and societies dominated by persons with and without entrepreneurial factors. The applicability of the findings is broad, mainly due to the crucial role of entrepreneurship in today's world as potential in each individual. Particular triggers should be catalyzed instead of looking for entrepreneurial individuals. The education process of entrepreneurs should focus on revealing entrepreneurial potential underlining the role of inspiration, and discovering the motifs of entrepreneurial activity.

Keywords: entrepreneur's identity; manager's identity; leader's identity; creator's identity; artist's identity; entrepreneurship; creativity; creativeness; artistry

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Additional disciplines: sociology, psychology, aesthetics, creativity

1. Introduction and theoretical background

As one of the vital components of social capital and economic growth, entrepreneurship is an extensively demanded feature of individuals and groups. Besides entrepreneurs, society requires managers to organize and achieve goals effectively, leaders inspiring people to grow and desire goals, artists who give rest, the possibility of catharsis, and add extra dimensions to everyday life. All the identities mentioned above have one common feature – creativity. That is why entrepreneurs, managers, and leaders are often called creators. The paramount entrepreneurs, managers, leaders, and creators are called artists of their professions (Szostak & Sułkowski, 2020a). It should be underlined that motivation and inspiration play significant roles in self-construction and efficiency in achieving goals by individuals performing these roles in society. Identity changes with time, resulting in identity work (Miscenko et al., 2017). Researchers show opposite conclusions about the leading source of professional success of individuals with these identities: talent or education (Celuch et al., 2017); it seems that a combination of both elements is needed. Also, the distinction between personal (internal) and social (external) context is crucial (Korte, 2018). In these frameworks, perception of the above identities can play a vital role in the management of entrepreneurship among individuals and organizations.

Due to the stringently psychological appearances of identity research, scientists undertake discovering rules helping to include varied identities in management practice. The investigation of the entrepreneur, manager, leader, creator, and artist in one research is crucial because these identities are driving forces of progress and development. They are not evident in distinction by society, and they usually occur not isolated. These identities are mostly merged in twosomes, like artist-manager, artist-leader, manager-entrepreneur (Szostak & Sułkowski, 2021c), or larger assemblies artist-manager-entrepreneur or creator-artist-manager (Szostak & Sułkowski, 2021a). Those complex identities may trigger complications, dilemmas, and tensions (Mathias & Williams, 2017; Mochalova, 2020; Schediwy et al., 2018; Warhurst & Black, 2017) but correspondingly can uncover different dimensions, skills, and potentials for individuals. There is only one condition here: these individuals must control the particular identities using well-described methods like identity work, identity regulation, creativity development, or paradoxical thinking (Antal et al., 2016; Cuganesan, 2017; Szostak & Sułkowski, 2021b).

Researchers face a problem that the individuals – possessing talent, personal characteristics, and deep-rooted professional status in the areas of entrepreneurship, management, leadership, creativity, or artistry – reveal difficulties with the classification of who an entrepreneur is, who a manager is, who a leader is, who a creative person is, and who an artist is. These imprecise “definitions” of the certain identities make possible to separate the scientifically-described complex identities of artists-entrepreneurs (Bass, 2017; Bridgstock, 2012; Szostak & Sułkowski, 2021a) or artists-managers (Elstad & Jansson, 2020; Szostak & Sułkowski, 2020a, 2021c, 2020b). There is not much research trying to compare individual’s perceptions of chosen issues by individuals with and without entrepreneurial identity. On this foundation, the inspection of the differences in perception of the identities of an entrepreneur, manager, leader, creator, and artist by entrepreneurial and nonentrepreneurial individuals may expose supplementary findings to the explored identities.

The subsequent hypotheses were designed for this research: H1) There are differences in perception of the entrepreneur's, manager's, leader's, creator's, and artist's identities between entrepreneurial and nonentrepreneurial individuals. H2) The differences in perception of the entrepreneur's, manager's, leader's, creator's, and artist's identities between entrepreneurial and nonentrepreneurial individuals are not the same and vary in the case of each of the particular identities.

2. Research objective and methodology

To verify the hypotheses, quantitative research was executed using a questionnaire enclosing the dimensions of the examined phenomenon and selected indicators that allow defining the examined phenomenon (Nowak, 2007).

The initial research design was expected to create separated lists of indicators for every studied dimension. Sets of indicators for individual dimensions began to be changed based on the literature on entrepreneurship, management, leadership, creativity, and artistry. The analysis of individual groups of indicators did expose that each of the indicators preferred for different dimensions could portray each of the examined dimensions with benefits to its description. Based on this supposition, a single list of 50 identical indicators was composed and applied to all five observed dimensions. For additional conclusions, the obtained results can be compared with the same indicators for other dimensions.

The survey entitled “Perception of creativity, artistry, entrepreneurship, leadership and managerial abilities” was divided into four segments. There was a list of inquiries (each question connected to a single indicator) divided into thematic sections discussing each analyzed dimension: entrepreneurship (Fillis & Rentschler, 2010; Toscher, 2020), management (Elstad & Jansson, 2020; Lutas et al., 2020), leadership (Jankurová et al., 2017; Raso et al., 2020), creativity (Deresiewicz, 2020; Dufour et al., 2020; Szostak & Sułkowski, 2020a), and artistry (McHugh, 2015; Szostak, 2020). All questions were closed, and a five-point Likert scale was designed for replies: 1. *definitely not*, 2. *rather not*, 3. *hard to say*, 4. *rather yes*, and 5. *definitely yes*. Then, questions were set about the relation of each analyzed dimension to other dimensions. In the third section, the research participants were asked to define their identity concerning each investigated dimension. In the end, questions classifying the respondents were set, i.e., gender, age, education, the valuation of their own identity (as an entrepreneur, manager, leader, creator, and artist).

The nonparametric chi-square test of independence devoted to minor samples that do not have a normal distribution helped verify the hypotheses. The pairs of the observed values were associated with pairs of the expected values for each hypothesis. The p-value of the tests was < 0.001 . Data analysis was completed using Microsoft Excel. Because of the minor size of the sample ($n = 160$), complex statistics were not conducted. This article exhibits only a portion of the conclusions from the complete research.

The research lasted 34 days in December 2020 and January 2021. Questionnaires were disseminated via direct contact and indirect public tools (social networks, group communications to various types of public). Estimation of the number of individuals who were requested to participate in the experiment is approx. 2-3 thousand. Eight hundred seventy-nine people were interested in taking part in the survey, which was estimated by the number of clicking on the link leading to the survey. The total contribution in the examination, involving filling in the questionnaire, was realized by 160 individuals, i.e., 18.2% of those interested in the research. The typical time of filling in the form was 32.5 minutes, and the mean age of a respondent was 38 years.

Individuals with an entrepreneurial identity (answering *rather yes* or *definitely yes*) constituted 38.8% of the respondents. Individuals without an entrepreneurial identity (answering *rather no* or *definitely not*) constituted 51.2% of the respondents. Individuals having problems with the description of their entrepreneurial identity constituted 16.0% of the respondents. Among the respondents: women constituted 42.5% and men 57.5%; individuals with secondary education 15.75%, with higher education (bachelor, master, engineer) 64.57%, with doctoral, postdoctoral, or professor degrees 18.90%. The respondents came from 28 countries: 74% from developed countries and 26% from developing countries (United Nations, 2021); 71.7% from Europe, and 28.3% outside of Europe; 63.8% from post-communist countries (Belarus, Czech Republic – former Czechoslovakia, Kazakhstan, Lithuania, Poland, Russia, Ukraine, Uzbekistan), and 36.2% from countries with no experience of communism (Angola, Argentina, Brazil, Dominican Republic, Germany, Greece, India, Ireland, Italy, Japan, Kenya, Luxembourg, Nepal, Netherlands, Nigeria, Pakistan, Thailand, Turkey, the UK, the USA). 83.77% of respondents named themselves creative individuals (answering *rather yes* or *definitely yes*), and 16.23% named themselves noncreative individuals (answering *rather no* or *definitely not*).

3. Results and discussion

Both hypotheses of the research were established with the intention to confirm significant differences in perception of chosen issues by individuals with and without entrepreneurial identity. These discrepancies would underline commonly perceived differences between entrepreneurial and nonentrepreneurial individuals. Their negative verification was astonishment and should be perceived as a novelty in the investigated area. The novelty can be perceived as an entrepreneurial potential existing in each individual (similar perception of the creative identities) that requires a specific spark and a fuel. The spark is an inspiration of entrepreneurial activity and can be divided into two groups of factors: 1) internal, e.g., basic personality traits, type of creative personality, the complexity of the identity, needs, goals, and dreams of an individual; 2) external, e.g., conditions and circumstances, momentary occasions, expectations of us (Szostak, 2018). The fuel of entrepreneurial activity is motifs of entrepreneurial activity, e.g., fascination with the world, perception of the imperfections of the world, excess creative energy, selfishness, and narcissism, or material necessity (Gołaszewska, 1984; Szostak & Sułkowski, 2020a).

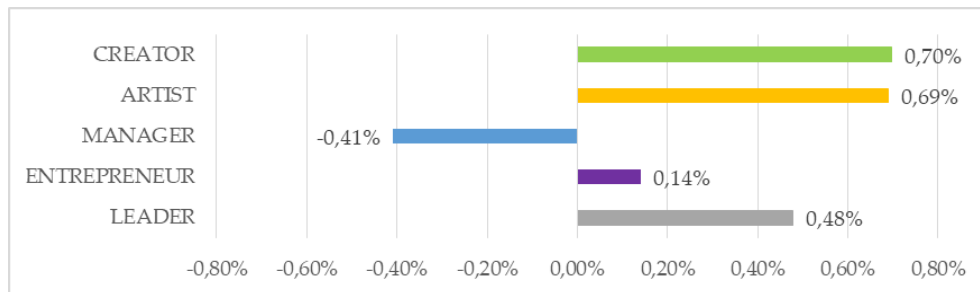


Figure 1. Means of the 50 features of each investigated identity perceived by entrepreneurial individuals in comparison to nonentrepreneurial individuals

Source: own elaboration

The following conclusions were found about the statistic verification of the research hypotheses. H1 (“There are differences in perception of the entrepreneur’s, manager’s, leader’s, creator’s, and artist’s identities between entrepreneurial and nonentrepreneurial individuals”) was verified negatively. The *chi-square* value amounted to: 407.50 for an entrepreneur, 410.55 for a manager, 413.41 for a leader, 396.72 for a creator, and 398.35 for an artist. For the $df = 49$, using the chi-square distribution table, there is a value of 85.3506. It means that the results are statistically significant for the significance level of $p = 0.001$. H2 (“The differences in perception of the entrepreneur’s, manager’s, leader’s, creator’s, and artist’s identities between entrepreneurial and nonentrepreneurial individuals are not the same and vary in the case of each of the particular identities”) was verified negatively. The *chi-square* value = 40.53. For the $df = 4$, using the chi-square distribution table, there is a value of 18.4668. It means that the results are statistically significant for the significance level of $p = 0.001$. In the case of each investigated identity, the means of the 50 features of the identities of an entrepreneur, manager, leader, creator, and artist are lower than 0.7%. The graphical illustration shows Figure 1. Although the basic hypotheses were statistically verified negatively, the qualitative analysis of the in-depth characteristics of the investigated identities between entrepreneurial and nonentrepreneurial individuals reveals interesting outcomes.

3.1. Entrepreneur's identity

The variety of disparities in the answers referring to the entrepreneur’s identity seen by entrepreneurial and non-entrepreneurial individuals displays Figure 2 and Figure 3. The ten most important features of an entrepreneur’s identity perceived by entrepreneurial individuals are (in descending order): patience and persistence in achieving goals, searching for opportunities, responsibility, efficiency, courage, self-confidence, innovation, ability to set goals, focusing on financial profit, a tendency to plan. The ten most important features of an entrepreneur’s identity

ty perceived by nonentrepreneurial individuals are (in descending order): the ability to set goals, self-confidence, resistance to fails and failures, searching for opportunities, patience and persistence in achieving goals, focusing on financial profit, responsibility, efficiency, courage, a tendency to plan. Perception of the particular 50 investigated features of the entrepreneur's identity by entrepreneurial individuals versus nonentrepreneurial individuals reveals the following conclusions. The ten features of the entrepreneur's identity seen as less critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in descending order): being guided by reason (rationalism), resistance to fails and failures, ability to set goals, ability to analyze, focusing on financial profit, solving problems in a methodical way (logic), self-confidence, observation, inner sense of control, tendency to plan.

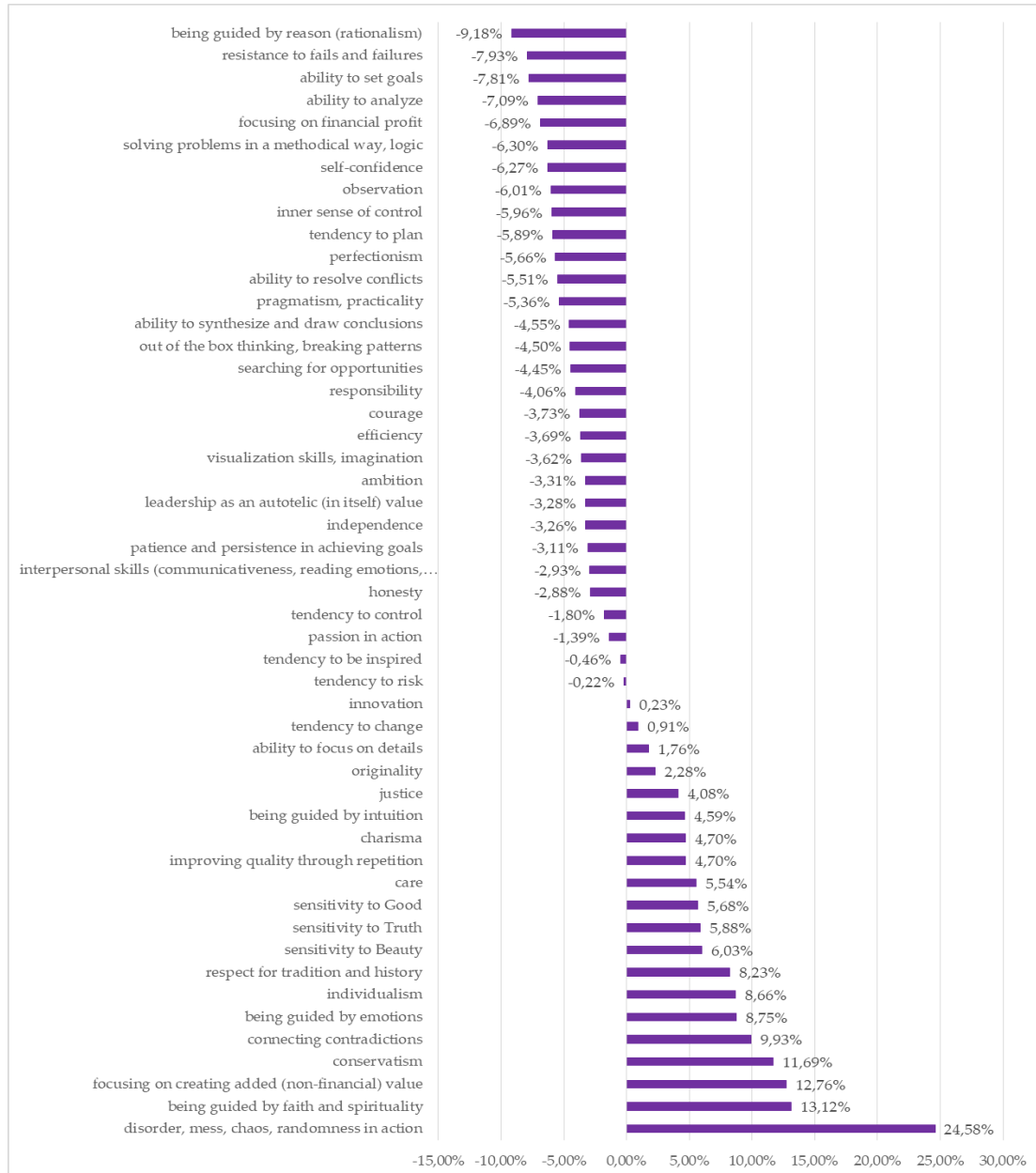


Figure 2. Perception of the 50 features of an entrepreneur's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten features of the entrepreneur's identity seen as more critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in ascending order): sensitivity to Truth, sensitivity to Beauty, respect for tradition and history, individualism, being guided by emotions, connecting contradictions, conservatism, focusing on creating added (non-financial) value, being guided by faith and spirituality, disorder (mess, chaos, randomness in action). The ten features of the entrepreneur's identity seen similarly by entrepreneurial individuals and nonentrepreneurial individuals are interpersonal skills (communicativeness, reading emotions, sensitivity to others), honesty, tendency to control, passion in action, tendency to be inspired, tendency to risk, innovation, tendency to change, ability to focus on details, originality.



Figure 3. Perception of the most differently assessed features of an entrepreneur's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

An entrepreneur's identity is commonly constructed around the subject of two sides of profitability: financial or beyond financial (Saxena, 2019). The research confirms this issue: focusing on financial profit is perceived as a fundamental issue for entrepreneurial individuals (4.41) and nonentrepreneurial individuals (4.75) – the difference is 6.89%. Focusing on creating added (non-financial) value is described as *rather important* by entrepreneurial individuals (3.84) and as *neutral* by nonentrepreneurial individuals (3.20) – the difference is quite significant (12.76%). The literature shows that entrepreneurship and creativity are linked together by motivation, actualization, and innovation (Fillis & Rentschler, 2005, 2010). The research confirms the importance of innovation: both entrepreneurial (4.49) and nonentrepreneurial individuals (4.48) perceive it as a fundamental issue – the difference is negligible (0.23%). Analyses reveal that individual dissimilarities and qualities – like proficiency, individuality, human capital and abilities, cognition – play a vibrant role in the process of an entrepreneur's identity creation (Lewis et al., 2016). In the research, the respondents were asked about the issue of independence (which is analogous to individuality) and confirmed that independence is vital for entrepreneurial (4.16) and nonentrepreneurial

individuals (4.33) – the difference in perception is 3.26%. The issue of observation (which is analogous to cognition) was also confirmed by entrepreneurial (4.32) and nonentrepreneurial individuals (4.63) – the difference in perception is 6.01%. The ethical side of an entrepreneur's identity was researched about honesty (Alrawadieh & Alrawadieh, 2018). The research confirms the importance of honesty: both entrepreneurial (4.08) and nonentrepreneurial individuals (4.23) perceive it as a *rather important* issue – the difference is 2.88%.

3.2. Manager's identity

The whole range of differences in the answers regarding the manager's identity perceived by entrepreneurial and nonentrepreneurial individuals shows Figure 4 and Figure 5.

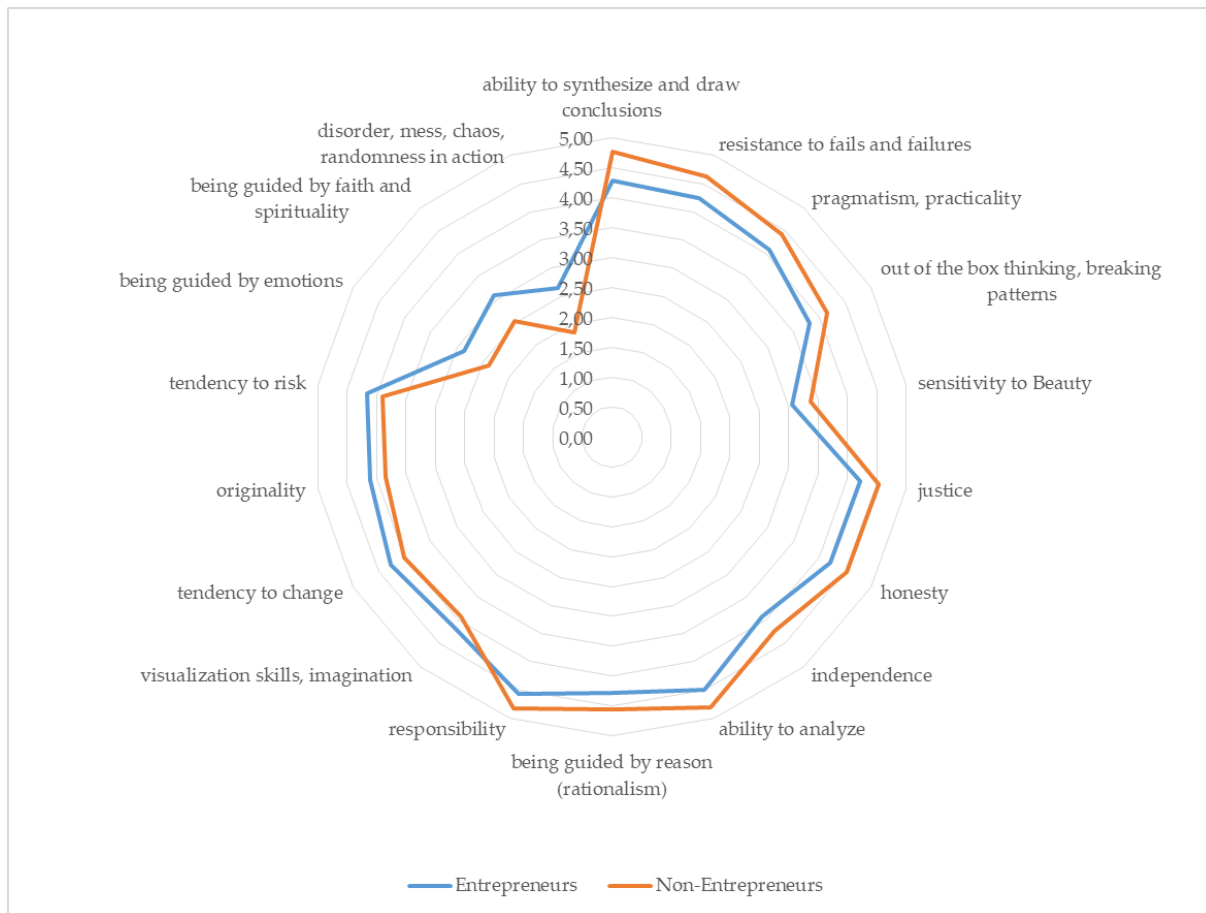


Figure 4. Perception of the most differently assessed features of a manager's identity by entrepreneurial versus nonentrepreneurial individuals.

Source: own elaboration

The ten most important features of a manager's identity perceived by entrepreneurial individuals are (in descending order): efficiency, ability to set goals, a tendency to plan, ambition, responsibility, patience and persistence in achieving goals, ability to resolve conflicts, interpersonal skills (communicativeness, reading emotions, sensitivity to others), self-confidence, ability to analyze. The ten most important features of a manager's identity perceived by nonentrepreneurial individuals are (in descending order): efficiency, responsibility, ability to analyze, ability to synthesize and draw conclusions, ability to set goals, ability to resolve conflicts, a tendency to plan, patience and persistence in achieving goals, self-confidence, interpersonal skills (communicativeness, reading emotions, sensi-

tivity to others). Perception of the particular 50 investigated features of the manager's identity by entrepreneurial individuals versus nonentrepreneurial individuals reveals the following conclusions.

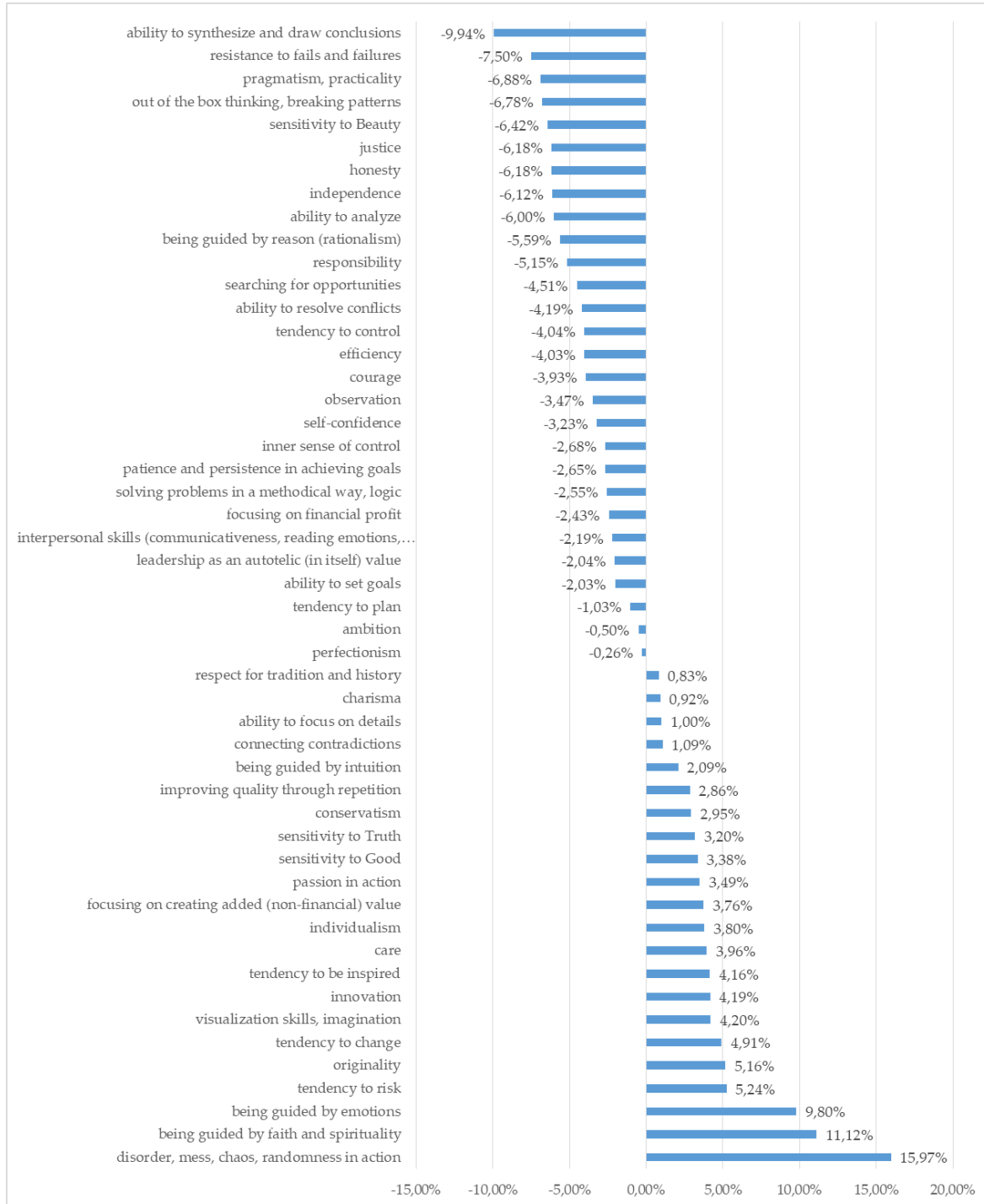


Figure 5. Perception of the 50 features of a manager's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten features of the manager's identity seen as less critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in descending order): the ability to synthesize and draw conclusions, resistance to fails and failures, pragmatism (practicality), out of the box thinking (breaking patterns), sensitivity to Beauty, justice, honesty, independence, ability to analyze, being guided by reason (rationalism). The ten features of the manager's identity seen as more critical by nonentrepreneurial individuals versus nonentrepreneurial individuals are (in ascending order): care, tendency to be inspired, innovation, visualization skills (imagination), tendency to change, originality, tendency to risk, being guided by emotions, being guided by faith and spirituality, disorder (mess, chaos, randomness in action). The ten features of the manager's identity seen similarly by entrepreneurial individuals and nonentrepreneurial individuals are leadership as an autotelic (in itself) value, ability to set goals, a tendency to plan, ambition, perfectionism, respect for tradition and history, charisma, ability to focus on details, connecting contradictions, being guided by intuition.

Manager's identity in the writings is expressed as: an organizer, an expert, a political operator, a rational actor (Bulei et al., 2014; Sims, 2003; Watson, 2001, 2009). Being guided by reason (rationalism) was assessed by entrepreneurial individuals as *rather important* (4.27) and by nonentrepreneurial individuals by 5.59% stronger (4.55). As confirmation by negating the importance of organizing skills, it can be found disorder, mess, chaos, and randomness in action as *rather unimportant for entrepreneurial individuals* (2.65) and *not important* (1.85) nonentrepreneurial individuals – the difference is 15.97%. It results in opposite to investigations suggesting that randomness is one of the specific attributes of the manager's identity (Lahmiri et al., 2020).

Based on diverse levels of creativity and efficiency, the following manager's identities may be found: a manager-theoretician, an administrator (an official), a professional, a creative manager (a leader). A manager with high creativity and competence in his domain can be effectively called a management artist; it will also be approved to name the manager as an artist/virtuoso who, completing his ideas, knows how to organize reality according to his intentions (Szostak & Sułkowski, 2020a). Researches based on educational institutions reveal that factors affecting managerial creativity are: innovative leadership attributes, risk tolerance, domain expertise, openness, emotional stability, confidence, action-oriented and professional development (Alsuwaidi & Omar, 2020). The literature underlines the profound influence of managers on their employees' creativity (Williams, 2001), but the level of creativity among managers varies depending on many factors, e.g., gender (Ahmad & Zadeh, 2016). Creativity also has its paradoxes in the form of assumptions and unanswered questions (DeFillippi et al., 2007). The research confirms the importance of creativity among managers. Spreading creativity on analytical elements, it can be stated that: 1) innovation is perceived similarly (difference 0.23%) by both entrepreneurial (4.49) and nonentrepreneurial individuals (4.48); 2) originality is perceived as *rather important* by entrepreneurial (4.11) and nonentrepreneurial individuals (3.85) – the difference is 5.16%; 3) out of the box thinking and breaking patterns was assessed by entrepreneurial individuals as *rather important* (3.81) and by nonentrepreneurial individuals by 6,78% as less crucial (4.15); 4) searching for opportunities is perceived by 4.51% weaker by entrepreneurial individuals (4.32) than by nonentrepreneurial individuals (4.55), but both groups perceive it as *very important*.

Manager's identity is built around profitability: financial or beyond financial (Fiolleau et al., 2020; FitzGibbon, 2021; Gaudette et al., 2020). The research confirms this statement, but it needs to be underlined that focusing on financial profit is much vital (4.38 for entrepreneurial individuals, 4.50 for nonentrepreneurial individuals, difference 2.43%) than focusing on creating added (non-financial) values (3.84 for entrepreneurial individuals, 3.65 for nonentrepreneurial individuals, difference 3.76%).

Between specific attributes of the manager's identity, the literature emphasizes efficiency (Baker et al., 2012; Kohail et al., 2016), independence (McGrath et al., 2019), individualism (Frank et al., 2015), rationalism (Faran & Wijnhoven, 2012), courage (Barratt-Pugh et al., 2013), responsibility (Mikkelsen & Marnewick, 2020), conservatism (Sturdivant et al., 1985). The research confirms the high importance of efficiency (4.65 for entrepreneurial individuals, 4.85 for nonentrepreneurial individuals, difference 4.03%), independence (by analogy 3.92, 4.23,

6.12%), individualism (by analogy 3.81, 3.62, 3.80%), courage (by analogy 4.38, 4.58, 3.93%), responsibility (by analogy 4.57, 4.83, 5.15%). However, conservatism is *rather neutral* for entrepreneurial individuals (3.30) and nonentrepreneurial individuals (3.15) – a difference of 2.95%.

3.3. Leader's identity

The whole range of differences in perception of the leader's identity by entrepreneurial and nonentrepreneurial individuals displays Figure 6 and Figure 7.

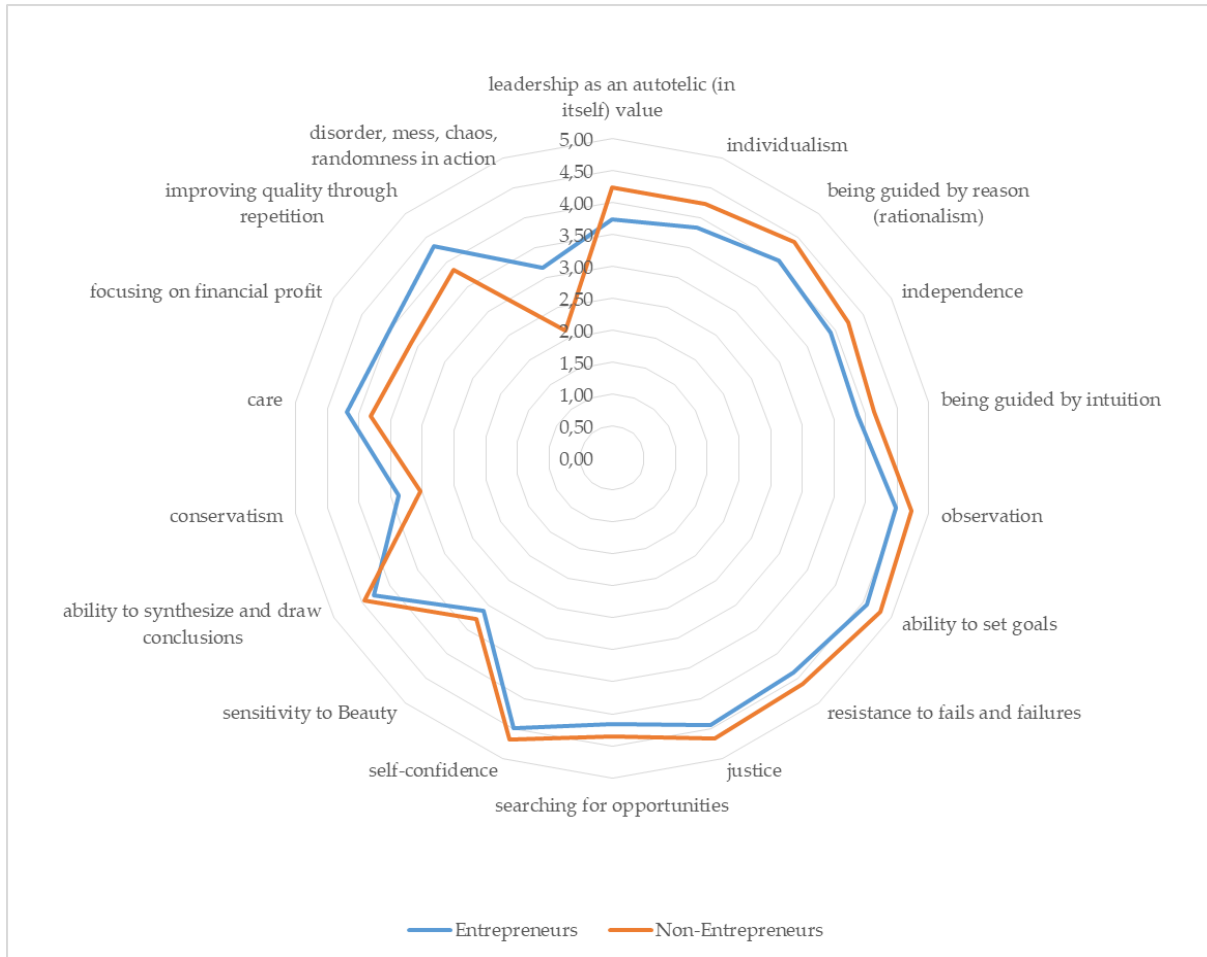


Figure 6. Perception of the most differently assessed features of a leader's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten most important features of a leader's identity perceived by entrepreneurial individuals are (in descending order): charisma, ability to resolve conflicts, patience and persistence in achieving goals, responsibility, efficiency, ability to set goals, courage, interpersonal skills (communicativeness, reading emotions, sensitivity to others), self-confidence, observation. The ten most important features of a leader's identity perceived by nonentrepreneurial individuals are (in descending order): charisma, ability to set goals, patience and persistence in achieving goals, observation, ability to resolve conflicts, self-confidence, interpersonal skills (communicativeness, reading emotions, sensitivity to others), responsibility, justice, courage. Perception of the specific 50 explored features of

the leader's identity by entrepreneurial individuals versus nonentrepreneurial individuals reveals the following conclusions.

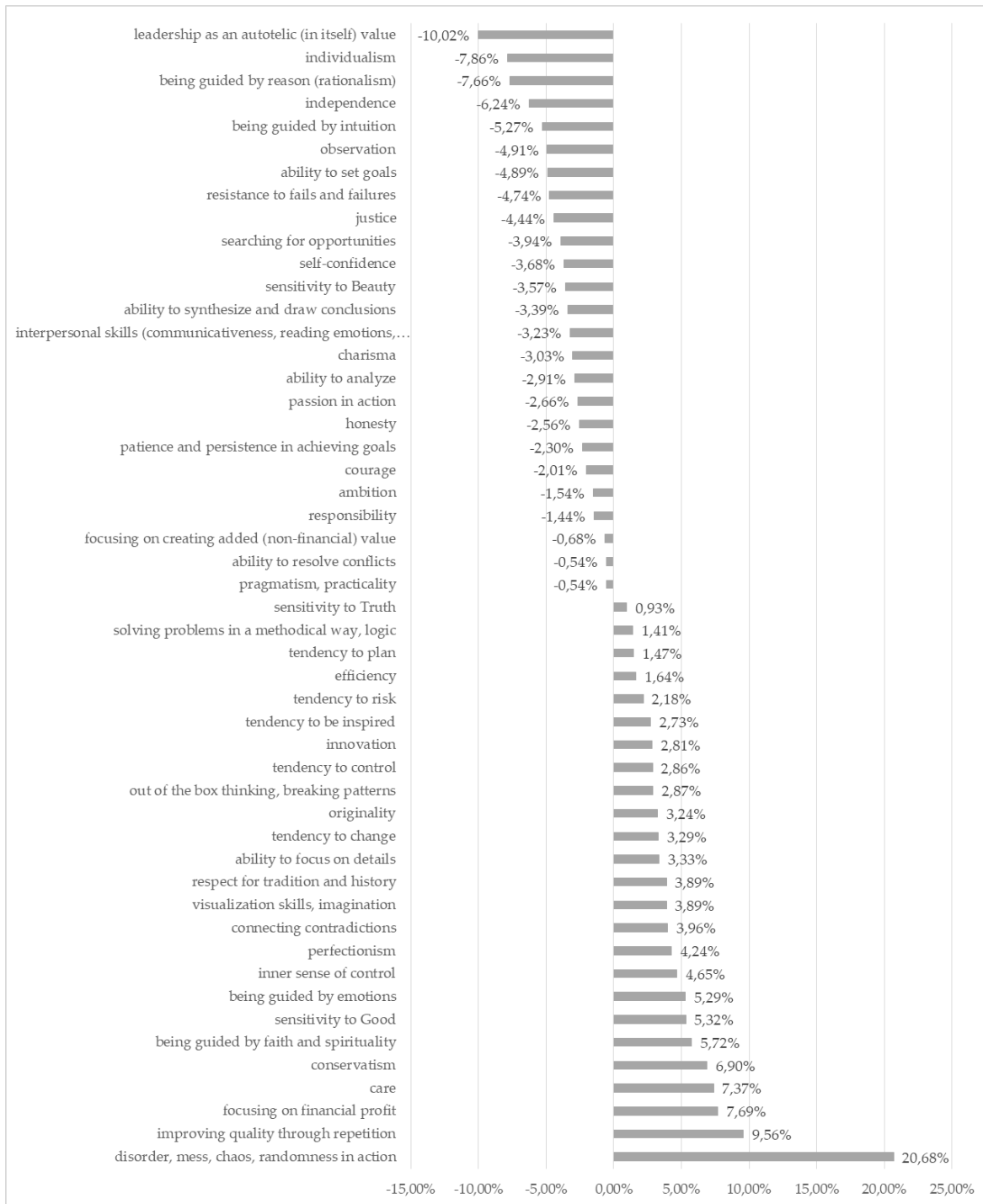


Figure 7. Perception of the 50 features of a leader's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten features of the leader's identity seen as less critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in descending order): leadership as an autotelic (in itself) value, individualism, being guided by reason (rationalism), independence, being guided by intuition, observation, ability to set goals, resistance to fails and failures, justice, searching for opportunities. The ten features of the leader's identity seen as more critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in ascending order): perfectionism, inner sense of control, being guided by emotions, sensitivity to Good, being guided by faith and spirituality, conservatism, care, focusing on financial profit, improving quality through repetition, disorder, mess, chaos, randomness in action. The ten features of the leader's identity seen similarly by entrepreneurial individuals and nonentrepreneurial individuals are courage, ambition, responsibility, focusing on creating added (non-financial) value, ability to resolve conflicts, pragmatism (practicality), sensitivity to Truth, solving problems in a methodical way (logic), a tendency to plan, efficiency.

The literature shows that the level of a leader's self-identity influences vision communication with coworkers and subordinates positively (Venus et al., 2019). The narcissistic personality has an essential impact on a leader's identity integration (Chen, 2018). Transformational leadership and procedural justice positively and significantly affect manager trust, and manager trust positively impacts creating a sustainable organizational identity (Erat et al., 2020). The research confirms that justice is a *very important* feature of a leader's identity (4.44 for entrepreneurial individuals, 4.67 for nonentrepreneurial individuals, difference 4.44%). Communicativeness, reading emotions, sensitivity to others as interpersonal skills are crucial both for entrepreneurial individuals (4.51) and nonentrepreneurial individuals (4.68) – a difference of 3.23%.

There are arguments that the leader's values and approach to an organization's identity affect the organization's performance and financial revenues (Adler, 2006; Voss et al., 2006). The research reveals that focusing on financial profit is 7.69% more vital for entrepreneurial individuals (4.00) than for nonentrepreneurial individuals (3.62). In the case of focusing on creating added (non-financial) value, the difference in perception is negligible (0.68%) – entrepreneurial (3.84) and nonentrepreneurial individuals (3.87) assess it as slightly less than *rather important*. Leaders influence, encourage, formulate a vision, motivate, inspire and mobilize followers; they affect their employees but are inspired by their surroundings too; they affect people through their charisma (Jankurová et al., 2017). A leader's identity must be strong enough to face the complex, dynamic, chaotic, and highly subjective, interactional surroundings of current organizations and perspectives (Sutherland, 2013). The research confirms that charisma is vital for entrepreneurial individuals (4.69) and nonentrepreneurial individuals (4.85) – a difference of 3.03%.

The level of surveillance regulates followers' replies to leaders with whom they either do or do not share an identity (O'Donnell et al., 2010). Tendency to control is assessed as *rather important* for entrepreneurial individuals (4.19) and nonentrepreneurial individuals (4.05) – a difference of 2.86%. A leader's effectiveness depends on sharing values by his followers and is negatively linked with compensation inconsistency between a leader and followers (Steffens et al., 2020). The research confirms efficiency as a crucial factor of a leader's identity (4.59 for entrepreneurial individuals, 4.51 for nonentrepreneurial individuals, difference 1.64%).

The issue of leader's moral identity and moral attentiveness as antecedents of perceived ethical leadership and follower moral identity and moral attentiveness as ethical leadership outcomes are described in the literature (Ete et al., 2020; Zhu et al., 2016). The ethical approach and leader's honesty mainly was examined based on decision-making promptness (Van de Calseyde et al., 2020). The research reveals interesting conclusions here. Sensitivity to Truth of a leader, practically without a difference (0.93%), is perceived as a *rather important* factor (4.26 by entrepreneurial individuals, 4.20 by nonentrepreneurial individuals). Leader's sensitivity to Good is more important for entrepreneurial individuals (4.06) than nonentrepreneurial individuals (3.79) – a difference of 5.32%. Leaders' care for entrepreneurial individuals (4.19) in comparison to entrepreneurial individuals (3.82) is per-

ceived with a difference of 7.37%. It can be stated that entrepreneurial individuals behave more ethically than nonentrepreneurial individuals.

Studies emphasize the value of authenticity and high self-concept consistency in a leader's identity (Steffens et al., 2021; Zheng et al., 2020) and describe the role of rationalism among leaders based on the environment of politics (He & Feng, 2015; Rueda, 2020), religiosity (Pascoe et al., 2019), or higher education institutions (Charteris et al., 2016). The research confirms that a leader's inner sense of control is *rather important* for entrepreneurial individuals (4.42) and nonentrepreneurial individuals (4.18) – a difference of 4.65%. Also, a leader's honesty plays a vital role in professional activities (4.33 for entrepreneurial individuals, 4.46 for nonentrepreneurial individuals, a difference of 2.56%).

3.4. Creator's identity

The whole range of differences in the answers about the creator's identity perceived by entrepreneurial and non-entrepreneurial individuals shows Figure 8 and Figure 9.

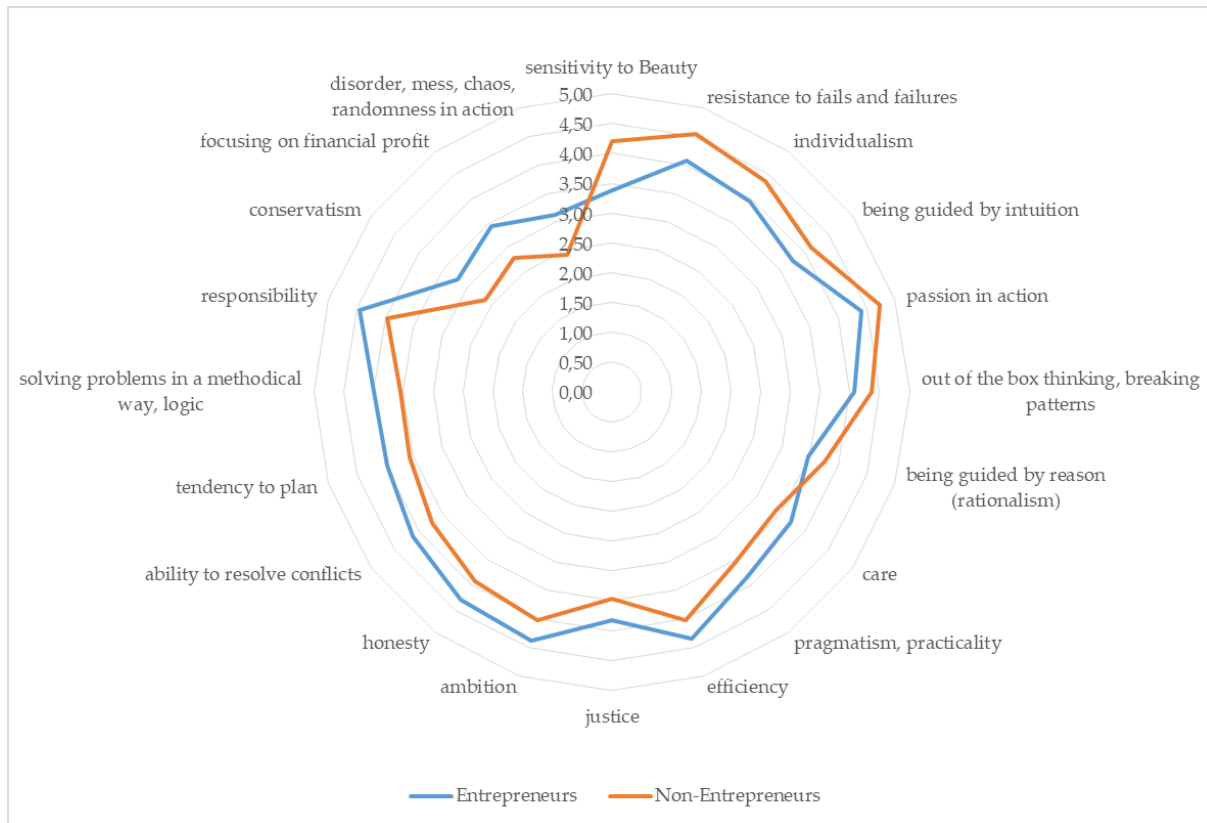


Figure 8. Perception of the most differently assessed features of a creator's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten most important features of a creator's identity perceived by entrepreneurial individuals are (in descending order): patience and persistence in achieving goals, self-confidence, responsibility, innovation, courage, ability to set goals, originality, passion in action, ambition, visualization skills (imagination). The ten most important features of a creator's identity perceived by nonentrepreneurial individuals are (in descending order): passion in action, courage, self-confidence, visualization skills (imagination), resistance to fails and failures, originality, ability

to synthesize and draw conclusions, patience and persistence in achieving goals, individualism, innovation. Perception of the particular 50 examined characteristics of the creator's identity by entrepreneurial individuals versus nonentrepreneurial individuals reveals the following conclusions.

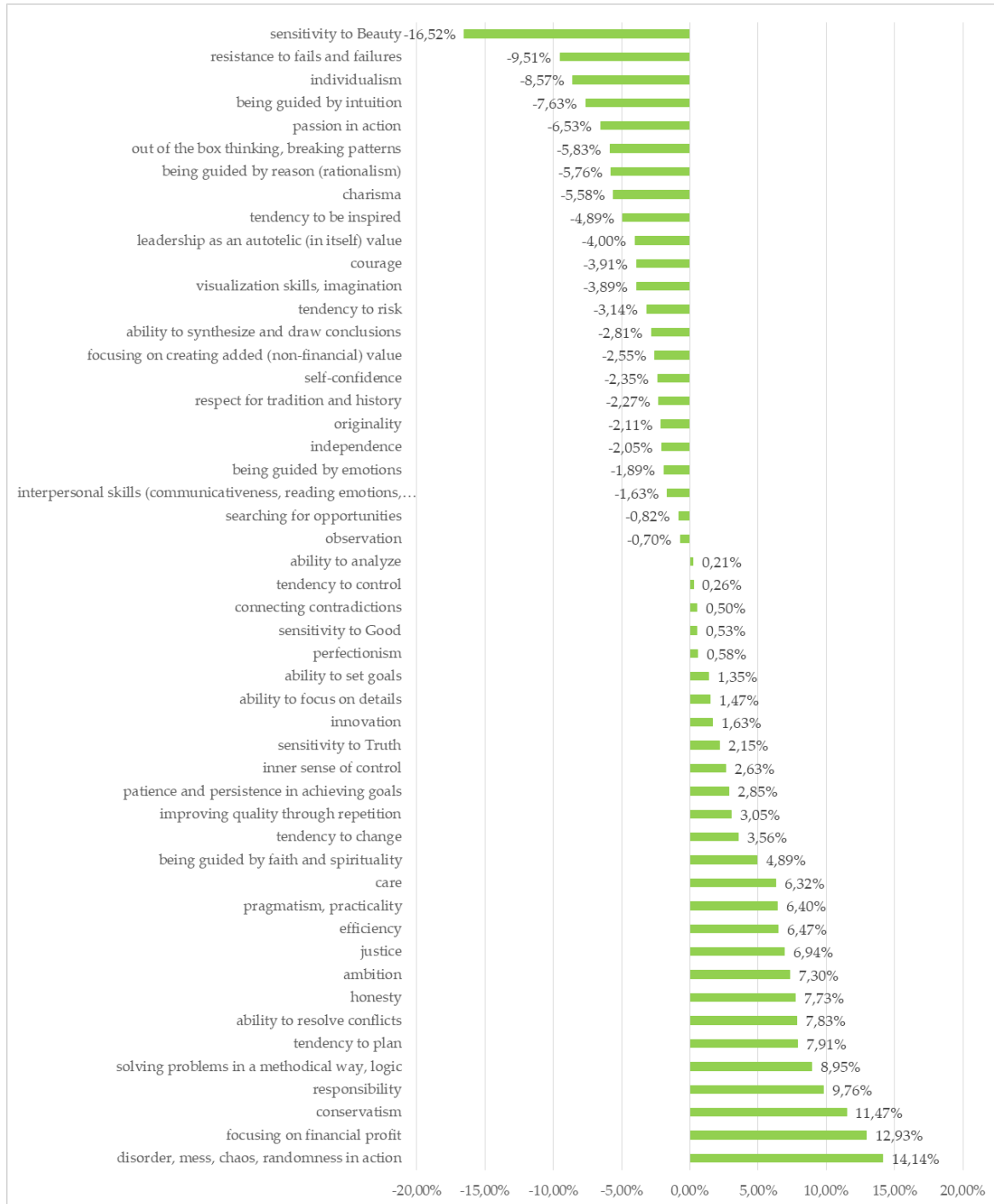


Figure 9. Perception of the 50 features of a creator's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten features of the creator's identity seen as less critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in descending order): sensitivity to Beauty, resistance to fails and failures, individualism, being guided by intuition, passion in action, out of the box thinking (breaking patterns), being guided by reason (rationalism), charisma, tendency to be inspired, leadership as an autotelic (in itself) value. The ten features of the creator's identity seen as more critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in ascending order): justice, ambition, honesty, ability to resolve conflicts, a tendency to plan, methodically solving problems (logic), responsibility, conservatism, focusing on financial profit, disorder (mess, chaos, randomness in action). The ten features of the creator's identity seen similarly by entrepreneurial individuals and nonentrepreneurial individuals are: interpersonal skills (communicativeness, reading emotions, sensitivity to others), searching for opportunities, observation, ability to analyze, tendency to control, connecting contradictions, sensitivity to Good, perfectionism, ability to set goals, ability to focus on details.

Creator's identity is primarily explained in the context of individuals dealing with particular areas: profit- or non-profit oriented organization creator (Fauchart & Gruber, 2011; Giacomini et al., 2007), classical arts – e.g., literature creator (Ottery, 2006), music creator (Tillay & Chapman, 2019), new arts – e.g., anime creator (Reysen et al., 2020), social media content creator (Arriagada & Ibáñez, 2020; Maynard, 2021; Mehta & Kaye, 2019), religious institution creator (Jones & Massa, 2013), fake-news or rumor creator (Dong et al., 2019). Academics emphasize the fluctuating contexts and necessity for regulation to these deviations. The research shows that focusing on financial profit (3.44 for entrepreneurial individuals, 2.79 for nonentrepreneurial individuals, difference of 12.93%) is generally less important than creating added (non-financial) value (3.93 for entrepreneurial individuals, 4.05 for nonentrepreneurial individuals, a difference of 2.55%).

Analysis of the creative identity (personality) is the matter of aesthetics where a comprehensive explanation of creative personality in contrast to basic personality, categories of creative personalities, and purposes of creation may be observed (Gołaszewska, 1984; Szostak, 2020; Szostak & Sułkowski, 2020a; Tatarkiewicz, 2015). Among specific characteristics of creators examined by researchers were: motifs of the undertaking of creative endeavors (Gołaszewska, 1984; Szostak & Sułkowski, 2020a), resistance to fails and failures (Leone & Schiavone, 2019), individuality (Ferguson, 2015; Lorenzo-Romero & Constantinides, 2019), courage (Davenport & Redman, 2020), fairness (Thanh & Quang, 2019). Creativity proved its importance in overcoming stressful experiences (Hirschmann et al., 2020), and the creators, through creativity and sharing, build relationships with social sustainability (Pinto et al., 2020). The research confirms the importance of a creator's resistance to fails and failures (4.08 in the case of entrepreneurial individuals and 4.55 in nonentrepreneurial individuals), but it reveals a difference of 9.51% between them. Creator's courage is vital both for entrepreneurial (4.44) and nonentrepreneurial (4.63) individuals (difference of 3.91%). By analogy to a creator's fairness, it can be stated that a creator's sensitivity to Truth (by analogy: 3.92, 3.82, 2.15%) and justice (by analogy: 3.82, 3.47, 6.94%) are *rather important*.

3.5. Artist's identity

The whole spectrum of variances in the answers about the artist's identity seen by entrepreneurial and nonentrepreneurial individuals shows Figure 11 and Figure 10.

The ten most important features of an artist's identity perceived by entrepreneurial individuals are (in descending order): self-confidence, originality, passion in action, visualization skills (imagination), efficiency, patience and persistence in achieving goals, ability to focus on details, innovation, observation, improving quality through repetition. The ten most important features of an artist's identity perceived by nonentrepreneurial individuals are (in descending order): passion in action, patience and persistence in achieving goals, visualization skills (imagination), originality, sensitivity to Beauty, self-confidence, resistance to fails and failures, improving quality through repetition, individualism, observation. Perception of the particular 50 examined attributes of the artist's identity by entrepreneurial individuals versus nonentrepreneurial individuals reveals the following conclusions. The ten fea-

tures of the artist's identity seen as less critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in descending order): resistance to fails and failures, leadership as an autotelic (in itself) value, passion in action, sensitivity to Beauty, charisma, patience and persistence in achieving goals, sensitivity to Truth, visualization skills, imagination, ambition, out of the box thinking, breaking patterns, individualism, searching for opportunities, being guided by intuition, ability to set goals, originality, being guided by reason (rationalism), improving quality through repetition, sensitivity to Good, connecting contradictions, focusing on creating added (non-financial) value, courage, tendency to be inspired, observation, ability to analyze, self-confidence, honesty, tendency to change, solving problems in a methodical way, logic, interpersonal skills (communicativeness, reading emotions, responsibility, perfectionism, being guided by emotions, inner sense of control, respect for tradition and history, independence, ability to synthesize and draw conclusions, ability to focus on details, justice, innovation, being guided by faith and spirituality, pragmatism, practicality, tendency to plan, focusing on financial profit, ability to resolve conflicts, tendency to risk, efficiency, tendency to control, disorder, mess, chaos, randomness in action, conservatism, care

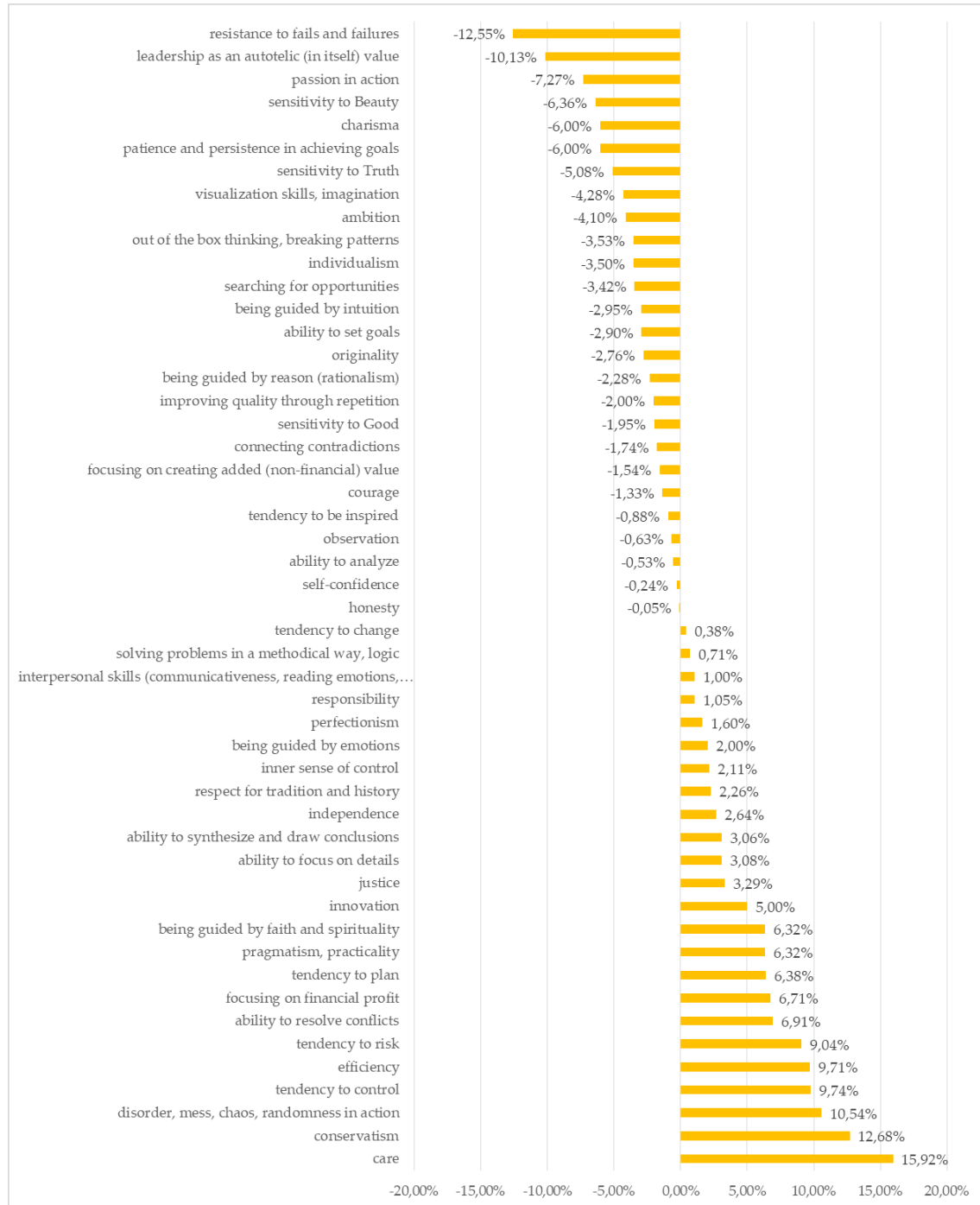


Figure 10. Perception of the 50 features of an artist's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

The ten attributes of the artist's identity seen as more critical by entrepreneurial individuals versus nonentrepreneurial individuals are (in ascending order): pragmatism (practicality), tendency to plan, focusing on financial profit, ability to resolve conflicts, a tendency to risk, efficiency, tendency to control, disorder (mess, chaos, randomness in action), conservatism, care. The ten features of the artist's identity seen similarly by entrepreneurial individuals and nonentrepreneurial individuals are courage, tendency to be inspired, observation, ability to analyze, self-confidence, honesty, tendency to change, methodically solving problems (logic), interpersonal skills (communicativeness, reading emotions, sensitivity to others), responsibility.

In the historical perspective, an artist's identity has been described as: an artisan, a genius, a doer, a God's will doer, a master, a holy man in touch with the hidden, a cultural aristocrat, a knowledge worker, a professional, an entrepreneur, an influencer, a freedom maker, a collaborator, a value or idea guardian, a superman (Deresiewicz, 2015, 2020; Hermes et al., 2017; Hocking, 2019; Tatarkiewicz, 2015). By diverse degrees of creativity and efficiency, the artist's identity may be named a conceptualist, a copyist, an artistic craftsman (artisan), and a creator (Szostak & Sułkowski, 2020a). The research describes an artist's possibility of out-of-the-box thinking and breaking patterns as *rather important* for entrepreneurial individuals (3.95) and nonentrepreneurial individuals (4.13) – a difference of 3.53%. An artist's efficiency is perceived with a higher discrepancy (9.71%) between entrepreneurial individuals (4.41) and nonentrepreneurial individuals (3.93).

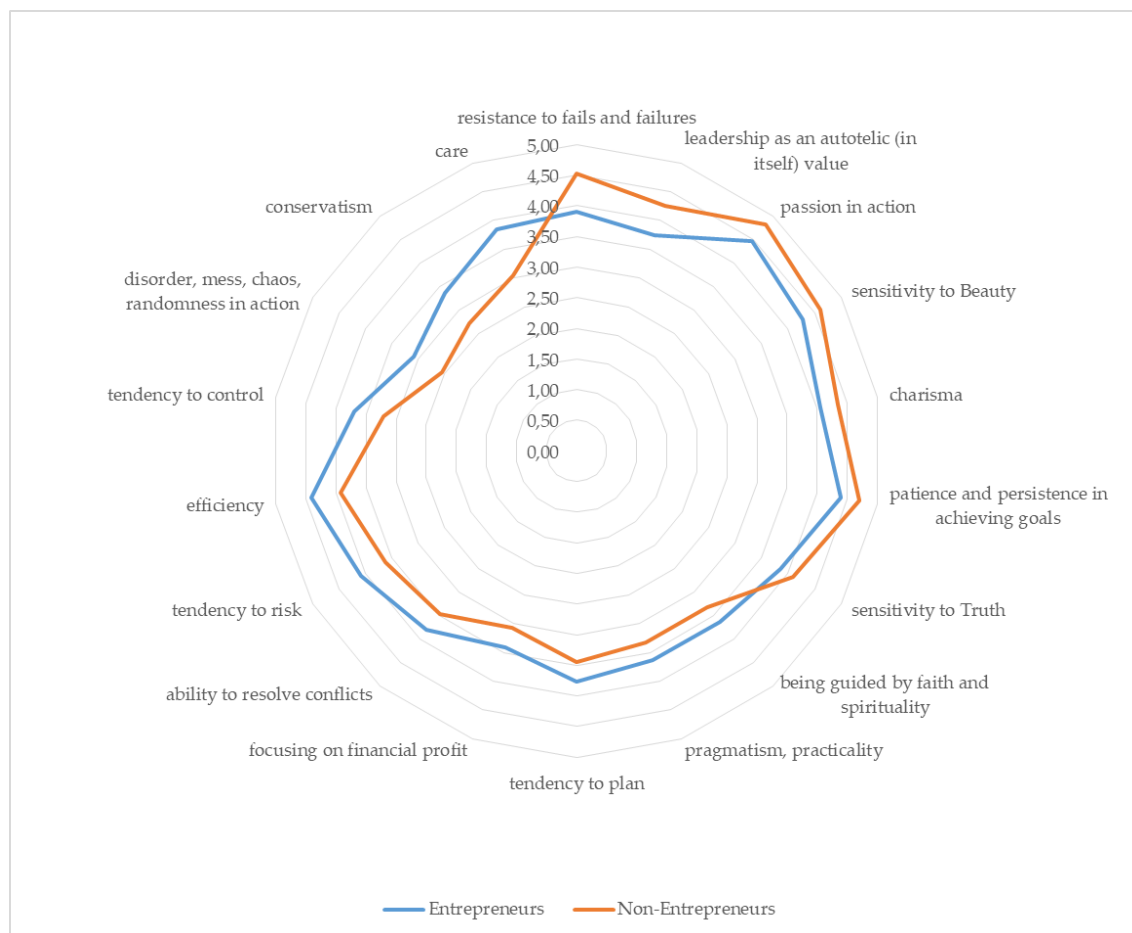


Figure 11. Perception of the most differently assessed features of an artist's identity by entrepreneurial versus nonentrepreneurial individuals

Source: own elaboration

Artist's identity is described in the situation of the crisis on the meta-level and the level of national identity (Rikou & Chaviara, 2016). The development of an artist's identity reduces symptoms and exposes damaging narratives based on a psychopathological paradigm (Thompson, 2016). The research exposes the highest discrepancy (12.55%) among the investigated features of an artist – resistance to fails and failures: *rather important* for entrepreneurial individuals (3.90) and *very important* (4.53) for nonentrepreneurial individuals. A crisis means problems, and solving problems methodically and logically were described as *neutral* (by analogy: 3.41, 3.38, 0.71%); it can be concluded that more important is the issue of solution than the way of the problems solving. Faced problems need to be resolved; an artist's ability to resolve conflicts is more critical for entrepreneurial individuals (3.82) than for nonentrepreneurial individuals (3.48) – a difference of 6.91%. In the same context, the ability to connect contradictions by an artist is quite similar (difference of 1.74%) perceived by entrepreneurial (3.51) and nonentrepreneurial individuals (3.60) in halfway between *neutral* and *rather important*. Artist's identity appears in numerous supplementary areas of human activity, e.g., among teachers and lecturers (Bremmer et al., 2020; Dahlsen, 2015; Thornton, 2011), managers (Szostak & Sułkowski, 2020a, 2021b, 2021c). Nevertheless, the context is continuously explained as the most critical factor in self-identity and the artist's perception; the state of self-negotiation and identity formation by artists is substantially dependent on context (Luger, 2017). The research shows that ability to synthesize and draw conclusions about the broad context of an artist's activity is described as *rather important* for entrepreneurial individuals (4.13) and nonentrepreneurial individuals (3.98) – a difference of 3.06%.

The artist's identity may profoundly influence society, e.g., children dealing with musicians and artworks (Ey, 2016). Investigations about similarities and differences in artist's identities were also undertaken (Lindholm, 2015). Among particular features of the artist's identity, researchers underline randomness (Wagner, 2020), individualism (Kenning, 2009), sensitivity (Koide et al., 2015), charisma (Senior & Kelly, 2016), honesty (Syrko, 2019), an inclination to plan (Koponen et al., 2018), a tendency to risk (Kleppe, 2017). The research does not confirm that disorder, mess, chaos, randomness in an artist's action are essential: for entrepreneurial individuals, this feature is *neutral* (3.08), and for nonentrepreneurial individuals, this feature is *rather unimportant* (2.55); the difference here is quite clear (10.54%). The research confirms that an artist's individualism is *rather important* for entrepreneurial (4.28) and nonentrepreneurial individuals (4.45) – a difference of 3.50%. Analytically investigating the issue of sensitivity, the research concludes that – among the Platonic triad elements – the most important is sensitivity to Beauty (by analogy: 4.28, 4.60, 6.36%), sensitivity to Good (4.10, 4.20, 1.95%), and sensitivity to Truth (3.85, 4.10, 5.08%). This order is contrary to the basic feature of art – in opposition to kitsch – which bases the most on Truth, then Beauty (Szostak & Sułkowski, 2020b). The research reveals that charisma is slightly more crucial in an artist's identity (4.05, 4.35, 6.00%) than honesty (3.90, 3.90, 0.05%), although both features are perceived as *rather important*. Artist's tendency to plan (3.77, 3.45, 6.38%) is perceived clearly less important than the ability to set goals (4.21, 4.35, 2.90%). Entrepreneurial individuals perceive artist's tendency to risk (4.08) clearly more important than nonentrepreneurial individuals (3.63) – a difference of 9.04%.

Interventions of artists and their arts in the organizational world are a fruitful tool for creativity and innovation development among particular employees and groups, teams (Skoldberg Johansson et al., 2015). Researchers describe an artist's identity as a complex issue where self-defining, choosing an identity, and becoming are separate elements but deeply combined in one piece (Hocking, 2019). According to this research, artist's innovation is more critical for entrepreneurial individuals (4.38) than for nonentrepreneurial individuals (4.13) – a difference of 5.00%.

4. Conclusions

Entrepreneurs define themselves by experience and achievements (4.46, *rather important*), personal characteristics (4.32, *rather important*), self-definition (4.26, *rather important*), actually performed work or occupation (4.14, *rather important*), talent (3.89, *rather important*), and formal education at schools, studies, courses, training

(3.08, *neutral*). Nonentrepreneurial individuals define an entrepreneur by actually performed work and occupation (4.49, in between of *very important* and *rather important*), experience and achievements (4.37, *rather important*), personal characteristics (3.59, *rather important*), talent (3.56, *rather important*), self-definition (3.54, *rather important*), and formal education at schools, studies, courses, training (3.05, *neutral*).

Considering all investigated identities, the subsequent personality dimensions of an entrepreneur's identity play the following roles in the eyes of entrepreneurial individuals: managing (4.59, *very important*), creativity (4.45, *rather important*), leadership (4.41, *rather important*), and artistry (3.43, *neutral*). Nonentrepreneurial individuals see the majority of dimensions quite similar: organizing (4.70, *very important*, a difference of 2.11%), creativity 4.27, *very important*, a difference of 3.58%), and leadership (4.27, a difference of 2.74%); only artistry (2.44, *rather unimportant*) is perceived quite differently – a difference of 19.87%.

The research limitations are: 1) Division of respondents with and without entrepreneurial identity was done based on their self-perception; no external tools to assess the presence of entrepreneurial features were applied. 2) The research was run during the first deep phase of the COVID-19 pandemic (Spring 2020) that could influence respondents' views and opinions. 3) The research sample (n = 160) was somewhat minor compared to the examined problem. 4) Synthetic suppositions cannot be broadly representative due to the density of the experiment problem. 5) Because more than 90% of respondents hold at least a higher degree of education – and because these people are statistically valuable equipped with awareness and perception tools than less educated persons – the deductions should not be automatically spread on the entire society.

Although the results are on a high level of generality and theoretic, the practical value of the research is quite extensive. The following groups may benefit the outcomes of the study. 1) Managers desiring to understand the discrepancies in the perception of the explored identities by groups, organizations, and societies controlled by entrepreneurial and nonentrepreneurial individuals. 2) Individuals (entrepreneurs, managers, leaders, creators, artists) for a) better understanding the diverse levels of their personality with highlighting the matter of complex identity, b) likeness of own identity with the general perception of a particular role by entrepreneurial and nonentrepreneurial individuals. 3) Scientists desiring to explore the similarities and variances between identity and its perception regarding entrepreneurship, organizing, leadership, creativity, and artistry about entrepreneurial and nonentrepreneurial individuals. The applicability of the findings is broad, mainly due to the crucial role of entrepreneurship in today's world. If entrepreneurship is a potential existing in each individual, there is a problem of catalyzing particular triggers, not just looking for entrepreneurial individuals (contrary to nonentrepreneurial ones). The education process of entrepreneurs should be focused on revealing their entrepreneurial potential based on the spark of inspiration and looking to discover the fuel of motifs of entrepreneurial activity.

Potential research questions for future qualitative investigations or the hypothesis for additional quantitative research may be the following. 1) Self-perception of a particular identity may differ from the perception of the identity by groups/society varying on the belonging to the entrepreneurial and nonentrepreneurial group of individuals. 2) Self-perception of identity is analogous to the perception of the identity by a particular group if there is a consistency (entrepreneurial and nonentrepreneurial individuals) between the evaluated identity and people perceiving the identity.

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THE SOCIODEMOGRAPHIC DETERMINANTS OF POLISH CONSUMER PERCEPTION OF FOOD QUALITY

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Abstract. Consumer-perceived food quality covers a wide range of aspects, including sensory characteristics, healthful properties, convenience of preparation for consumption or storage. The aim of the research was to identify the main segments of Polish consumers who differ in their perception of quality components of food products, as well as to indicate the main sociodemographic determinants underpinning that distinction. Responses were analyzed divided into clusters in order to distinguish the key consumer segments in the Polish food market. Cluster analysis showed that the three isolated clusters differ significantly in their perceived importance of quality features shaping consumer behaviors in the food market. Additional analysis of variance helped identify the reasons for this differentiation. The isolated segments perceived differently the importance of the following food characteristics: naturalness, visual appeal, shelf life and level of processing, fat content and calorific value, presence of health-promoting ingredients, absence of chemical additives. The views concerning diet compatibility or impact on health also differed significantly. Another differentiator for the compared segments proved to be the manufacturer (brand) of the product.

Keywords: food quality; consumer preferences; food quality management

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1. Introduction

Product quality is seen by consumers as an important determinant of their purchase decisions. Consumers tend to associate quality with a certain set of attributes that a product should have in order to meet their expectations (Grunert, 2002). When considering quality in the context of food products, there are two different approaches currently applied in consumer theory. The first is Lancaster's characteristics demand theory (sometimes referred to as basket theory), which views food as a set of quality attributes that respond to consumer expectations. The second approach is the Becker model in which characteristics which properly meet consumer needs emerge only during the preparation of the product for consumption (Sznajder et al., 1998).

Overall however, the concept of quality defies easy definition. In any case, it can be considered as a set of certain attributes whose order and meaning are different depending on the consumer's sociodemographic profile. It therefore seems justified to view quality through the prism of consumer expectations. Quality means the degree to which a product meets consumer expectations (Pin-Jane Chen and Marta Antonelli, 2020; Baryłko-Pikielna and Wasiak-Zys, 2004; Becker, 2000; Oude Ophius, van Trijp, 1995).

Consumer-perceived food quality covers a wide range of aspects, including: sensory characteristics, healthful properties, convenience of preparation for consumption or storage (Sajdakowska and Szymborska, 2013; Larson, N.; Story, M. 2009; Grunert, 2002). In most cases, the consumer can assess each of these features only during the preparation of the product for consumption or after direct consumption (Grunert 2002). The literature tends to divide quality features into internal and external. The internal features determine the organoleptic and physicochemical properties of the product, while the external features have to do, among others, with the production process. The external features cannot be perceived in the finished product but refer to the specificity of production and other factors that may have a direct impact on the finished product and are mostly specified on the packaging (Pin-Jane Chen, Marta Antonelli 2020; Darmon, N. and Drewnowski, A., 2015; Gutkowska et al., 2012; Grunert, 2002).

In addition to satisfying basic needs such as hunger or demand for nutrients, consumers also expect food products to fulfill some of the higher-order needs such as: pleasure of consumption, self-realization, ease of preparation. From among numerous expectations towards food, we can distinguish increased vitality, saving time by using highly processed products, organic origin, and biodegradable packaging. All this points to the lack of common understanding as to what exactly constitutes food quality (Pin-Jane Chen and Antonelli M., 2020; Gutkowska et al. 2012; Sajdakowska and Szymborska, 2013).

In the European Union, consumers are increasingly concerned about the link between diet and health. In response to this, the food industry has developed what is known as "functional food". Demand for these products is on the rise in both volume and spending, which adds to the fact that the industry is witnessing changes in which functional attributes are being ascribed to new groups of food products (Barreiro-Hurle J. et al., 2008).

Overall in Europe, consumers rely on heterogenic factors in their food choices, which are related to nutrition and individual and social conditions. Recent studies also highlight the important role of the environment and climate change in consumer food choices (Gifford et al., 2018; Gifford and Chen, 2017; Lombardi et al., 2017; Nielsen et al., 2020). Natural resources (Berger, 2019; Lukas et al., 2016; Ruby et al., 2020), production and the food supply chain all influence purchase decisions as well (Augustin, 2016).

The multidimensional nature of food quality has prompted many authors to develop food-quality characteristics in a way that best reflects available research findings. The tool enabling such ordering is principal component analysis, which allows transforming primary variables into an orthogonal system of latent variables, and therefore to significantly reduce the number of attributes describing quality. Two approaches can be distinguished here. The

first focuses on lab-determined quality parameters; attempts of this kind can be found, among others, in Cozzolino et al. (2019), Granè et al. (2014), Ghosh et al. (2012), Luciano et al. (2009). Borgogrone et al (2001), Iezzoni et al. (1991). The second approach focuses on consumer-perceived quality using the measured importance of individual characteristics and preference-shaping factors in the food market. A study of this kind was conducted several years ago (Cichocka, Pieczonka, 2004) and put forward a "new" role of quality, embedded primarily in the utilitarian, marketing context. In order for marketing activities to suffice, the product must be of the quality that is expected by the consumer - and especially the target consumer.

In this study, we share and discuss findings from our research to check them against these results and see to what extent the perceived quality of food products has changed over the last 15 years. Furthermore this study aimed to find answers for several questions. The main task was to identify the main segments of the Polish food consumer that differ in the perception of the importance of various quality parameters of food products. The research goals were also the determination of the quality structure of the consumer, characteristic for each of these segments, as well as identification of the most important socio-demographic characteristics that determine this differentiation.

2. Materials and methodology

The research was carried out in the second quarter of 2019 and consisted in a survey addressed to Polish residents across all geographic regions. In the main part of the questionnaire, respondents were asked to answer one question, namely: "How important for you is each of these items when shopping for food?". The question comprised a total of 23 characteristics of food products that were considered possible triggers of purchase decisions and consumption behaviors (Table 2).

Respondents indicated the subjective importance of each of these items on a 7-point interval scale with the two extreme values representing: 1 point = extremely unimportant, 7 points = extremely important.

Results were tallied using the Statistica 13.3 software suite. This was done in two stages. The first stage involved multivariate cluster analysis and one-way analysis of variance (ANOVA). Cluster analysis (agglomeration) was carried out using Ward's method against the basis of Euclidean distances. The analysis of variance (Fisher-Snedecor's F-test) was to indicate the differences between the selected clusters in the assessment of the importance of individual primary variables. The testing was performed at the significance level $\alpha = 0.05$. The inference was based on the p-values "p" of test probability. In the second stage, principal component analysis was performed. The following methods were used to extract the number of principal components: Kaiser's and the proportion of variance explained. The values of factor loadings were calculated after a normalized varimax rotation.

3. Results and discussion

A total of 946 respondents aged 18-71 participated in the survey. Their demographics are shown in Table 1.

Table 1. Respondent demographics

	Category	Symbol	N	%
Gender	Woman	W	542	57,3
	Man	M	404	42,7
Age [in years]	18-29	A1	349	36,9
	30-49	A2	316	33,4
	51-71	A3	281	29,7
Education level	Secondary or lower	E1	642	67,9
	Higher education (university diploma holders)	E2	304	32,1
Place of residence	Rural areas	L1	426	45,0
	Urban area	L2	520	55,0

Source: own elaboration

The majority of respondents were women (57.3%). Young people, i.e. below 30 years old, accounted for 36.9% of the sample. The share of those aged 30-49 was 33.4%, while the oldest age group, people over 50, made up 29.7% of the study population. Nearly every 2 out of 3 respondents had a secondary or lower level of education. The survey covered a slightly larger (by 10 percentage points) number of urban dwellers than of rural residents. The overall breakdown into segments was similar to the structure of Poland's population in 2016-2018. In that period, women outweighed men 52% to 48%. As for the population of working age, 34% of its total was composed of people aged 18-29, 36% - those aged 30-49, and roughly 30% - those aged 50-64. About 33% of Poles had a higher level of education. Urban residents accounted for 60% of Poland's population at that time.

Responses were analyzed in clusters to distinguish the key consumer segments in the Polish food market that differ in their perceived quality characteristics shaping shopping preferences and consumption patterns. The analysis covered the values of the average level of importance from among the 23 items listed in the questionnaire, calculated for 24 groups of respondents based on their sociodemographic profile comprising: gender (W, M), age (A1, A2, A3), education level (E1, E2), and place of residence (L1, L2) - for explanation of symbols, see Table 1. The results of the cluster analysis are shown in Fig. 1 as a dendrogram whose shape indicates that the isolated groups of respondents can be assigned to three clusters. These are:

- Cluster A:
 - all women up to 50 years of age;
 - women aged over 50 with higher education, regardless of place of residence;
 - men with higher education living in urban areas;
 - men aged 31-50 with secondary or lower education living in urban areas
- Cluster B:
 - women and men aged over 50 with secondary or lower education, regardless of place of residence
- Cluster C:
 - men aged 18-50 living in the rural areas, regardless of level of education;
 - men aged over 50 with higher education living in rural areas;
 - men aged up to 30 years of age with secondary or lower education living in urban areas.

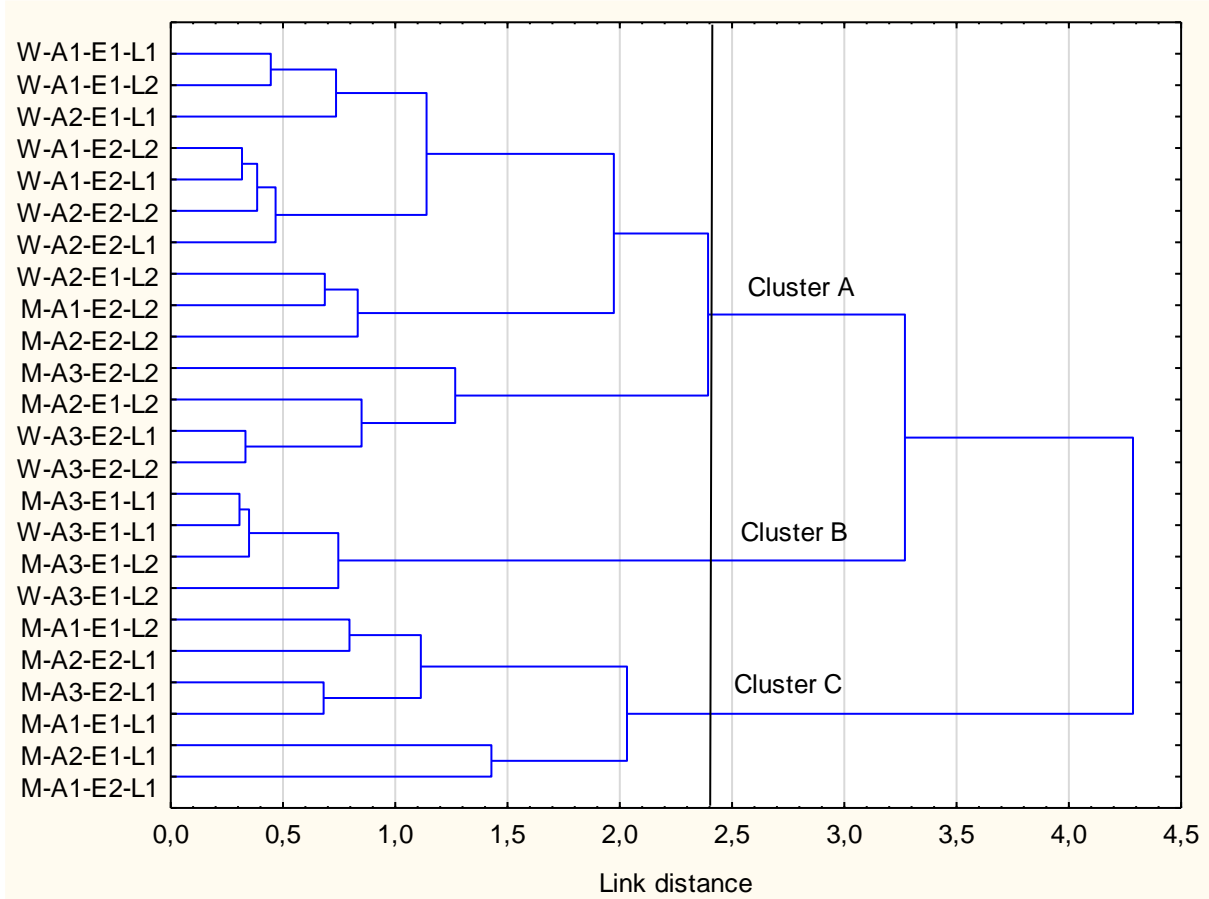


Figure 1. Dendrogram of clusters selected based on the subjective importance of food-product purchase determinants
Source: own elaboration

It can therefore be assumed that these three clusters are segments that differ significantly in their perceived importance of quality properties shaping consumer behavior in the food market. An additional analysis of variance (Table 2) allowed to identify the reasons for this distinction.

Table 2. Differentiation of subjective importance of food-product purchase determinants between selected clusters - F-test results

Property	Cluster A N=662	Cluster B N=81	Cluster C N=203	F-test (p-value)
	Mean ± standard deviation			
Freshness	6,3±1,9	5,9±1,6	6,1±1,8	0,767
Naturalness	5,8±2,2	5,6±1,8	4,1±2,4	0,023*
Pleasant taste and aroma	5,9±1,5	6,3±1,3	6,0±1,3	0,745
Visual appeal	3,6±0,9	4,9±1,3	5,8±1,5	0,001*
Nutritional values	6,5±2,1	6,2±2,3	6,3±1,8	0,878
Low fat content	6,8±1,2	6,1±2,4	3,6±0,4	0,000*
Low caloric value	6,8±1,3	6,0±2,1	3,8±0,6	0,000*
Health-promoting ingredients	6,5±1,1	5,3±1,3	4,9±1,5	0,003*
Dietary compatibility	5,6±2,2	5,2±2,5	3,1±1,1	0,002*
Impact on looks and figure	5,9±2,4	2,9±1,2	2,3±0,4	0,001*
Impact on well-being	4,6±1,9	5,1±2,2	4,8±1,3	0,514
Absence of contaminants	6,0±1,3	5,6±0,8	5,5±0,7	0,522
Absence of chemical additives	5,8±1,6	5,2±1,2	3,9±1,2	0,005*

Shelf life (durability)	4,6±0,5	5,2±0,6	4,3±1,4	0,045*
High level of processing	4,9±2,2	3,2±1,1	4,8±0,6	0,033*
Ease of preparation	5,5±1,7	5,8±1,4	6,0±2,6	0,416
Has advertising	4,1±0,8	3,2±0,3	3,4±0,1	0,089
Stand-out factor	4,9±1,2	2,5±0,2	2,6±0,3	0,001*
Manufacturer (brand)	3,8±0,9	5,6±1,5	4,1±0,5	0,001*
Eco-friendly packaging	5,4±2,3	5,2±0,9	5,3±2,4	0,826
Aesthetic packaging	4,9±0,5	4,7±0,7	5,1±1,4	0,678
Convenient packaging	3,6±1,1	3,9±0,8	4,0±1,4	0,667
Packaging size	4,1±1,5	4,4±1,7	3,8±1,9	0,415

Source: own elaboration

P-values lower than 0.05 give grounds to reject the null hypothesis in the F-test. This means that the segments isolated in the cluster analysis differ in their perceived importance of the following properties: naturalness, visual appeal, shelf life, level of processing, fat content, calorific value, health-promoting ingredients, absence of chemical additives. Feedback for compatibility with a specific diet, the possibility of standing out among friends and the impact on physical appearance also differs markedly across the sample, while the importance of brand further differentiates the compared segments.

Compared to the other two clusters, Cluster A reports the lowest ratings for the importance of acceptable visual organoleptic features while scoring highest for impact on looks and figure and for stand-out factor. Cluster B, meanwhile, reports the highest expectations for shelf life and attaches greatest importance to brand. Finally, Cluster C is more inclined than the other clusters to look out for aesthetic packaging while paying less attention to nutritional properties such as naturalness, dietary compatibility, calorific value, fat content, and absence of chemical contaminants.

Also noteworthy are the values reported collectively for the importance given to individual items. These range from roughly 3.5 points to approximately 6.5 points, which means from "moderately important" to "very important". This shows that the set of answers did not contain any items that would be irrelevant to consumers.

Subsequently, the numerical feedback was subjected to principal component analysis, preceded by testing for two prerequisites to apply this method, that is, determination of a correlation matrix between primary variables and calculation of Cronbach's alpha. The correlation matrix showed that each variable is significantly correlated with at least five others, meaning the first prerequisite was met. The Cronbach alpha stood at 0.95, which indicates a very good reliability of the set of original variables. In fact, this value significantly exceeds the reliability threshold of 0.6.

Principal component analysis was performed separately for the three isolated consumer segments, that is, for Clusters A, B and C.

Responses from Cluster-A consumers allowed to identify 6 principal components related to the importance of the assessed quality properties. The subsequent eigenvalues were as follows: 3.79; 2.43; 2.34; 1.74; 1.55; 1.06. The remaining eigenvalues were lower than 1.0, meaning the Kaiser criterion was met. In total, the distinguished principal components explain 84.7% of the pooled variance of the results. The values of the factor loadings (rounded off ≥ 0.7) allow for an unambiguous assignment of each primary variable to the next principal component (Table 3).

Table 3. Principal component analysis results for Cluster A

Property	Principal component					
	1	2	3	4	5	6
	Factor loadings					
Freshness	0,022	0,230	0,116	0,930	0,089	0,005
Naturalness	0,192	0,706	0,020	0,187	0,235	0,106
Pleasant taste and aroma	0,186	0,169	0,036	0,724	0,049	0,078
Visual appeal	0,157	0,038	0,196	0,704	0,227	0,044
Nutritional values	0,925	0,051	0,153	0,023	0,213	0,077
Low fat content	0,766	0,126	0,195	0,050	0,125	0,214
Low caloric value	0,682	0,330	0,416	0,230	0,089	0,103
Health-promoting ingredients	0,192	0,806	0,020	0,187	0,068	0,099
Dietary compatibility	0,186	0,669	0,267	0,124	0,049	0,143
Impact on looks and figure	0,058	0,038	0,696	0,004	0,227	0,137
Impact on well-being	0,025	0,751	0,153	0,316	0,213	0,077
Absence of contaminants	0,066	0,004	0,195	0,050	0,925	0,011
Absence of chemical additives	0,118	0,010	0,297	0,023	0,697	0,351
Shelf life (durability)	0,164	0,057	0,229	0,071	0,039	0,844
High level of processing	0,173	0,064	0,137	0,088	0,738	0,281
Ease of preparation	0,338	0,062	0,206	0,004	0,008	0,678
Has advertising	0,345	0,294	0,055	0,188	0,436	0,387
Stand-out factor	0,264	0,158	0,748	0,041	0,471	0,068
Manufacturer (brand)	0,062	0,147	0,856	0,264	0,228	0,006
Eco-friendly packaging	0,369	0,182	0,667	0,401	0,051	0,008
Aesthetic packaging	0,268	0,411	0,512	0,026	0,099	0,006
Convenient packaging	0,145	0,168	0,344	0,055	0,181	0,066
Packaging size	0,336	0,345	0,197	0,057	0,169	0,008

Source: own elaboration

As for Cluster-A respondents, there are six main pointers of food quality, all of which drive, independently of each other, preferences and purchase decisions. The first principal component is correlated with those variables that relate to the traditionally understood nutritional value, also associated with a low content of ingredients that are high in calories. These are the properties directly related to product health. Ozimek (2006) developed in fact a similar system of consumer-perceived importance regarding food-quality characteristics. This may indicate an entrenched stereotype that the sine qua non condition of food products is their nutritional value which is independent of other parameters.

The second component focuses on product naturalness, the presence of health-promoting ingredients and those ingredients which - in the opinion of nutritionists at least – constitute added value in dietary nutrition or influence well-being. If anything, this confirms that "healthy" food, by bringing the consumer additional benefits beyond just the nutritional value, has become a new multidisciplinary trend among consumers (Asioli et al., 2017; Grunert, 2011; Hansen et al., 2017; Hoek et al., 2017; Aertsens et al., 2009). According to the Food and Agriculture Organisation (2019), a balanced and healthy diet is one that promotes all pillars of the person's health and well-being, and is at the same time accessible, safe, and culturally acceptable. The link of naturalness with this principal component also proves that pro-health food is not only about the presence of health-promoting ingredients but also carries a low level of food processing. As reported by several authors (Ozimek, 2006; Żakowska-Biemans, Kuc, 2009; Sajdakowska, Żakowska-Biemans 2009), naturalness is one of the product's main properties that is

increasingly appreciated by Polish consumers. Unsurprisingly perhaps, this association is most prevalent for organic products (Gutkowska, Ozimek; 2005; Żakowska - Biemans 2011b).

The third principal component refers to the product's symbolic value, being accompanied by two characteristic properties: impact on looks and figure and stand-out factor. Correlated with this component are also: brand and eco-friendliness of packaging, which the literature has long considered to be marketing determinants. This correlation indicates that the Cluster-A segment willingly "submits" to marketing-mix recommendations and perceives these trends as a fashionable market and nutritional behavior.

The fourth principal component is mainly about freshness, which is accompanied by taste and aroma and properties that are perceptible either during or after the purchase. Overall, consumers thought these were the characteristics that best describe product freshness. Two conclusions can be drawn from this, one of them being that organoleptic parameters are accompanied by freshness, as has been echoed in the literature (Yiridoe, E.K et al., 2005) where commodity-specific attributes are reported to include variables such as visual appeal, taste, freshness, etc.. And so, the fourth principal component contains the most important organoleptic characteristics for consumers, thus paving the way for being referred to – as per nomenclature proposed by Szczucki (1970) – as "sensory attractiveness".

Szczucki's quality structure, put forward in the same study, is also confirmed by the next two areas indicated by Cluster-A participants.

The fifth principal component represents the safety of consumption. Interestingly, Cluster-A respondents assess the importance of this area regardless of the scores of other properties. Consumers understand this area to signify the absence of contaminants from various sources, the absence of chemical additives, and a high level of food processing. Given the inclusion of this last parameter, consumers seem to express their confidence in the preservation methods used by the processing industry.

The sixth principal component revolves around product accessibility, which encompasses shelf life and ease of preparation – both components that facilitate the use of the product in a home setting. The absence of packaging (size, convenience) in this group is probably due to the market being already saturated with various packaging options.

Let us also note that Cluster-A consumers considered the presence of health-promoting or dietary ingredients and the impact on looks or well-being in general to be very important (Table 2), with these items being rated markedly higher than in Clusters B and C. This may be owed partly to the distinction of two orthogonal quality values: pro-health and symbolic. Another factor is that 84.3% of Cluster-A consumers were women, the majority below 50 years of age. It is therefore possible to compare the perception of quality by this group with the quality structure determined for an all-female group in Cichocka and Pieczonka (2004), who found that women distinguish five mutually orthogonal areas. In addition to the traditional approach, where the health and nutritional value of a product is determined, sensory quality and accessibility add to the product's symbolic value. The same study goes on to argue that women have an emotional approach to purchased goods and consider some of them as playing a symbolic role in their lives.

Moving on, three independent areas can be distinguished for the perceived food quality among Cluster-B consumers (Table 4). Here, the analysis indicated three principal components related to the importance of the assessed qualitative characteristics. The subsequent eigenvalues were: 4.79; 1.43; 1.02. Together, these three principal components explain 74.9% of the pooled variance of the results.

The first principal component, in addition to nutritional values, determines parameters such as: low calorific value, dietary compatibility, impact on well-being, absence of contaminants, absence of chemical additives. These

characteristics represent the overall healthiness of the food product. Consumers perceive them as important due to their effect on the body by means of providing nutrients, lack of preservatives or other chemical additives, and low industrial processing.

The following properties are meanwhile related to the second main component in this cluster: freshness, naturalness, pleasant taste and aroma, visual appeal. These features can be clearly called generally organoleptic, as consumers can visually evaluate some of them at the time of purchase, therefore knowing what to expect in terms of preparation and consumption.

The third principal component reflects product accessibility, as it encompasses ease of preparation and high level of processing. These are the properties that significantly facilitate the use of the product in a household setting.

When analyzing responses from Cluster-B consumers, we noticed they attached much more importance than Clusters B or C to shelf life and brand. One of the reasons for this may be the fact that Cluster B comprised mostly people over 50 for whom shelf life, storage and loyalty towards the brand are important due to their purchase and nutritional habits shaped in the times of a centrally-planned economy and a producer-driven market. From the mid-1970s, Poland's economy fell on a downward slope, plunging into ever greater lows. In the summer of 1980, the disruption of supplies expanded to nearly all items, causing the already long queues in stores to become even larger. The shortage of meat and its derivatives, as well as of all chocolate products, was estimated at 25%, and at 20% for cheese products. The supply of most articles was below the levels recorded in 1975 (Kaliński. J., 2005). That is why this model of consumer quality structure can be called, after Polish researchers in the 1930s, the traditional model.

Also in the opinion of Cluster-C consumers the quality characteristics of food products form three independent areas (Table 4). In this case, the analysis identified three principal components for which the eigenvalues are: 6.79; 3.43; 1.15. Together, these three principal components explain 78.5% of the pooled variance of the results. The consumer-perceived quality structure for this group of respondents differs significantly from that for Cluster-B consumers.

This becomes particularly noticeable in the absence of parameters that make up the sensory attractiveness of the product. In Cluster C, freshness is correlated with the second principal component, pleasant taste and aroma - with the third, and visual appeal - with the first. A conclusion can therefore be drawn that the quality structure proposed by this cluster differs substantially from the traditional concept proposed by Szczucki. Analyzing the results listed in Table 4, we see that the characteristics that make up the subsequent latent variables are much closer to the structure proposed by Nelson (1974).

Visual appeal aside, the first principal component is correlated with parameters referred by Nelson as a set of sought-after parameters, i.e. those that consumers can initially assess at the time making a purchase decision. These include: advertising, brand, aesthetic packaging, convenient packaging, all describing a food product more broadly, allowing it to stand out, reflecting its commercial attractiveness and the demand for something that is elegant and in vogue. Each of these characteristics can be perceived by the consumer when actually shopping for products.

The second principal component, apart from freshness, determines parameters such as: naturalness, pleasant taste and aroma, nutritional value, low fat content, low calorific value, presence of health-promoting ingredients, absence of contaminants. These properties can be attributed to those expected by the consumer, but which cannot be assessed when making a purchase decision or during preparation and consumption. As such, they pertain to the second component and can be referred to as a set of good-faith features, in line with Nelson's proposal. Our results do indeed confirm the findings shared in Shafie and Rennie (2012) and in Mauracher et al. (2013), who argue that food safety, human and environmental health as well as sensory characteristics such as nutritional value, taste,

freshness and appearance all influence food preferences among consumers, in the case of their studies that food being organic.

The third principal component is related to ease of preparation, as well as a high level of processing and shelf life. All these properties have one thing in common: the consumer can assess, as it were "experience", each of them when preparing the product for consumption. In line with Nelson's nomenclature, this principal component could be called the area of empirical parameters.

As shown by our results, the structure proposed by Szczucki was fully replaced in Cluster C by that proposed by Nelson. When choosing a food product, this segment of consumers does not judge quality based on the set of beneficial properties arising from consumption. For them, properties that are present at every stage of contact with the product are those that truly matter. A characteristic feature of this group is that it is made up of men of different ages, which may confirm the findings shared by Cichocka and Pieczonka (2004).

In result of literature review, it can also be concluded that quality in marketing terms refers to those product elements that are appropriately interpreted and perceived by buyers (Wiśniewska, Malinowska, 2011). Pieczonka (2009) demonstrates that the marketing approach is itself nothing else but a specific set of characteristics. A similar interpretation is proposed in a EC-commissioned study by L. Dries and M.C. Manacini where properties are grouped into three categories: seeking, experience, and trusting. Our own research findings overlap with the strategy proposed by other authors (Wiśniewska, Malinowska, 2011; Iwanicka, 2015).

To summarize, attention should be paid to how public perception of the importance of particular areas of food quality evolves over time in consumer-market countries.

Juxtaposing the results of our own research with those from fifteen years ago (Cichocka and Pieczonka, 2004), we see that the rank and importance of certain quality pointers were at markedly different levels. While accessibility and functionality were the most sought-after characteristics in the 1970s, these preferences did not quite stand the test of time as consumers shifted their focus towards "healthiness" and accessibility. As noted by Cichocka and Pieczonka (2004), such changes in the perception of quality spring not only from economic factors but also from evolving social preferences. Fast forward fifteen years and consumers no longer view "healthiness" as the overriding determinant of food quality.

Table 4. Principal component analysis results for Clusters B and C

Property	Cluster B			Cluster C		
	Principal component					
	1	2	3	1	2	3
	Factor loadings					
Freshness	0,422	0,830	0,116	0,222	0,730	0,416
Naturalness	0,192	0,676	0,020	0,192	0,806	0,020
Pleasant taste and aroma	0,186	0,869	0,154	0,186	0,169	0,954
Visual appeal	0,264	0,738	0,196	0,944	0,038	0,196
Nutritional values	0,725	0,441	0,153	0,025	0,751	0,153
Low fat content	0,066	0,369	0,195	0,066	0,968	0,195
Low caloric value	0,822	0,530	0,416	0,422	0,830	0,416
Health-promoting ingredients	0,192	0,106	0,020	0,192	0,706	0,020
Dietary compatibility	0,686	0,169	0,254	0,186	0,169	0,454
Impact on looks and figure	0,344	0,038	0,196	0,344	0,038	0,196
Impact on well-being	0,725	0,051	0,153	0,025	0,051	0,153
Absence of contaminants	0,666	0,429	0,195	0,066	0,968	0,195
Absence of chemical additives	0,718	0,010	0,022	0,118	0,010	-0,022
Shelf life (durability)	0,129	0,057	0,030	0,129	0,057	0,830
High level of processing	0,173	0,064	0,737	0,173	0,064	0,837
Ease of preparation	0,092	0,062	0,806	0,092	0,062	0,706
Has advertising	0,188	0,436	0,332	0,688	0,066	0,322
Stand-out factor	0,041	0,471	0,284	0,368	0,426	0,215
Manufacturer (brand)	0,264	0,228	0,065	0,745	0,392	0,249
Eco-friendly packaging	0,401	0,051	0,697	0,479	0,326	0,398
Aesthetic packaging	0,213	0,077	0,179	0,703	0,124	0,087
Convenient packaging	0,125	0,214	0,668	0,811	0,235	0,149
Packaging size	0,089	0,103	0,745	0,357	0,334	0,206

Source: own elaboration

Conclusions

Our analysis shows there are three segments of Polish consumers, each significantly different in terms of how they perceive behavior-shaping quality characteristics in the food market. The following properties showed disparities across all three groups: naturalness, visual appeal, shelf life and level of processing, fat content and caloric value, health-promoting ingredients, absence of chemical additives. Significant discrepancies were also found for dietary compatibility and impact on health, as well as for brand.

Cluster-A consumers perceive six food quality areas in total. Quality properties in these areas determine, independently of each other, preferences and purchase decisions. Let us note that, for this segment, the following product characteristics were very important: the presence of health-promoting or diet-compatible ingredients, and the impact of product on appearance and general well-being. Cluster-A consumers rated the importance of these items significantly higher than the other two groups. Cluster-B consumers perceive the quality of food products in a way that corresponds to the traditional model prevalent in Poland until the late 1980s, that is a producer-driven market. Meanwhile, Cluster-C consumers are more likely to seek food quality in three independent areas, which Nelson refers to as: sought-after, assuming good faith, and empirical.

Besides, the very structure of perceived food quality among Polish consumers has changed over the last 15 years. Around the year 2005, Polish women abandoned the three-dimensional quality model to incorporate two additional independent areas: that of pro-health and symbolic value. Currently, a similar structure of quality is observed among consumers below 50 years of age, both women and men, except that in their case the emergence of dietary, rather than pro-health, value can be observed. Lastly, while fifteen years ago the marketing quality structure proposed by Nelson could be ascribed to all men, today it remains true only for the segment comprising men living in rural areas.

Four important determinants of consumer-perceived food quality in Poland refer to sociodemographic variables. These are: gender, age, education level, and place of residence.

It should be noted, that the presented results might constitute a starting point for analogous studies involving consumers from other populations living in European countries. These studies would have a significant utilitarian value, as they could be used both in the management of the quality of the food sector products and in the marketing of food products.

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CUSTOMER SERVICE QUALITY MANAGEMENT ON THE COURIER SERVICES MARKET*

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Abstract. The purpose of the study is to evaluate the quality management of customer services. The paper demonstrates the results of own research on the quality standards of customer services in courier service companies. The significance of the aspects of sustainable development implemented by courier companies for customers was also analyzed. The investigations focused on a group of individual customers availing of the services of courier service companies. The study was conducted in September 2020 with the application of electronic tools in the form of an online survey. The questionnaire was composed of single-choice and multiple-choice questions. Upon a factual and logical verification, 260 surveys were selected for further analysis. The conducted study demonstrates that the prime motives behind the choice of a courier company are delivery completion time, service prices, and safety concerns. The last issue has been particularly crucial amidst the Covid-19 coronavirus epidemic. Over three-fourths of the studied subjects (75.8%) said they felt safe in contact with courier operators. The door-to-door (D2D) segment is gradually absorbed by PUDO (pick up drop off) and automated package machines. This may, as a consequence, lower the cost of the last mile and increase customer satisfaction. An important element in the activities of courier companies are also aspects of sustainable development. It is about reducing the negative impact on the natural environment. For over half of the respondents (52.7%), ecological aspects are important or very important. As a result, the most modern companies invest in hybrid and electric cars, optimize travel routes to the customer, and use recyclable packaging. This translates into a better reputation of the company and is also associated with corporate social responsibility.

Keywords: customer service; courier services market; quality management; sustainable development; logistics costs

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1. Introduction

Differences in the quality of customer services constitute vital elements of competitive advantage of enterprises. Strong pricing competition results from market saturation with products in almost every branch. For the majority of customers, customer service quality is the underlying argument when making the purchasing decision (Kempny, 2001).

The contemporary economic reality targets individual customer's need satisfaction. The process of management of the customer service quality captures the process of buying-selling, the complex and competitive after-sales services, and continuing marketing contacts with the consumer – the buyer. Adequately performed customer services should ensure fast, reliable, punctual, timely, and flexible product supplies to purchasers (Długosz, 2005).

All of the mentioned aspects are the characteristic features of the market of courier services. Courier companies aim at reducing delivery times, cutting transport costs, and meeting the requirements of individual clients. Customer care is highly valued due to the fact that the cost of acquisition of a new customer is many times higher than the cost of retaining an existing one. (Song et al., 2018).

The introduction of optimum management of the quality of customer services in the line of courier services has allowed for a flexible response to changes in the demand and adjustment to consumer needs (Zhang et al., 2011). The present market of courier transport is highly diversified with respect to provided services, depending on the market sector. Operators are committed to the comprehensive nature and flexibility of services through the implementation of novel, innovative solutions (Barlow, & Stewart, 2014).

The market of courier services is the sector of the market of logistics services that features high growth dynamics. Courier services have been gaining importance because of the continuing evolution of the electronic trade. Operators cooperate, above all, with the B2B market. At the same time, there is a rise in the share of the B2C market (Vrontis et al., 2017; He et al., 2019).

In Poland, we can observe an increase in courier branch-related infrastructural investment. State-of-the-art industrial warehouses are mushrooming, terminals and automatic sorting plants are developing (Yu et al., 2020). Moreover, we are witnessing the process of consolidation of courier service companies through the merging of global and national logistics integrators, and large business concerns taking over local service providers (Rydzkowski, 2011).

The offer of courier service companies is highly diversified in terms of quality and pricing. Customers may choose an option for their courier parcels to be delivered within a specific timeframe. Present challenges and threats on the part of competition have become an impulse for courier operators to facilitate the process of customer service quality management through an introduction of a broader service offer and diversification of one's operations (Liu et al., 2018).

In the area of courier companies' activities, the aspects of sustainable development are becoming more and more important. This applies to the limitation of the use of foil packaging, envelopes with bubble foil as a filler, or the external dimensions of the package. Combining environmentally friendly, recycled or biodegradable packaging with less resources can help reduce pollution and harmful materials. Improving your packaging not only reduces your company's carbon footprint, it can also help you differentiate your brand among your customers and further reduce logistics costs.

2. Literature review

The operation of markets in the globalization era has a significant impact on the method of generation of companies' competitive edge. Nowadays, customers expect the product to be practicable, also in terms of place and time, and the orders to be completed on time (Shah, 2020). In practice, this means that customer services focus on the identification of buyers' needs, preferences, and motives behind their purchases, and on need satisfaction. Another vital aspect is development of long-term relations with consumers (Li et al., 2020).

Good management of customer services may be defined as the provision of a suitable product to the customer in accordance with the logistics 7R rule. In other words, the right product must be at the disposal of the customer in the right place and at the right time. (Thirumalai & Sinha, 2005). Given the above, customer services translate into punctual, certain, reliable product deliveries compatible with relevant orders. According to S. Kauf and A Tuczak, logistics customer services involve the ability of the logistics system to provide a smooth and effective practicability of the place and time in the process of product movement between the seller and the buyer (Kauf, & Tłuczak, 2018).

On the other hand, customer services may also be viewed from the functional, executive and process perspectives. The process approach has the most advanced scope. It captures the planning, organizing, and supervising the entire cycle of order placement, customer relations, information services and supplies (Palese & Usai, 2018). The efficiency of customer services determines company's image and the way it is viewed by its competition. The basic assessment criteria are customers' feelings and sensations cited in survey studies.

The growth in the importance of customer services means that it consumes more and more of organizations' resources. The process of decision taking is three-phased: pre-transaction, transaction, and post-transaction. From the logistics point of view, the most essential are the components of the transaction phase, involving the physical product's flow, availability, the cycle of order processing, information regarding the order, and reliability of supply (Naccache & Montreuil, 2015).

The key element of the transaction phase is time, associated by customers with the delivery timeframe. The processing time acceptable by the customer may be achieved thanks to efficient management (Zuo et al., 2013). The shorter the order completion time, the more satisfied the customer. As a consequence, the customer is likely to consider another purchase and become one's royal customer (Nadeem et al., 2020).

Yet another component of the transaction phase of customer service is reliability. It is understood as the ability to keep agreed deadlines and meet order standards. Reliability further means a damage-free product on delivery. Preciseness and quality of supply are the underlying criteria of customer services (Liang et al., 2019).

The process of communicating with the customer allows one to control order processing. A typical activity, well-assessed by the customers, is the provision of ongoing updates about the stage of order completion and any potential delays. Effective communication system allowing the tracking of parcels is the condition of establishing long-lasting relations with customers. The monitoring of order processing and early information about any potential difficulties or impediments facilitates swift response and allows one to offer satisfying solutions. This is of utmost importance in the event of action undertaken on the market of courier services (Kramarz, 2014).

The next relevant element of the transaction phase is convenience. It consists in flexibility of order completion corresponding to customer's needs (Golmohammadi et al., 2020). In the area of courier service operations, this boils down to the ability to select the time and place of parcel pick-up, and the availability of different methods of order placement and payment. The emphasis on the satisfaction of the customer and his needs has become the main

challenge of contemporary organizations. This is because a satisfied customer will return and repurchase, or even recommend a product or service to other customers (Rita et al., 2019).

The term courier services has its genesis in postal services. The reason why the sector has been separated was the imperfectness of operation of the national postal companies and low quality of provided services (Liao et al., 2006). Courier operators have competitive advantages thanks to various factors, such as short delivery times, the emphasis on customer's convenience, and reliability in package delivery (Rydzkowski, 2011; Vinodhini & Chandrasekaran, 2014).

The situation on the market pushed courier service companies to be flexible in meeting their customers' expectations. Nowadays, many companies offer world-wide services, meeting top quality customer service standards. The operators on the market of courier services more and more often operate on the basis of extensive distribution networks, modern sorting plants and terminals (Vakulenko et al., 2018). While striving at the continual improvement of provided service quality, companies offering courier services are trying to suit the scope of activities to the needs of individual customers (Lou et al., 2020).

Given the ongoing transformations, courier operators have become faster in adjusting their offers to customer needs. This pertains to, in particular, parcel management. Recipients (addressees) are able to redirect the parcel to a different address, change delivery dates, even time-frames, and order parcel pick-up within the operator's network (Schwerdfeger & Boysen, 2020). In addition, some operators of courier services have introduced the standard of package delivery in the late afternoon or evening, or provide couriers' details and phone numbers (Alsaad & Taamneh, 2019).

What is more, seeing how popular smartphones have become, courier companies have started to launch mobile applications. Thanks to the applications, one can monitor the parcel status, check the location of the collection point and delivery time, or modify them, from any point on Earth (Lemke et al., 2016).

Simultaneously, given the growing expectations of the customers with respect to managing delivery pick-up times, the rising costs, including the cost of labor, the courier market operators have begun a dynamic development of pick-up points. Currently, apart from the ability to collect parcels at company branches, postal establishments or via automatic devices, one may have them delivered to partner networks, such as shops, news stalls or gas/fuel stations (Iwan et al., 2016).

As far as a few years ago, parcels in the courier sector were delivered mainly in the "door to door" (D2D) system. With a shared commitment to improve the quality of customer service standards, courier service companies faced a new challenge in the form of parcels ordered online by individual customers, often out of homes in the courier working hours or based in hard-to-reach locations. The above contributed to the development of deliveries to collection points other than homes or workplaces (D2P – door to point, P2P – point to point). The system features deliveries to automated package machines and pick-up and drop-off points (PUDO – pick up drop off). In the year 2018, over 13% of parcels reached PUDOs. The popularity of such delivery forms has been growing annually (Janjevic & Winkenbach, 2020).

There is a customer service quality management gap in the currently available literature during the Covid-19 coronavirus epidemic. This situation makes it necessary to adapt to new requirements both on the part of companies providing courier services and companies cooperating with them.

3. Materials and methods

The purpose of the study is to evaluate the quality management of customer services. This has been illustrated by the case of the courier services market. The conducted research and analysis will significantly contribute to a better understanding and understanding of customer expectations resulting from functioning during the COVID-19 coronavirus epidemic. This can be a useful source of information to develop effective strategies for the operation of companies providing courier services and business units cooperating with them.

Companies in the courier service industry should pay particular attention to the provision of top standards of customer services. In the contemporary economic reality, a satisfied customer is the main source of competitive advantage.

The paper demonstrates the results of own research on the quality standards of customer services in courier service companies. The significance of the aspects of sustainable development implemented by courier companies for customers was also analyzed. The investigations focused on a group of individual customers availing of the services of courier service companies. The conducted surveys were anonymous and voluntary. The criteria of respondent selection were the use of courier service companies and the willingness to complete the questionnaire. The study was conducted in September 2020 with the application of electronic tools in the form of an online survey. The method of conducting the research resulted from the sanitary limitations related to the COVID-19 coronavirus epidemic. It eliminated the traditional form of research. The questionnaire was composed of single-choice and multiple-choice questions. Some questions offered an option of providing an individual answer. Upon a factual and logical verification, 260 surveys were selected for further analysis.

The studied group was diversified in terms of sex, age, education, and place of residence. The most numerous groups were people aged 18 to 25 and 26 to 35. They made up 36.9% and 31.9% of all the respondents, respectively. The remaining age groups, i.e. 36-45 and 46 and over were much less populous (17.7% and 13.5%, respectively). This was a consequence of the fact that courier services are mostly used by young people. The respondents varied also in terms of sex. The majority of the surveyed were males. They accounted for 54.6% of the studied population.

Another differentiating factor was the level of education. The dominant group in the education structure were those who held a degree of higher education and those who were pursuing a degree course (who entered higher education) (32.7% and 21.9%). Their total share in the studied population was 54.6%. A relatively large group of respondents was general or vocational high school graduates (28.5%). By far the smallest groups of respondents were those who completed basic vocational, elementary school, or junior high school education (16.9%).

The analysis of the respondents by their place of residence showed that the vast majority lived in the cities (71.9%) rather than in the countryside. About one-third (34.2%) of the respondents came from cities with a population below 100,000, whereas 15.8% lived in the cities with a population of between 100,000 and 500,000. The remaining group (21.9%) were city-dwellers who resided in cities with a population exceeding 500,000.

4. Results and discussion

The conducted research study demonstrates that the majority of the studied population (54.6%) uses courier services several times a month. The 'once a month' option was selected by 28.5% of the respondents. Only 16.9% of the respondents avail of courier services several times a year. This diversification is a consequence of individual needs and preferences.

The major reason behind the use of courier services according to the study participants is the supply of goods purchased online. The respondents specified the types of packages they most frequently order. In this case, they could select more than answer, for they had a few categories of parcels to choose from. Most often (76.5%) the respondents pointed at packages with apparel and shoe-wear. The next most popular types of packages (68.8%) were those containing electronic devices (phones, television sets, laptop computers, etc.) and household articles. Quite popular were also cosmetics and chemical products, spare parts and car accessories, and books (14.6%, 12.8% and 9.4%, respectively). The other reasons behind using courier services were shipment of documents (10.2%) and items sold online (13.3%).

Among courier service companies, the absolute leader in the group of individual customers was DPD, whose services were used by as many as 89.6% of the respondents. DPD was followed by DHL, as selected by over a half of the studied population (76.5%). Such good results may indicate high level of trust and efficiency of the two logistics operators. The popularity of DPD and DHL is due to the fact that both are the top well-known courier companies on the Polish market of courier transport. The third position is occupied by InPost. The company is the youngest operator on the Polish market of couriers, express parcel delivery and parcels. Above all, it is known of its flagship product - the automated parcel machine or package locker. According to data of the end of January 2021, there were 11,000 such machines in Poland. InPost provides services mostly to individual and institutional customers, focusing on e-commerce, in particular on the logistics operation of APMs and courier services for online shoppers. The company employs 8,000 employees and partners. Nearly a half of the respondents (46.7%) have cooperated with InPost.

Poczta Polska has turned out to be equally popular on the Polish market of courier services (34.8% of those surveyed). Poczta Polska is a state-owned company with 460 years of tradition, which fulfills the function of an operator obliged to provide common postal services. What is more, it offers parcel and package postal services, and courier and logistics services. The development of the market of couriers, express parcel delivery and parcels and e-commerce is one of the main areas of activity included in the strategy of Poczta Polska. The other courier service companies on the list are: GLS, UPS and FedEx. In the case of these entities, the quantity of indications among the respondents did not exceed 20%.

The respondents were further asked to describe their motives behind choosing a given courier company. Here, also more than answer could be provided. The results are presented in Figure 1.



Fig. 1. Things considered when choosing a courier company

Source: compiled on the basis of own research

The absolute majority of the respondents (71.1%) paid attention to the time of delivery. This is the most important factor considered when selecting a courier company. Another significant element was the price of services (67.3%). It is essential especially for frequent courier service users. Yet one more central reason was safety (62.3%). On the one hand, safety was associated with a lack of damages to parcels in transit. On the other hand, it was related to ability to deliver a package to the parcel machine or a fixed pick-up point (PUDO). The latter was particularly popular in the Covid 19 coronavirus epidemics. The quality of services, mostly expressed as timely delivery and custom-made services, was selected by 46.5% of the respondents. The relatively least frequent motive underlying the choice of a courier company were the conditions for making claims (30.4%).

Next, the respondents had an opportunity to evaluate individual components of customer service quality. They could do so on a scale from 1 to 10. Figure 2 presents average ratings of the studied group of customers.

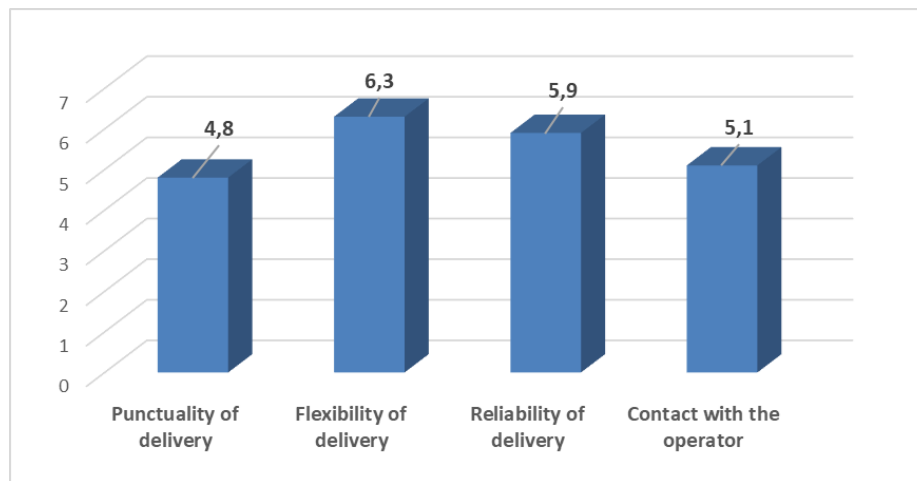


Fig. 2. Distribution of answers regarding the rating of individual elements of customer service

Source: compiled on the basis of own research

Courier service users best rated flexibility of deliveries. It consists in the ability to change the dates and address of delivery and tailor to individual customer's needs. The average rating here was 6.3. Reliability of deliveries was, on average, rated quite similarly (5.9). The issues which require greater commitment on the part of courier companies are communication between the operator and the customer, and those related to timely deliveries (date and hour punctuality). The average ratings here were 5.1 and 4.8, respectively, on a scale from 1 to 10.

The factor which differentiated the respondents was the popularity of the forms of order placement (Figure 3).

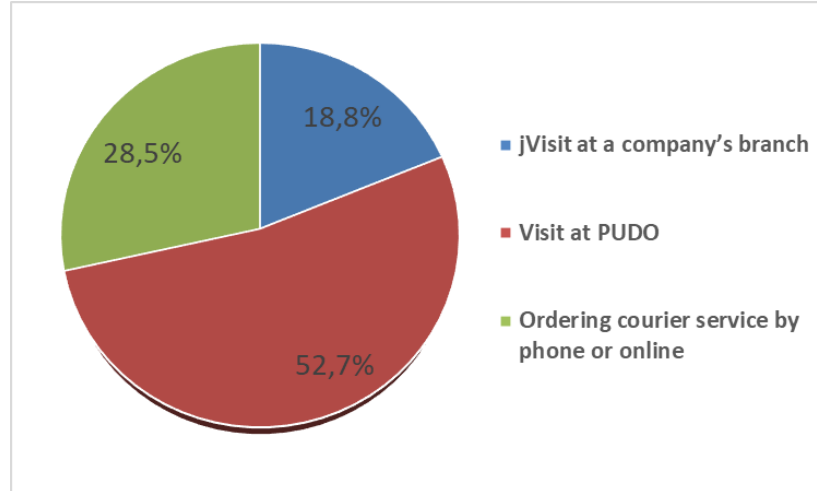


Fig. 3. Distribution of answers regarding the most frequently selected forms of order placement

Source: compiled on the basis of own research

When sending a parcel, customer most willingly selected a visit at a PUDO (52.7%). Beforehand, they used an online form downloaded from a website of a courier operator. The major reasons behind it are comfort, common access, and convenient working hours, often stretching beyond courier working hours, and low cost of communication. A vital issue is to place all information required to place an order on the website of an operator (Patil & Divekar, 2014). Thanks to electronic forms or direct contact by phone, one can order a courier without even leaving home. This form of communication was indicated by 28.5% of the respondents. The least popular form of order placement turns out to be a visit at a company's branch office. Customers who continue to highly value direct contact with the service seller constitute only 18.8% of the group.

The respondents were also asked to mark their level of satisfaction with the components considered when choosing a courier service, i.e. completion time, price and safety. Figure 4 shows the level of satisfaction of the respondents with courier service completion time.

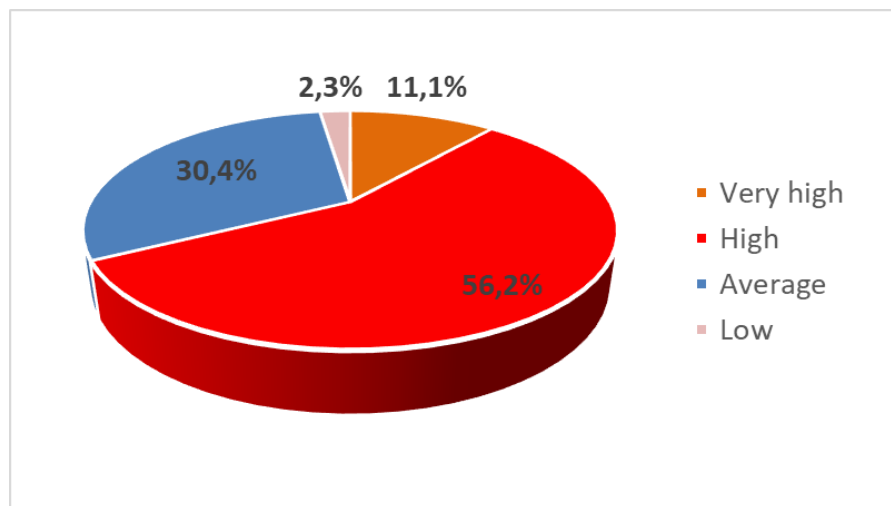


Fig. 4. Level of customer satisfaction with courier service completion time

Source: compiled on the basis of own research

The level of respondents' satisfaction with the time of completion of a courier service is definitely positive. Most of the respondents highly rated the delivery completion time (56.2%). About eleven percent (11.1%) expressed their satisfaction level as very high. Average satisfaction levels were indicated by 30.4% of the studied group. The research findings presented in Figure 4. demonstrate that the time of completion of a courier service, which is the major component considered when choosing a courier operator, is equally highly valued among the respondents. Only 2.3% of the analyzed persons had a negative opinion. The second most important motive when selecting a courier company was the price of service performance. Figure 5 shows the results of the analysis in respect of the above.

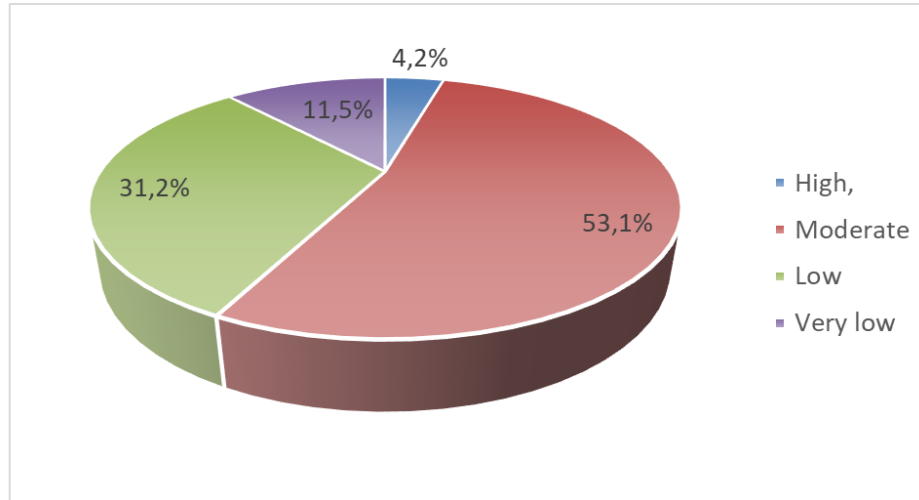


Fig. 5. The level of satisfaction with the price of courier services

Source: compiled on the basis of own research

The level of satisfaction with the price of courier services is not as positive as in the case of completion time. The majority of the studied subjects (53.1%) were moderately satisfied with the prices of courier services. Nearly every third respondent (31.2%) expressed a low level of satisfaction with the offered prices. Highly dissatisfied with the pricing levels were 11.5% of the respondents. Only for 4.2% of the studied group, the pricing level was suitable. The selection of courier companies was based on the safety of delivery and, above all, package's perfect condition on arrival. The opinions in this respect were also diversified (Figure 6.).

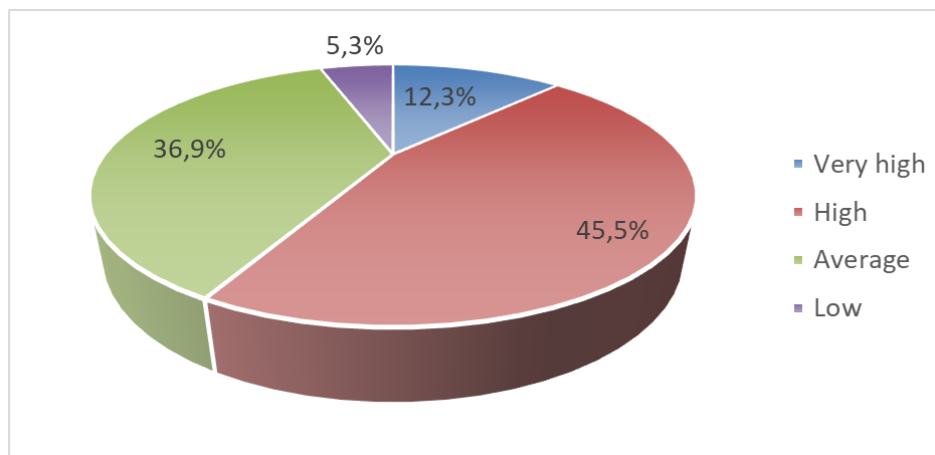


Fig. 6. Level of respondents' satisfaction with the safety of delivered packages

Source: compiled on the basis of own research

The level of safety of delivered parcels was evaluated by the majority of the respondents as high (45.5%) and very high (12.3%). Over one-third of the respondents (36.9%) expressed a moderate level of satisfaction. Only 5.3% of the respondents were greatly concerned with the safety of delivered packages.

In the study, the studied subjects were asked to provide information and rate the level of safety of courier services during the COVID-19 pandemic. The first coronavirus case in Poland was detected on 4 March 2020. Since then, the working conditions for courier companies and the whole economy have transformed dramatically. The study participants were asked to provide their rating of the safety principles when contacting a courier company. Over three-fourths of the studied population (75.8%) said they felt safe. Courier companies were fast and effective to introduce the basic rules of safe customer contact. For nearly every fifth person (19.3%), the epidemic-related threats sensed by the respondents were high but possible to be accepted. Only 4.9% of the surveyed were anxious about epidemiological threats. Despite the above, however, they show that the use of automated parcel machines can largely decrease health-related risks.

The distribution of answers regarding preferred forms of parcel delivery by courier service companies' customers are shown in Figure 7.

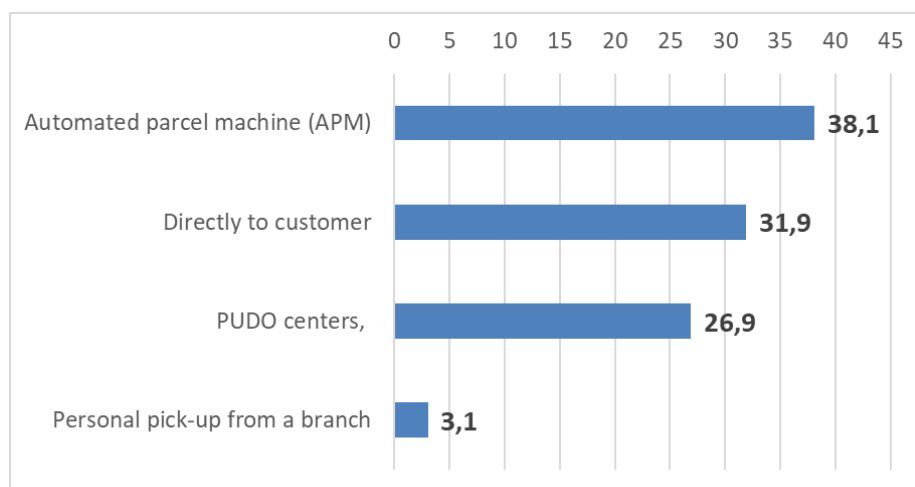


Fig. 7. Preferred forms of parcel delivery
Source: compiled on the basis of own research

By far the most popular form of parcel delivery in the difficult times of the epidemic appeared to be APMs. This option was selected by 38.1% of the respondents. APMs allow for observance of relatively high sanitary regime rules. Package machines were followed by deliveries directly to the customer (31.9%). These, however, are often completed without the need to contact the customer in person. The courier may signal his arrival by the door using a doorbell. Furthermore, customers highly value when couriers wear masks and gloves. Another frequently selected form of delivery was PUDO (26.9). The relatively rarest type of delivery was through a visit at a branch of a courier company (only 3.1%).

The last mile is one the key stages of an online order completion, because it signifies the first contact with the product. If it is a courier who delivers a parcel, he is often treated as a representative of the seller. The last mile is a critical element of the supply chain in the e-commerce (Lou et al., 2020; Wang et al., 2020).

All preceding processes are often automated and less prone to mistakes. The key to a successful parcel delivery is good communication with the recipient and the application of effective logistics solutions (Gevaers et al., 2014).

The respondents also assessed the importance of the sustainable development aspects used in the activities of courier companies.

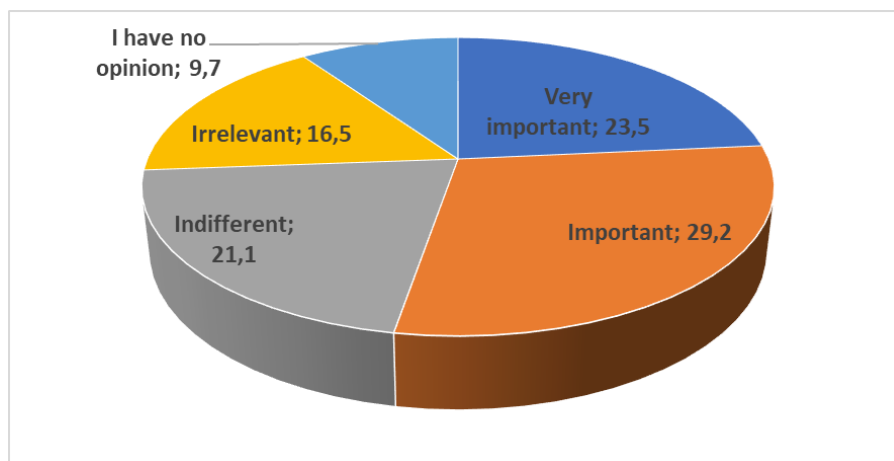


Fig. 8. Significance of aspects of sustainable development offered by a courier company
Source: compiled on the basis of own research

The analysis of the data contained in Figure 8 shows that for 29.2% of respondents the issues of sustainable development are important and for 23.5% very important. It proves the growing ecological awareness of the society (Tvaronavičienė, Černevičiūtė, 2015; Tseng, Wu, Lim & Wong, 2019). For only 21.1% of respondents, matters related to ecology are indifferent or irrelevant (16.5%). 9.7% of respondents did not have an opinion on this matter.

Ecology is more and more important for the management of courier companies. Hence the widespread pursuit of solutions that focus on environmental protection. For example, DB Schenker encourages the use of an ecological calculator showing CO₂ emissions to the atmosphere during standard transports, depending on the number of kilometers or the weight of the load. At UPS, the customer can request a service that transports their goods in a hybrid or electric vehicle. In turn, DHL has introduced the GoGreen program, on the basis of which individual routes of the most popular shipments are forested by the company. The company also focuses on the transport of parcels, on a fleet of electric vehicles. Customers who decide to use eco-shipping are rewarded by DHL with a special certificate.

Conclusions

The conducted study demonstrates that the prime motives behind the choice of a courier company are delivery completion time, service prices, and safety concerns. The last issue has been particularly crucial amidst the Covid-19 coronavirus epidemic. Among the individual elements of customer services, flexibility and reliability of deliveries received the highest ratings from courier service users. Over a half of the respondents also highly rated the delivery completion time. Over three-fourths of the studied subjects (75.8%) said they felt safe in contact with courier operators. Courier companies were fast and effective to introduce the basic rules of safe customer contact. For nearly every fifth person (19.3%), the epidemic-related threats sensed by the respondents were high but possible to accept.

The Polish customer values the freedom to choose a convenient delivery method and fast services. The major reasons are e-commerce development and an increasing number of pick-up points and offers promoting such shipment type. Next, the door-to-door (D2D) segment is gradually absorbed by PUDO and automated package

machines. PUDO points are convenient for both customers and couriers. More than one package can be delivered to a selected address and PUDO is accessible 24/7. Therefore, the numbers of undelivered packages because of an absent recipient are dropping. This may, as a consequence, lower the cost of the last mile and increase customer satisfaction.

In the coming years, click&collect services are said to be on the rise. The digital revolution will have an effect on consumer behavior, which together with the growth of costs of traditional deliveries will stimulate parcel collection at PUDOs. The quantitative share of parcel deliveries completed by PUDOs and automated package machines will be growing faster than their value due to lower prices of delivery to PUDOs than in the D2D system. The major development stimulus in the courier service sector over the years to come will continue to be e-commerce. Moreover, the service which allows customers to manage their parcels at the last mile stage will become something ordinary. This will have a direct effect on the growth of quality standards of customer services.

An important element in the activities of courier companies are also aspects of sustainable development. It is about reducing the negative impact on the natural environment. For over half of the respondents (52.7%), ecological aspects are important or very important. As a result, the most modern companies invest in such vehicles, the emission of which is as low as possible. These are hybrid and electric cars. Some of the courier companies are heavily involved in creating procedures that optimize the routes of their couriers to their clients. This reduces the time it takes for shipments to arrive, but also lowers fuel or energy consumption. Appropriate GPS systems integrated with systems informing about traffic in particular areas of the city help in this. It translates not only into a better reputation of the company, but is also associated with corporate social responsibility.

It is to be hoped that the analysis of issues related to the management of customer service quality in the courier services market will allow, at least partially, to fill the existing gap in the literature. The aspects related to security in the delivery of parcels to the customer, introduced in the era of the Covid 19 epidemic, should be permanently included in the strategies of courier companies. This will minimize the risk of threats and will be the basis for building appropriate relationships with the customer.

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TRANSITION OF BUSINESS COMPANIES TO CIRCULAR ECONOMY IN SLOVAKIA *

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Abstract. Integration of the circular economy system and its elements into business activities present new business opportunities. Despite the fact that circular economy represents a global trend, most industrial branches are based on the structure of a linear model. A system of circular economy has been gradually gaining ground in the business activities of companies functioning in Slovakia in different industries, including the clothing and textile industry. Transformation to the circular economy will be a necessity resulting from the legislative changes, as well as the pressure of public opinion. Our article focuses on this issue mentioned above. The main goal of the article is to explain the principles of the transition of companies operating in the textile and clothing industry from the linear to the circular economy and their potential for such a change and define the benefits of such a new business strategy for companies in Slovakia. In order for companies to be willing to switch to a circular economy, it is necessary to address the potential of the market and know the opinion of companies in the transition to a circular economy. To determine the market potential, we used ex ante forecasting using Holt's linear exponential smoothing, which showed us the growing trend of revenues in the textile industry, which can be an important factor for companies. In order for the transition to the circular economy to be successful, it is important to know the opinion of companies on the limitations and problems associated with the circular economy. To assess the opinions of companies, we worked with cluster analysis using the centroid method. The cluster analysis pointed to an implementation problem in almost 70% of the companies surveyed. Despite that all companies from the first cluster regard the circular economy as a new business model. However, it will be necessary to create adequate conditions for these companies to make the transition to the circular business models easier or possible. This primarily concerns adequate legislation and business operators' awareness of both positives and negatives connected with the transition to such a business model.

Keywords: circular economy; circular business model; clothing and textile industry

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1. Introduction

Global climate change is one of the greatest economic and social problems in the foreseeable future (Adamisin et al., 2018). It requires the implementation of a full range of various solutions and new systems. One of them is the transition of national economies from a linear system of economy to a circular economy.

Transition to the circular economy is a social, political and economic phenomenon deserving deeper scientific research. It is a change which we can, by its extent and impact, compare to the Industrial Revolution. Circular economy represents a manual how to leave a zero, or at least a minimal ecological footprint in both personal and production consumption. In the model of a linear economy, it steps in applying the principle of “a circle”, meaning repeated usage of a product or a material, its remake and recycling).

Slovak economy faces an important change. Transformation to the circular economy will be a necessity resulting from legislative changes, as well as the pressure of public opinion. Stakeholders will have to explain the necessity and usefulness of legislative changes and requirements. Implementation of new environmental goals or tightening the ones which already exist will have to be communicated towards the market and the public in a way to make them accepted and implemented.

Companies functioning in Slovakia are part of the European Union’s single market and are therefore facing pressure from the European Commission. The Plastics Strategy will lead to the decrease of plastic waste and to the increase of recycling, as well as using recycled materials in production, which will have a huge impact on business (European Commission, 2018). Public pressure towards limiting disposable plastic products will mean a revolutionary change in gastronomy. It will create an opportunity for the use of new materials, but also new concepts of catering, and thus business.

Directive on the reduction of the impact of certain plastic products on the environment by the European Parliament and the Council of the European Union will bring new duties to producers in the form of special requirements on changes of packaging designs, particularly beverage bottles (European Commission, 2018). Producers will have to start to use recycled material in a larger scale and also change the system of closing so the cap would not be separated from the bottle.

An important precedent is the implementation of extended responsibility of producers for specific products such as wet wipes for personal hygiene and household cleaning and filters of tobacco products containing plastic. Extended producers’ responsibility represents an economic instrument and a modern version of a principle “a polluter pays”, the aim of which is to raise the circulation of products and materials (Ghisellini et al., 2016). Extended producers’ responsibility is an instrument that closes the circle in the circular economy and that will gain importance and relevance.

One can state that nowadays the majority of industry is built on the structure of a linear model. The same applies to the textile and clothing industry. To make the textile industry circular, the whole infrastructure, including the supply chain, has to transform into circular. European Directive 2018/851 refers to the textile waste in relation to the end-of-waste status with regard to the period until 1.1.2025, by which conditions for textile waste will be created within separate collection of municipal waste by means of waste containers (waste containers will probably be set for dirty waste textile as it is called for downcycling). Current waste containers for textile are set for repeated usage, i.e. upcycling (The European Parliament and the Council of the European Union, 2018).

2. Circular economy as a new economic system and business model

2.1. From the Linear to the Circular Economy

In the case of the circular economy, it is a change of the economy paradigm from the linear, typical for raw material extraction, production and consumption, to the circular one. The aim is to decrease the environmental impact of production and consumption. Circular economy has a potential to understand and implement fundamentally new models and facilitate reaching sustainability and welfare with minimal or no material, energy or environmental costs. Circular economy can present a solution how to reduce a negative impact of the "business-as-usual" economic system (Ghisellini et al., 2016; Andriyeva et al., 2021).

The topic of circular economy is very up to date, but at the same time very young. It means that the volume of specialized literature of older date is rather limited. The database of scientific publications Web of Science lists only 30 published scientific articles on the topic of the circular economy in 2014, but in 2016 there were more than 100 of them (Kirchherr et al., 2017)

The concept of the circular economy appeared in the 70' of the 20th century for the first time (Ellen MacArthur Foundation, 2014). Several authors such as Andersen, Ghisellini and Su claim credit for the concept of the circular economy to authors Pearce and Turner (Andersen, 2007; Ghisellini et al., 2016; Pearce & Turner, 1989; Su et al., 2013).

The concept of the circular economy is based on several schools of economics and economic theories. The most commonly referred source is the theory "cradle to cradle" by authors McDonough and Braungart (McDonough & Braungart, 2010). The second source is the theory Looped and Performance Economy by Walter Stahel and also the Industrial Ecology Theory (Preston, 2012; Prokopenko, 2011).

The best-known definition of the circular economy is the one by Ellen MacArthur Foundation that presented the circular economy as the industrial economy focused on regeneration and design (Ellen MacArthur Foundation, 2014; Geng & Doberstein, 2008).

The broader definition which describes the circular economy as a regenerative system in which the leakage of invested resources as well as waste, emissions and energy is minimized by slowing down, closing, and limiting material and energy cycles is very accurate. This might be achieved by a design aimed at long-term consumption, maintenance, reparation, repetitive usage, remaking, renovating and recycling (Geissdorfer et al., 2017).

Circular economy moved away from the traditional economic model "take-make-dispose" and transformed into an economic model that is renewable. The aim is to maintain the greatest possible value of resources, products, parts and materials in order to create a system that would enable long lifespan, repeated usage, renovation, repeated production and recycling (Lehmann et al., 2014). Circular economy is often defined as a concept in which the waste does not exist.

Circular economy has a big potential in changing the models of consumption and production by implementing new business models and processes which have positive impact on the environment. Integration of the circular economy system into companies' activities represents benefits typical for new tendencies. They result in new business opportunities in the form of models based on decreasing production inputs as well as outputs, new technologies, innovations, changing attributes of products and their life cycle, repeated usage of virgin resources and materials or raising the level of recycling.

Literature mentions many circular business models (Ellen MacArthur Foundation, 2014; Frankenberger et al., 2013; Joustra et al., 2013; Laubscher & Marinelli, 2014; Linder & Williander, 2015; Van Renswoude et al., 2015; Wirtz, 2011). A model CANVAS is considered to be the most comprehensive. It is comprised of nine pillars (elements) which create a base for this model: (1) customer segments, being served by a company, (2) creation of value for customers, (3) distribution and communication canals, used by a company to provide service for customers, communicate with them and sell products, (4) relations with customers, which a company creates and maintains with every market segment, (5) revenue flows resulting from price offerings to customers, (6) key resources as assets necessary for the provision and delivery of the above mentioned elements, (7) key activities, carried out for the purpose of the provision and delivery of the above mentioned elements, (8) key partnerships, which are the network of suppliers and partners who support the implementation of the circular business model by means of providing particular resources and carrying out particular activities, (9) structure of costs including all costs which resulted from the operation of the circular business model. (Osterwalder & Pigneur, 2010).

The each product goes through several stages of its life cycle – from the development to the market "death". From the point of view of circular economy, it is necessary to perceive the influence of a product's lifetime namely in the context of a product's life cycle. According to McDonough and Braungart it is crucial that materials are divided into two independently circulating circles (McDonough & Braungart, 2010). The first circle concerns a biological system comprised of products, which only contain substance that is possible to safely return to biosphere, e.g. making it into compost. Products such as food and beverages, fabric from natural fiber without harmful dye, products from wood etc. rank among them. These products are made from renewable biological materials which are not contaminated. Depending on the type of product, cascade usage prior to its processing into biosphere is possible. Within the second circle, synthetic substances are being handled with. Those should be put in products in a way that would enable to extract them as simple as possible and repeatedly use them after the product was used.

The aim of the model of desired circular behaviour is to act as a guide for designers to understand what the key user behaviours that help circular business models to function are and therefore design products, services and other systems with these in mind (Wastling et al., 2018). In the context of the circular economy, we talk about circular design of products. Circular design is complex; it is a conjunction of economic, environmental and social attributes. It is a part of a renewable design.

The core of the circular design is to correctly design a product or material so it would take different aspects and requirements in the account, such as e.g. durability, compatibility, modularity and functionality of designed products. Intelligent choice of materials, rational design and selection of adequate production processes significantly reduce negative impact of products on the environment, prevent waste production and economize on natural resources.

One possibility how to prolong the life cycle of a product which reflects the idea of the circular economy at the same time is the modular design of a product. Products with modular design not only follow customer's need and wishes and bring new solutions, but at the same time also mean easier development, bring lower production costs, eliminate spending unnecessary energy and economize raw materials. It is important to perceive the modular design as a business prospect in which the modularity is being used for offering adjusted products to big masses of consumers (Best, 2016).

A consumer as such plays an important role in the process of transition to the circular economy. A number of behavioural barriers are preventing the development of the circular economy but an appropriate behaviour change intervention could help to overcome them (Muranko et al., 2019). Several factors that affect consumer acceptance of circular economy-type product offerings have been identified, however these are yet to be fully tested in 'real-

world' scenarios (Chamberlin & Boks, 2018). Supply of information will influence consumers who will have greater expectations from a product or a service in relation to the environment protection.

Previous studies confirmed that up to 30 % of consumers are willing to pay an extra charge for products with environmental labels compared to those without such labelling (Vaško, 2016).

In a future circular economy, new business models are needed that slow, close and narrow resource loops to address key resource and climate challenges. After a phase of excitement and inspiration, an operationalization phase needs to start to ensure the best possible implementation and transition towards a circular economy.

2.2. Integration of the circular economy in the clothing and textile industry

The textile/apparel industry is of great importance to the economy in terms of trade, employment, investment and revenue all over the world. This sector is however characterised by substantial losses, due to production excesses on the one hand, and the “throw away” culture on the other. This state of affairs suggests that textile recycling is needed (Filho et al, 2019). Textile and clothing industry uses enormous number of resources and has a great impact on the environment, which is intensified by its growing tendency. Production of the clothing itself and the care of it uses great amount of soil, water, energy, chemicals and produces excessive amount of waste.

This growth is a consequence of the “fast fashion” trend. The term “fast fashion” was defined in the 90's of the previous century. Fast fashion is a contemporary term used by fashion retailers to express that designs move from catwalk quickly to capture current fashion trends. Fake world designer clothes are affordable for a consumer for low prices. From the total production of clothes sold by a year less than 1% is recycled. That equals loss of material in the amount of 90 billion euro, whereas up to 95% of clothes that are being thrown out can be recycled or upcycled. William McDonough and Michael Brangaurt see upcycling as the industrial revolution. According to their opinion, it is necessary to design products in a way that would make them being used in upcycling after the end of their first life cycle. They also stress the importance of the implementation of the given concept directly into production processes that would lead to sustainability and will contribute to the protection of the environment (McDonough & Braungart, 2010). Upcycling prevents the generation of excessive waste and has almost no impact on the environment.

Together with upcycling, it is necessary to define another concept of recycling, i.e. downcycling. The majority of recycled industry materials loses its value or viability in the process of recycling. To be more specific, it means that such materials can be used in the degraded form afterwards for components and products whose usage differs from the original usage. The result of the process of recycling is the production of shorter textile fibers of lower quality in comparison with virgin fibers. In order to enhance the quality, recycled fibers have to be combined with the original fibers (Subramanian, 2018). The opposite of the 21st century phenomenon of fast fashion is the “slow fashion”. Slow fashion is about design, production, consumption and better life. It combines thoughts on nature (regenerative cycles and evolution) and culture (about the value of traditions). Just as the more common time frame of fashion and trade slow fashion puts emphasis on the quality and design manufacture of clothing (Fletcher, 2008).

Textile and clothing industry creates a broad spectrum of new spheres of using textile materials. European industry maintains its position with higher added value in the supply chain. It most frequently concerns the fusion of knowledge, advanced technology skills and high specialization. In the clothing and textile industry in particular it means research and testing of the functionality of fibers, products and textile materials and a consequent use of these components in further production processing. It also includes design, efficient tailor-made production and fast supply of fashionable textiles with high level of sustainability.

Companies have started to gradually approach the solution of specific environmental and social challenges in the framework of their supply chains either on their own initiative or under the pressure of sector-wide organizations. First of all, these efforts cause the reduction of the impact of the current linear model of economy. In the new textile economy, which applies the principles of the circular model, clothes, textiles and fibres are being kept in the highest value during their usage and after it, they are being returned back into the circulation. They never end in the form of waste. The new model leads to better economic, environmental and social results.

The limits of the present linear model (take-make-waste) are extremely apparent when examining the textile and clothing industry. The transition to a circular economy requires significant changes in both production and consumption models (Koszevska, 2018).

3. Material and Methods

Due to topicality of the circular economy and the forthcoming changes concerning its implementation in the textile and clothing sector, we have implemented broader research in order to ascertain the readiness of the entrepreneurs to move from a linear to the circular economy. However, due to need an innovative approach in the both mentioned sectors, we firstly focused on the potential of the producers surveyed with a view to introducing new circular business models into their business activities. We later extended the research into a qualitative research approach aimed at examining the core of the problem – circular business models in relation to the attitudes, motivation and expectations of the companies surveyed towards the anticipated changes (Daňo et al., 2020).

However, it is essential that companies operating in the textile and clothing industry gradually and systematically prepare for the changes brought about by legislation and for the trends that determine those changes. Subsequently, we comprehensively processed the results of our research to determine the readiness of entrepreneurs in both industries to transition from a linear to a circular economy.

The main goal of this article is to explain the principles of the transition of business companies operating in the textile and clothing industry from the linear to the circular economy and their potential for such a change and to define benefits of such a new business strategy for companies in Slovakia. For the purpose of reaching the stated main goals we determine several partial goals: (1) explain the starting points of the companies' transition from the linear economy to the circular economy; (2) find out what are the conditions of the Slovak companies transition from the model of linear to circular economy considering possible problems and barriers in the selected industry; (3) define the market's potential for circular products in the selected industry and (4) specify effects related to the implementation of circular business models in the business practice in the examined sectors.

We focused on the core of the circular economy and implementation of its principles in business models. We concentrated on products and services in compliance with the circular design and the newest trends with regard to changes in the life cycle of products and finding a competitive advantage. In the course of the following years, the transition to the circular economy will probably become a key question for the majority of industries. If we want to examine the implementation of principles of the circular economy at the micro-level, it will be necessary to apply a sector-based approach as well. In our article, we focused on the principles of the circular economy from the point of view of the clothing and textile industry which are typical for turbulent reproductive process. For this purpose, we carried out a research, the goal of which was to find out what is the condition and the degree of applying the principles of circular economy in Slovak companies operating in the clothing and textile industry and assess their potential in relation to using such a model in their business activities. We were interested in the approach of the examined companies towards their product strategies, design and brand from the perspective of the circular economy. We also concentrated on the potential of the examined companies regarding the search for

markets for such circular products and their ability to apply the strategy of differentiation with an aim of finding a new source of competitive advantage.

Information on the clothing and textile industry were obtained from data published by the Statistical Office of the Slovak Republic. Our definition of the clothing and textile industry was based on the statistical classification of economic activities SK NACE Rev. 2, which was released in the Decree of the Statistical Office of the Slovak Republic on June 18, 2007 under the number 306/2007 Coll.

To process the results, we used the relevant mathematical and statistical methods. By means of the analysis of time series we tried to find out what the expected development for the next 3 years is and whether an increasing or a decreasing trend will prevail. The ex ante prognosis is closely related to the companies' decision-making. The result is the monitoring of the development of the revenue on the basis of statistically available information for the period from 2008 to 2018, forecasting by means of the Holt's Exponential Smoothing, and setting a conclusion. The method of cluster analysis was used to determine the size of clusters, to find out how individual companies perceive the difficulty of the circular economy implementation and where do they see the main issues with implementing the circular economy in their business activities. A variable entering the model as individual companies was used as dependent and variables named as follows were put as independent: problems with implementation, high costs, increased capacity requirements, lack of qualified employees and insufficient government support.

When carrying out time series analysis and using the Holt's exponential smoothing method, we applied the following method:

$$\begin{aligned}\widehat{\beta}_{0,t} &= \alpha y_t + (1 - \alpha)(\widehat{\beta}_{0,t-1} + \widehat{\beta}_{1,t-1}) \\ \widehat{\beta}_{1,t} &= \beta(\widehat{\beta}_{0,t} - \widehat{\beta}_{0,t-1}) + (1 - \beta)\widehat{\beta}_{1,t-1}\end{aligned}\quad (1)$$

$\widehat{\beta}_{0,t}$ - the linear trend level estimation at the end of the period t,

$\widehat{\beta}_{1,t}$ - the linear trend direction estimation at the end of the period t,

$\widehat{\beta}_{0,t-1}$ - the linear trend level estimation at the end of the period t - 1 ,

$\widehat{\beta}_{1,t-1}$ - the linear trend direction estimation at the end of the period t - 1

α, β - equalizing constants.

We carried out the cluster analysis applying the centroid-based clustering method as follows:

$$D(C_h, C_h') = d_{ij}^2(\bar{X}_{c_h}; \bar{X}_{c_h'}) \quad (2)$$

$D(C_h, C_h')$ - distance between clusters,

d_{ij} - Euclidean distance,

$\bar{X}_{c_h}; \bar{X}_{c_h}'$ - newly created cluster related by an average element,

When applying mathematical and statistical methods, we relied on several literary resources [Bailey, 1994; Chatfield, 1984; Rublíková et al., 2003; Stankovičová & Vojtková, 2007).

4. Results and discussion

In practice, the circular economy is still far from being implemented in industrial companies in general and in small and medium enterprises in particular. It is for such companies where it can represent an important contribution in the form of innovations. Innovation is a key factor for small and medium businesses to remain successful. Innovation is undoubtedly a key to ensure the sustainability of the entrepreneurial activity. The introduction of new and innovative processes in the company will result in improved products and services (Linder & Williander, 2015; Prokopenko, et al. 2014).

There is still no universally accepted definition what small and medium enterprises are. The most common criteria are the financial criteria of turnover, sales or assets and a number of employees. While the limits of the financial criteria are still being changed because of its adaptation to economic development, the number of employees is more stable during the period of time and so more suitable for statistical analysis of the small and medium enterprises development.

We regard in further analysis the SMEs by number of employees as provided by the Statistical Office of Slovakia. Small enterprises are considered as enterprises with the number of employees within the range 0 to 49; medium enterprises within the range of employees 50 to 250 and large enterprises have 250 employees or more (Láziková et al., 2018).

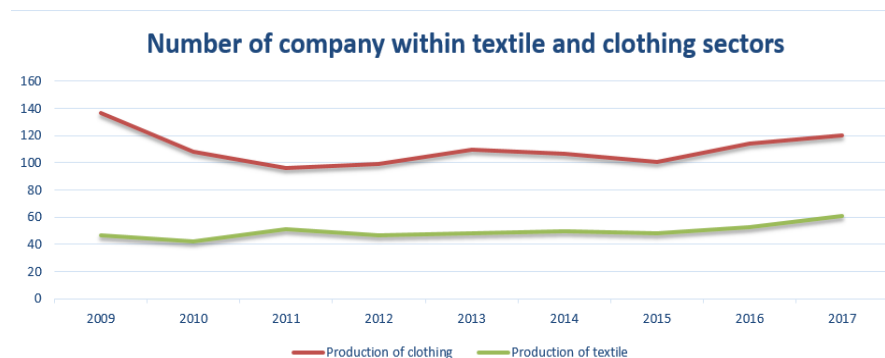


Figure 1. Number of companies in the individual sector of the textile industry in the period from 2009 to 2017

Source: Own processing from datacube

We can see in Figure 1, is that the production of clothing reached the maximum number in the year 2009 and because of the financial crisis, the number of companies fiercely fell down. Since 2015, the number of companies had been growing and reached the number 120 in 2017. The production of textile recorded stable progress.

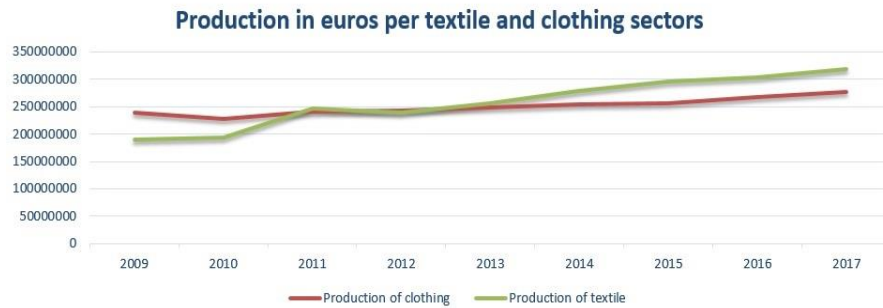


Figure 2. Production in the sector of the textile industry in euros in the period from 2009 to 2017

Source: Own processing from datacube

Production of textile had growing tendency in the whole reference period, whereby production of clothing fluctuated around 250 000 000 euros (Figure 2).



Figure 3. Average nominal monthly wage in the textile industry in euro in the period from 2008 to 2018

Source: Own processing from datacube

Average nominal monthly wage had stable variability of value in time in the reference period; we can also see a growing trend of our time series (Figure 3).

4.1. Time series analysis using the Holt's exponential smoothing model

4.1.1. Analysis of development of revenue

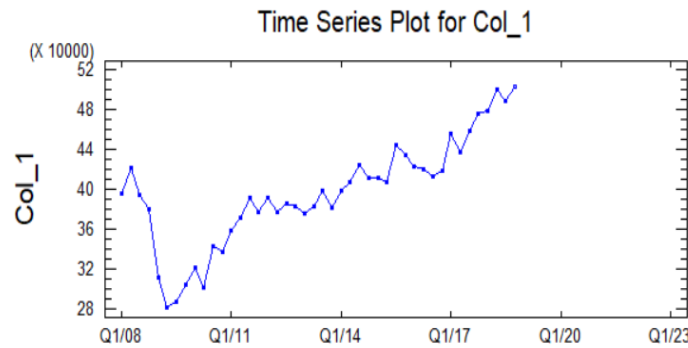


Figure 4. Time series of the development of revenue from Q1/2008 to Q4/2018

Source: Own processing

On the line charts, we can see a growing trend from the third quarter of 2009, whereby the alternation of the decrease and increase predicated the inherence of seasonality. Time series had stable variability of value, so we could assume that this concerns the additive model, in which case variability does not increase with time (Figure 4).

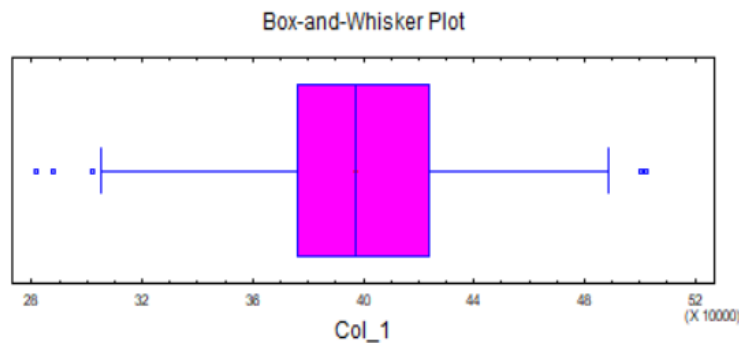


Figure 5. Box and Whisker Plot

Source: Own processing

Box-and-Whisker Plot indicate that time series have moderately left skewed the distribution and the negative kurtosis. In our time series, we have also recorded an extreme value (Figure 5).

4.1.2. Verification of seasonality in times series

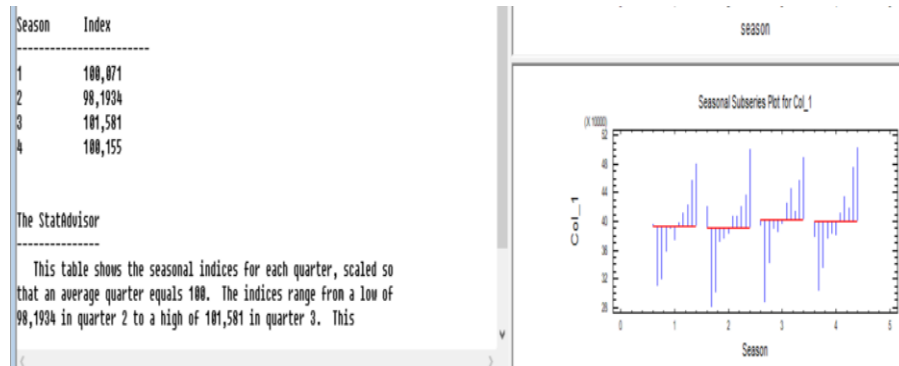


Figure 6. Seasonal indices and Subseries Plot

Source: Own processing

From the first line charts we predicted the inherence of seasonality. Seasonal indices and Seasonal Subseries Plot confirmed our prediction that in time series the seasonality in the second and third quarter of the years is moderate (Figure 6).

4.1.3. Choosing the correct model

Models

(A) Holt's linear exp. smoothing with alpha = 0,9939 and beta = 0,0387
Seasonal adjustment: Additive

(B) Linear trend = -475338,0 + 3427,39 t

(C) Quadratic trend = 5,79565E6 + -45976,5 t + 97,0606 t^2

(D) Simple exponential smoothing with alpha = 0,9939

(E) Brown's linear exp. smoothing with alpha = 0,9939

Estimation Period

Model	RMSE	MAE	MAPE	ME	MPE
(A)	21548,5	15130,7	3,96052	146,0	-0,151641
(B)	31607,5	21970,0	5,8823	-3,17496E-11	-0,696209
(C)	28520,6	20498,5	5,65786	-1,18532E-9	-0,617787
(D)	20417,4	15312,3	3,97892	2406,86	0,392319
(E)	29160,2	23924,9	6,18238	1194,3	0,301135

Model	RMSE	RUNS	RUNM	AUTO	MEAN	VAR
(A)	21548,5	OK	OK	OK	OK	OK
(B)	31607,5	*	**	***	OK	***
(C)	28520,6	OK	*	***	OK	***
(D)	20417,4	OK	OK	OK	OK	OK
(E)	29160,2	OK	OK	OK	OK	OK

Figure 7. Comparing applicability of various models

Source: Own processing

We choose the predictive model on the base of the lowest value of the mean absolute percentage error. In our case it is Holt's linear exponential smoothing. Real value differs from the predictive value average by 3.96 percent.

$$E(\varepsilon_t) = 0$$

$$D(\varepsilon_t) = \sigma_\varepsilon^2$$

$$\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$$

$$\text{cov}(\varepsilon_t, \varepsilon_{t+k}) = \text{cov}(\varepsilon_t, \varepsilon_{t-k}) = 0$$

Figure 8. Conditions of residues

Source: Own processing

We have to verify the conditions of residues before a prediction. In the Comparison of model we have tests RUNS, RUNM, AUTO, MEAN, VAR which verify all conditions of residues. In our chosen model Holt's linear exponential smoothing, all tests are OK on our significance level $\alpha=0.05$. We can therefore say that all residues conditions are carried out (Figure 8).

4.1.4. Prediction of the revenue for years Q1/2019 - Q4/2021

After verifying the condition of residues we can use Holt's linear exponential smoothing, in which, due to distortion results, we use the data without seasonal factor for prediction.

Period	Forecast	Lower 95,0% Limit	Upper 95,0% Limit
Q1/19	506072,0	466310,0	545835,0
Q2/19	511344,0	422867,0	599822,0
Q3/19	514596,0	366855,0	662338,0
Q4/19	518453,0	302434,0	734472,0
Q1/20	522991,0	230717,0	815265,0
Q2/20	528263,0	152507,0	904019,0
Q3/20	531515,0	65622,4	997408,0
Q4/20	535372,0	-26855,2	1,0976E6
Q1/21	539910,0	-124476,0	1,2043E6
Q2/21	545182,0	-226873,0	1,31724E6
Q3/21	548434,0	-336533,0	1,4334E6
Q4/21	552290,0	-450598,0	1,55518E6

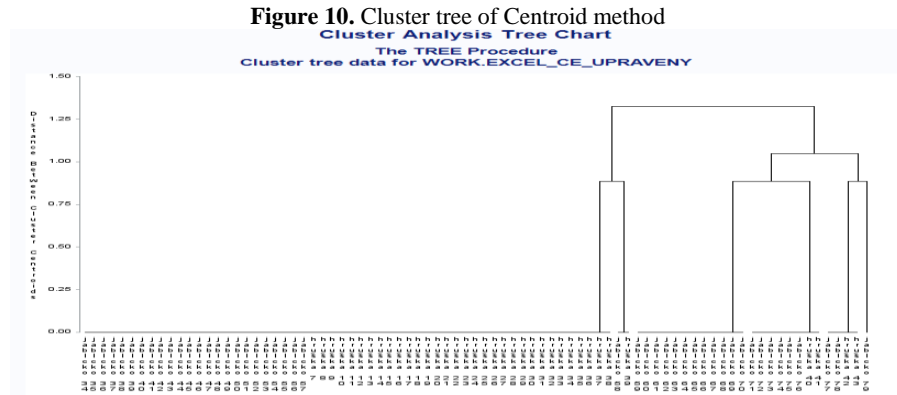
Figure 9. Prediction for years Q1/2019 – Q4/21

Source: Own processing

In the future, the prediction will have a growing tendency, what is a positive factor for investments in the textile industry. In reality, this result can obviously be different because of I_t , what we call an error or an irregular component (Figure 9).

4.2. Cluster analysis

Individual companies answered the question about a problem of the entry in the Circular Economy. If they answered “yes”, the answer was linked to “1”, and if “no”, to “0“. To create clusters, we used hierarchical procedure. We chose the centroid method, using which we obtained the subsequent cluster tree (dendrogram). (Figure 10)



Source: Own processing

It is important to find number of significant clusters. One of the reliable criteria is the greatest standard deviation of cluster variables RSQ and the smallest semi-partial coefficient of determination of SPRSQ. In our case, RSQ have value 0.963 and SPRSQ 0.0369. We apply both variables to the vertical axis and the number of clusters to the horizontal. In the chart, we must find a significant offset. In the Figure 11, we see significant offset on the level 5, so we set model to 5 clusters.

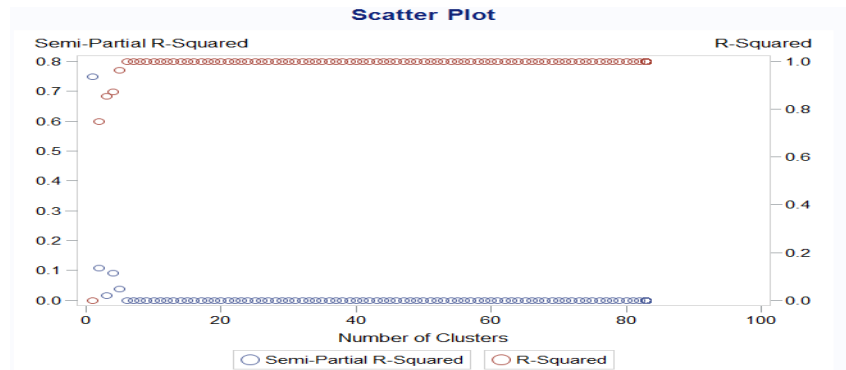


Figure 11. Scatter Plot

Source: Own processing

The absolute frequency in clusters is as follows: CLUSTER 1 = 58, CLUSTER 2 = 12, CLUSTER 3 = 8, CLUSTER 4 = 4 and in CLUSTER 5 we only have 1 observation. We modify number of clusters to number 4, but still, the system created a cluster with 1 observation. We choose the absolute number of cluster on the number 3. After modifying the absolute frequency in clusters, CLUSTER 1 = 58, CLUSTER 2 = 20 and CLUSTER 3 = 5.

Summary Statistics							
Results							
The MEANS Procedure							
CLUSTER	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	N
1	58	Problems with implementation	1.0000000	0	1.0000000	1.0000000	58
		High costs	1.0000000	0	1.0000000	1.0000000	58
		Increased capacity requirements	1.0000000	0	1.0000000	1.0000000	58
		Lack of qualified employees	1.0000000	0	1.0000000	1.0000000	58
		Insufficient government support	0.9655172	0.1840592	0	1.0000000	58
2	20	Problems with implementation	1.0000000	0	1.0000000	1.0000000	20
		High costs	1.0000000	0	1.0000000	1.0000000	20
		Increased capacity requirements	0.6000000	0.5026247	0	1.0000000	20
		Lack of qualified employees	0	0	0	0	20
		Insufficient government support	0	0	0	0	20
3	5	Problems with implementation	0	0	0	0	5
		High costs	0.8000000	0.4472136	0	1.0000000	5
		Increased capacity requirements	0	0	0	0	5
		Lack of qualified employees	0	0	0	0	5
		Insufficient government support	0	0	0	0	5

Figure 12. Summary of Statistics of various Clusters

Source: Own processing

CLUSTER 1 – Significant problems with the implementation of the circular economy. We can see that in cluster 1, companies have had a problem in almost all aspects of the implementation. Majority of companies in this cluster already have the circular economy or have been considering the circular economy so they are aware of the problems that may arise in implementing it or have already experienced it.

CLUSTER 2 – Moderate problems with the implementation the circular economy. Companies in the second cluster do not see a problem with the implementation of the circular economy in that many aspects. All companies in cluster coincide with problems of deployment and high costs, most of them with the increased capacity requirements. In this cluster, only companies that consider the circular economy and are already having some information on problems or risks are included. However, as we can see, they mainly underestimate the lack of qualified staff and the lack of state support. On the one hand, these firms can be better prepared, and on the other hand, there is a need for better information on the circular economy implementation.

CLUSTER 3 – Minor problems with the implementation of the circular economy:

Companies in the third cluster see that the problem of the circular economy implmentation mainly resides in high cost. In this cluster, there are companies that do not consider the implementation of the circular economy. We can state that companies have insufficient information on the circular economy (Figure 12).

Conclusions

As we can see, there is an assumption of a growing tendency regarding the development of revenues in the clothing and textile industry, what is a positive indicator for companies to invest into new technologies.

Transition to the circular economy is, however, a difficult process, requiring overcoming several difficulties. Despite that all companies from the first cluster regard the circular economy as a new business model. However, it will be necessary to create adequate conditions for these companies to make the transition to the circular business models easier or possible. This primarily concerns adequate legislation and business operators' awareness of both positives and negatives connected with the transition to such a business model. A significant effect particularly for companies which consider implementing the circular economy could be brought in the form of the government support by applying different motivational and economic instruments. Their implementation could first of all eliminate the fear of high costs connected with the implementation of the circular economy elements into companies' business activities. Consumers' awareness of circular products, their quality and design

in particular will be an equally important instrument for supporting the transition of business operators to the circular business model. We consider it an opportunity for establishing a new consumer segment with a potential to grow, i.e. a new business opportunity.

Retail trade has played a significant role in the whole contractor's process. Retailers have to take the initiative and the responsibility for social and environmental costs of clothes and textiles. It is inevitable that companies begin to perceive this fact as the market opportunity and competitive advantage and will react on consumers' increasing demand for responsible, sustainable and transparent clothes.

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THE LEGAL REGULATION OF FOOD WASTE IN POLAND AND LITHUANIA IN COMPLIANCE WITH EU DIRECTIVE 2018/851

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Abstract. Food waste is a global problem, one that has moved up the public and political agenda in recent years. Food is at the core of the United Nations' (UN) 'Sustainable Development Goals'. Food waste prevention is also highlighted as a priority area in the '2015 Circular Economy Package'. Food waste is an important indicator of sustainability because it embodies the sum of resources being used to produce uneaten food, and food waste disposal has an environmental, economic, and social impact. Directive 2018/851 established amendments to the food waste regulatory regime, including the definition of a food waste category and general provisions, which were related to food waste, providing a strong emphasis on waste prevention and the reporting of data in connection with food waste. New EU food waste rules should be implemented at the national level. Comparative research is needed for identifying any potential implementation problems. Such research will be carried out using case studies of Poland and Lithuania.

Keywords: food waste legal regulation; waste management; food waste; bio-waste, waste hierarchy

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1. Introduction

Food waste is a global problem, one that has moved up the public and political agenda in recent years. Food waste is an important indicator of sustainability because it embodies the sum of resources being used to produce uneaten food, and food waste disposal has an environmental, economic, and social impact.

Various studies have shown that between a third and a half of the world's food production is not consumed, leading to the generation of negative impacts throughout the food supply chain, including in households (Bio Intelligence Service, 2011; Food and Agriculture Organization of the United Nations, 2017; Gustavsson et al., 2011, p. 4). While the food value chain is responsible for significant resource and environmental pressures, an estimated 20% of the total food produced is either lost or wasted in the EU (EC, 2015; Stenmarck et al., 2016). The EU food manufacturing sector and households alone waste about ninety million tonnes of food annually, or 180 kg per person, not taking into account losses in agriculture and fisheries (Bio Intelligence Service, 2011; EC, 2012; Stenmarck et al., 2016).

Food consumption and the generation of food waste are receiving increasing attention both at the global and EU levels. Global food production must increase by 70% by 2050 in order to meet the demands of the world's rapidly growing population levels (EC, 2012). Food has a vital importance as a resource given its intrinsic usage value for humanity as one of the few basic human needs.

Food is at the core of the United Nations' (UN) 'Sustainable Development Goals' (SDGs), which was released in 2015 as the UN's development agenda for the twenty-first century. The second and twelfth of the UN's seventeen SDGs are to '*End hunger, achieve food security and improved nutrition, and promote sustainable agriculture*', and to '*Ensure sustainable consumption and production patterns*' (United Nations, 2015). The later goal includes target 12.3: '*By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses*'. International attention on food waste has risen in recent years, as can be evidenced by its inclusion in the UN SDG, which has resulted in it making an impact on European policy in terms of food waste and food waste regulations.

Legislation is vital for important social issues to be addressed through law in a timely way (Scotford, 2021; Andryeyeva et al., 2021). Directive 2008/98/EC (hereinafter referred to as the 'waste framework directive', WFD) (EU, 2008), amended by Directive 2018/851 (EU, 2018, p. 851) established changes to the food waste regulatory regime, placing a far greater emphasis on waste prevention and reporting in detail regarding food waste. EU information regarding food waste is for the moment insufficient. The new waste legislation seeks to address this gap, as 'what is not measured cannot be managed'.

C. Bradshaw identifies problems with the key architecture of waste law applied to food waste, narrowing it to waste management problem rather than to problem of resource management (Bradshaw, 2018, p. 330). CJEU had regard to the obligation to interpret the concept of waste widely in order to limit its inherent risks and pollution (Van Calster, 2015, p. 21). It is becoming increasingly difficult to separate problems of environment, food safety, and public health (de Sadeleer, 2020). European waste law can be called an example of a set of deontic norms where factual uncertainty reigns (Post, 2016, p. 348).

Amendments at EU level did not formally affected EU waste hierarchy in relation to food waste, thought suggestions to expand current food waste hierarchy are presented (European Court of Auditors, 2016; Sanchez Lopez et al., 2020). Waste hierarchy is considered as one of most important concepts of waste management. Various assessments can be found in the available scientific literature: waste hierarchy is stated to be normative (Hultman & Corvellec, 2012, p. 2414), policy recommendation (Krämer, 2015, p. 361), or 'aprioristic hierarchy',

which means is only a starting point for analyses which must be carried out according to specific cases (Pope, 2020, p. 250). The limited character of the waste hierarchy is also observed (Van Ewijk & Stegemann, 2016, p. 127).

Emphasis on food waste prevention and data reporting systems should encourage further food waste research directions. Big data implementation in the sector of municipal waste management already gains scientific interest (Limba et al., 2020).

Food waste represents a unique opportunity to protect the economy, conserve natural resources, create jobs, and provide food to people who experience food insecurity, but legal requirements should be borne in mind. New EU food waste rules should be implemented at the national level, so state-of-the-art solutions should be analysed which will make it possible to achieve this goal in Poland and Lithuania.

2. Methodology

It has been hypothesised that changes to legal acts in Poland and Lithuania which regulate waste during the process of implementing the guidelines of the new ‘Waste Directive 2018/851’ may have contributed to an improvement in the general situation regarding food waste in both of those countries.

Considering this hypothesis, the following research questions have been formulated:

1. What are the effects of WFD implementation in EU member states, particularly in Poland and Lithuania?
2. What are the similarities between Poland and Lithuania in terms of their legal regulations regarding food waste?

The aim of this article is to divulge the main legal changes in food waste regulation at EU and national levels, particularly in Poland and Lithuania.

The aim of the article will be realised through the following objectives:

- To reveal a new food waste category and general provisions, which are related to food, waste within the waste framework directive, WFD.
- To disclose the main characteristics of these legal changes at both the EU and national levels (the latter regarding Poland and Lithuania specifically).
- Analyse and compare the legal and organisation-related solutions in terms of the management of food waste in Poland and Lithuania.

The research is based on legal dogmatic and comparative methods, including legal regulation analysis, document analysis, statistical data analysis, historical, linguistic, logical, and systematic analysis. The information for this paper was gathered according to the key words: food waste, waste management, waste hierarchy, municipal waste, and waste, using the methods of document analysis and statistical data. The authors relied on databases, such as those of the ‘Web of Science’ or Scopus, Eurostat, the United Nations, the European Environmental Agency, and the EU’s publications office, which provide quality data and information in terms of conducting research of this nature.

3. Rethinking the food waste problem: the circular economy

Food waste is a global problem, one that has moved up the public and political agenda in recent years. It took time to find acceptable solutions to the food waste problem at the EU level.

In order to be able to achieve the ambitious goal of reducing food waste, change is required across all stages of the food supply chain. This will include organisations, which are involved in agricultural production, food processing, transportation, and retail, including supermarkets and food service sectors, as well as individuals (Pearson & Perera, 2018, p. 47).

The implementation of the EU's circular economy concept had an important level of impact on the legal regulation of waste within the union. Food waste prevention is highlighted as a priority area in the '2015 Circular Economy Package'. A proposal for a directive by the European parliament and the council which amended Directive 2008/98/EC on waste (EC, 2015b) as part of a circular economy package suggested an amendment to EU waste legislation and set out new measures to promote food waste prevention, and food re-use.* The EU action plan for the circular economy set out the main measures in the food waste area:

- The development of a common methodology and indicators regarding the measurement of food waste;
- A stakeholder platform to examine how SDG goals regarding food waste can be achieved, along with the sharing of best practice and how progress may be evaluated;
- Clarify the relevant EU legislation where this may be related to waste, food, and feed, in order to facilitate food donations and the utilisation of former foodstuffs for animal feed;
- Explore options for the more effective use and understanding of date marking on food packaging.

A new circular economy action plan (EC, 2020), which presents a set of interrelated initiatives, will make it possible to establish a strong and coherent product policy framework which will make sustainable products, services, and business models the norm, and will serve to transform consumption patterns so that no waste is produced in the first place. The plan includes a sustainable product policy framework, key product value chains (including food, water, and nutrients), an enhanced waste policy, which supports waste prevention, the ideal of a circular economy, and other, related concepts. In the new circular economy action plan, it is stated that *'Commission will propose a target on food waste reduction, as a key action under the forthcoming EU Farm-to-Fork Strategy, which will address comprehensively the food value chain'*. The commission will also consider specific measures to increase the sustainability of food distribution and consumption. Under the sustainable products initiative, the commission will launch an analytical work to determine the scope of a legislative initiative on reuse in order to substitute single-use packaging, tableware, and cutlery by means of the supply of reusable products in food service areas. A new circular economy action plan shows that more improvement in food waste regulation can certainly be carried out.

A new regulatory regime for food waste was introduced in Directive 2018/851 (EU, 2018). This included new food waste definition and provisions to support food waste prevention. The new waste legislation seeks to address data gap as 'what is not measured cannot be managed'. This explains the need to develop of a common methodology and indicators to measure food waste, which are essentially important for further regulatory decisions.

One of the biggest obstacles when it comes to producing solutions for the problems regarding food waste is the lack of accurate data on food consumption and waste. Previous studies have revealed major data gaps in the available areas of knowledge regarding global food loss and waste (Gustavsson et al., 2011, p. 15), especially

* In general, within in the scope of the 'Circular Economy Package' proposals, six waste directives were drawn up.

with regard to the quantification of food losses through individual reasons, and the cost of preventing food waste. When the required information actually is available, it is often accompanied by major uncertainties. In EU-level food waste respects, methodological and data gaps have been identified through the European research project, FUSIONS (Møller et al., 2014, p. 32). Studies which have been conducted during the FUSIONS project served to propose a framework which could define food waste (Fusions, 2014), while proposing a methodology for measuring and monitoring volumes of food waste (Fusions, 2016).

The volumes, which are generated by the various sectors, tend to support results, which show that households are wasting the highest volumes of food. Food waste is therefore argued as not being a problem which can be linked to feckless consumerism at the household level, but one which is a side effect of a deeply-embedded failure to value food at a structural level (rather than an individual one) (Bradshaw, 2018, p. 312).

Food waste management does not work in isolation. The legal requirements for waste management must be taken into account. The main elements, which have some form of relevance when it comes to improving food and bio-waste managing in Europe, are as follows:

- The compulsory separate collection of bio-waste by 2023
- The overall recycling target for municipal waste of 65% by 2035 (besides the final recycling target for municipal solid waste, intermediate targets of 55% by 2025 and 60% by 2030 were also set).
- The exclusion in regards accounting for the mechanical biological treatment of municipal waste for recycling by 2027, and
- The 10% reduction target for municipal solid waste being sent to landfill by 2035.

The circular economy package has been a major driver in terms of resolving the general food waste problem, and for the first time food waste is gaining special recognition in terms of waste regulation at the EU level.

4. The concept of food waste within the ‘Waste Framework Directive’

The definition of food waste was set out in the directive, in Article 3(4a) of the WFD:

‘4a. “food waste” means all food as defined in Article 2 of Regulation (EC) No 178/2002 of the European Parliament and of the Council that has become waste’.

In defining food waste, this particular directive refers to Regulation (EC) No 178/2002 by the European parliament and of council (EU, 2002) which defines the concept of food in Article 2:

‘For the purposes of this Regulation, “food” (or “foodstuff”) means any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans.

“Food” includes drink, chewing gum and any substance, including water, intentionally incorporated into the food during its manufacture, preparation or treatment. It includes water after the point of compliance as defined in Article 6 of Directive 98/83/EC and without prejudice to the requirements of Directives 80/778/EEC and 98/83/EC’.

The regulation also defines categories, which do not fall within the definition of food, and consequently cannot constitute food waste.

These definitions raise a question regarding what the relationship may be between the ‘waste’ and ‘food’ definitions. Food has special properties: it is very important and is different from other resources. Food is one of the few basic human needs, being different from many (though not all) resources in that it is a form of matter,

which is subject to decay. Legal acts, which govern food, acknowledge the nature of food in the respect that it tends to perish. *Food-related legal acts also prohibit the sale and donation of 'unsafe' food; that is, food which is 'injurious to health' or 'unfit for human consumption'. Food shall not be placed on the market if it is unsafe* (EU, 2002). EU law requires most pre-packed food to include either a date of expiration (a 'use by' date), which concerns food safety, or a date of minimum durability (a 'best before' date), which concerns food quality. To be able to value food as food, edibility is a key touchstone in determining when food should acceptably be removed from the food supply chain (Bradshaw, 2018, p. 325).

Decision 2019/1597 (EC, 2019a) provides an explanation, which states that the definition of 'food' as laid down in Regulation (EC) No 178/2002 encompasses food as a whole, along the *entire food supply chain* from production to consumption. Food also includes *inedible parts*, where these have not been separated from the edible parts when the food was being produced, such as bones, which are attached to meat that is destined for human consumption. Hence food waste can comprise items which include parts of food that are intended to be ingested and *parts of food that are not intended to be ingested*.

Food waste is defined as '*food [...] which has become waste*'. The WFD defines waste as 'any substance or object which the holder discards, or which they intend or are required to discard'. Under this definition 'food' should be regarded 'waste' at the point at which it is discarded. According to the courts, 'the scope of the meaning of "waste" depends upon the meaning of the verb "to discard"', and that verb must be interpreted in light of the aim of the directive, but 'no decisive criteria is, however, suggested by such a directive other than the holder's intention to or the action of discarding a given substance or object (CJEU, 2004, pp. 33–34).

The main properties of food, such as whether it is edible or safe to eat, do not count when defining food waste as they are not included in the definition of food waste. This means that the definition of food waste is somewhat wide and inclusive.

Food waste is subject to the basic provisions of legal acts, which cover food waste, which are set out in Decision 2019/1597 (EC, 2019a):

- Food waste does not include losses at stages of the food supply chain in which certain products have not yet become food as defined in Article 2 of Regulation (EC) No 178/2002, such as edible plants, which have not been harvested.
- In addition, the definition does not include by-products from the production of food, which fulfil the criteria set out in Article 5(1) of WFD, since such by-products are not classed as waste.

The properties and uses of the food make it possible to distinguish food waste as avoidable or non-avoidable (Bio Intelligence Service, 2008, p. 3). Legal regulations count food waste as a whole without any divisions into smaller categories, such as avoidable or unavoidable waste.

Food is a form of biodegradable waste or bio-waste. Directive 2018/851 supplemented the WFD with a definition of bio-waste:

'The term "bio-waste" refers to biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises and comparable waste from food processing plants'.

WFD Article 22 obliges member states to ensure that, by 31 December 2023, bio-waste is either separated and recycled at source, or is collected separately and is not mixed with other types of waste. Member states are to take measures in accordance with Articles 4 and 13, to: a) encourage the recycling, including composting and digestion, of bio-waste in such a way which fulfils the requisite high level of environmental protection and results in output which meets relevant high-quality standards; b) encourage home composting; and c) promotes the use of

materials which have been produced from bio-waste. WFD Article 11(6) states that, by 31 December 2024, the commission will consider [...] preparing for re-use targets for municipal waste and recycling targets for municipal bio-waste.

The definition of biodegradable waste in the ‘Landfill Directive’ (EU, 1999) has also remained unchanged. The term ‘biodegradable waste’ refers to any form of waste, which is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and paperboard. Under Article 5 of the directive, member states are to set up a national strategy for the implementation of the reduction of biodegradable waste going to landfills, while the directive also sets out targets for the reduction of biodegradable municipal waste, which is going to landfills. The EU landfill directive obliges member states to reduce the amount of biodegradable waste going to landfill to 35% of 1995’s levels by 2020. Some EU member states have gone further by banning any food waste at all going to landfill (such as Germany, Austria, and Sweden).

The definition of food waste is somewhat wide and inclusive, so it raises questions if it sufficiently corresponds with the main features of food.

5. New provisions for food waste management in EU directives

Directive 2018/851 places a great deal of emphasis on the implementation of waste prevention, setting out *legally non-binding targets*:

1. Member states should take measures to promote prevention and prevent the generation of food waste in line with the ‘2030 Agenda for Sustainable Development’ and, in particular, in regard of its target of halving per capita global food waste at the retail and consumer levels and reducing food losses along production and supply chains, including post-harvest losses, by 2030 (WFD Art 9 (1g)).
2. Member states should aim to achieve an indicative union-wide reduction in the food waste target of 30% by 2025, and 50% by 2030 (recital 31 in the preamble).

Directive 2018/851 outlines these main directions for the *implementation of food waste prevention*, which is to be carried out by member states:

1. Food waste prevention planning

- 1.1. Directive 2008/98/EC required member states to include food waste prevention in their waste prevention programs (Art 29 (2a)).

2. Informational measures about food waste

- 2.1. Member states should put in place specific measures to prevent food waste, including awareness-raising campaigns to show how to avoid food waste (recital 31 in the preamble).
- 2.2. Raising consumer awareness of what is meant by ‘use by’ and ‘best before’ dates (recital 32 in the preamble).

3. Actions to promote waste prevention

- 3.1. Encourage food donation and other forms of redistribution for human consumption, prioritising human use over animal feed and reprocessing into non-food products (WFD Art 9 (1h)).
- 3.2. Reduce the generation of food waste in primary production, in processing and manufacturing, in retail and other forms of food distribution, and in restaurants and food services, as well as in households (WFD Art 9 (1g)).
- 3.3. Member states should provide incentives for the collection of unsold food at all stages of the food supply chain and its safe distribution, including to charities (recital 32 in the preamble).
- 3.4. Annex IVa to the directive sets out an example of economic and other measures to promote the waste hierarchy which is referred to in Article 4 (3) in relation to the reduction of food waste: fiscal incentives for the donation of products, in particular food.

4. *Monitoring and the evaluation of waste prevention*

4.1. Member states will monitor and assess the implementation of their food waste prevention measures by measuring the levels of food waste on the basis of the methodology which has been established by the delegated act, as from the first full calendar year after the adoption of that delegated act (WFD Art 9 (5)). In this way, member states should also measure any progress, which is made in reducing food waste.

4.2. Member states are required to measure food waste in accordance with a common methodology, and to provide food waste data to the commission on an annual basis (WFD Art 9 (5), 37 (3), Preamble p 31).

4.3. The commission adopted delegated Decision (EU) 2019/1597 (EC, 2019a), establishing a common EU methodology to measure food waste. This decision separately measures the amount of food waste according to the stages of the food supply chain (primary production, processing and production, retail and other food distribution, restaurants and catering services, and households). The first compulsory reference year for reporting (the data and quality report) is the year 2020, which is to be reported before 30 June 2022.

4.4. The commission's Implementing Decision (EU) 2019/2000 (EU, 2019) lays down a format and quality check report for the reporting of data on the levels of food waste which is generated in member states.

4.5. The guidance primarily addresses the reporting of food waste and food surplus data collection, as well as the reporting of the applied methodology for data gathering and calculation (Eurostat, 2020, p. 3).

4.6. The setting of a quantified reduction of the food waste target at a European Union level will be decided on the basis of this information. To that end, the commission will submit a report to the European parliament and to the council, accompanied, if appropriate, by a legislative proposal.

6. **Food waste hierarchy and food waste prevention**

The waste hierarchy is the overarching principle of EU waste policies, which sets out a priority order: waste prevention is most desirable option, followed by preparing for re-use; recycling; other recovery, e.g. energy recovery; and disposal as the least desirable option (Figure 1).

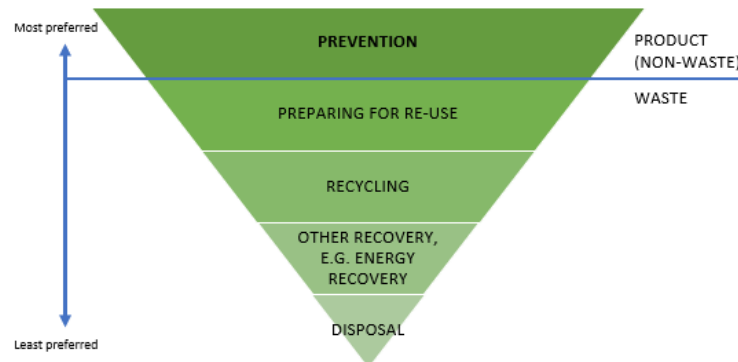


Figure 1. Waste hierarchy under the WFD.

In the recently-amended WFD, the definition of food waste and other provisions were introduced, but an amendment was not made to the existing EU waste hierarchy in relation to food waste. The commission does not consider it necessary to lay down a specific food waste hierarchy in EU waste legislation (European Court of Auditors, 2016, p. 57).

The question of waste hierarchy is not simple and straightforward. Therefore, various assessments can be found in the available scientific literature. Here it is stated that the waste hierarchy is normative because it determines the desirability of waste management practices (Hultman & Corvellec, 2012, p. 2414). Waste hierarchy is referred to

as an ‘aprioristic hierarchy’, which means that although the hierarchy must be seriously followed by member states in terms of waste management, it is only a starting point for analyses which must be carried out according to specific cases (Pope, 2020, p. 250). For example, the WFD allows specific waste streams to depart from the hierarchy where this is ‘justified by life-cycle thinking on the overall impacts of the generation and management of such waste’ (WFD Art 4 (2)). L Kramer therefore characterises the hierarchy as a policy recommendation (Krämer, 2015, p. 361).

The existing waste hierarchy is a solid strategy when it comes to avoiding the use of landfill sites, but doubts have been raised about the merits of the hierarchy with regard to minimising environmental impacts and the use of natural resources (Van Ewijk & Stegemann, 2016, p. 127). It has been stated that ‘policy implementation of the waste hierarchy has been limited mainly to the lower options’ (Van Ewijk & Stegemann, 2016, p. 127). Criticism of the waste hierarchy was initially directed at the fact that the measures, which involve reuse and recovery, although defined by the directive, did not serve as hierarchical levels of waste management (Pope, 2020, p. 251).

While food waste tells us about the difficulties within legal acts, which cover food waste, these difficulties, are exacerbated by the importance of food and its difference as a resource (Bradshaw, 2018, p. 312). The limited practical and legal utility of the waste hierarchy, together with the ‘waste as a resource’ approach it validates, adds to problems which surround food waste, rather than providing tools to disrupt them (Bradshaw, 2018, p. 323).

Inspired by the existing food waste hierarchies (*Wageningen University’s Ladder of Moerman, Food Waste Pyramid for London, OVAM’s (Public Waste Agency of Flanders) food waste hierarchy, FEVIA’s (Fédération de l’Industrie Alimentaire/Federatie Voedingsindustrie) food waste hierarchy and US Environmental Protection Agency’s food waste hierarchy*) it was observed in special report (European Court of Auditors, 2016, p. 10) that a hierarchy can be applied to food waste but should be slightly modified in order to take account of the particularities of food. It suggested a top three layers (prevention, donation, and animal feed) to be actions that can be taken before food constitutes waste, with those top three being the most preferable (Figure 2).

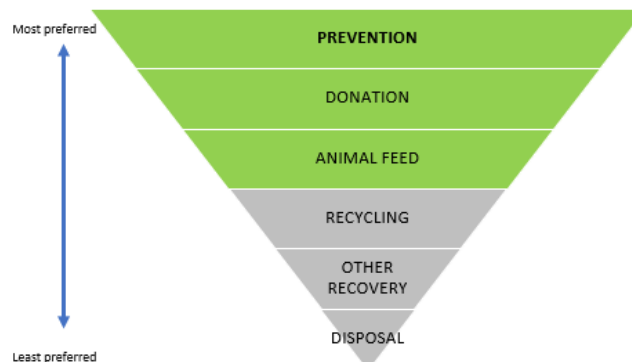


Figure 2. A food waste hierarchy as suggested in a special report (European Court of Auditors, 2016)

Other authors present a food surplus, by-products and food waste hierarchy as a prioritisation of the most preferable options: prevention, reuse (human consumption), reuse (animal feed), reuse in products and recycling food waste, recycling nutrient recovery, the recovery of energy, and disposal (Sanchez Lopez et al., 2020, p. 8) (Figure 3).

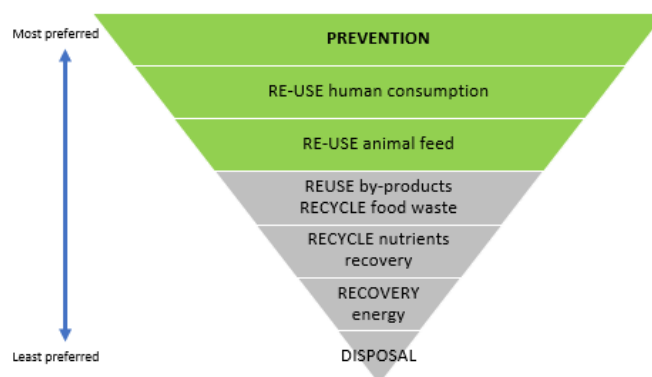


Figure 3. The food waste hierarchy model (Sanchez Lopez et al., 2020).

Although the WFD formally does not include a food waste hierarchy, it prioritises options within the waste prevention category: food donation and other forms of redistribution are both encouraged, along with prioritising human use over animal feed and reprocessing into non-food products (WFD Art 9 (1h)).

Waste prevention concerns what we do with ‘stuff’ before it becomes waste. Waste prevention actually has very little to do with waste so that, in turn, legal acts which cover food waste have a limited role in preventing waste (Scotford, 2008, p. 75). In defining ‘prevention’ as a measure, which is designed to reduce the quantity of waste, the directive demonstrates that its primary focus is on reduction rather than prevention (Pope, 2020, p. 251). According to the directive’s definition of waste, it is clear that products, which are in perfect conditions in terms of use, may be considered as being waste as long as the holder plans to get rid of them, even if they may be reused.

The action of food donation expresses a reuse of food, being a form of waste prevention measure. The main difference between preparing for reuse and actual reuse is that, in the case of the latter, the material has not yet become waste. At the level of the different EU policy areas, there are still a number of barriers which stand in the way of donation, such as a lack of clarity in existing legal provisions, missing legal provisions, or legal provisions which are not used in practice. As was noticed in a special report by European Court of Auditors (European Court of Auditors, 2016, p. 39), EU texts do not clarify whether donated food should be counted as wasted food or, on the contrary, whether a donation should be considered as a way of preventing food from being wasted.

If wastage in terms of food is not prevented, further food waste treatment options should be enacted. The acts of preparing for reuse, recycling, and other recovery options are sub-categories of the overarching concept of recovery. As noted in Article 22 of the WFD, priority is given in the following areas: a) to encourage the recycling, including composting and digestion, of bio-waste in a way which fulfils a high level of environment protection and results in output which meets relevant high-quality standards; b) to encourage home composting; and c) to promote the use of materials which have been produced from bio-waste.

Composting is an aerobic process, which decomposes organic material into a nutrient-rich soil conditioner. Types of compost formation include garden or on-site composting, vermi-composting, aerated windrow composting, aerated static pile composting, and in-vessel composting (IVC).

Anaerobic treatment (or **anaerobic digestion** (AD)) is seen as another option for food waste treatment. The treatment of biodegradable waste by means of controlled AD is used to transform the organic matter which is

contained in the waste into biogas and digestate. The production of biogas through controlled anaerobic digestion is one of the principal advantages of the process: it is a renewable energy source, which can be used in the production of electricity, heating, and fuel (whether gaseous or liquefied) (Pinasseau et al., 2018, p. 351).

Economically speaking, anaerobic digestion is very expensive and needs subsidies and a constant waste supply to be efficient. Some others advance environmental concerns, such as the emission of GHGs, and fear that the promotion of anaerobic digestion will divert attention from recycling being included in the overall waste hierarchy (Food and Agriculture Organization of the United Nations, 2013, p. 89). AD subsidies create an artificial demand for food as a fuel, with which an already existing demand for redistributed food must then compete.

The goal behind keeping food in the food supply chain must therefore be balanced with ensuring that wasted food is kept out of landfill (Bradshaw, 2018, p. 316). Food, like other biodegradable materials, releases climate-change gasses when it is sent to **landfill**. The amount of degradable organic matter within food waste is much higher than in average municipal solid waste, which contains only minimal levels of organic material. In other words, under the same conditions, 1kg of food waste will generate more methane (CH₄) than 1kg of average municipal solid waste (Food and Agriculture Organization of the United Nations, 2013, p. 87). Methane emissions from landfill represent the largest source of GHG emissions from the waste sector, contributing around 700Mt CO₂ eq (UNEP, 2010). At the global level, the environmental impact of incineration is relatively minor when it is compared to the impact of sending waste to landfill sites, as it contributes around 40Mt CO₂ eq (Food and Agriculture Organization of the United Nations, 2013, p. 87).

A specific food waste hierarchy is not laid down in EU waste legislation. The first option is to keep food in the food supply chain by means of prevention, and to balance other waste hierarchy options to ensure that wasted food is kept out of landfill. Due to waste hierarchy limitations, implementing more sustainable options rather than less presentable ones is somewhat impractical.

7. The legal regulation of food waste in Poland and Lithuania: a comparative analysis

In 2018, a total of 30% of the total volume of municipal waste generated in the European Union was recycled, while 28% was thermally disposed, 23% was rendered harmless by having it sent to landfill sites, and 17% was composted. In Poland, the proportion of deposited municipal waste was 76%, with 15% recycled and 8% composted in 2009 at the average level amongst EU countries (Zębek et al., 2015). This situation changed in 2019. At that time, biodegradable waste among municipal waste such as food and garden waste account for 28.9% of the total. An increase in the composting of municipal waste was observed, at a level of 9%, while the figure for waste, which had been sent to landfill sites, was at 42% (GUS, 2020). Moreover, in the years 2004-2014, the share of biologically processed municipal waste increased from 2.39% to 11.17% (GUS, 2005-2015). These values are slightly lower than the EU average.

The principles of municipal waste management in Poland are regulated in the 'Waste Act of 2012' (PLW), and the 'Cleanliness and Order Maintenance Act of 1996' (PLCOM). A definition of food waste has not yet been introduced in Poland, while the definitions of bio-waste and biodegradable waste have been implemented from the WFD 2008/98/EC. According to Article 3 (1) Point 1, bio-waste refers to biodegradable garden waste and parks, food and kitchen waste from households, as well as gastronomy outlets, mass caterers, retail units, and also comparable waste from facilities which are producing or introducing food marketing. However, biodegradable waste means waste that undergoes aerobic or anaerobic decomposition with the participation of micro-organisms (Article 3 (1) Point 10). The appropriate method of managing biodegradable waste is the R3 method, which is included in Annexe 1 to the act on waste, which consists of the recovery of organic substances, including composting and other biological transformation processes (Danecka and Radecki, 2020).

The communes are obliged to limit the volume of biodegradable municipal waste, which is sent to landfill by 16 June 1020 to no more than 35% of total municipal waste (Art 3c PLCOM). In 2013 and 2014, these levels were achieved (GUS, 2015). In order to achieve this level, the separate collection was introduced for biodegradable waste at the source. Previously, biodegradable waste was processed in the organic recycling-composting facility in 'Regional Municipal Waste Treatment Plants'. These were comprehensive municipal waste treatment plants, which were regulated by Art 35, which must meet the criteria for accepting waste from an area which is inhabited by at least 120,000 people, but were also guided by BAT requirements, regulating the mechanical and biological treatment of mixed municipal waste for recovery, waste incineration, and the storage of materials which are unsuitable for recovery. In 2020 these regulations were changed, with composting which was not already covered by the activities of the municipal installation with waste incineration processes and the number of people being covered by these installations likewise being eliminated (Article 35 PLW). Waste management plans are developed in order to achieve the goals, which were set out in the environmental protection policy along with the decoupling of the trend of increasing the volume of waste which is generated from the country's economic growth tendency - plus its impact upon the environment, and the implementation of the hierarchy of ways in which waste is managed along with the principles of self-sufficiency and proximity, and also establishing and maintaining an integrated and sufficient network of installations in the country's waste management processes which serves to meet the requirements of environmental protection policies (Article 34 PLW). Waste management plans should define a waste management policy, together with the planned usage of technology and processing methods, or they should propose policies, which regulate waste-causing problems in waste management. In addition, measures should be applied to encourage the separate collection of bio-waste for this purpose, composting and obtaining fermented biomass from such waste. Processing bio-waste should be conducted in such a way, which ensures a high level of environmental protection, along with the use of environmentally safe materials, which have been produced from bio-waste whilst maintaining a high level of protection for human life and health and the environment. According to Article 35 (1), in Poland, the 'National Waste Management Plan 2022' currently remains in force. The plan sets out guidelines covering municipal waste, especially food waste, at different stages of the product life cycle. In this regard, the following activities may be used in gastronomy-related situations, including workplaces, schools, and hospitals: a) education in the field of food waste; b) an introduction of different sizes of food portions, and the promotion of local and seasonal products; c) the early selection of a menu in the case of groups; and d) handing over to those in need of unused and good quality food.

In Poland, legislative work is underway on the draft act which serves to amend the act which regulates waste, resulting from the necessity transposition into Polish law of Directive 2018/851. The planned solutions in connection with the draft act on food waste consist of making changes to the definitions of bio-waste, waste management, waste prevention, and municipal waste, establishing new requirements in the field of waste prevention, extending the provisions on the scope of waste management plans, introducing targets for reducing the amount of waste which is sent to landfill, and specifying the date of their achievement, as well as imposing penalties for failures to achieve these targets. The planned date for the project's adoption by the council of ministers is the first quarter of 2021 (The Council of Ministers, 2021). The biggest challenge in the near future is the further development of the separate collection system for municipal waste in the country, which will ensure the acquisition of recyclable waste, and the development of bio-waste processing installations. Detailed changes in the act on waste concern Art 3 of the 'Waste Act', new definitions will be added and some existing definitions will be amended. The definition of bio-waste will be changed to ensure compliance with Directive (EU) 2018/851, with it now being classified as biodegradable waste from gardens and parks, and food and kitchen waste from households, gastronomy outlets, offices, restaurants, wholesalers, canteens, mass caterers, retail units, as well as comparable waste from establishments, which are producing or marketing food. In Art 3, Point 13a will be added with the definition of food waste, which covers any food as defined in Art 2 of Regulation (EC) No 178/2002, which has become waste. Due to the requirements of Directive 2018/851 regarding the development by member states of special programmes for the prevention of food waste, Art 34a (2) will contain an obligation to

develop a separate food waste prevention programme. Additionally, Art 34a (5 and 6) has clarified the requirement that national and regional food waste prevention programmes will form separate parts of these programmes within the field of waste prevention (Sejm materials, 2020).

Lithuania has achieved significant progress regarding waste management, as it has halved its rate of use of landfill sites since 2014, down to 33%. Recycling and composting (48%) have become the main treatment options, slightly above the EU average of around 46%. This development is in large part due to the increase in composting, up to 24%, an almost 150% increase since 2014, which ranks Lithuania as one of the top performers in the EU (which has an average composting rate across the EU of about 17%) (EC, 2019b, p. 6). The increase in composting is due to the opening up of green waste composting sites, to which members of the public can bring garden waste and similar waste, free of charge (EC, 2019b, p. 7).

The republic of Lithuania's 'Law on Waste Management' (LLWM) does not provide a definition of food waste. This law defines biodegradable waste as any waste, which is capable of undergoing, or may be subjected to, anaerobic or aerobic decomposition.

LLWM Article 26(4) requires that the 'National Plan for Waste Management' must provide goals and targets in respect of the reduction of the volume of biodegradable waste, which is sent to landfill. Municipalities must ensure that each municipality and municipal waste management region provide conditions for the treatment of municipal biodegradable waste (for compost and/or anaerobic digestion (LLWM 30(17)).

Lithuanian waste management rules (Minister of environment of the Republic of Lithuania, 1999) lay down provisions for economic operators: hotels, restaurants, and other public catering establishments, along with food production and trade enterprises, requiring them to sort bio-waste at the place of its generation, and not mix it with other waste, as well as ensuring that it is not contaminated with hazardous substances (p. 60).

Waste management rules state that municipalities must ensure the sorting of household food and kitchen waste at the point of generation, and that they are required to set up sorting in cities which have a population of over 50,000 inhabitants, while ensuring the sorting of household food and kitchen waste on-site and setting up sorting in other areas in which the sorting of food and kitchen waste is economically viable or technically possible. Municipalities must provide the general population with containers and ensure the temporary storage of this waste where it does not pose a risk to human health or the environment.

The 'National Plan for Waste Management' for 2014-2020 (Government of the Republic of Lithuania, 2002) sets out tasks for municipalities from 2019 to implement the separate collection of food or kitchen waste and install sufficient capacity to separately treat collected food or kitchen waste. Municipalities, which are using various waste collection methods and measures, must ensure that biodegradable waste (green waste and food or kitchen waste) is collected separately in municipal waste management systems, which are managed by them when sorting out waste at the place of its generation.

The Alytus district, the only one out of ten, implemented the 'National Plan for Waste Management' requirement for a separate food and kitchen waste collection by 2019 (Alytus Region Waste Management Center, 2020, p. 13). For example, food and kitchen waste is still not separately collected in the capital city of Vilnius or the majority of municipalities. As the 'National Plan for Waste Management' expired in 2020 and a new plan has not yet been approved, there is a need for clear provisions which cover the separate collection of food waste or bio-waste, as requirements for the separate collection of food waste have largely not been fulfilled.

In order to transpose the provisions of Directive 2018/851 into Lithuanian law, a draft of LLWM has been prepared (Lietuvos Respublikos Seimas, 2021). This draft includes a definition of food waste and a renewed definition of biowaste, focusing on the prevention of food wastage and its prevention.

When analysing the efficiency of processing bio-waste from municipal waste in the composting process, it should be stated that Lithuania has better results, which come in at the level of 17%, while in Poland the corresponding figure is 11%; nevertheless, these trends are increasing. When comparing legislative solutions, which are aimed at implementing the provisions of Directive 2018/851 in both countries, a definition of food waste has not yet been introduced. However, there are currently definitions available for bio-waste and biodegradable waste which have directly been implemented from Directive 2008/98/EC, and which contain references to food waste. Moreover, in both countries the regulations are observed where they cover the limitation of stored biodegradable waste in landfill sites. The appropriate method for managing this waste is composting, which is clearly indicated in the legal acts which cover management plans for food waste and municipal waste. In order to strengthen the safety of using this method, the obligation was introduced to selectively collect bio-waste (waste from food and gardens), and it was forbidden to mix such waste with other forms of waste (especially, clearly, in the LLWM), which could contaminate it with toxic components and disrupt the aerobic or anaerobic decomposition of organic matter with the participation of micro-organisms. In addition, this is the most effective method of bio-waste management (Zębek, 2018). Moreover, in Poland, legislative work is underway to introduce a definition of food waste into the Waste Act in order to give it the status of waste and impose greater obligations to limit its generation and ensure its proper management.

Conclusions

1. The circular economy package has been a major driver in terms of resolving the food waste problem. For the first time food waste is gaining special recognition in terms of waste regulation at the EU level. Directive 2018/851, which amends the ‘Waste Framework Directive’ introduced a new definition of food waste and provisions to support food waste prevention. Food waste prevention which is being carried out by member states include food waste prevention planning, informational measures regarding food waste, action plans to promote waste prevention, and the monitoring and evaluation of waste prevention (the data-reporting duty). The directive sets out legally non-binding targets. The definition of food waste is considered wide and inclusive, so it does raise questions regarding whether it sufficiently corresponds to the main features of food.
2. A specific food waste hierarchy has not been laid down in EU waste legislation. The first option in this regard is to keep food in the food supply chain by means of prevention, and to balance out other waste hierarchy options to ensure that wasted food is kept out of landfill. Due to waste hierarchy limitations, implementing more sustainable options rather than less sustainable ones is somewhat difficult.
3. As a result of the introduction of legal solutions in the field of bio-waste management in Poland and Lithuania, selective collection of this waste ‘at source’ has been introduced, and its composting process increases without it needing to be stored in landfill sites, which is in line both with the hierarchy of waste management methods and the applicable regulations on limiting and banning the use of landfill sites as a way of disposing of biodegradable municipal waste.
4. In both countries, the definition of food waste and detailed rules for limiting its production and management have not yet been introduced into legal acts, which cover food waste. However, current bio-waste legislation partially meets the requirements of Directive 2018/851. Currently, in both countries, i.e. Poland and Lithuania, legislative work is underway to implement the definition of food waste as a category of waste and to include it into the obligation to act as in the case of waste.

5. All of these legislative and organisational activities will contribute to increasing the regulation of the issue of food waste in Poland and Lithuania, which will reduce food waste and strengthen the regulation of food production by producers and consumers, which is the main idea of Directive 2018/851.

The novelty of the article is to analyse, in the context of sustainability and circular economy, new legislative changes adopted at EU level, which provide legal instruments to address the issue of food waste.

The article examines the legal measures for solving the problem of food waste, which can be beneficial for private and public sector entities implementing food waste prevention measures. The presented legal and organizational solutions in the field of food waste management in connection with the implementation of the Directive 2018/851 in Poland and Lithuania may be an example and guidance for other EU countries.

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MARKET DIFFERENTIATION POTENTIAL OF TRADITIONAL FOOD QUALITY LABELS: CONSUMER AND PRODUCER EXPECTATION*

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Abstract. In the last few decades more consumers are choosing food products based on their local and traditional attributes as well as environmental and sustainability issues. The food industry have introduced several strategies to guarantee product quality and sustainability (quality schemes and quality labelling). With their rising number it is hard for consumers to differentiate between them. The purpose of the paper is to investigate how consumers perceive traditional food quality labels and to confront consumer expectations with the producer's motivation to supply certificated traditional products. The analysis has been based on literature studies and empirical data obtained from qualitative research in 2020. Six focus groups were conducted, with 7-8 participants in each, among traditional food producers and consumers in Poland. As the results of this study show, the awareness of food quality labels in Poland is quite low. The study concluded that apart from providing producers with protection from food fraud and serving as a indicator of a given quality, the additional differentiation of traditional food quality labeling is clearly not obvious. Results add value to recent consumers' behavior knowledge by analyzing role of food quality labels in consumer decision-making and the possible motives for producers that choose to feature them. These findings may be useful in developing effective educational and marketing activities in the traditional food sector.

Keywords: geographical indications, qualitative approach, labeling, buying decisions, sustainable consumption

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1. Introduction

In the last few decades, a growing number of consumers choose food products based on their unique attributes related to local origin, traditional production method, as well as sustainability and ethical considerations (Zander et al., 2015, pp. 1506-1526). Those concerns have prompted various actions by both governmental institutions and food producers to help consumers choose sustainable and high-quality food (Resano et al., 2012, pp. 1064-1076), like for example quality scheme and quality labeling (Aprile et al., 2012, pp. 158-165). It has been observed the development of sustainability related food labels aimed at reducing the information asymmetry between food practitioners and consumers regarding the sustainability impact on the food supply chain (Asioli et al., 2020).

Food quality labels are graphic symbols that can be placed on a product or its packaging, indicating that the product or the process complies with given standards and that this compliance has been certified (Velčovská, 2016, pp. 815-834). There are different types of certificates and quality labels that are placed on food products. In addition to international labels, each country has its own national and / or regional quality labels that are valid only in that country or region (Velčovská & del Chiappa, 2015, pp. 647-658). The concept of quality labeling information re-ported in this article refers to specific traditional food quality labels such as "Jakość Tradycja", Traditional Specialty Guaranteed and "Culinary Heritage". Those labels differ from simple indications of origin in the sense that such quality schemes highlight the traditional aspects, like the way the product is made or its composition, without being linked to a specific geographical area. The registration of such products is subject to many laws and regulations designed to protect them from counterfeiting and unjustified misappropriation.

Despite the growing interest in the literature on consumer preferences for food quality labels, studies about consumer attitudes and producer motivations regarding food quality labels in different food categories are quite limited. For this reason, this study aims to fill the research gap by investigating how consumers perceive traditional food quality labels and to confront consumer expectations with the producer's motivation to supply certificated traditional product. It adds value to recent consumers' behaviour knowledge by analysing the role and function of food quality labels in consumer decision-making and the possible motives and benefits for producers that choose to feature them. An attempt has been made to answer the following research questions: whether and to what extent traditional food quality labeling is an appropriate way to differentiate food products in the market? More specifically, this research is focused on managerial and consumer's perspective of food quality labels assessed through determining whether consumers and producers put emphasis on the quality labels of traditional food products and what are the determinants of their behaviours. The knowledge about the managerial and consumer's perspective of food quality labels, which represents the outcome of this study, will allow for adapting the educational and marketing strategies in the traditional food sector.

The focus is on traditional food sector in Poland, which is characterised by a large number of micro and small enterprises, whose market opportunities are related to changes in the behaviour of consumers interested in high-quality food (Jakubowska & Wierzejski, 2017, pp. 144–155). However, there is a problem with identifying these products. Insights into the potential for market differentiation through food quality labeling are provided and discussed using primary data collected in 2020 by means of interviews with six focus groups.

The paper is structured as follows: the first part includes an overview of the recent literature on food quality labels. Following this, the research method and the results of the empirical studies are presented. Conclusions and implications are then forwarded and, finally, study limitations and suggestions for future research are explained.

2. Theoretical background

Food consumers make decisions daily, and choose from many alternatives (Bartosik-Purgat, 2018, pp. 123–142). Various determinants influence a particular consumer decision (Freitas Santos & Cadima Ribeiro, 2012, pp. 294–311), which is related to choosing the product/service that will bring consumers the benefit and satisfaction, and will be in accordance with consumer needs, values, preferences and financial capabilities (Pappas, 2016, pp. 92–103). These are mostly based on the attributes of the product/service (e.g., label, price, taste, etc.). It can also be said that choices are made within specific attributes of alternatives in the decision-making process (Czine et al., 2020, pp. 1-18). However, it is essential to know which characteristics are relevant and how important they are for consumers.

Food label information and logo certification may be important for communicating the existence of product attributes consumers' desire. The main intention of food labeling is to transfer information from the producer to the consumer (Van Boxtael et al., 2014, pp. 85-92) and to allow consumers to make informed choices (Lagerkvist, 2013, pp. 77-88). There are different kinds of quality labels. In contrast to general quality labels, which present all product quality characteristics, specific quality labels focus on particular quality characteristics ensuring the quality, safety, product origin, organic production (Kos Skubic et al., 2018, pp. 650-664). The EU traditional speciality guaranteed (TSG) label and its national equivalent highlight the traditional character of a product (Verbeke et al., 2012, pp. 213-229). Indications on food labels, such as quality marks, geographical indications or origin labels, may represent some value to consumers because they may be perceived as signaling a particular product specification (e.g., relating to authenticity) and quality level (Verbeke & Roosen, 2009, pp. 20-35). Through their signal value and visibility on product packages, such labels may provide a specific information cue that consumers search for during their shopping and purchasing decision processes. Consumers weigh the perceived value of a specific information cue on a label against other cues and product attributes as they make their decisions. Therefore food labels may represent a marketing tool and may influence consumers' perception of food quality (Czine et al., 2020, pp. 1-18). Quality expectations may affect consumer attitudes and behaviours related to food purchase (Grunert, 2005, pp. 369-391). For food quality labels to have value to consumers, they must be attended to and understood, what is often not fulfilled. Information cues relating to quality or traditional production method may be relatively difficult to interpret for consumers compared to more easily understood indications such as expiry or best-before dates (Grunert, 2005, pp. 369-391). From the consumer perspective, the perception of quality is often based on subjective evaluations rather than objective information such as product taste, origin, and appearance (Grunert & Achmann, 2016, pp. 178-187). In most cases, the interest of consumers in food knowledge is basic, hence they are unable to evaluate the objective dimension of quality when making the purchase decision (Sadilek, 2019, pp. 2508-2523). Several studies confirmed that EU quality labels and other labels displaying information on the place of origin, specific production methods and composition may play an important role in willingness to pay, communicating credence attributes of food products and influence consumers' purchase decisions (de-Magistris & Gracia, 2016, pp. 560-571; Erraach et al., 2014, pp. 11-14; Schröck, 2014, pp. 1070-1091).

Summarizing findings from previous consumer studies it can be concluded that they are not unanimous with respect to whether food quality labels have a favourable impact on product evaluation by consumers. Therefore, the research is needed to diagnose the role and function of food quality labels in consumer decision-making. This justifies the advisability of the undertaken study presented in this manuscript.

3. Research methodology

Previous studies on food quality labels have used different methodological approaches (cluster analysis, factor analysis, conjoint analysis) (Schröck, 2014, pp. 1070-1091; Balogh et al., 2016, pp. 176-184; de-Magistris & Gracia, 2016, pp. 560-571; Sadilek, 2019, pp. 2508-2523). In this study a qualitative research design using structured focus group interviews was undertaken to collect the empirical material. This method is designed to be the primary choice in the case of insufficient knowledge about the research topic (Hudson, 2007). It was deemed to be the most appropriate as it allowed respondents' feelings and opinions to be discussed in order to reveal their motivations, prejudices, and attitudes (Proctor, 2005). A focus group is a small group of people which is gathered to engage in controlled discussions in order to elicit opinions about particular products or services. This approach is a specific tool for qualitative data collection, based on the dynamics of the group. Although the group process is one of its advantages, it might also result in an undesirable bias in the group (Sijtsema et al., 2013, pp.73-87).

Based on the preceding literature review of the role of food quality labels in consumer decision-making and the possible motives for producers that choose to feature them, two hypotheses were developed:

H 1. Consumers' perception of food quality labels is positive, despite their hypothesised low awareness.

H 2. Food producers put emphasis on the quality labels of their food products because of a conviction that it serves to differentiate their products from conventional food through positive product quality imagery.

The data of this study were obtained from exploratory research methodology (qualitative research), based on small samples of both consumers and producers. The group discussions were led by an experienced moderator, based on a discussion guide that listed the issues to be covered. Six focus groups were held with seven to eight participants. In the first part of the study, focus group discussions were conducted with Polish consumers. Respondents were the main person responsible for food purchasing within their household. Consumers were only allowed to participate if they were responsible for food shopping and consumed traditional food products at least once a week. Table 1 shows the composition of the groups.

Table 1. Respondent's characteristics

	Olsztyn	Kraków
Consumer research		
Focus group (n=4)	8 persons: age 25-35 year	7 persons: age 25-35 year
Total respondents (n=30)	8 persons: age >35 year	7 persons: age >35 year
Producer research		
Focus group (n=2)	Meat producers: 5	Meat producers: 3
Total respondents (n=15)	Cheese producers: 2	Honey producers: 1
	Beer producers: 1	Juice producers: 1
		Bread, bakery producers: 2

Source: Own research

Focus group interviews were also conducted to collect data for the producer survey. These interviews were conducted with Polish traditional food producers. Producers were selected for the survey if their production system fits into a traditional food initiative (they were members of local associations / groups promoting traditional production, they offered products with certificates confirming their tradition for sale). Producer's characteristics are shown in Table 1.





All focus group sessions were audio-recorded and transcribed verbatim within 7 days of completing each session. It was explained to the respondents that all recordings would remain confidential, and information they provided would be used only for scientific analysis. Any information that was considered commercially sensitive or that would reveal informants' identities was removed.

4. Results

Consumer perception of food quality labels

When asked about the spontaneous knowledge of the labels appearing on food packaging, most consumers were not able to indicate any label identifying traditional products. During the conversation on the certification of traditional products, the respondents were handed a questionnaire with five quality labels appearing on food product packages (Table 2).

Table 2. Analysed quality labels appearing on food product packages

1.		European Union organic food logo
2.		"Jakość Tradycja/Quality Tradition" label
3.		Traditional Specialty Guaranteed (indicating a product entered by the European Commission into the Register of Traditional Specialties Guaranteed)
4.		"Culinary Heritage" confirming affiliation to the association of food producers and restaurant owner from a given region manufacturing regional food
5.		"Poznaj Dobrą Żywność/"Know Good Food" label

Source: Own research

The participants had a very limited knowledge about labels. They had difficulties to speak about them but they were sure that protecting the quality of food is important. The most recognisable label was the EU label of Traditional Specialty Guaranteed (TSG) - 76% of the respondents correctly indicated its interpretation. The label of Culinary Heritage caused the most problems – it was recognised by only 40% of the respondents. A large disproportion can also be noticed between the correctness of the answers of younger and older respondents. The age group > 35 years more often indicated correct answers to all assessed labels. The analysis of the results and statements made by the respondents during the subsequent group discussion, allows concluding that some labels were recognised by consumers, but not always enough to correctly read their meaning.

The participants have no knowledge related to introducing labels showing the quality of the product but think that Polish traditional food should be protected by national or local legal regulations.

"It would be a good idea to have a certificate promoted by local governments to help identify these products on the local market."

"Legal product protection at the national and international level through certificates and quality labels is a way to protect the origin and quality of the product in order to prevent the traditional products from Poland being claimed by other countries".

Protecting traditional food is important for consumers to guarantee the origin of the product and the authenticity of it.

"Such a certificate provides information that the product has a long history and tradition of production, and thus a guaranteed quality".

The respondents also emphasized the importance of additional values of these products related to the guaranteed quality, safety or supporting local producers. Consumers agreed that these products reach higher prices on the market and a quality label may be important for their promotion.

"I am willing to pay more for a certified product, produced in the region, because I know that it combines good quality and taste"

"When purchasing a product directly from the manufacturer, the certificate does not matter much, because I know what source I am buying from. However, when I buy a product in a store or a restaurant, it allows me to distinguish it from others".

However, it was emphasized that for a certificate to be credible, the consumer must have confidence in the certification body. In the vast majority of cases, consumers do not know which institution is responsible for certification and how the certification process works.

The multitude of certificates present on the Polish market is also poorly received, which means that consumers stop treating them as a distinguishing feature of quality. The respondents emphasised that the presence of quality labels on food packaging informs them that a given product is characterised by a certain level of quality, but it is rather an auxiliary element and not decisive for its purchase.

"Everything has a certificate. Due to the fact that it is overused, I do not pay attention to these labels. "

The increasingly common practice among large producers / retail chains in Poland to create their own certificates confirming the quality of products causes that consumers approach them with a reservation.

Consumers believed that traditional products should be properly labeled to support their purchasing decisions and the local economy to protect and develop traditional food production. At the same time, the respondents pointed to the need to preserve the traditional values of the products to avoid their industrialization, as well as to build a consumer-producer relationship to strengthen the credibility of using food quality labels.

Producer expectations related to food quality labels

According to the producers of traditional food in Poland, the importance of certificates and quality labels of food products has significantly devalued over the years. There is no certificate or quality label, which would be universally recognised among consumers, and whose use would be perceived by producers as an ennoblement. Currently, the vast number of labels and certificates awarded not only at the national level, but also at the regional and local levels, diminished their recognizability among customers, and thus their real informative value.

"People don not respond to these labels. There are so many of them and on so many different products that the consumer does not recognise them and does not identify himself with them. In my case, the cost of maintaining a labale does not translate into the final product, and into its prestige"

There were also different approaches among manufacturers of products bearing certificates and quality labels. They were representatives of small- and medium-sized enterprises. They declared that their company benefited from the certification of its products, although they admitted that these benefits are difficult to attribute to food quality labels alone.

"It is difficult to measure directly how food quality labels affect our gains. There are many other factors."

"I perceive food quality labels as important information for consumers, which should translate into increased sales of products. However, it is difficult to directly relate these results to their costs. "

The producers suggested that having food quality labels could bring tangible business benefits, including increased sales, premium pricing, and the financial benefits of customer loyalty.

"We are a company that is recognised and trusted by consumers and we strive to maintain this trust. Food quality labels confirm what consumers already know about us. This trust leads to loyalty and can lead to financial gain in the future."

The producers also pointed to the benefits of product differentiation and providing additional value to consumers. They explained that food quality labels can be an element differentiating products available on the market.

"As a result of globalization and increasing competition on the market, it becomes more and more difficult to distinguish a product. For example, it is difficult to differentiate meat solely on the basis of its organoleptic properties. This can be achieved in other ways, including through food quality labels or price."

The surveyed producers also emphasised that the certification process is often very expensive, which in many cases blocks the way for small, sole proprietorships or family businesses. The respondents also pointed to the fact that the criteria adopted in Poland enabling manufacturers to undergo the certification process are so broad that they cover a too wide group of entrepreneurs. According to the respondents, a different approach should be adopted - to a greater extent promoting small, local production and entities based on traditional production methods. As it was argued, as a result of the legal solutions existing in Poland, truly traditional producers are placed on an equal footing with the big players in the food industry, which, according to the participants of the study, is unfair.

The issues mentioned above are the reason why a significant part of manufacturers of traditional products resigns from the effort of applying for certification. The resignation from the certification process is also influenced by the strong conviction of small producers about the need to invest resources and effort in individual relations with the clients, convincing them to their products through direct contact. The respondents claimed that they themselves become a guarantor of the tradition of their products for consumers, with a greater impact than any quality label or certificate anonymous for the buyers.

"In our scale of operations, this certification is not so important, because our customers, our market where we distribute our products, already recognise us as producers (...) In the micro scale, this customer is more valuable than the certificate."

During discussions with producers, there was often a postulate to restore the meaning of certificates so that they could really serve consumers when making decisions about purchasing traditional products. To this end, it was proposed to limit the number of certificates and to encourage local governments to promote their own certification / identification systems for traditional products, created in cooperation with manufacturers and recognised by consumers.

"In my case, it is nice to have this "Spichlerz Koronny" label, being a local [label] for 5 neighboring municipalities around Krakow, rather than a national or European certificate, where most people will not know who I am, and where I am from."

H1 and H2 should be accepted in view of the following findings. Consumers view positively food quality labels, despite their low awareness. They put emphasis on the quality labels of traditional food products because of a belief that it will add quality value of products that feature these associations. However, the research results indicate that a traditional food quality label does not seem to be really important for Polish buyers. Given the limited consumer awareness, this result suggests that the traditional food quality label scheme may be problematic as a tool for product differentiation from conventional food.

5. Discussion

The analysis of literature indicated that there is growing interest in traditional food among consumers and food producers (Barska & Wojciechowska-Solis, 2018 pp. 1994-2004). The research question the author of this study tried to answer was: *whether and to what extent traditional food quality labeling is an appropriate way to differentiate food products in the market?*

Based the studies presented in the paper and their results, it could be concluded that the differentiation potential of food quality labels in Poland is quite limited. The knowledge of traditional food quality labels among buyers of traditional food in Poland is negligible. They are not treated by the Polish consumers as unambiguous identifiers of high-quality or traditional food products. No food quality label was spontaneously mentioned by Polish respondents, which suggests that consumers are not able to fully use the labels in their purchase decisions. However, analysing the results obtained in this study, it can be said that officially certified food quality labels ensure consumers that producers have adopted methods resulting in high quality food products. Thus, they enhance the credibility of a product among consumers. The value added to food products by quality labels increases with consumer demand for high quality and authentic products. However, one should not forget that the knowledge of traditional food quality labels among buyers of traditional food in Poland is negligible. Therefore, an efficient marketing strategy is required to familiarise consumers with such products and ensure that they will keep buying afterwards.

These results confirm the findings of previous studies conducted by other researchers. In general, direct indications of quality, including mandatory information cues such as best-before dates and species names, are found to be more appealing to consumers than food quality labeling (Verbeke & Roosen, 2009, pp. 20-35). The different studies yield the conclusion that the number of food quality labels is perceived as very high and confusing for consumers (Sadilek, 2019, pp. 2508-2523), which may cause the label an unimportant attribute (Schröck, 2014, pp. 1070-1091; Rousseau, 2015, pp. 92-100).

The analysis of literature indicated that the influence of food quality labeling on consumer preferences varies between products and countries (Grunert & Aachmann, 2016, pp. 178–187). For example, for Greek consumers of upper social and income groups the appearance of a quality label on Zagora apples was more important than the product's price (Fotopoulus & Krystallis, 2003, pp 1350-1374). In Spain the price and PDO label (Protected Designation of Origin) were the attributes that most affected consumer preferences for olive oil (Erraach *et al.*, 2014, pp.11-14).

Some surveys have also revealed differences in consumer perception of specific food product categories. For example, in Italy the role of the food quality label was stronger for olive oil than for oranges and grapes (Scarpa *et al.*, 2005, pp.329-349).

The literature underlined that personal characteristics, such as age, gender, income level and education matters when evaluating food products with different quality labels (Krystallis & Ness, 2005, pp. 62-91; Fotopoulus & Krystallis, 2003, pp 1350-1374; Kos Skubic *et al.*, 2018, pp. 650-664). Female and older respondents were willing to pay more for quality labelled products (de-Magistris & Gracia, 2016, pp. 560-571).

These study findings confirm that food labels containing information on the traditional production can be an aid to distinguishing quality. However, in Poland this aid seems to be not supportive enough, especially among consumers who are less familiar with food quality policies. The study concluded that apart from providing producers with protection from food fraud and serving as an indicator of a given quality, the additional differentiation and marketing potential of traditional food quality labeling is clearly not obvious. The findings suggest that direct consumer interest in traditional food quality labeling in a country like Poland, with little experience with quality labels, cannot be taken for granted.

6. Conclusions

This paper reports insights from exploratory research focusing on consumer and producer expectations about traditional food quality labels in Poland. The producers pointed to the low level of consumer awareness of the labeling of traditional food products. The results of the consumer survey confirm that the buyers' orientation in this matter is negligible. Therefore, a large part of the surveyed manufacturers questioned the sense of certification, claiming that its business effects are disproportionate to the benefits obtained.

This indicates the need to create a single label promoting traditional products throughout the country, the dissemination and support of which would be the responsibility of producers and institutions at the local or central level. However, taking into account that most of the producers of traditional food in Poland are small family businesses, often without capital reserves, it should be ensured that the participation in the certification program depends exclusively on the entity meeting the qualification criteria, and not on its financial capabilities.

As far as practical implications are considered, the findings imply that traditional food producers should design marketing strategies that would project quality labels for traditional food to effectively communicate product quality attributes, thus reduce information asymmetry. This implies the need for companies and local authorities in Poland to improve the level of consumer knowledge of food quality labels. This could help consumers to

improve their knowledge about certification labels and, consequently, their acceptance and intention to purchase them.

Although these results suggest practical implications for companies, there are some limitations that are worth highlighting. The main limitations of this research are linked to the qualitative nature of the research method that was used. As a result, the findings are preliminary and cannot be generalised to the entire population. Instead, these insights form grounds for developing hypotheses for further quantitative research with large samples of consumers and producers.

Further research, using quantitative methods, should be implemented to investigate the findings on the traditional food market in Poland. The results presented here only considered qualitative consumer data, without focusing on potential differences between different consumer segments and without concentrating on particular niche markets. Therefore, investigating particularities of specific market segments is recommended. Relations between consumer attitudes and producer motivations regarding food quality labels in different food categories were not tested in this research due to its exploratory nature. Therefore, there is a need to further investigate the role and importance of food quality labels for different groups of consumers and specific categories of food. It would also be appropriate for future research to measure the benefits and costs that food producers perceive.

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PROPULSIVE FORCES OF ECONOMIC GROWTH IN SLOVAKIA: THE INFERENCE FROM THE INPUT-OUTPUT TABLE DATA

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Abstract. The main objective of the paper was an investigation of the structural relations between the industries affecting the macroeconomic performance of the Slovak economy. The scope of the paper focuses on evaluation of the productive efficiency, labor intensity and employment productivity, considering multiple backward and forward linkages among the industries. The highest production efficiency recorded Electricity & Water supply and waste management (D+E), Construction (F), and Administrative support services (N), whereas Arts and Recreation (R), Public administration (O) and Health care (Q) recorded the lowest one. The results have also shown a moderately negative link between the productivity of some particular industry and labor intensity, which suggests that highly productive sectors need fewer jobs. As a lowest labor intensive industries became Electricity & Water supply and waste management (D+E), Financial and Insurance services (K) and Professional, scientific and technical activities (M). Moreover, considering the ratio between employment multiplier and the coefficient of the labor intensity has shown, that Real estate (L) and Energy & Water supply sector (D+E) is able to sustain most jobs per one unit of the labor intensity, whereas the Education (P) least. For sustaining competitiveness, Slovakia should prioritize high productivity industries or try to foster productivity in lagging ones.

Keywords: production efficiency; labor intensity; input-output analysis; employment multiplier; competitiveness

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1. Introduction

The paper's main objective is to evaluate the structural determinants of the macroeconomic performance of the Slovak economy, based on sectoral indicators describing production efficiency and labor intensity. For the scope of our study, we use data of national accounts assembled in symmetric input-output tables (SIOT).

Despite the limited evidence (the last available period is 2015), tables provide far better insights into the dependency relations between the social accounts. This obvious drawback emerges, because of data processing delay in composing SIOT. In Slovakia, input-output tables are being composed according to the T+3 rule, where T does mean time cycle, which is five year period plus additional three years for the table assembly. Thus, it does mean that tables for the 2020 year will be available in 2023. Still, we are confident that underlying results provide interesting insights into the sectoral performance of Slovakian's economy.

From the historical perspective, the founder of the formal structure of input-output analysis can be considered W. Leontief. However, the idea of economic circulation is far older, prior evidence came from W. Petty and later F. Quesnay, one of the main representatives of physiocrats. F. Quesnay constructed the first economic table, where the national economy was caught in the economic circular flow. However, W. Leontief was the first pioneer, who constructed the economic table for the United States. The input-output model, which was created by himself, is still in present one of the basic approach to the empirical economic analysis, Tiruneh, Lábaj, & Dujava (2011).

This topic is extensively covered by the evidence about the structural relations in Slovakia economy provided by Lábaj, Luptáčík, & Rumpelová (2008), Kubala *et al.* (2015), Popesko *et al.*, (2016), Hajduová *et al.* (2019) determinants of economic growth provided by Baran (2013) & Szkorupová (2014). Overall assessment of the major structural strengths and weaknesses provides Becker & Lesay (2019).

2. Theoretical background

Slovakia entered into the transition period structurally disadvantaged. Donnorummo (2006) and Morvay (2001) speak about the difficult initial position of Slovakia since Czechoslovakia split in 1993. Slovakia initially had inherited unfavorable industrial composition, which was much more dependent on the large, non-consumer type of industries (steel, armaments, chemicals) which could not successfully compete for sales to the EU market and were experiencing steep production slumps. Koyame-Marsch (2011) distinguishes two generations of reform policies realized over the 90s. Reform policies undertaken at the start of the transition in the early 90s are referred to here as a first-generation reform policy and included a broad scope of objects like macroeconomic stabilization, price, and trade liberalization, privatization, and others. Consequently, new policies of stabilization and rapid structural reforms were introduced in the late 90s, referred to as the second generation reform. The second-generation reform policies also resulted in the improvement in FDI, output growth, and employment.

In a broader geographical scope, Central Eastern European countries (CEEc): Hungary, Poland, Slovakia, and Czechia, these countries adopted different approaches in conducting market reforms. While all four countries followed set economic policy prescriptions promoted by international institutions aimed at macroeconomic stabilization, trade liberalization, and privatization; Poland and former Czechoslovakia adopted a more radical reform program, while Hungary opted for a more gradual approach to reforms (Baran, 2013). Slovakia should serve as a textbook example of surrender to illusions of success and the following awakening into a difficult economic situation. Almost 7% economic growth in 1995 – 1997 proved unsustainable with more than 10% current account deficit a 5% fiscal shortfall in 1997-1998. The next phase of the reform became inevitable. Pillars of economic recovery should become institutional build-up, restructuring, and competitiveness enhancement; Marcinčin & Morvay (2001).

(Martins & Price, 2000; Mathernová & Renčko, 2006) identified four broad policy blocks related to liberalization, stabilization, exit, and entry during Slovakia's transition process. They especially noted the lack of structural reforms in the banking and enterprise sectors, which contributed to public debt mounting and a tight monetary policy to increase interest rates.

Central and Eastern European countries have witnessed considerable FDI inflows since the collapse of communism and the EU accession. FDI has been an important source of financing and a catalyst for the economic development of many of these nations. Therefore, while competing for FDI, countries tried to implement structural reforms aimed at improving their investment climate; Lokar & Bajzikova (2008).

There is substantial evidence about the positive impact of FDI on economic growth in (CEEC); Carstensen & Toubal, 2014, Bevan & Estrin (2004), and Jimborean & Kelber (2017), Prokopenko & Shkola (2010) or in Slovakia; Szkorupová (2014), and Wach & Wojciechowski (2016). Nežinský & Fifeková, (2014) highlight the positive aspect of FDI inflow in terms of the influence of the capital stock formation (through the gross fixed capital) and favorably impacted the technological preparedness and productivity growth of the CEE countries.

Foster & Stehrer (2007) consider the speed of transition of Slovakia along with Czech Republic and Hungary as relatively fast. These three countries, albeit following different reform strategies, were those that opened to western markets more quickly, that succeeded in attracting foreign direct investments, and in general benefited from the geographical proximity to the European Union, EU.

The post-transition period of the Slovakian economy is specific for rising reliance on FDI (Becker & Lesay, 2019) and monostructural orientation of the economy targeting the automotive industry predominantly. Slovakia had developed a substantial component capacity, albeit also with the need for substantial imports (Myant, 2007).

Slovak development model of the last 15 years, in particular, can be characterized by excessive reliance on FDI, skewed industrial export structures, high external vulnerabilities, regionally very uneven development patterns (Szeiner *et al.*, 2020; Shuai, 2021), and highly persistent regional unemployment (Becker & Lesay, 2019). In turn, risks are associated with reliance on FDI based on downstream activities with low value-added, the dependence of Slovakia on cars and electronic industries, and insufficient vocational education and adult training system; however, FDI inflows contributed to economic growth and job creation during this period, and Slovakia was transformed into a powerhouse of the automotive industry. The process of structural changes has been attracting economists' attention for a long time and up to the present, it is still a relevant concept. A number of authors point to structural changes in changes in the sectoral composition of output and employment in the national economy. During the process of economic development, employment first shifts from agriculture to manufacturing and then to services. This is a core aspect of the three-sector hypothesis; Mihnenoka & Senfelde (2017).

The most recent evidence about patterns of structural change in advanced economies has been provided by Jorgenson and Timmer (2011); on the example of developing countries; de Vries, Timmer, & de Vries (2013) investigated the process of structural transformation in Africa. According to the findings, in the advanced nations (Europe, U.S., & Japan), personal, finance, and business services follow the classical pattern of low productivity growth (Fila *et al.*, 2020), rising relative prices, and increasing employment and GDP shares. The share of non-market services in GDP and employment have also continued to rise (Mura *et al.*, 2020; Přivara & Kiner, (2020)). In contrast, the shares of distribution services have been rather stable, and productivity growth has been rapid; Jorgenson and Timmer, (2011); and Vries, Timmer & de Vries (2013).

As countries grow more affluent, we observe secular shifts in their labor allocation and expenditure across broad sectors of agriculture, manufacturing, and services; Świąćky, (2017); Jorgenson and Timer, (2011). The structural changes are often also connected with labor productivity changes. The expected nature of structural change dynamics is the continual shift of factor inputs from lower to higher productivity sectors, consequently raising productivity at the aggregate level; Vu, (2017). Fagerberg (2000), clarifies that for structural change to have a positive effect on overall productivity growth (Uddin *et al.*, 2020), there are two conditions to be fulfilled. First, there have been some changes in the sectoral composition of labor over time; that is, some industries have to

increase their share of the total labor force at others' expense. Second, these changes have to be correlated with productivity or its rate of growth.

Buček & Pastor (2002) evaluated the Slovakian economy's transition period from the perspective of ongoing structural changes. In contrast with the EU 15 countries, the Slovak economy's main characters had been a high share of agriculture and industry (including energy and mining industry); wholesale and retail industry, on the total economy in terms of the employment and the GVA. They highlighted especially the modest representation of service industries (business and finance, education, and healthcare) on the total economy. (Karász, 2011) distinguishes two economic cycles during the transition and post-transition period of Slovakia. The first economic cycle affected the Slovak economy during economic transformation. It resulted in the slump of production capacity use and also in employment. Slovak economy had its problems with its financial consolidation and struggled with over-employment inherited from the socialism period. The second cycle had been the period of market relation consolidation and growth of labor market activity. There was a high positive correlation rate between employment and economic growth.

Moreover, (Kotulic, *et al.* 2014) add, that through the period from 2000-2012, we can observe the enormous decline of employed persons in the primary sector in the long term (Agriculture, forestry, and fishing) by 44%, similar downturn, but much moderated also recorded the sector of industry, which declined by 4%, however, the chosen branch of the service sector and sector of the construction marked a substantial growth in employment, like sales, transportation and accommodation rose by 29%, professional activities by 56% and construction by 41%.

Furthermore, the authors analyze the employment and output through the employment elasticity, as a change in employment given the change in output. They conclude, that during the observed period 1995 – 2012, the employment elasticity indicator became $\varepsilon = 0.02$, which means an increase in employment and output, together with increases in labor productivity (Kotulic, *et al.* 2014).

Lábaj (2007); Weresa, *et al.* (2016), evaluate the Slovak economy's structural dynamics during the trans- and post-transition periods. The Slovak economy has recorded high GDP growth, total factor productivity, and intensity economic growth parameters. Total factor productivity has provided a lion contribution to total economic growth by 84% on average, and labor and capital contribution, either intensively or extensively, was at par (Lábaj, 2007). However, Weresa *et al.* (2016) put a slightly different estimation, stressing the role of capital build-up and contribution of labor productivity.

3. Research objective and methodology

As a principal research method, we have resorted to the application of the input-output analysis. The basic tool of the input-output analysis is a Leontief input-output model. An essential condition for assembling the I-O model for the Slovak economy is the matrix, being recognized at the symmetric input-output table. The symmetric I-O table is being collected from *the table of supply and use*. These tables have rows and columns on the same scale – *commodity x commodity* or *industry x industry*. There are two versions of symmetric I-O tables in general. The first version is recognized as table „A“ which includes the data about production-consumption of domestic and imported commodities. The second subset represents table „B“ which includes data about only domestic production relations. (Tiruneh *et al.*, 2011; EC Directive, 2010). In our research paper, we have been concerned only by the records of table „B“ due to capturing output generating by the Slovak economic production factors.

I-O tables for Slovakia, in their basic form, consist of 99 branches of the economy. However, we are able to group them into sectors according to the SK-NACE into 21 sectors representing all 99 branches of the economy. However, practically we have used only 18 sectors (D+E – Electricity, gas, steam, etc. and Water supply, etc.

sectors were merged together; T- household activities; U- activities of extraterritorial organizations were non-available).

The data (Input-Output tables) used for constructing the Leontief inversion matrix were provided by the Statistical Office of the Slovak Republic. For capturing Slovakia's structural change since the split of Czechoslovakia in 1993, we used data from 1995 to 2015 due to its availability. There are four comparison periods organized in 5-year cycles (1995; 2000; 2005; 2010; 2015), which should provide us insights into structural changes of the final demand and its contribution to the output formation. The data represent the value of commodities expressed in monetary terms (million €) in constant prices, taking the year 1995 as a basic year for all periods.

Our scope of the study concerns production multipliers, employment multipliers, and labor intensity. We have proceeded accordingly (Raa and Rueda- Cantuche, 2007; Teixeira and Díaz, 2014; Tiruneh *et al*, 2011). All kinds of economic activities (according to the SK-NACE classification) we have divided on commodities, representing goods and services. Produced commodities are being consumed to produce the new commodities or for demand satisfaction of the final consumption. The total volume of production of the i -th commodity, we denote as x_i , intermediate consumption as of i -th commodity for the production of the j -th commodity as z_{ji} and total consumption of the i -th commodity as y_i . Formally written as:

$$x_i = z_{i1} + z_{i2} + \dots + z_{in} + y_i \quad (1)$$

Such a system of the linear equations determine the balance of the consumption of all commodities in the economy:

$$\begin{aligned} x_1 &= z_{11} + z_{12} + \dots + z_{1n} + y_1 \\ x_i &= z_{i1} + z_{i2} + \dots + z_{in} + y_i \\ x_n &= z_{n1} + z_{n2} + \dots + z_{nn} + y_n \end{aligned} \quad (2)$$

This system might be written in matrix form as

$$x = Zi + y \quad (3)$$

Where x represents the volume vector of the commodity producers, y volume vector of the final consumption, i is

unit vector and Z is an intermediate consumption matrix. The volumes of the intermediate consumption, or

inputs, are in the Leontief I-O model directly proportional to the output's size, which is the volume of the production of the total sector. This model uses the assumption of the so-called *Leontief production function*. This means that production of each unit of the output demands fixed units of the input. Any form of substitution between the inputs is not possible. Thus, it does exist accurate linear relations between the production volume and volume of the inputs. These relations are being determined by so-called *technological coefficients* a_{ij} , being

computed as a ratio between the volume of input of the i -th commodity used in the production of the j -th commodity and total production volume of the j -th commodity.

$$a_{ij} = \frac{z_{ij}}{x_j} \quad (4)$$

From the matrix notation, we can find out the matrix of technological coefficients by right-multiplying the intermediate consumption matrix by the diagonal matrix of inverted values of the commodities' total production volumes.

$$A = Z\hat{x}^{-1} \quad (5)$$

Finally, the linear equation system, divided the production of the commodities on intermediate and final consumption, we can formally write with the use of technological coefficient matrix as

$$x = Ax + y \quad (6)$$

By the simple adjustment, we can get the explicit relation between the production and final consumption vectors

$$(I - A)x = y \quad (7)$$

$$x = (I - A)^{-1}y = Ly \quad (8)$$

Where $(I - A)^{-1} = L$ means *Leontief inverse matrix*. Using the Leontief inverse matrix, the Leontief model could be formally written as

$$x = L.y \quad (9)$$

$$\begin{pmatrix} x_1 \\ \vdots \\ x_n \end{pmatrix} = \begin{pmatrix} l_{11} & \dots & l_{1n} \\ \vdots & \ddots & \vdots \\ l_{n1} & \dots & l_{nn} \end{pmatrix} \cdot \begin{pmatrix} y_1 \\ \vdots \\ y_n \end{pmatrix} \quad (10)$$

Where vector y after left-multiplication by the matrix L gives total production in the economy of the commodity, i.e. vector x . Each unit l_{ij} in the matrix L determines, what volume of the commodity i is necessary to produce for providing one unit of the commodity j for a final use. Summation of all units in each matrix column (i.e. multiplying the matrix by the unit line vector) gives us a line vector of *production multipliers* with units l_j .

$$o = e' \cdot L \quad (11)$$

$$(o_1 \dots o_n) = (1 \dots 1) \cdot \begin{pmatrix} l_{11} & \dots & l_{1n} \\ \vdots & \ddots & \vdots \\ l_{m1} & \dots & l_{mn} \end{pmatrix} \quad (12)$$

Secondarily, we use the model in the employment and labor productivity/ intensity analysis. In general, productivity is defined as the amount of output produced by one unit of input. However, inverting the ratio gives us the share of employment in any particular sector on this sector's output. Thus, we can set *coefficients of direct labor intensity* h'_c , otherwise, to assign how many employees are needed in some particular sector for producing one unit of the output of this sector. Using together these two ratios would give us an insight into labor efficiency in each sector. Coefficients of direct labor intensity can be formally written as

$$h'_c = h' \hat{x}^{-1} \quad (13)$$

$$(h_1^c \dots h_n^c) = (h_1 \dots h_n) \cdot \begin{pmatrix} \frac{1}{x_1} & \dots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \dots & \frac{1}{x_m} \end{pmatrix} \quad (14)$$

Next multiplying Leontief inverse matrix by row vector of coefficients of direct labor intensity we get *row vector of employment multipliers*. Calculation of employment multipliers can be formally written as

$$h_m' = h_c' \cdot L \quad (15)$$

$$(h_1^m \dots h_n^m) = (h_1^c \dots h_n^c) \cdot \begin{pmatrix} l_{11} & \dots & l_{1n} \\ \vdots & \ddots & \vdots \\ l_{m1} & \dots & l_{mn} \end{pmatrix} \quad (16)$$

4. Results and discussion

Firstly, we introduce calculated production multipliers (eq.5) as a result of the Leontief inversion matrix. Production multipliers generally indicate an incremental change in total output because of the change in input factors by one. This model will also reveal the indirect effects of increasing input factors in a source industry, targeting the other industries. Calculated production multipliers are computed for 2015 in constant prices using symmetrical I-O tables of recorded domestic production in Slovakia, excluding the import.

Table 1. Production multipliers by the industry in 2015

Code	Commodity	Production multiplier	Effects on other commodities	Share of effects %
A	Agriculture, forestry and fishing	1.542	0.341	22%
B	Mining and quarrying	1.568	0.493	31%
C	Industrial production	1.502	0.331	22%
D+E	Electricity & Water supply, waste management	2.037	0.323	16%
F	Construction	1.793	0.345	19%
G	Wholesale and retail trade ; repair of motor vehicles and motorcycles	1.556	0.464	30%
H	Transport and Storage	1.694	0.372	22%
I	Accommodation and food services	1.506	0.489	32%
J	Information and communication	1.549	0.352	23%
K	Financial and insurance activities	1.642	0.264	16%
L	Real estate activities	1.439	0.410	29%
M	Professional, scientific and technical activities	1.626	0.408	25%
N	Administrative and support services	1.704	0.531	31%
O	Public administration and defense; compulsory social security	1.412	0.366	26%
P	Education	1.355	0.338	25%
Q	Health care and social assistance	1.412	0.371	26%
R	Arts, entertainment and recreation	1.331	0.142	11%
S	Other activities	1.481	0.436	29%

Source: Own calculations

Table 1 shows production multipliers for each industry for the time of 2015. The highest multipliers record Electricity & Water supply, waste management (D+E), following by Construction (F), and Administrative support services. For instance, in the case of Electricity & Water supply industry, increasing inputs by one million € would give rise in total output by 2.03 million €, combining direct and indirect effects. Thus it means that a rise of input by one million in source industry (D+E) would give growth of output in this industry by 1.71 million € indirect effects and 323 thd.€ of indirect effects, for other industries.

The highest effect on other commodities record Administrative and support service industry (N), followed by Mining and quarrying (B) and Accommodation and food services (I). The lowest production multipliers record the Arts and recreations industry (R), followed by Public Administration (O) or Health care (Q).

Fig.1 (below) shows descriptive statistics of production multipliers, employment multipliers, and coefficients of labor intensity in standardized scores.

The production multiplier (left) sample is rather balanced with just one outlier. The mean value of the sample is 1.564 and the standard deviation is 0.171. There are eleven industries below the mean value of the production multiplier. Thus less of the industries (47.5%) are above the mean value.

The employment multiplier (middle) sample shows rather positive skewness. The mean value of the sample is 27.130 and the standard deviation is 16.625. There are thirteen industries (72%) where the employment multiplier became below the mean value. The lowest value of the employment multiplier belongs to Electricity & Water supply (D+E) and the highest belongs to Accommodation and food services (I). The employment multiplier denotes the number of jobs generated by the final use of one commodity j . Thus, the increase of the final use of the commodity in economics might generate up to six job places in Real estate (L) and up to sixty-eight in Accommodation and food services (I).

Finally, coefficients of labor intensity show the number of employees needed for the production of one commodity j . Again, we might speak about the positively skewed sample. The mean value of the sample is 20.43

and the standard deviation is 16.7. There are thirteen industries (72%) where the employment multiplier became below the mean value. The lowest value of the coefficient belongs to the Real estate (L) and the highest belongs to Accommodation and food services (I).

Moreover, taking the ratio between the *employment multiplier* and *coefficient of labor intensity* reveals to us how many jobs one unit of commodity j provided by the sector i generates, along the number of jobs needed for the production of one unit of the commodity itself.

The highest ratio shows Real estate (4.48) and Electricity & Water supply (2.75); and lowest Education (1.09) and Accommodation and food services (1.10). Thus, this does mean that the Real estate sector is able to sustain up to five jobs per one unit of the labor intensity, however, Education just one.

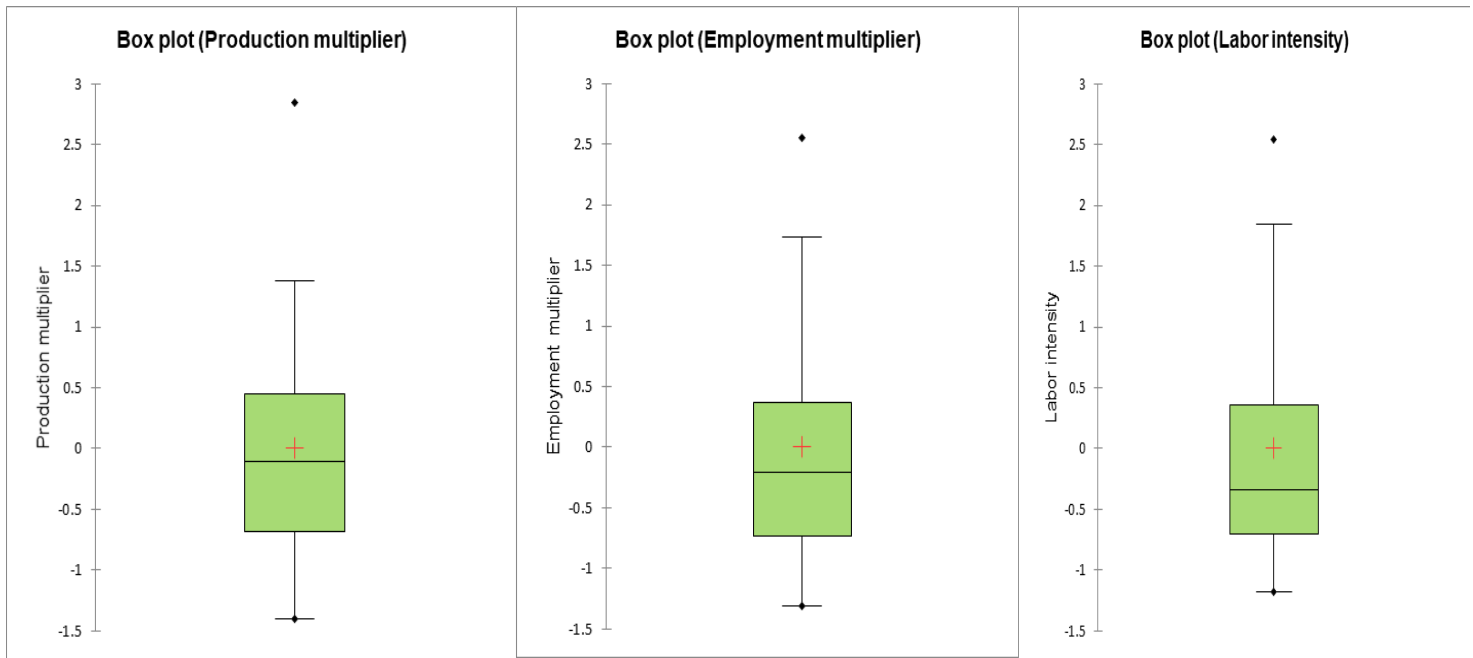


Figure1. Descriptive statistics of production and employment multipliers, coefficient of labor intensity, Slovakia in 2015

Source: Own calculations

Next, we are interested in the link between the production multiplier and the labor intensity. Figure 2 (below) shows a scatterplot diagram of these variables calculated for the whole sample of industries. The panel shows a rather weaker link and it is negative (correlation coeff. is -0.454). However the relationship is reasonable, low labor intensity is approached by low production multiplication.

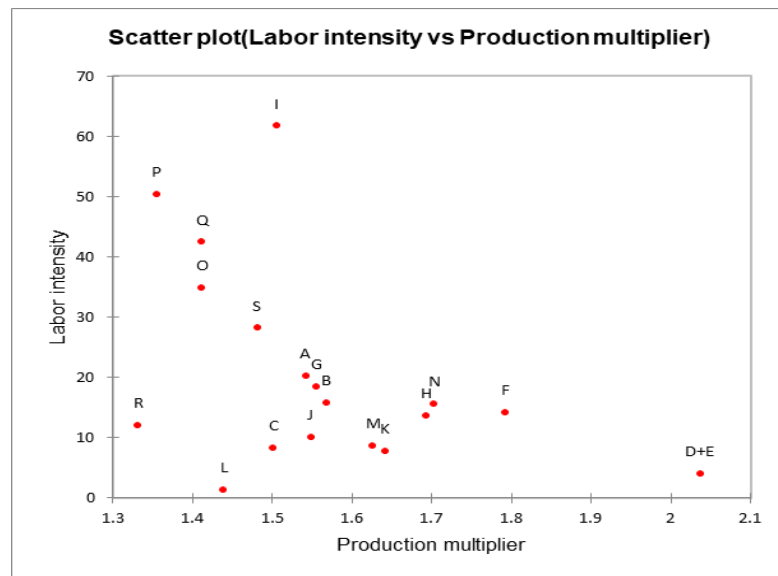


Figure 2. Relationship between labor intensity and production multiplier

Source: own calculations

Conclusions

The paper's main objective was to investigate the structural and productivity relations between all industries of the Slovak economy via the input-output analysis application. For this purpose, we used symmetric input-output tables, projecting in *commodity x commodity* array, containing data about total domestic production, intermediates, and final consumption of commodities in all industries of the economy. We constructed the Leontief inversion matrix from I-O tables, necessary for computing production multipliers, employment multipliers, and labor factor intensity coefficients for assessment structural and productivity relations between the industries in the Slovak economy.

The research results have provided us interesting insights into the macroeconomic performance of the Slovak industries. Regarding the production multipliers, Electricity & Water supply (D+E), Construction (F), and Administrative and support services (N) show the highest production efficiency in a searched period. Similarly, however using a different approach, de Miguel, Llop, and Manresa (2014) identified Construction and Energy among the other ones, as a key sector with the highest sectoral productivity gains in the studied area. Other evidence points to significant advances in productivity growth in electronic-product manufacturing and the goods sector (agriculture, mining, manufacturing, and construction), Houseman, Bartik, and Sturgeon (2015).

Conversely, Arts, entertainment and recreation (R), Education (P), Health care, and social assistance (Q) show the lowest production efficiency. These results have might meet our expectations, because of the prevailing nature of these sectors (providing public goods) and in Slovak conditions can be still considered as 'mixed' provided by private and public institutions. Similar conclusions have found Kecek, Milkovic, and Boljuncic (2019), identified Education services as a sector with the lowest output multiplier. However, the Health care and social assistance, Tarancón *et al.* (2018) consider as high productive efficiency sector.

Listing the other results, Partridge *et al.* (2021) shown on the negative link between productivity growth and employment growth. On the sample of industries, he has found a weak negative link between productivity growth and employment growth in the case of the computer industry, however, most of the other employment-productivity results were insignificant. Our research results point to the moderate link between production multipliers and labor intensity, which we can consider as proxy indicators of the employment level.

Coefficients of labor intensity describe the labor intensity of the production process. The lowest values over the studied period shown Real estate (L), followed by the Water supply (D+E) and Financial and Insurance activities. The highest values are shown Accommodation and services (I), followed by the Education (P) and Health care and social assistance (Q). These results are in line with previous studies elaborated by Lábaj, Luptáčík and Rumpelová (2008); and Kubala *et al.* (2015).

Conclusively, we confirmed a moderate negative link between productivity and labor intensity; which suggests that higher productivity indeed needs only a few labor resources and vice-versa. Despite that, the correlation does not mean causation, regarding the circumstances, in this case, we might consider it. Over the studied period, most of the industries in the Slovakian economy shown below the mean value, which suggests that most of them couldn't generate more extensive scale economies. On the other side, they employ a vast share of the labor force. Considering the ratio between the employment multiplier and labor intensity shows that the real estate and energy & water sector is able to sustain most jobs per unit of labor intensity. For sustaining competitiveness, Slovakia should prioritize high productivity industries or try to foster productivity in lagging ones.

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INNOVATIVE APPROACHES IN MANAGEMENT: A KEY FACTOR FOR THE QUALITY OF HEALTH SERVICES*

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Abstract. The aim of the study is to examine whether the use of innovative approaches in management of health care facilities is related to a higher overall rating of these facilities and whether this connection is supported by information sharing and the climate in the organization, expressed by soft management tools. The Baron and Kenny's mediator model was used for testing the correlations and the Sobel test for determining the mediator effect. A series of regression analysis were used to identify the proposed hypotheses. Incomplete mediation was found with a 57% share of the total effect in the form of a direct effect and a 47% share of the total effect in the form of an indirect effect. Both effects have been shown to be significant. The overall rating of a device can be influenced by innovative management approaches and amplify its effect through information sharing. The climate in the organization did not prove significant in our study. From the innovative approaches, most contribution to the overall rating of hospitals provided its innovations in strategic management and planning, where the coefficient of increase in evaluation was the highest in the unit change of both items. Innovative approaches in management, information sharing and also climate support in organizations are more significantly implemented in hospitals - joint stock companies, belonging to the network of hospitals, which strives within this network for efficient and effective implementation of management tools.

Keywords: Innovative management; management; healthcare; quality of health services

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1. Introduction

The health systems of developed countries are currently facing many challenges. These are the challenges of managing patients with chronic diseases, the challenges of technologically advanced, comprehensive and costly treatment, the growing societal expectations of the healthcare system and many more that are constantly increasing the need for effective management and quality healthcare (Spehar et al., 2012). Last but not least, it is the current difficult crisis situation related to the Covid-19 pandemic. Top managers of individual healthcare facilities should be able to proactively respond to these challenges with many innovative management tools and then transform strategic goals into internal management processes with appropriate implementation tools to ensure the high quality of healthcare provided at cost-effective costs. Given the fact that most managers in health care are also highly specialized medical professionals, it is not surprising that in professional and scientific circles are constantly discussing their sufficient, respect. insufficient managerial competencies. Problems with the management of healthcare organizations have been documented by many articles, studies, research, which we do not consider surprising given the specificity and complexity of these systems. Managing a medical facility is no longer just about highly professional medical knowledge. The managerial skills of top health care managers are increasingly being discussed, as well as their insufficient level compared to the business sector (Ackerly et al., 2011; McCallin & Frankson, 2010; Townsend et al., 2012; Warren & Carnall, 2011). Authors Pihlainen, Kivinen and Lammintakanen (Pihlainen et al., 2016), Enterkin et al. (Enterkin et al., 2013) and Yoder-Wise (Yoder-Wise, 2014) point out, that not only to the lack of basic managerial knowledge and skills, but especially to the lack of an innovative approach in management in the form of various modern tools and techniques offered by current management theory. Kuhlmann et al. (Kuhlmann et al., 2013) emphasize the need for innovative approaches in management of health organizations within the so-called "Hybridization" of the relationship between medicine and management.

A study by Cook and Bartram (Cooke & Bartram, 2015) states that given the general pressures to reduce costs and the need for high-quality care in the healthcare sectors, effective management in healthcare organizations is critical, with the authors seeing the problem mainly in aligning care ethics with business efficiency and in the invasion of performance culture into management itself. Identification of weaknesses in the management of health organizations are also innovative forms of communication due to the hierarchical limitations of organizational culture (Mesfin et al., 2020) and the related lack of opportunities (Cooke & Bartram, 2015) in human resources management and lack of situational leadership, which allows the use of different leadership styles such as clinical, servant, compassionate, diverse and others, suitable for the environment of medical teams (Dickinson et al., 2013; Kuhlmann & von Knorring, 2014). Constantly and continuously discussed area remains patient-oriented human resource management for reducing fluctuation and stabilization of job satisfaction, quality working conditions, safety, but also professional development and training, which is essential in this sector (Avgar et al., 2011; Cooke & Bartram, 2015; Dahlke et al., 2018; Martinussen et al., 2020). The loss of well-performing specialist professionals is costly for hospitals, and therefore their fluctuation is a critical issue in healthcare systems around the world (Kroezen et al., 2015). The authors confirmed a statistically significant relationship between the competencies of health leaders and the lower probability of intention to quit. Von Knorring et al. (Kuhlmann & von Knorring, 2014) point out in their study the weak informal position of managers / physicians in a healthcare organization compared to a physician expert and found that many healthcare managers struggle with this discrepancy and are unsure, due to insufficient managerial skills, to assume their managerial role. The authors see this as a major problem in the management of healthcare organizations, regardless of whether the manager is a doctor or not.

In the Slovak Republic, the non-governmental and non-profit organization INEKO Institute, which supports economic and social reforms in the country, implemented a project to evaluate Slovak hospitals on the basis of 16 criteria documenting their quality. With this evaluation, hospitals are presented in the Slovak ranking of medical facilities, which not only increases their external image, but also points to functioning internal systems in the best-rated hospitals (Institute for Economic and Social Reforms, INEKO). This encourages researchers to examine the factors that give some facilities priority in many criteria relating not only to the quality of services provided, but also to patient satisfaction or facility management, and to contribute to the complex issue of effective health management. There is a significant research gap here, which is the basis of our research model.

The aim is to examine whether the use of innovative management approaches (IA) is linked to a higher overall rating of healthcare facilities and whether this link is supported by information sharing and the climate in the organization, expressed in soft management tools. Our first effort is to explore the relationship between innovative management tools and the performance of healthcare facilities. The performance of the facility is expressed by the index "Overall Rating" (OR), which is reported in the Slovak Republic in 44 healthcare facilities for the years 2015 to 2019 as one indicator, expressing the position of the hospital in the Slovak ranking of hospitals. The OR contains 16 sub-items, which are evaluated in two main areas - medical (quality of services provided, experience, difficulty of diagnoses) and non-medical (patient satisfaction, management, and transparency). It is prepared and published by the INEKO Institute. Secondly, it is our intention to examine the mechanism by which the use of innovative approaches affects the performance of equipment. Within this mechanism, we focused on management tools that largely influence the implementation of changes, new approaches or modern management tools in the organization and to the organization's climate (CO) and information sharing (IS).

2. Theoretical background

Research in the management of health services is increasingly shifting to the search for factors influencing organizational performance, focusing on organizational management and management practices as important factors (Denis & Van Gestel, 2016; Lega et al., 2013; Tsai et al., 2015). At the same time, given the rapid development of management as a science, stronger views on the need for managerial education of health leaders and their continuous acquisition of knowledge about modern management trends (Flaig et al., 2020; McAlearney, 2008; Sonnino, 2016). Savage et al. (Savage et al., 2020) add that the improvement of their managerial knowledge and skills have a positive impact on the quality of care, the management of financial and operational resources and social performance. Positive effects of using soft management tools of doctors in management positions on employee satisfaction (Menaker & Bahn, 2008) and their stabilization or psychological safety were found (Shanafelt et al., 2015). Shipton et al. (Shipton et al., 2008) present with their findings a positive relationship between innovative leadership and hospital performance. We understand innovative leadership not only as leadership in relation to the internal environment, ie employees, but also towards external stakeholders. In this context, working on patient satisfaction through appropriate employee leadership styles has great importance (Collinson, 2006; Kristensen et al., 2016). The influence of leadership on hospital performance is also presented in a study by Sarto and Veronesi (Sarto & Veronesi, 2016).

Many authors focus on the influence of hard management factors on the performance of healthcare facilities (strategic management, planning, organizational structures, quality, control, etc.). Sunol et al. (Suñol et al., 2009) demonstrated a positive impact of quality strategies on hospital outputs. Johannesen et al. (Johannesen et al., 2020) found that external assessment programs, such as certification, accreditation, may support resilient performance in healthcare by nurturing the potential to respond and learn. Nabitz et al. (Nabitz et al., 2006), Van Schoten et al. (van Schoten et al., 2016) examined the implementation of the EFQM quality model. Their results show that the use of the EFQM model in hospitals is associated with improved organizational performance in the longer term. Best practices of total quality management implementation in health care settings and their

connection with organizational performance are presented by Talib et al. (Talib et al., 2011). Lindskog, Hemphälä & Eriksson (Lindskog et al., 2017) pointed out the importance of the Lean management concept in promoting individual innovation in Swedish healthcare, but assuming the implementation of soft management tools.

The growing importance of networks in health care as integrative and interdisciplinary tools that support coordination between service providers, improve their quality and other performance indicators through shared leadership, shared vision, transparent communication (Brown et al., 2016; Cunningham et al., 2012; Sibbald et al., 2020). As part of control, new tools are being promoted in the form of complex control systems that will be able to measure various aspects of performance (Fanelli et al., 2017).

The use of hard and soft tools simultaneously is being addressed by Campbell et al. (Campbell, 2020) in innovative change management in healthcare organizations, transforming the 8 steps of John Kotter's change management model (Kotter & Cohen, 2012) into the healthcare environment and its specifics.

Based on the above mentioned statements, we formulate the first hypothesis:

H1: We assume that the use of IA in management of healthcare facilities is related to their overall rating (OR).

IS is a critical process because if information is not shared and adapted in team processes, then individual resources remain underused in implementing innovative approaches (Moser et al., 2019; Srivastava et al., 2006; Vainieri et al., 2019).

IS is a tool for management that ensures individual and team performance by acquainting employees with the vision, mission and goals of the organization, through clear, timely, regular information about current issues and facts, new intentions and opportunities (Fanelli et al., 2017; Moser et al., 2019; Vos & Buckner, 2016). Only informed employees can contribute to the implementation of changes related to the implementation of innovations in the organization (Pfeffer, 2010). Aragon-Correa et al. (Aragón-Correa et al., 2013) even point to a direct link between practices that promote IS and organizational innovation. Gibson et al. (Gibson et al., 2007) and Roohi et al. (Roohi et al., 2020) point to the important contribution of IS to organizational performance and at the same time confirmed in their research that IS has a unique place among different management practices.

Information sharing is also presented in the context of outcome variables such as improving the quality of health services, reducing costs, increasing patient satisfaction, etc. (Bodenheimer & Sinsky, 2014; Hussey et al., 2013; Storkholm et al., 2017).

H2: We assume that the use of IA in management of healthcare facilities is related to IS.

H4: We assume that IS is related to the OR of the healthcare facility.

The climate represents the atmosphere that prevails in the organization. It is a surface variable in contrast to organizational culture, which extends into deeper organizational layers and is long-term resistant to various interventions. The climate is a relatively less stable layer, it is relatively easy to intervene with immediate measures. The climate is manifested by a collective consensus on certain aspects of the functioning of the organization. These are ways of communicating, focusing on common values, ensuring employee well-being, opportunities for innovation, incentive systems or leadership styles (Savage et al., 2020; Shipton et al., 2008). The authors point out the important links between climate and the results of hospital performance and emphasize that better results in achieving higher quality of health services are achieved in organizations where a collective

consensus of patient-oriented services prevails. An important finding of their study is the mediation effect of care quality climate on outcome variables of facilities. IA require an innovative climate in which employee behavior, incentive systems, teamwork and other aspects of the climate are innovatively oriented, encouraging and supporting innovation (Moser et al., 2019).

Given the evidence-based studies on the supportive effect of CO in implementing various changes in organizations, especially through the mechanism of shared values (Shipton et al., 2008; Spurgeon et al., 2015), job satisfaction of employees (Cambré et al., 2012; Hargadon & Bechky, 2006; Hong et al., 2019; Chen et al., 2020; Lamberti et al., 2020; Wang et al., 2014; Wombacher & Felfe, 2017), we are inclined to believe that innovative management practices will be transformed into the work environment by creating a favorable CO.

A favorable and pro-innovative CO is a tool that contributes to increasing employee loyalty (Flory et al., 2014), trust (Nedkovski et al., 2017), increasing employee performance (Boğan & Dedeoğlu, 2017), job satisfaction (Abdolshah et al., 2018) and the performance of the organization as a whole (Ali et al., 2018).

H3: We assume that the use of IP in management of healthcare facilities is related to the climate in the organization (CO).

H5: We assume that the climate in the organization (CO) is related to the overall rating of the healthcare facility (OR).

The aim of the paper is to verify the hypothesis of a positive relationship between **the use of innovative approaches in management of healthcare facilities and the overall rating of the facility, which is mediated by the organization's climate and information sharing** (Figure 1).

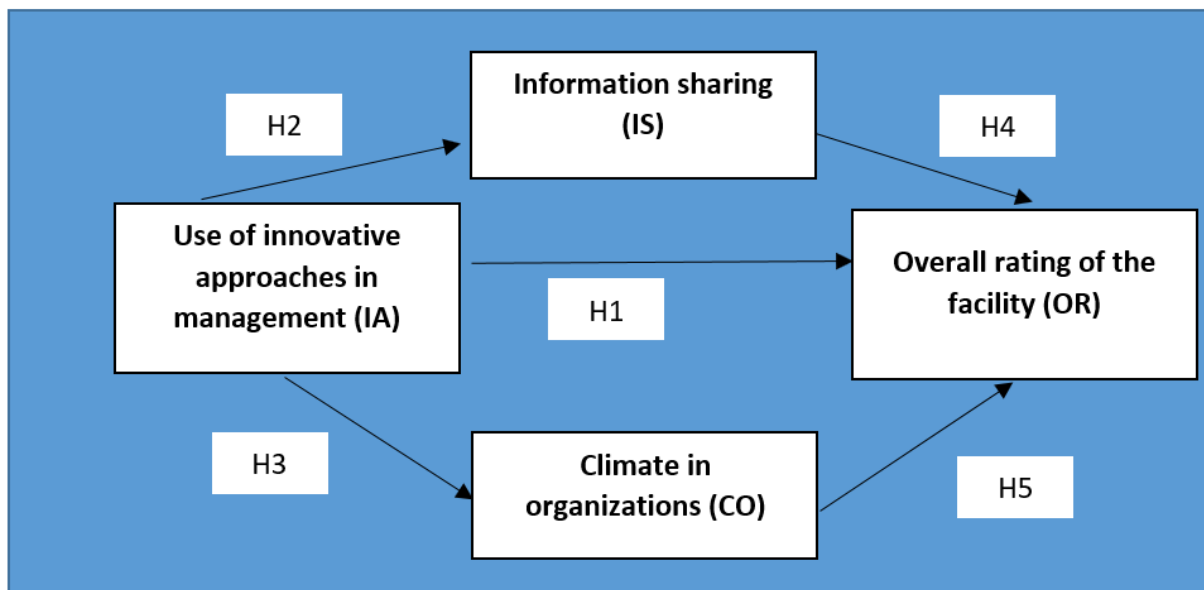


Figure 1. The mediation model and the 5 tested hypotheses

3. Material and methods

Sample and Data collection

Our sample consisted of 44 top managers of healthcare facilities in Slovakia. Hospitals, 11 teaching and 33 general hospitals (27 state and 17 private) were selected. The main reason is that these facilities are registered in the database of a INEKO Institute and published on its website as an official document on the performance of these facilities for the years 2015 to 2019 in the form of the overall rating of the facility, calculated below. Subsequently, we contacted the top management of these facilities through personal contact and explained our intention and research model, offering the provision of results and the possibility of comparison in the use of innovative management tools. In agreement with the representatives of the facilities, we sent them a questionnaire by e-mail. The questionnaire was sent at the end of September 2020. By the end of October, all 44 responses were returned. The return was 100% due to the fact that we contacted only pre-agreed contacts, as the output information on organizational performance was available only from the selected hospitals. The questionnaire contained identification data and the core of the questionnaire consisted of scaled questions in three areas - innovative approaches and satisfaction with the state of their application in the facility, information sharing with disagreement / disagreement with the above statements and climate in the organization.

The structure of the sample of respondents is shown in Table 1.

Table 1. Characteristics of the examined sample of respondents

		<u>Frequency</u>	<u>Percent</u>
Organization	Faculty hospital	11	25
	General hospital	33	75
	<i>Total</i>	44	100
Legal form	Public limited liability company	15	34,1
	Non-profit organization	8	18,2
	Contributory organization	17	38,6
	Private limited company	3	6,8
	Association (union)	1	2,3
	<i>Total</i>	44	100
Position	General director	7	15,9
	Hospital director	37	84,1
	<i>Total</i>	44	100
Education (MUDr., other Universities)	Ing.	16	36,4
	Ing. Et Ing.	1	2,3
	Ing. Mgr.	1	2,3
	Mgr.	2	4,5
	MUDr.	22	50,0
	MUDr. Mgr.	1	2,3
	PhDr.	1	2,3
	<i>Total</i>	44	100
Completed specialized management study (MPH, MBA...)	Yes	19	43,2
	No	25	56,8
	<i>Total</i>	44	100
Gender (male, female)	male	35	79,5
	female	9	20,5
	<i>Total</i>	44	100

Data Analysis

All data were analyzed using the SPSS 24.0 software package. Cronbach's α coefficient was used to assess the internal consistency reliability of scales. The Baron and Kenny mediator model was used to test the correlations and the Sobel test to test the mediator effect. A series of regression analysis were used to identify the proposed hypotheses. The control variables were the legal form of the facility and age, gender, and completed the managerial study of the director of the organization. ANOVA was used to analyze the multiple dependence. We worked at a significance level of 5%. Multiple regression of innovation items was also used for the overall evaluation of hospitals.

Measures

IA are an independent, explanatory variable. This variable is realized (is operationalized) as a score based on the answers of managers to the questions of satisfaction with the state of application of innovative management tools in the organization. In total, the independent variable IA contains 11 items (see Appendix 1), which are scaled using 6-point Likert-type scales (6 - absolutely satisfied, 5 - satisfied, 4 - rather satisfied, 3 - rather dissatisfied, 2 - dissatisfied, 1 - significantly dissatisfied). After reliability analysis, the Cronbach's α of the IA was 0.772 (11 items).

The second, dependent variable, representing the consequence, is the indicator of the OR of a medical facility, published on the website of the Institute for Economic and Social Reforms of the Slovak Republic (INEKO). Since 2015, this organization has been evaluating health care facilities on the basis of a developed methodology, accepting their availability and relevance, wide scope and stability in the selection of indicators (data were monitored for several years to minimize the impact of random one-time fluctuations, most indicators were monitored 4 -season). INEKO takes over data from health insurance companies (in Slovakia these are General Health Insurance Company, Dôvera and Union Insurance Companies) health facilities, the Ministry of Health of the Slovak Republic, the Ministry of Finance of the Slovak Republic, self-governing regions, the Health Care Supervision Office, the National Health Information Center, the Emergency Medical Service Operations Center and Transparency International Slovakia. The evaluation was carried out for state university and teaching hospitals - 11 facilities (note: children's teaching hospitals were not assessed) and general hospitals - 53 facilities (of which 33 hospitals passed the qualification criteria).

Hospitals were assessed on the basis of the following indicators: 1. Quality of health care provided (sub-indicators: reoperation, total rehospitalization within 30 days, mortality after operations, mortality from acute cerebrovascular accident, mortality after femoral fracture (65+ years), mortality in the intensive care unit, mortality in the inpatient department after translation from the intensive care unit, waiting time of the patient on the emergency admission brought by the ambulance, fines from the Health Care Supervision Office; (value 40%). The indicators result from the statutory quality indicators in the field of health care outcomes. Indicators and their definition are determined by the Ministry of Health of the Slovak Republic. Health insurance companies are obliged to monitor these indicators. They draw on the data provided by the healthcare provided to them by individual providers. 2. Experience (sub-indicators: Index of the number of so-called EBHR procedures (procedures used in stratification; value 10%). 3. Difficulty of diagnoses (sub-indicators: Case Mix Index (CMI) of the hospital, expressing the average economic and medical demands of patients hospitalized in the hospital for a certain period of time, in our case per year; value 10%). 4. Patient satisfaction (sub-indicators: overall patient satisfaction and patient complaints; value 18%). It is a summary indicator - the average of 12 statutory quality indicators in the field of perception of healthcare provision by hospitalized patients. The indicator is formed as a synthetic index of the subjective evaluation of the provider from the point of view of patients covering the evaluation of their satisfaction with care, behavior and information provided by health care staff, evaluation of

accommodation quality, cleaning of wards and diet and evaluation of satisfaction with provided care and subjective perception of treatment success. Complaints are measured as the total number of complaints per hospital in relation to 1000 hospitalized patients, which were addressed to the Health Care Supervision Office and where the Office terminated the supervision of the provider concerned. 5. Economy (sub-indicators: ability to generate own funds and overdue debt and its year-on-year change; valued 12%) and 6. transparency (sub-indicators: transparency index representing a summary assessment of individual facilities based on the quality of patient information and other public and economic information; value 10%). The resulting hospital rating is calculated as a weighted average of the points achieved for the above indicators. In total, the device could get a maximum of 100 points, a minimum of 0 points, while the more points, the better the rating and ranking.

Information sharing (IS) is variable, that is operationalized as a score based on managers' answers on the items listed in Table 2. The scale for IS was adopted from the study of Ketokivi and Castañer (Ketokivi & Castañer, 2004), who measured the sharing of general information and communication of organizational priorities with employees. In total, the intermediate variable IS contains 5 items (see Appendix 1), which are scaled using 6-point Likert-type scales (6 - strongly agree, 5 - agree, 4 - rather agree, 3 - rather disagree, 2 - disagree, 1 - strongly I do not agree). After reliability analysis, the Cronbach's alpha of the IS was 0.969 (5 items).

The second mediator is the CO variable. It is operationalized as a score based on managers' statements for the items listed in Table 1. The scale for CO was adopted from a literature search on the issue of organizational climate, while the authors measured in different ways the atmosphere that prevails in the organization and which is manifested by a collective consensus on certain aspects of the organization. In total, the variable CO contains 8 items (see Appendix 1), which are scaled using 6-point Likert-type scales (6 - strongly agree, 5 - agree, 4 - rather agree, 3 - rather disagree, 2 - disagree, 1 - strongly I do not agree). After reliability analysis, the Cronbach's alpha of the CO was 0.980 (8 items). The internal consistency of the variables used is very good.

4. Results

Examining the items of individual variables, we found that within the innovative management approaches, the highest satisfaction with their application in hospitals was presented in tools of comprehensive and systematic change management (mean = 3.66, StD = 1.055) and innovative quality management tools (mean = 3.43, StD = 1.108). Above 3 within the selected scale from 1 to 6, approaches in organization (mean = 3.27, StD = 1.283), in human resources management (mean = 3.11, StD = 1.166) and in the process approach in management (mean = 3.05, StD = 0.861) were declared. Other innovative approaches gained very low average values, ranging from mean = 2.00 (IA in strategic management) to mean = 2.84 (IA in human resources management). It is clear from the results that IA in management are used to a very low extent by hospitals, and at the same time a higher standard deviation was found in innovative approaches with a higher average, which indicates high differences in application.

As mediators that could amplify the effect of IA in management on the OR of facilities, we have chosen IS and the CO. Within the variable IS, we found out the agreement / disagreement with the submitted statements. The answers ranged from mean = 3.52 (regular information on the plans of their departments) to mean = 3.82 (regular information on the requirements for the performance of employees), but the standard deviations are again high and indicate differences between individual facilities.

For the mediating variable CO, we asked about the importance of the selected tool on a scale from 1 to 6 in a particular organization in managing people. The average values are higher than for the IS variable and range from mean = 3.84 (teamwork) to mean = 4.05 (employee behavior). High standard deviations were also found in this case.

We determined the connections between the individual variables by a correlation matrix, in which variables are also included in the matrix.

Descriptive statistics and the correlation matrix itself are shown in Table 2.

Table 2. Descriptive statistics and correlation matrix

Variable	Mean	StD	N	OR	IA	IS	CO	SMS	G	LF
OR	52,14	6,70	44	-						
IA	2,92	0,51	44	0,787**	-					
IS	3,65	1,22	44	0,820**	0,638**	-				
CO	3,92	1,25	44	0,083	0,113	0,061	-			
SMS	1,57	0,50	44	-0,248**	-0,234**	-0,090	-0,191	-		
G	1,20	0,41	44	-0,052	-0,124	-0,246	-0,107	-0,127	-	
LF	1,34	0,48	44	0,017	0,061**	0,122**	0,192**	0,240	0,230	-

Notes: OR = overall rating of the facility, IA = innovative approaches, IS = information sharing, CO = climate in the organization, SMS = completed specialized management study (1 = yes, 2 = no), G = gender (1 = male, 2 = female), LF = legal form (1 = non-profit organization, contributory organization, association, 2 = joint stock company) ** $p > .0.5$

It is clear from the correlation matrix that there are significantly positive correlations between the OR of facilities and IA to management as well as IS. A positive relationship between the OR and the CO has been demonstrated, but is not statistically significant. The existing relationships between the examined variables indicate the use of mediator model. At the same time, the examination of the context revealed to us that there is a negative connection between the OR and the completion of the managerial specialization study, as well as between the implementation of IA and the completion of the managerial specialization study. Negative associations were also found between the other two variables, namely the IS and CO and the completion of a managerial specialization study. However, these were statistically significant. Those directors who have completed specialized studies in the field of management also try to share information in the organization and also to support its climate. No statistically significant correlations were found with gender in the examined variables. However, it turned out that more of them are used by men. In connection with the legal form, we divided the hospitals into 2 groups. The first consisted of non-profit, contributory organizations and associations run by the state, and the second group consisted of hospitals belonging to the company „World of Health“. This company operates a regional network of 17 hospitals in Slovakia, which are among the leaders in innovation, digitalization and emphasis on the quality and safety of healthcare provided. At the same time, they emphasize financially sustainable and modern healthcare. The „World of health“ is part of the multinational holding Penta Hospitals International, which operates dozens of hospitals and outpatient fclincs in Central Europe. The correlation matrix pointed to a positive relationship between this type of hospital and the overall rating (not statistically significant), but a statistically significant correlation was found in applying IA to management, IS and CO in hospitals belonging to the World of Health as a joint stock company. Even the specialized management study was in a positive connection with this form of providing health services, although not statistically significant.

In mediation, we used the main hypothesis: **The dependence between the use of IA in management of healthcare facilities and the OR of the facility is mediated by the CO and IS.**

The distribution of variance for the overall dependence in the baseline model showed that no control variable was significant ($p\text{-value} < 0.5$), therefore were not included in further regressions.

The multiple regression is shown in Table 3.

Table 3. Regression results for main effects and mediation analysis

Variable	Model 0		Model 1		Model 2		Model 3		Model 4	
Dependent	OR		OR		IS		CO		OR	
	Coefficient	(SE)	Coefficient	(SE)	Coefficient	(SE)	Coefficient	(SE)	Coefficient	(SE)
Constant	21,50	6,02	22,10	3,69	-0,77	0,84	3,12	1,11	24,38	3,09
Main effects										
IA	10,31**	1,31	10,28**	1,25					5,81**	1,24
IS					1,51**	0,28			2,96**	0,52
CO							0,27	0,37	0,00	0,39
Controls										
SMS	-0,85	1,35								
G	0,97	1,70								
LF	3,20	2,33								
R2.adj	0,82		0,79		0,64		0,11		0,89	

Notes: OR = overall rating of the facility, IA = innovative approaches, IS = information sharing, CO = climate in the organization, SMS = completed specialized management study (1 = yes, 2 = no), G = gender (1 = male, 2 = female), LF = legal form (1 = non-profit organization, contributory organization, association, 2 = joint stock company) ** $p > .0.5$

The total dependence between the dependent and independent variables in the initial model is significant (coef. = 10.31, Sig. = 0.000). We found out, that is a significant relation between the mediation variable IS and IA (IS:model 2, coef.=1.51, Sig.= 0,000). Mediator “CO” was not significant (CO: model 3, coef.=0.27, Sig.>0.05). The relations between mediators and the dependent variable are significant only in the case of IS (model 4, ZI - coef. = 2.96, Sig. = 0.000), CO (coef.=0.00, Sig.>0.000).

In addition to the two indirect (mediated) paths, there is also a path for a direct relationship and this path is significant. IA versus OR (coef. =5.81, Sig.=0.000).

Total indirect effect $A \times B = 4.470$ (SE=0.980, $z=4.561$, Sig.=0.000) is significant and the dependence is positive. Indirect effects provided by individual mediators are significant only for variable IS (for IS is SE= 0.970, $A \times B_i = 4.470$, $z_i=4.608$, Sig.=0.000), non-significant for variable CO (SE=0.150, $A \times B_i = 0.000$, $z_i=0.002$, Sig.=0.999). Somehow direct effect C (effect IA on OR) is also significant, the presentation about non-complete mediation was approved.

The value of effects of the components of the used model is presented in the table 4.

Table 4. The value of effects of the components of the used model

Effect	Coefficient	%
Total	10,280	100%
Direct	5,810	57%
Indirect	4,470	43%
Indirect through M1:	4,470	
Indirect through M2:	0,000	

From the table we see that the direct effect is relatively higher (57%) than the indirect effect (43). This means that the direct interaction of two variables – IA in management of organizations and their overall evaluation - is more significant than the interaction mediated between these variables with the IS having the greatest impact in indirect action - renting the whole indirect effect.

Due to the fact that the examined mediation found a significant direct effect compared to the indirect effect, we were interested in which innovative approaches contribute most to the positive relationship between the overall rating of organizations and the implementation of innovative approaches. We used multiple regression of management innovation items for the overall evaluation of hospitals. The results are shown in Table 5.

Table 5. Multiple regression items IA in management

	1	2	3	4	5	6	7	8	9	10	11
coefficient	4,702	2,793	0,688	0,304	0,019	0,372	-0,503	0,132	0,218	0,011	0,794
calculations											
SE	0,818	0,741	0,458	0,396	0,436	0,370	0,516	0,470	0,617	0,363	0,660
t	5,748	3,767	1,503	0,769	0,044	1,007	-0,975	0,281	0,354	0,029	1,202
p	0,000	0,001	0,143	0,448	0,965	0,321	0,337	0,780	0,726	0,977	0,238
crit.adj.	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005

Notes: 1 = Innovative tools in strategic management, 2 = Innovative tools in planning, 3 = Innovative tools in organization, 4 = Innovative tools in HR, 5 = Innovative tools in people management, 6 = Innovative tools in control, 7 = comprehensive and systemic change management, 8 = quality management through models (EFQM, CAF, TQM....), 9 = process approach in management, 10 = risk management, 11 = diversity management, SE = standard error of the coefficient, t = test statistics t, p = p value ($p < 0,05$), crit.adj. = adjusted significance level corrected for multiple comparisons.

The dependence with variable OR is most influenced by tools 1 (innovative tools in strategic management) and tools 2 (innovative tools in planning), for which the highest positive coefficient was found (statistical significance $p < 0,05$). The coefficient represents the increase in the valuation at the unit change of the item. For other innovative approaches, the coefficients were not high (they were below 1), nor were they statistically significant and even for an innovative tool 7 (comprehensive and systemic change management) the coefficient was negative, which indicates a decrease in the valuation of the unit change of the item.

5. Discussion

Healthcare organizations around the world face challenges related to the rapid shifts of the 21st century in every area. A persistent knowledge gap is the solution to high-quality healthcare and limited resources faced by all developed countries with regard to health care financing systems. Against this background, the question of health leaders at every level of management and the examination of the mechanisms by which they can achieve high-quality organizational performance comes to the fore. The question of examining these mechanisms is very complex and ambiguous. It reflects many internal and especially external factors. In any case, it can be an enrichment and benefit in a broad scientific field dealing with improving the quality of advanced health services.

Given the conditions under which we worked in the research, we excluded the examination of endogeneity and we based research on the analysis of the relationship between individual variables. A simple correlation analysis is not a tool for a deeper understanding of the interacting mechanisms, so we used mediation as the main statistical tool. Through mediation, we found out that the effect of IA in management of organizations on their OR through measured IS and CO has been statistically confirmed. Based on the above, we confirm the main hypothesis.

We have therefore found that both the indirect and direct effects are significant. The indirect effect does not reach more than 80% of the total effect, it is therefore an incomplete mediation. Only a part of the effect (43%) is mediated by mediation variables, its lower part. The rest, which is bigger part is transmitted directly (57%). In any case, this is an important finding, namely that the OR of a facility can be influenced by IA of management and enhance its effect through IS. Partial hypotheses H2 and H4 were confirmed. The CO, which is presented by some studies as a significant factor influencing the performance of the organization (Ali et al., 2018; Savage et al., 2020; Shipton et al., 2008) in our study did not prove to be significant. It does not participate in the mediating role of the association between IA in management and OR and its impact is not significant. The direct connection between climate and innovative approaches or the overall rating has not even been demonstrated, so the partial hypotheses H3 and H5 have not been confirmed. IA in management need to be implemented differently in the environment of Slovak hospitals. The main tool is IS in hospitals. Innovations in management represent changes that are necessary to communicate, disseminate, share. Therefore, informing employees about important changes, overall policies and goals, how to evaluate the performance of the organization and the results achieved, as well as the requirements related to the performance of employees themselves are essential for providing high quality services, for their high professional level, but also for the purpose of greater patient satisfaction, better economy and transparency. Our findings are in line with the findings of many studies on the positive impact of IS on organizational performance while implementing innovation and management changes (Aragón-Correa et al., 2013; Bodenheimer & Sinsky, 2014; Roohi et al., 2020).

At the same time, we found that of the IA in management, innovations in strategic management (4,702) and planning (2,793) contribute the most to the OR of hospitals, where the coefficient of increase of evaluation in the unit change of both items was the highest. Our findings are consistent with the findings of the authors Sunol et al. (Suñol et al., 2009), who demonstrated a positive impact of quality strategies on hospital outputs. A very low increase in the overall rating was found in the item - unit change of the quality management (0,132). Although the coefficient is positive, which indicates a certain positive impact, it is very low compared to the findings of other studies, which showed a strong impact of using EFQM models or other best practices of Total Quality Management on organizational performance, even in the longer term (Johannesen et al., 2020; Nabitz et al., 2006; Talib et al., 2011; van Schoten et al., 2016). On the contrary, the negative coefficient has been demonstrated in the comprehensive and systematic management of change (-0.503), which is often underestimated in organizations not only in the health sector but also in other areas. The reason is also given by Campbell et al. (Campbell, 2020) in his study, ignoring one or both important aspects - situational or psychological, which causes the implementation of change without any results.

Our study showed that IA in management as well as IS and climate support in organizations are more significantly implemented in hospitals - joint stock companies, belonging to the company “The World of Health”, which strives for efficient and effective implementation of management tools in its network of hospitals. Significant positive correlations with the OR of hospitals are currently demonstrated mainly in the level of hard factors, but also in the level of soft management factors such as human leadership or human resources management, certain elements have been noted that gradually penetrate the management of these hospitals with a positive impact on their overall performance. Sibbald et al. (Sibbald et al., 2020), Brown et al. (Brown et al., 2016), Cunningham et al. (Cunningham et al., 2012) point to the growing importance of networks in health care in the context of improving the performance of all stakeholders.

5. Conclusions, practice implication and limitations

We see the practical implications of our research on several levels. The first is the fact that the performance of medical facilities is not a simple and one-dimensional concept. Many aspects need to be taken into account, which vary from one stakeholder group to another and cover different areas, including the quality of services, their level

of expertise, patient satisfaction, cost-effectiveness and transparency. All aspects must be considered at the same time.

The second level of implication is the knowledge of the mechanisms by which hospital management influences their performance, taking into account the relentless pressures of the 21st century on health care systems around the world. Building, but especially maintaining, high-quality health services that reflect the demands of an advanced technology society is a challenge for all developed countries, and at the same time the debate on the new role of health leaders and the need for their development and education comes to the fore. Although we do not describe causality, our findings are in line with the theoretical considerations outlined in the introductory part of the paper.

Within this level, the following implications are important. (1) Recognizing that, when it comes to moving forward, healthcare management necessarily requires new innovative approaches that will enable today's healthcare managers to cope with extremely challenging situations related to the constant changes in the social environment and to achieve excellent performance within them. These approaches will allow them to orientate themselves in the flood of information that managers encounter on a daily basis and support them in making strategic decisions. It is based on a clear and concise vision, knowledge of the direction of your organization and knowledge of answers to important strategic questions. (2) Knowing the vision and direction, as well as developing a strategic orientation through innovative tools, is not enough. It is important to share information, acquaint employees, communicate, present, spread outwards and inside the organization. Even in traditional bureaucratic structures in healthcare, there is a shift from management toward leadership, which not only manages, but above all inspires its followers.

The third level of our research has an impact on the managerial role of healthcare professionals, which is constantly discussed, and it turns out that its importance will constantly grow and influence the positive performance of hospitals. Related to this is the support of managerial education of leading healthcare professionals in accordance with new managerial trends and the needs of modern hospitals in the new technological era. Managers, regardless of completed university education (doctor or other), but with completed specialization studies in management, implement management innovations to a greater extent, and these subsequently have a strong positive effect on the overall rating of facilities through information sharing in organizations. This means higher quality of services provided, evaluated by seven quality indicators, resulting from statutory quality indicators in the field of health care outcomes, higher experience in the implementation of services used in stratification, higher average economic and medical demands of patients hospitalized for certain time period, for patient satisfaction, hospital management and transparency, measured on the basis of the level of quality of information provided to patients and the general public and economic information.

The fourth level of implications is important in terms of demonstrating the importance of networks in health care and integrating and interdisciplinary tools that support coordination between service providers, improve their quality and other performance indicators through shared leadership, shared vision, transparent communication.

Our research has several limitations. The first is a sample of respondents. We are aware that due to the number of entities providing health care in Slovakia, the number of respondents is low. On the other hand, measuring the performance of medical facilities is not a simple and one-dimensional concept. It covers many aspects that are very difficult to report, as the information needed to calculate them comes from several stakeholders and relates to different areas of service provision. For this reason, we consider our sample to be sufficient and we consider the performance data to be highly valuable, as in such a summary and comprehensive expression in Slovakia they exist only in the facilities that make up our sample. Research can also be limited by subjective, sometimes overestimated views of managers on the implementation of innovations in their management, or on the items of the other two variables, namely information sharing and the climate in the organization. Given the conditions we

had in conducting the research, we excluded the study of endogeneity and we based the paper on an analysis of the relationships between individual variables. Research is the basis for further ongoing research, in which we can then work with time as a missing condition for endogeneity and delve deeper into the study of causal relationships. At the same time, when the ranking of hospitals is enriched with other subjects, the research can be carried out subsequently in these hospitals as well.

We see the scientific novelty of our study in the identification of mechanisms influencing the performance of hospitals in terms of innovations in management. The overall rating of a facility as a complex medical and economic indicator can be influenced by innovative approaches in management and enhance its effect through information sharing. Management innovations represent changes that need to be communicated, disseminated, and shared. Therefore, informing staff is essential for the provision of high quality services, for their high professional standards, but also for the purpose of higher patient satisfaction, better economy and transparency.

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Appendix 1 Content definition of the examined variables

Innovative approaches in management (satisfaction with the status of the application in the organization): 6 – absolutely satisfied, 1 – significantly dissatisfied

1. innovative tools in strategic management (BSC, BCG, scenarios,...)
2. innovative tools in planning (IT, business models,...)
3. innovative tools of organization (flexibility, agility, lean org.)
4. innovative tools in HRD (strategic partner, performance reward, talent management, employee contribution management,...)
5. innovative tools in people management (transformational, shared, compassionate, clinical, servant leadership)
6. innovative tools in control (BSC, analysis of deviations, self-control,...)
7. comprehensive and systematic change management (reengineering)
8. quality management through models (EFQM, CAF, TQM,...)
9. process approach in management (definition, analysis, process improvement)
10. risk management (Healthcare Failure Modes and Effects Analysis, Probability Risk Assessment,...)
11. diversity management (according to age, gender, ... , but also abilities, skills, thinking,...)

Information sharing

(6 – completely agree, 1 – strongly disagree)

1. Managers shall keep employees regularly informed of significant changes.
2. Managers shall regularly inform employees of overall policies and objectives.
3. Managers regularly inform employees about the method of evaluating the company's performance and about the achieved results.
4. Managers shall regularly inform employees of the departments plans.
5. Managers regularly inform employees about the requirements related to the performance of their work.

Climate in the organization

(6 – absolutely important, 1 – significantly unimportant)

1. Informal communication
2. Opportunities for innovation
3. Employee involvement
4. Common Values
5. Employee behavior
6. Leadership style
7. Motivation
8. Team work

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CONSTRUCTING A MODEL OF NATIONAL PRODUCTION SYSTEM FOR BUILDING A CIRCULAR ECONOMY FOR INTERNATIONAL TRADE INVOLVEMENT

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Abstract. The paradigm of "unlimited growth" capitalism leads to an aggravating the problem of a natural resource shortage, an increase in waste and general pollution of the Earth. The concept of a circular economy (CE) is an alternative to this; it implies a transition to closed production and consumption cycles. The purpose of the article is to supplement this concept with ideas of integrating several rationalizing production models of the CE building at the national production system level, taking into account the country's participation in international trade. These model production models are "flexible custom manufacturing", "distributed manufacturing" and "lean manufacturing", which also means the widespread involvement of small and medium-sized enterprises. The use of digital technologies for a new quality of communication, as well as the creation of sharing centers, in order to achieve greater organizational and technological complexity of the production system is required. The CE building must take into account the country's participation in international trade. Attention is focused on the fact that the CE will have a different effect on certain types of international trade, in particular, it will stimulate such trade as: materials for processing, secondary raw materials, technologies, projects of finished products, R&D services. Purposeful national and global policies, expansion of international cooperation and support of developing countries are needed in order to increase the positive contribution of international trade to CE building. Practical recommendations for the CE concept implementation are proposed, including the creation of: information infrastructure for production networks; digital platforms for interaction between producers and consumers; industrial parks, clusters and incubators for new industries, as well as technological, digital and organizational innovation stimulation.

Keywords: circular economy; international trade; industrial production; models of organization; innovations

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JEL Classification: D51, D20, E23, F19, Q50

Additional disciplines: ecology and environment; organization of production; information and communication.

1. Introduction

The economic paradigm established in XX century and extrapolated in the beginning of XXI century is primarily focused on maximization of consumption. Under easing of monetary conditions and growth in money supply, monetary stimulation of demand, which was underpinned by continuous product innovations, the development of consumerism becomes disappointing in the modern society, and growth in consumption – alarming, especially in terms of ecology. In conditions of the traditional “linear economy” (“take-use-dispose”), the growing consumption exacerbates the problems of scarcity of primary natural resources, including energy resources, which requires urgent alternative. The unrestrained exploitation of nature’s gifts during previous centuries has brought a high level of prosperity to humankind, but now, against the background of climate changes, global population growth, urbanization and other challenges, it causes deterioration of environment to the point where it becomes dangerous.

Due to the aggravated situation, the efforts to process waste, introduce resource and energy saving technologies, and form new production, supply and consumption chains have increased, which, in general, was named circular economy (CE). This concept implies recycling and cyclic use of materials, minimization of primary natural resources use, transfer to closed loop production and consumption, with due consideration of the local conditions. CE building is aimed to satisfy the growing demand, while achieving environmental sustainability by lowering the level of resource depletion and reducing waste generation and emissions. This initiates a new round of industrialization as a part of the Fourth Industrial Revolution and other technological trends, because it is technologies that will enable to build an industry with minimum adverse impact on the nature.

Accepting the inevitability of changing the production system, it is critical to understand that it is fundamental to the whole economy; therefore, a large-scale transition to CE may serve to overcome major economic problems and create conditions for the transfer to a new long cycle of economic development. The creation of a new production system, among other things, is based on the integration of different production models for CE building at the national level. On one hand, a transformation of the production system in the context of transition to CE will significantly change the structure of international trade. On the other hand, it is not every country that can take into account participation in international trade, which might facilitate as well as complicate the process of such economy building.

2. Literature Review

The growing pressure from the human species to the environment through resource extraction and waste generation has led to the revival of the long-standing ideas of optimization of production and development of new concepts. In the scientific, expert and political discourse, along with the term “Circular Economy”, they use the definitions “Closed Loop Economy” and “Cyclical Industry”. The term “Closed Loop Economy”, representing the economic model with minimization of waste, may give rise to different understanding of closeness. The term “Cyclical Industry” can be considered as the one, which supplements the concept of “Circular Economy” in the relevant sense.

The concept of CE is gaining momentum in the development of government policy and corporate strategies in academic and expert circles. This attractive concept is considered as a potential solution of the creation of the production system with more efficient use of resources. Being positioned as an approach which enables to create new business models and provide benefits, simultaneously reducing the pressure to the environment, CE is backed up by the government and the enterprises in private and public sectors (Velenturf, Purnell, 2021). CE is highly relevant for the achievement of the most part of sustainable development goals, which becomes a matter of global significance (Schroeder, Anggraeni, Weber, 2018).

CE concept has been developing over nearly half a century and it has been gaining popularity in recent years, and it has already become a theoretical and practical basis for government policy, organization of

production systems, supply chains, consumer infrastructure, and creation of new value propositions, businesses and social structures (Korhonen, Nuur, Feldmann, Birkie, 2018). CE is promoted by multiple countries and international organizations, but, in practice, it has significant economic, social and technological constraints; therefore, it often remains a set of ideas (Korhonen, Honkasalo, Seppälä, 2018).

Restructuring of production sectors as a part of CE is, first of all, encouraged by climate and resource challenges, which enables to consider CE as a new paradigm for sustainability. Environmental criteria urge the transition to CE, but they should definitively be agreed with the economic and social components, in order to ensure economic growth and maintain the level of prosperity (Hysa, Kruja, Rehman, Laurenti, 2020). This is due to the fact that CE reveals a new vast sphere for entrepreneurship and innovations, and even the whole areas for a creation of innovative technologies (Barros, Salvador, 2021). This requires innovative capabilities from business, which is a driver of knowledge advances.

CE unleashes the potential of the Industry 4.0 to achieve the sustainability criteria and strengthen the competitiveness of enterprises as well as to improve organizations, technologies and management (Enyoghasi, Badurdeen, 2021). Considering the production as a complex multilevel material and technical, information and socio-economic system, it should be noted that the transition to CE includes its modernization and constitutes the beginning of a new life cycle of enterprises. CE building is based on the consideration of local conditions; therefore, its outcomes will determine the sustainable development of territories (Bassi, Marco Bianchi, Guzzetti, Pallaske, Tapia, 2021).

Transition to CE is accompanied with complex introduction of new business models, their gradual upgrading to the required efficiency levels, which requires in-depth optimization (Geissdoerfer, Pieroni, Pigosso, Soufani, 2020). In order to form CE and obtain the expected benefits, it is also required to overcome multiple technological, market, institutional and social barriers (Grafström, Aasma, 2021).

CE covers almost the entire range of industrial sectors. For example, this concept is relevant to ensure circulation of plastics, create closed loop production and consumption of packaging, reuse materials, and especially, recycle plastic waste. CE approaches are relevant for construction sector, pharmaceuticals, textile and apparel industry, chemical and petrochemical industry, electronics and computers, production of metals, leather, paper, automobiles, etc. Therefore, it turns into one of the key trends in economic transformations related to industrialization, and it can also be considered as a strategic focus for economic recovery from the prolonged recession and its modernization in terms of sustainability. However, there are some remaining concerns about possible adverse impact of CE on the environment and society. Different views as well as constructive criticism are needed to find the right way and develop government policy (Valenzuela, Böhm, 2017). Of course, objective constraints should be taken into consideration. Thus, for example, CE will lead to an increase in overall production output, including creation of products, recycling of waste and out-of-use products. Moreover, certain products are impossible or inexpedient in terms of quality and energy consumption to be recycled, which reduces the advantages of CE. In this case, the alternative material management strategies are required as well as recycling for other use and technological advancements.

CE concept gains international importance as a response to global challenges. Country's progress towards CE building becomes more extended, including not only the leading developed countries. In general, one can say that there is a prospect of global CE (Velenturf, Purnell, Macaskie, Mayes, Sapsford, 2019). This implies consideration of the global contest, attracting certain countries to the worldwide trend, establishing new areas of international cooperation. The discourse on this issue is maintained by EU, UNO, OECD and transnational companies. EU, for example, actively engages Member States to the building of CE, forming a single strategy and rendering individual support to countries, thereby ensuring a common progress (Lazarevic, Valve, 2017).

As far as CE is understood as a basis for building the global paradigm for sustainable development, the policy of EU and China is of great interest. The driving forces, problems and the course of circular transformations are diverse in the EU and China, but they are interrelated (Ranta, Aarikka-Stenroos, Ritala, Mäkinen, Saku, 2018). The Chinese and European points of view of CE have common conceptual basis and demonstrate not only a lot of similar concerns, but also conceptual distinction, which should be taken into account in international policy-making (McDowall, Geng, 2017). Despite certain distinction between global players, an analysis showed that it is possible to consider CE as one of the bases for creation of the global model of sustainable growth, which also makes it

necessary to cooperate internationally. This is particularly true for the cooperation between the developing countries, for which the issues of CE building are kept up to date in the context of industrialization (Batista, Gong, Pereira, Jia, Bittar, 2019). This applies particularly to foreign investments and technology transfer as a part of international cooperation.

Despite a potential link between trade and CE, the existing studies on this issue are limited. The transformation of production chains will lead to significant implications for the international trade, including primary and secondary raw materials, technologies and other knowledge, finished products and components. CE building in a particular country should not be considered separately, without taking into consideration the link between the internal and external aspects, implications for international positions of a country, new threats and opportunities for national companies (Gaur, Mani, 2018). It is essential to ensure dialog, institutionally support CE formation at the global level and encourage the developing countries to the respective industrial modernization.

3. The Research Objective

Taking into consideration the need to overcome the shortcomings of the existing economic paradigm and implications of the prolonged recession and COVID-19 crisis, this paper is aimed to develop CE concept through supplementing it by the innovative ideas on the integration of several production models at the national level, taking into account participation in international trade.

4. Theoretical Framing and Methodology

In this paper, CE as a concept is related to the national production system, which could be applied to almost all its sectors, first of all, production of consumer goods. The production system is abstractly understood as creating benefits for society (social production), but not as operational resources of an enterprise. CE, in general, is understood as a new type of economy and, in a narrow sense – as the production where waste and out-of-use products are recycled to the maximum extent, creating a full circular cycle of production-delivery-consumption-recycling to achieve waste prevention or minimization. It is also possible to move from consumption to temporary use. Recycling and reuse imply the respective organization and management, require technologies and infrastructure, and often need interaction with consumers as well as new system of cooperation with other enterprises. The existence of different types of CE, for example, strong (creation of the full circular recycling loop) and weak (secondary resources supplement the primary ones) circularity (Johansson, Henriksson, 2020).

Further, the paper looks into the integration of the production models, which are diversely understood: 1) as certain concepts of production management; 2) as a set of organizational forms, methods and procedures, which enable to ensure production process; 3) as a description of the relationships of this process. The integration of production models will be understood as their combination and fusion to build more complex production system. The ideas suggested in this paper are more suitable for consumer goods sectors; although, many of them are also relevant for production of capital goods.

In order to achieve the goal of this paper, it is required, besides a metaanalysis of previous best practices in the field of CE and an application of the methods of qualitative analysis (historical, comparative, functional, etc.), a justification of the integration of production models to build a new quality of CE, which is based on structural approach. The monitoring of the transformation of production systems in the U.S. and China as well as the innovative experience of EU countries and negative consequences of de-industrialization of former USSR countries became the empirical basis for the study.

CE implies a full cycle of production and recycling and, by its nature, it is multisectoral. Therefore, the development of new production models does not fall within the scope of standalone science or theory, but represents an interdisciplinary area of the study, including: production technologies and networks; digital technologies and platforms; logistics; economic geography; sectoral markets; ecology; sociology; international economy. The issues of CE building are structured not by sciences, but by problems.

The study is methodologically based on the evolutionary approach to the development of production

systems. The following concepts made a theoretical basis for the study of CE and integration of production models: sharing economy, smart specialization, on-demand economy, digital platforms, Industry 4.0, innovation ecosystems, etc. It is empirically backed up by the study of global technological trends, in particular the Internet of things.

5. General Explanations

CE concept represents the real alternative to the unsustainable production systems and is able to radically change the economic paradigm in general. To achieve this, one should proceed from the drawbacks and contradictions of the modern form of capitalism of “unlimited growth”. First of all, it is a promotion of excessive individual consumption, aggressive marketing and approval of the lifestyle oriented towards consumerism, accumulation of wealth as an end in itself, excessive and corrupting desire for comfort instilled at the level of values and beliefs, and, therefore, it reinforces individual decisions (to the maximum extent – “first prosperity, and then morality”). This value framework includes pragmatism and selfish interests, inherent in capitalism, where the balance with altruism and solidarity is often upset. Consumerism is supplemented by the continued diversification of the product range and emergence of innovations, leading to the change in generations of products as well as emergence of products with the “planned obsolescence”. Forcing more money into circulation increases consumption, and consumerism created the economic culture. Monetary stimulation of demand led to overconsumption on account of future earnings, which undermines the potential for the long-term growth. Transformation of this lifestyle will lead to decrease in prosperity, therefore it is politically supported.

Of course, the more and more amount of waste is recycled, but the pressure on nature increases (Figure 1). With the systematic development of composting (about 6% of GLOBAL waste), an increase in incineration (over 11%) and other methods, open landfills are in the order of 33% of GLOBAL waste, and recycling is over 13% global average.

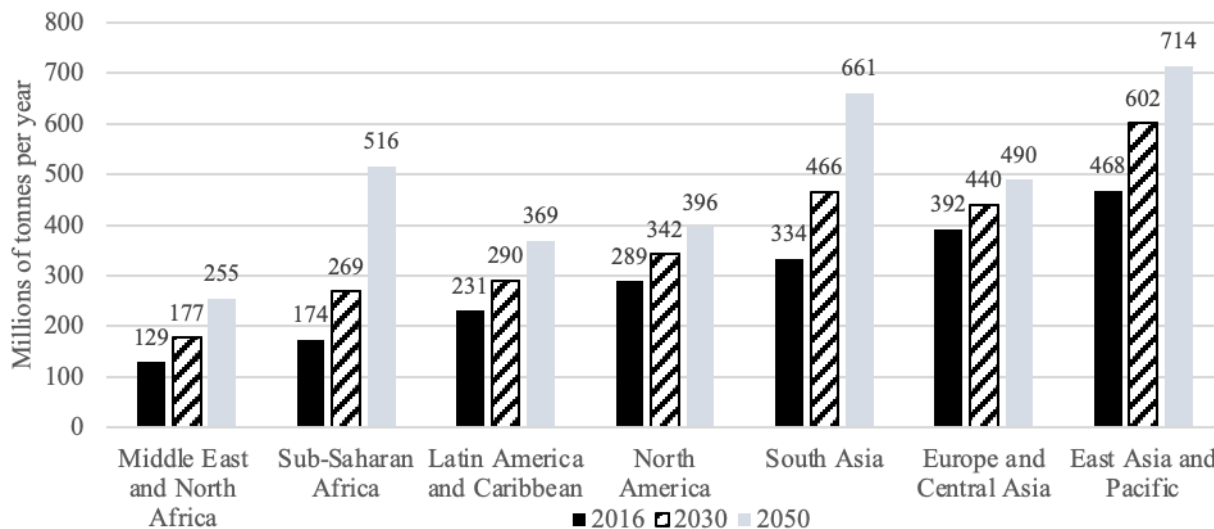


Figure 1. Projected waste generation, by region

Source: The World Bank

The problem in ensuring the sufficient production volumes was addressed in XX century. Humankind has achieved a high level of wealth creation, but its uneven and sometimes extremely unfair distribution remains widespread. Ill-considered stimulation of the demand by monetary and credit levers, apparently, is reaching its limits. The levels of public debts and global debt in general are breaking the records, which enables to compare

them with a pyramid, gives birth to doubts about their repayment and undermines the credibility of financial institutions.

Even in previous centuries, “fevers” and “bubbles” were inherent in capitalism, and, in the modern economy, they become of permanent nature. The predominance of financial sector puts an enormous burden on industrial sector, leads to disproportion, encourages unproductive entrepreneurship, especially in the light of modern consumption. Together with the excessive money supply, it leads to an increase in prices and makes long-term planning impossible. Economy has already been dependent on the artificial maintenance of the demand for a long time, and it is permanently in turbocharging mode owing to printing money. In these conditions, it is impossible to talk about the high quality of economic growth, even given the employment and income growth. The growth, in fact, is achieved on account of worsening of economic structure and stimulation of demand. As it is well known, it gave birth to the global financial crisis of 2008-2009 and prolonged recession that it turned into. Since the late XX century, it has become clear that overcoming financial crises by pumping market assets with money leads only to the inflation of stock exchanges and increase in prices for the assets, and it does not revitalize economy at all. Instead of eliminating the causes, the imbalances are exacerbated.

The capitalism of “unlimited growth” triggered the factors that determine high production intensity, growing demand for resources and amounts of waste. Environmental problems have become more acute in comparison with XX century, and climate changes have become a real threat. The world population is rapidly increasing, and, in a number of countries, it is reducing and aging, which, in conditions of the modern economic paradigm, gives rise to enormous challenges posed by pressure to resource base, inequality, poverty and migration. This is also facilitated by technological changes. Human being became focused on obtaining of money to achieve the modern standard of living. Under the pressure of multiple adverse factors, people today face a number of ambiguous changes of mindset, existential and even moral problems. The resulting economic situation is exacerbated by the political crisis, which has been clearly evident since the beginning of XXI century (rise in corruption, ignoring the problems, inability to develop new approaches, etc.). Against this backdrop, risks of pandemic instability and further recovery increase.

Special mention should be made on the international trade. Since its creation, it has already been the most powerful factor in the enrichment by big capital-holders, and only partially – the factor in raising the population’s welfare level, and, in recent centuries, it has become the main engine for progress. In XIX-XX centuries, it has been international trade that facilitated the rapid development of many countries as well as their modernization and transition to the civilized state. In XX century, the national specialization gradually expanded, the internationalization of production reached the highest level, which acquires the form of the global production network, global value chain, and global supply chain. In order to win the world market, the countries began to focus on the development of a limited number of strategic sectors (“national champions”), especially on increasing their export capacities. This turned into fierce competition, where just a small number of countries became winners, reinforcing their advantages by economic as well as financial (being producers of money) and military-political methods. This led to economically uneven world, which could not be eliminated by economic order that was conceptualized in the second half of XX century.

Turning of South-East Asia, especially China, into a global production factory has consolidated the system of the global division of labor, which, in many countries, led to suppression of the local production activity (at the same time, only a few countries have R&D potential and expertise to create innovative products to compete in these areas) and development of international business, which designs and sells products or even just deals with resale. Initially, industrial recession undermined the basis for economic growth in many countries, which was counterbalanced with financialization and development of the services sector. Then deindustrialization brought to structural imbalances, large-scale unemployment, and disqualification, decline of middle class and polarization of population. These problems became clearly evident during the global financial crisis of 2008-2009. COVID-19 pandemic, which became a global economic shock, once more demonstrated the irrationality of the global trade paradigm, country’s dependence and fragility of global supply chains, affecting even the “national champions”.

In general, pernicious antagonism of the suppliers of raw material and technological goods remains on the world market as well as the “bullish” price competition in the context of all monetary features of modern

economy. It should be taken into consideration that the developed countries produce money, have absolute technological advantages and continue expansion in the world markets. As for the suppliers of primary resources, they are predominantly represented by the developing countries, seeking to increase their export capacity to ensure import. At the same time, the world natural resources are very unevenly used.

The economic competition on the world markets has become “violent” with a domination of large companies and financial institutions, forming the whole “empires” of assets. Many product and resource markets have monopolistic or oligopolistic structure. In these conditions, it is difficult to talk about real capitalism and free competition. Recently, “wars” of the vaccine for COVID-19 portend even greater distortion from the principles of free market. For the above-mentioned economic reasons, protectionism ideas are becoming more active and increasingly embodied. The problems with free market, on one hand, and protectionism, on the other hand, mean the crisis of the global trading system. There are risks of the world fragmentation and “national egoism”.

In view of the multifaceted nature of the prevailing crisis phenomena in the economy, raise a number of issues. Is it possible, based on the old paradigm, to ensure the revival of the national economies after the decline and crisis of COVID? Is it possible to build capacity for future growth? The answer to this question can be given by means of “model solution”. It cannot be expected that the irrational production approach or inflating new bubbles, for example, around “green economy” will become an adequate answer. It is impossible to build a new economic structure based on the artificially inflated services sector, created in pursuit of comfort and idleness, based on the monetary and credit levers. The only way which can be seen is a radical reconstruction of the economy and transition to another production system, which should: become a basis for economic restructuring; allow meeting the requirements to sustainability and make progress in addressing social problems related not only to unemployment, but also to stimulation of activity.

CE concept seems to be the basis for new national production system, facilitated by the implementation of the large-scale recirculation schemes in a number of countries. CE initially was focused on minimization of waste, but it gradually turns into a broad-scale approach to the organization of production. Therefore, it is proposed to reconsider overall concept of CE as the basis of the national production system, supplementing it with the integration of a number of other models. This requires a new structural approach to be applied in production, economic organization and the whole complex of relations.

CE is oriented towards production and using the products in the most efficient way, to manage waste economically and eco-friendly, and to recycle it to the maximum extent. Following this orientation, the key idea of the creation of a new social production system is a transition to the closed loop production and consumption with due consideration of local conditions. At the same time, the production structure should be diversified and, by its saturation, it should correspond to the diversity of modern consumption, subject to the following formula: “economy should be aimed to produce all things that people need”; “economy should produce exactly the things which are needed by a particular consumer, in the quantity and of the quality which is requested”. This implies the integration of, at least, the following three models:

I – flexible individualized manufacturing, which is built on an interaction with every consumer and consideration for the specific nature of his demands. The model can include a wide range of consumer goods; it implies an active use of modern technologies which enable to achieve the appropriate level of costs even in case of small series. Small-scale production can be localized at the areas of consumption;

II – distributed manufacturing which is appropriate for the manufacturing of the large sophisticated products. Besides the application of state-of-the-art technologies, the model assumes development of the associated cooperative production, reconstruction of the network of relatively small-scale enterprises, coalescing around the innovative and technological (with shared access system) centers;

III – “lean manufacturing” (*lean production*), the well-known concept of which, besides elimination of all kinds of losses, should be clearly focused on the resource and energy saving. Comprehensive intensification of production, reduction the time of business processes, including interactions with consumers and production partners are also expected.

The above-listed models present a structural framework for organization of sophisticated production system – CE 2.0 (Figure 2). At the same time, the idea is that the production will be primarily focused on the base of small

and medium enterprises associated between each other. The production in the sectors where it is impossible to avoid large enterprises is assumed to be developed in new forms, for example, as a part of national or international industrial parks, but not on the basis of market principles, avoiding aggressive competition.

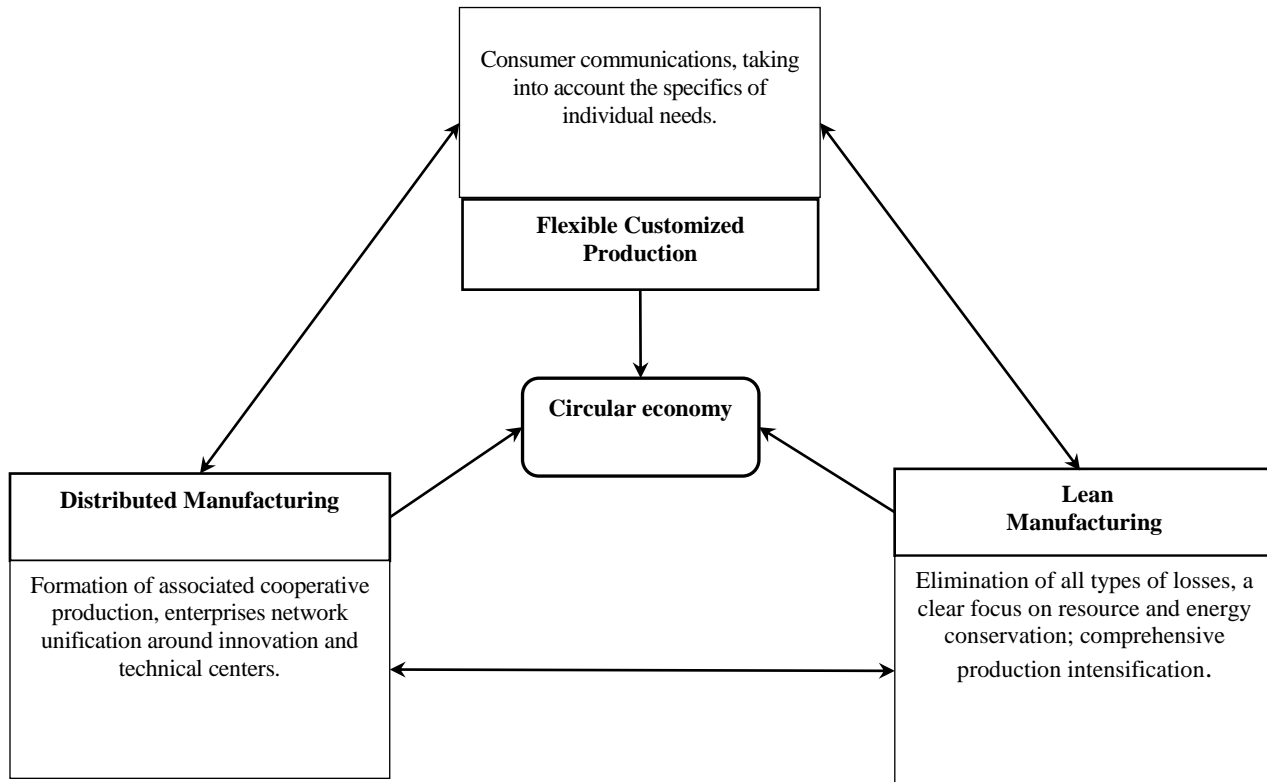


Figure 2. Structural frame for CE building based on the integration of rationalizing production models

Source: developed by the authors

The suggested production approach CE 2.0 implies an application of state-of-the-art technologies (robotic technology, additive technology, etc.), which enables, to the full extent, to unleash their potential not for domination of individual companies, but for extensive socialization and complex redistributions. More sophisticated system requires the respective organization and management; therefore, the information and communication technologies (ICT) and special digital platforms for the interaction of producers between each other and with consumers will be of crucial importance. Of course, the innovativeness is imperative. However, it is not only product innovations, matching the “abundance” demand, but also the structure-forming technological, organizational and digital innovations, which involve transition through modernization and enable to achieve the required level of resource and economic efficiency. This implies an interaction not only with consumers, but also with science. It should be noted that the approach presented is appropriate not only for large cities, but also for the medium and small towns, which will enable to radically change the territorial economy.

The suggested approach to organization of production system does not mean a setting of the avatar, but it promotes the idea of reducing the dependence and increasing the level of the country’s self-sufficiency, smoothening over the flows of neoliberal doctrine. Speaking of its other potential advantages, at the macro level, the emphasis should be laid on: 1) stimulation of new demand and new investments in production, rationally reallocating the accumulated financial capital; 2) correction of imbalances in the country’s foreign trade; 3) equalizing effect in terms of reducing inequality and poverty; 4) development of certain territories, enhancing

their natural specialization in the domestic market. This will produce an effect of the long-term sustainable growth, improving its quality (rates, employment rate, and investment structure), not on account of monetary manipulations, but through changing the basis - production. This will encourage entrepreneurship and innovations, and will help correctly use the advantages of capitalism in improving people's lives. At the mezzo-level, this will revitalize competition, and state-of-the-art technologies will be used not for domination and shrinking labor market. Owing to the new understanding of CE, it will become possible to produce even greater effect in terms of saving primary resources and reducing waste and emissions. However, greater attention should be paid to possible beneficial social effects. First of all, new production system enables to launch capitalism of the parties concerned, "social capitalism", as it will be focused on human being, his needs and capabilities, i.e., achievement of a new level of economic freedom (having needs and opportunities), working without exhaustion, with interest, at maximum capacity, creatively and developing. Around this, it is possible to create integrated ecosystem of human activities, which can be institutionally configured to equality and support to youth. In social terms, this will strengthen the middle class and revitalize democracy.

The proposed changes to the national production systems should evolutionally emerge and germinating "from bottom to top". This does not rule out the proactive role of the State and its support. In terms of prioritization of the support for the development of individual sectors, the criteria of their selection are: significance in terms of job creation, human development and quality of life; growth potential, development of the country's domestic market, import substitution; multiplier effects on the economy, boom in innovative sector, creation of new production capital; innovativeness and science intensity, creation the stocks of new knowledge and promising innovations. Of course, in order to develop the sectors, it is critical for the particular country to have its own potential. The assistance in the development to the countries with insufficient potential will be more efficient on account of "small-scale" industrialization.

In terms of the implementation of CE 2.0 and previously mentioned models, it is critical to ensure new associated forms of production organization based on digital platforms, which enable to engage more extensive number of small enterprises. It is suggested providing the access to production facilities, built on the state-of-the-art technological basis, on account of the shared use centers. The important factor is an access to information and knowledge.

Global expansion of CE paradigm is not limited by domestic economy and it transforms global production chains. Therefore, one of the critical issues in the context of CE is the development of international trade, as evidences by the experts of the World Economic Forum, OECD and World Trade Organization. On one hand, participation in international trade has a great impact on the domestic production, which can facilitate or impede the progress of CE. On the other hand, CE can lead to the optimization of the country's foreign trade; it can also reduce import and increase export earnings, including resources.

It can be assumed that CE has different impact on certain types of international trade. First of all, this will reduce international flows of finished products, which might also affect the components. As to the raw materials, the growth of the trade volumes is expected for the following goods: second-hand and damaged products; expired products; natural resources (primary raw material); resources obtained from recycling (secondary raw materials); waste and scrap. Naturally, the trade in the goods for recycling and production will increase, namely: technology and hardware, diverse knowledge for this purpose as well as services (mounting, maintenance, R&D, economic surveys). An emphasis should be laid on the fact that the use of state-of-the-art technologies will result in the growth of international trade in the designs of new products, which can be produced at the local level. Most probably, in conditions of CE, international trade will have new comparative advantages. It will be especially related to the development of production and recycling technology as well as design of new goods based on R&D. This, apparently, will be a basis for new economic expansion. In general, it is reasonable to expect profound qualitative changes in the structure and volumes of international trade, which will reconstruct the entire global economy.

In order to increase a positive impact of the international trade on CE building, it is necessary to have national and international policy built on new goals. It should be accompanied with the exchange of experience and best practices, unification of new standards, enhancement of monitoring and logistics. The global risks of the transition to CE should be taken into consideration, for example, strengthening the technological positions of the

developed countries greater dependency on export of the developing countries' resource, rising inequality, destabilization of resource markets, intensifying contradictions due to the uneven availability of countries' resource, etc. These risks are quite possible and require global response, because it provides individual advantages from CE for certain countries as well as the global ones. The effective assistance in the development will ensure more steady global progress of the developing countries, which is possible only taking into account a diversity of countries, but not the global unification.

National strategies of CE building will not be able to work separately. The creation of a new production system in the countries will be accompanied with the intensification of the international cooperation in the following areas: development of technologies, cooperation in hardware production and waste recycling; professional training of specialists; harmonization of the standards of production, transportation, product quality, data protection, etc.; security protection, etc. Therefore, the transition to CE should enhance the quality of international relations. The highest level of such cooperation can be achieved as a part of creating new (regional) areas of economic integration, taking into account the nature of CE and the proposed production models. The intensification of international cooperation, being new in its content, during the transition to CE, could be viewed as the next wave of globalization, which, in many aspects, will be related to the sphere of knowledge and innovations, and should become a powerful driver of development. In this respect, it is fair to ask: Is the global CE, i.e., the cycle closed on a planetary scale, possible? Apparently, it is possible in future, but, for this purpose, it is necessary not only to seek minimization of the use of primary resources, but also address a complex of problems of their fair distribution, global unity in combating climate changes, solidarity in addressing social problems, coordination of the policies of CE building. It can be achieved exceptionally based on the planetary thinking, mutual respect for the interests of the countries and confidence building. This should be the focus of the new trade policy, technological and industrial cooperation as well as the development assistance policy. It is necessary to ensure strong, inclusive and fair global recovery.

6. Discussion and Practical Recommendations

Therefore, the transformation of social production systems as a basis for a new economic paradigm deserves the priority attention. So far, the discussion on CE looks non-systemic, but, at this initial stage, the pluralism of opinions is helpful. The most important thing is to achieve unity on the issues of the need to change the models of production systems in the context of CE building and to develop different thinking, which will enable to go through "reshaping" the established paradigm of "linear economy". This can be implemented only through the destruction of the old and reconstruction of the new understanding of the role and configuration of the social production system.

The discussion should be focused on a number of high-priority issues, including: transformation sequence of production systems (depending on the level of the country's industrial development); development of the mechanisms for transition to CE, new institutional configuration of the economy; support to technological, digital and organizational innovations, which form a new production structure; support to entrepreneurs, training of specialists; creation of new industrial areas and clusters of new type, etc. In particular, this is related to the developing countries that have no experience in industrialization. They need an access to technologies, development of human capital and entrepreneurship culture.

The more general issues of CE building are: building the efficient markets based on the economic relations, establishing traditions instead of dominant directions; counteracting new types of monopolization; correction of imbalances; realization of the supportive and initiating role of the State, etc. The biggest problems of the transformation of production system are associated with the creation of the large industrial production, which can be only partially downscaled (on account of the distributed manufacturing of the components). That is, initially, a part of the sectors will still have a domination of large enterprises. However, they should meet the new environmental and social requirements. Such large manufacturing complexes can in theory be the subject of international cooperation.

The practical measures for the launch of a new production system comprise: 1) creation of information

infrastructure for production networks; 2) creation of digital platforms for the cooperation between producers and consumers; it is related to ensuring interregional and international cooperation; 3) development of industrial parks and incubators for new production. One of the major challenges is to support small and medium enterprises, which should become the drivers of new approaches and innovations.

8. Conclusion

Modern situation in the global economy, associated with the prolonged recession and crisis due to COVID-19, should become a turning point. Trying to eliminate the acute problems of the existing economic paradigm (consumption growth, imbalances, predominance of financial sector, stimulation of demand, irrational economic exchange between the countries), it is proposed to lay emphasis on the transition to the closed local manufacturing cycles in the context of CE building. Among all other things, it should include the integration of the models of flexible individualized, distributed (associated) and “lean” manufacturing; for this purpose, the required technological capabilities are available today. First of all, the emphasis should be laid on the human development, creation of new opportunities for self-realization, creative labor, and high-quality jobs. This will have considerable advantages in terms of addressing economic and social problems as well as enhancing the quality of economic growth. CE building and transition to the closed local manufacturing cycles will have a great impact on the volumes and structure of international trade, including trade strengthening by knowledge (development of digital designs of products). At the global level – it can become a basis for the reconstruction of the whole world economy and ensure a strong, inclusive and fair recovery. Therefore, CE building will require an intensification of international cooperation in a number of sectors and revision of the policy related to assistance to the developing countries. The proposed ideas may serve as a basis for further academic studies and development of practical projects. In the future papers, it is expected to provide rationale for the concept of digital platform for CE.

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DETERMINANTS OF DIGITIZATION IN SMES*

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Abstract. The aim of the study is to present the conditions for introducing digitization in enterprises of the Polish SME sector, with particular emphasis on the changes brought about by the pandemic. The study analyses the degree of digitization which has taken place in the Polish economy in comparison with the EU average, with particular emphasis on SMEs, by making recourse to the Digital Economy and Society Index (DESI). This study presents the results of my own research on the determinants of digitization in enterprises. The subject of the research was a group of enterprises classified as SMEs in Poland. The survey was conducted in March 2021 using electronic tools in the form of an online survey. After substantive and logical verification, 120 questionnaires were selected for further analysis. The analysis of enterprises from the SME sector showed that over 44% of enterprises operate on the basis of action plans not exceeding one year. This type of planning was particularly common in micro-enterprises employing up to 10 people and running a service activity. Digitization acted as an important process in the activities of the analysed enterprises. Every fifth surveyed enterprise had plans to invest in software and digital solutions for enterprises; and wanted to implement these plans within the next year. The most common area of activity and implementation of digital solutions was sales and distribution. This was due to the need during the pandemic to build new distribution channels for products or services through the increasingly important e-commerce market. Research has shown that the Covid situation has led to significant changes taking place in the economy of enterprises. More than half of the analysed enterprises indicated a lack of financial resources as a barrier when introducing cloud solutions.

Keywords: outsourcing; sustainable development; core competencies; company management

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1. Introduction

Given the changing economic environment, enterprises have had to adapt to the standards of new digital reality. in order to make decisions, they require digital tools that are essential for managing an ever-increasing amount of data and the carrying out of analysis. The new business support tools are mainly digital (Villa & Taurino, 2019; Oliveira et al., 2021). This means that enterprises must become familiar with digital solutions, as over time they will not be able to communicate in a fluid and effective manner with either suppliers or customers (Genest & Gamache, 2020; Ardito et al., 2021).

Many enterprises are still operating in a state of uncertainty; and postponing decisions when it comes to digitalisation expenditure, so it is worth stressing the necessity and benefits of digitization over the long term (Doyle & Cosgrove, 2019; Zheng et al., 2019). Enterprises must move from the old order of information flow in the physical dimension in the form of cash, checks, invoices, consignment notes, reports, meetings, calls to the new economic order, where information in all its forms is digital (Siedler et al., 2019; Ballestar et al., 2020). The modern economy is increasingly a digital economy that allows people to communicate with each other in order to optimize their potential (Gamache et al., 2019; Bouwman et al., 2019).

The current pandemic has shown how important digital resources are for a country's economy. Networks, connectivity, data exchange, artificial intelligence as well as basic and advanced digital skills support the economy and facilitate the functioning of enterprises. One of the few positive economic effects of the pandemic has been the increased awareness of the importance of digitization on the part of SMEs (Gavrila Gavrila & de Lucas Ancillo, 2021). Among the enterprises able to prosper during the pandemic have been those related to the use of digital technology. For most SMEs, the organization of work with the use of online tools has been of key importance (Oliveira et al., 2021). Even in industries that have been hit hard by the pandemic, such as transport and the entire automotive and service industries, digitization processes have accelerated, revealing new opportunities for business development by way of remote work organization. This has created a huge demand for products and services related to the digitization of processes (Ardito et al., 2021).

Digitization also has an impact on sustainable development (Bai et al., 2021; Oliveira et al., 2021; Kayikci, 2018; Korsakienė et al., 2014; Tvaronavičienė et al., 2020). Thanks to digitization, it is possible to smoothly transfer to work remotely from home in critical situations. Such challenges are created by the current epidemic situation. This affects the limited number of commuting, and thus reduces carbon dioxide emissions. In the business environment, digitization reduces the use of paper and reduces the use of chemicals related to document printing. It is then that the ecological awareness grows (Ghobakhloo, 2020; Vásquez et al., 2018; Isensee et al., 2020).

The aim of the study is to present the conditions for introducing digitization in enterprises of the Polish SME sector, with particular emphasis on the changes brought about by the pandemic. The study analyses the degree of digitization which has taken place in the Polish economy in comparison with the EU average, with particular emphasis on SMEs, by making recourse to the Digital Economy and Society Index (DESI). The results of my own research were also used in the carrying out of this analysis.

Information from the literature on the subject and a preliminary analysis of the available data of mass statistics provide the basis for the formulation of the following research hypothesis: that the crisis caused by the pandemic revealed a need to accelerate the digitization of enterprises, in spite of the fact that the crisis had restricted the financial resources required for its implementation.

The conducted research will significantly contribute to our perception of the low level of digitization of Enterprises in the SME sector in Poland. The findings here can be a useful source of information for developing effective business development strategies.

2. Literature review

The concept of digitization has been treated in various ways. It is a vague concept, defining various areas of social life, focusing on digital media and electronic communication. In the literature on the subject C. Dellarocas, consider digitization in terms of three features: creating value at the new frontiers of the business world; optimizing processes that directly affect the sum of customer experiences gained from contact with the enterprise or product; and building foundations supporting all business activities (Dellarocas, 2003). According to R.A. Schallmo and G. Williams, digitization means fundamental changes in the way that business operations are carried out and business models function, implemented on the basis of new knowledge acquired by digitization activities (Schallmo, Williams, 2018). On the other hand, M. Moore points out that the goal of digitization is to create and offer new value to customers, and not only to improve on, or ameliorate, that what they have already been in receipt of in terms of delivery (Mazurek, 2019; Balagué & Valck, 2013).

At the same time, the literature on the subject recognizes the potential of digitization, considering it a phenomenon that is able to revolutionize markets at the level of entire industries or sectors. And yet, as L. Zacher points out, digitization is a process that is bringing about radical changes at the level of tasks, professions, processes, organization; and the lives of people (Bartosik-Purgat, 2017).

Digitization conveys many benefits. It influences the efficiency, quality and stability of implemented processes, thus achieving a higher level of delivery. It also enables better control over operational activities and the effects of these activities. The benefits in the area of interaction with external stakeholders also include shorter response times and better customer service (Mazurek, 2019).

The digitization of enterprises is a means of achieving a more flexible and competitive production, one that is adjusted to the modern realities of the emerging digital world. This digital transformation is defined as the exploitation of new technology aimed at radically improving production and increasing the expansiveness of the enterprise (Emara & Zhang, 2021; Brozzi et al., 2021).

Although the digitization of enterprises is technology based, the concept of digital transformation is not so much about technology as it is about people. The conditions for a successful digital revolution in Polish SMEs has entailed changes in the following areas: infrastructure, business environment and digital competences of entrepreneurs and employees (Śledzińska et al., 2015).

R. Sobiecki draws attention to the interdependence of the digitization of enterprises with the fourth industrial revolution (Poniatowska-Jaksch & Sobiecki 2016). It is also referred to as Industry 4.0 and it has contributed to the introduction of enormous changes in technologies that form the basis of the activity of a modern enterprise. Whereas R Sobiecki confers on the structure of Industry 4.0 such elements as: cloud computing, Big Data, the Internet of Things, and various types of autonomous solutions. One of the key building blocks of the Fourth Industrial Revolution, however, has been digitization (Poniatowska-Jaksch & Sobiecki 2016).

Research conducted by Deloitte shows that there has been a shift from the traditional approach to the Enterprise as a closed entity with a rigid organizational structure, towards the development of organizational systems and networks that will be both flexible and agile. This has been done by replacing rigid, hierarchical structures with networks of teams authorised to take action (Deloitte, 2017).

According to D. Tapscott, changes in management methods caused by digitization, accompanied by the development of information technology and computer networks, trigger a multi-layer transformation of the economic landscape, taking place in five main areas: accessibility of partners, new interdependencies, inter-organisational metabolism, cooperative competencies, inter-organization value creation (Tapscott, 1998).

K. Bondyra has noted that micro, small and medium-sized enterprises in Poland, which constitute the backbone of the economy, have not developed enough to implement profitably industry 4.0 solutions, to include process automation (Kolla et al., 2019; Bondyra & Zagierski, 2019). Due to a lack of human resources, SMEs are often lacking in terms of financing, planning, control, training and the adaptation of information systems (Eller et al., 2020; Kumar et al., 2020; Amaral & Peças, 2021).

According to K.C. Laudon and J.E. Laudon, the ongoing digital transformation of enterprises is all about remote work opportunities (employee mobility), online activities (e-business, e-commerce), low transaction costs, and coordinated activities; all enabled by the digitization of the information sent and the possibility of providing services by electronic means (e-payments), not to mention the possibility of confirming the trustworthiness of documents (Laudon & Laudon, 2000; Vásquez et al., 2018).

The importance of digital techniques in the case of enterprises is also emphasised by C.K. Prahalad and M.S. Krishnan, according to whom, the transformation brought about by digital technologies, ubiquitous connectivity and globalization has radically changed enterprises, particularly in terms of the way they create value. This has necessitated the use of resources from various sources of the global ecosystem. This means that accessing resources, and not having them, has become the focus (Prahalad & Krishnan, 2008). The size of an enterprise and the size of its possessed resources are no longer decisive. Network affiliation is now of key significance.

There is a gap in the currently available literature concerning the determinants of digitization in enterprises during the Covid 19 epidemic. This situation makes it necessary to adapt to new requirements both on the part of enterprises from the SME sector and organizations cooperating with them.

3. Material and methods

Analysing the literature on the subject and numerous publications, reports and studies, one can find many ways for researching and evaluating the digitization of the economy. Proposed methodologies are varied, with differing research needs. Further considerations should be led by those measures that are used in cyclical research with the use of the DESI index (Rafael et al., 2020).

The DESI index measures and evaluates five categories of the digital economy: connectivity, human capital, citizen use of internet services, digital technology integration by businesses and digital public services, with a total of 34 indexes. Their compilation in the form of a report allows for the identification of priority areas of the digital economy of the EU states that require specific actions and investments. (Ulas, 2019; Khayer et al., 2020). To achieve the goal of this study, it is important to analyse the results in the field of digital technology integration, which assesses the degree of digitization of enterprises and e-commerce. The measured area of DESI digital technology integration covers in detail:

- electronic information exchange (% of enterprises),
- social media (% of enterprises),

- Big Data (% of enterprises),
- cloud (% of enterprises),
- SMEs selling online (% of SMEs),
- e-commerce turnover (% of SME turnover),
- cross-border online sales (% of SMEs) (DESI Report, 2020).

This study presents the results of my own research on the determinants of digitization in enterprises. The subject of the research was a group of enterprises classified as SMEs in Poland. The criterion for the selection of objects was the fact of running an enterprise classified as an SME and the willingness to fill in the questionnaire. The survey was conducted in March 2021 using electronic tools in the form of an online survey. The survey questionnaire consisted of single or multiple choice questions. For some questions, it was also possible to provide a comment on the question posed. After substantive and logical verification, 120 questionnaires were selected for further analysis. The enterprises were represented by persons holding managerial or specialist positions.

The studied group was diversified in terms of the number of employees. The group of micro-enterprises employing up to 10 people was the most numerous, constituting 52.5% of all respondents. Enterprises employing from 11 to 50 people accounted for 28.3%. The relatively smallest group were enterprises employing 51 to 250 people, constituting 19.2% of all respondents. This was due to the similar structure of individual enterprises in the SME group in Poland.

Another factor differentiating the surveyed entities was the type of business. The dominant group were entities running service activities – it constituted 64.2% of the surveyed entities. Processing activity was conducted by 18.3% of the analysed entities. The group of entities conducting industrial activity was only slightly smaller – it accounted for 17.5% of all analysed entities.

When analysing the entities according to the location of the enterprise's offices, one can notice a clear advantage enjoyed by entities operating in cities of up to 100,000 residents. They constituted 55.0% of all surveyed enterprises. The share of enterprises located in cities with a number from 100,000 to 500,000 residents accounted for 20.0% among analysed entities. 14.2% of enterprises were located in rural areas. The least numerous was the group of enterprises with their headquarters located in cities with more than 500,000 residents. Their share was 10.8% of all surveyed entities.

4. Results and discussion

The DESI Index allows for a comparison of the digital maturity of individual EU States. Their progress with regard to digitization using this index in 2015-2020 is shown in Figure 1.

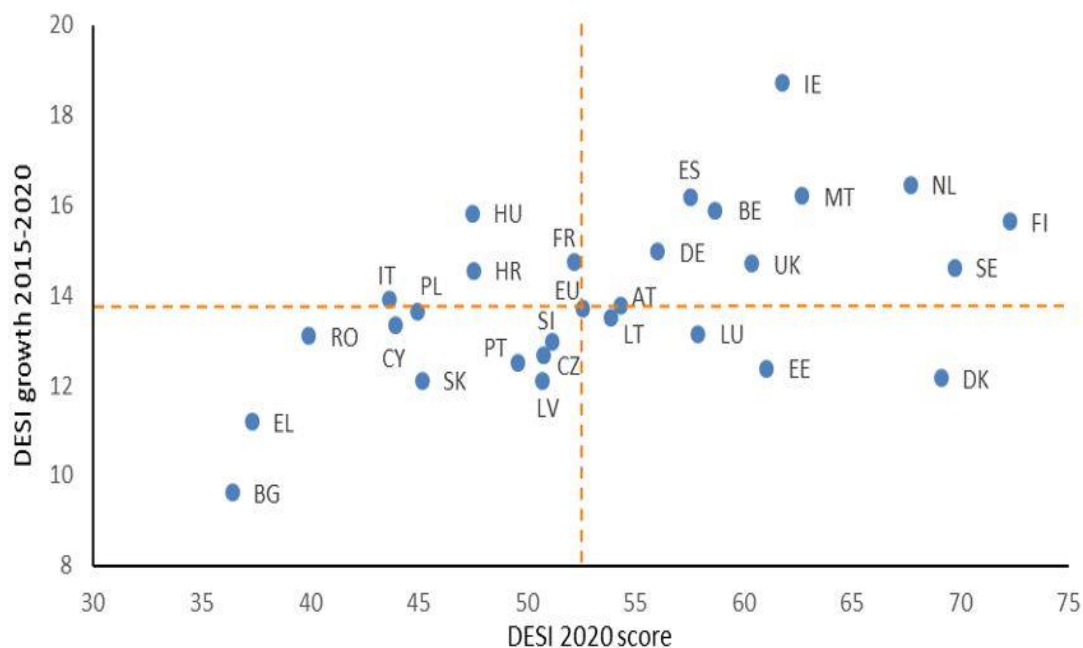


Fig. 1. Index of Digital Economy and Digital Society – Progress Made by Member States in the years 2015-2020

Source: The Digital Economy and Society Index (DESI) 2020, European Commission, [in:] <https://ec.europa.eu/digital-single-market/en/desi>

The most significant progress has been made in Ireland, followed by the Netherlands, Malta and Spain. These countries also perform well above the EU average as measured by the DESI score. Finland and Sweden are leaders in the overall digital performance of economies and societies, but in terms of the progress made over the past five years, they are slightly above average, as are Belgium and Germany. Denmark, Estonia and Luxembourg show relatively low levels of digitization progress in the last five years, despite remaining among the group of EU states with high scores in the overall DESI ranking.

Poland belongs to the group of countries with low scores in the Digital Economy and Society Index, despite the fact that expenditure on digitization in Poland has increased by 100% over the course of the last decade. In 2020, Poland achieved a score of 45.0 points, higher than that achieved in 2019. However, this result is still below the European average of 52.6 points. Achieving a higher score resulted a jump of two ranking places, from 25th to 23rd position (Table 1).

Table 1. Digital Economy and Society Index for Poland in the years 2018-2020

Year	Place	Score	UE Average
2020	23	45,0	52,6
2019	25	40,7	49,4
2018	24	37,7	46,5

Source: Author's research based on DESI Poland (2020)

With regard to the integration of digital technology in business operations, Ireland, Finland and Belgium scored the highest. The lowest was Hungary, Romania and Bulgaria. In this ranking of 28 countries, Poland ranks 25th and is below the EU average (Figure 2).

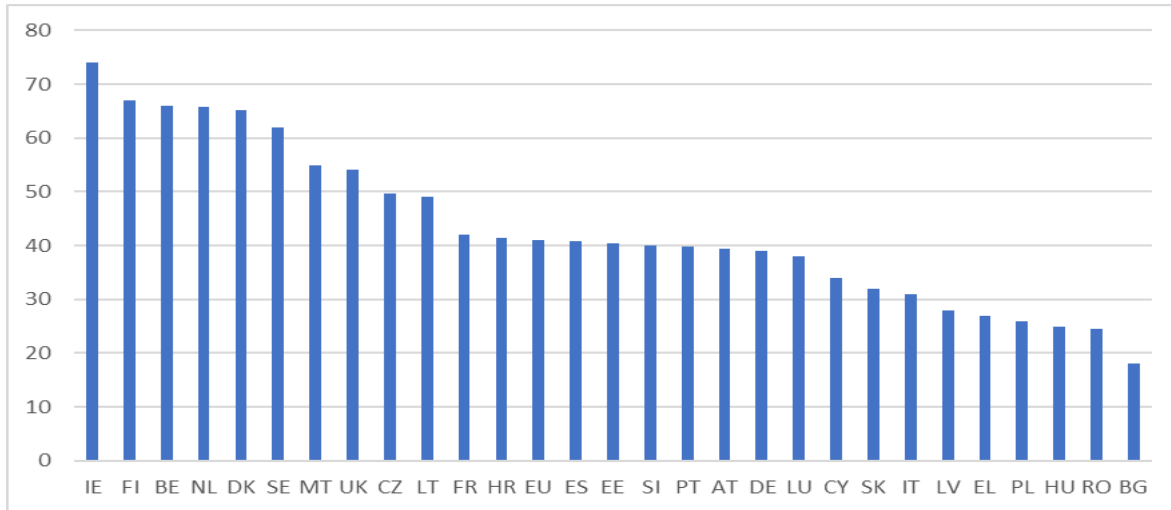


Fig. 2. Digital technologies integration for European Union based on DESI Report for 2020
Source: DESI Report (2020).

According to the DESI report, data on the integration of digital technologies by European Union enterprises varied widely depending on the size of the enterprise, sector and EU state. In 2020, 38.5% of large enterprises relied on advanced cloud computing services, and 32.7% used Big Data solutions. The vast majority of SMEs declared that they did not use these solutions. 17% of SMEs use cloud services and 12% use Big Data. According to the report, 17.5% of SMEs sold their products on the Internet (an increase of 1.4% when compared to 2016).

Table 2 depicts the digitization process results achieved by the Polish SMEs in the years 2018-2020.

Table 2. Digital technology integration according to DESI for Poland in the years 2018-2020

Year	Place	Result/Score	EU average
2020	25	26,2	41,4
2019	26	23,5	39,8
2018	26	21,0	37,8

Source: Author's research based on DESI Poland (2020)

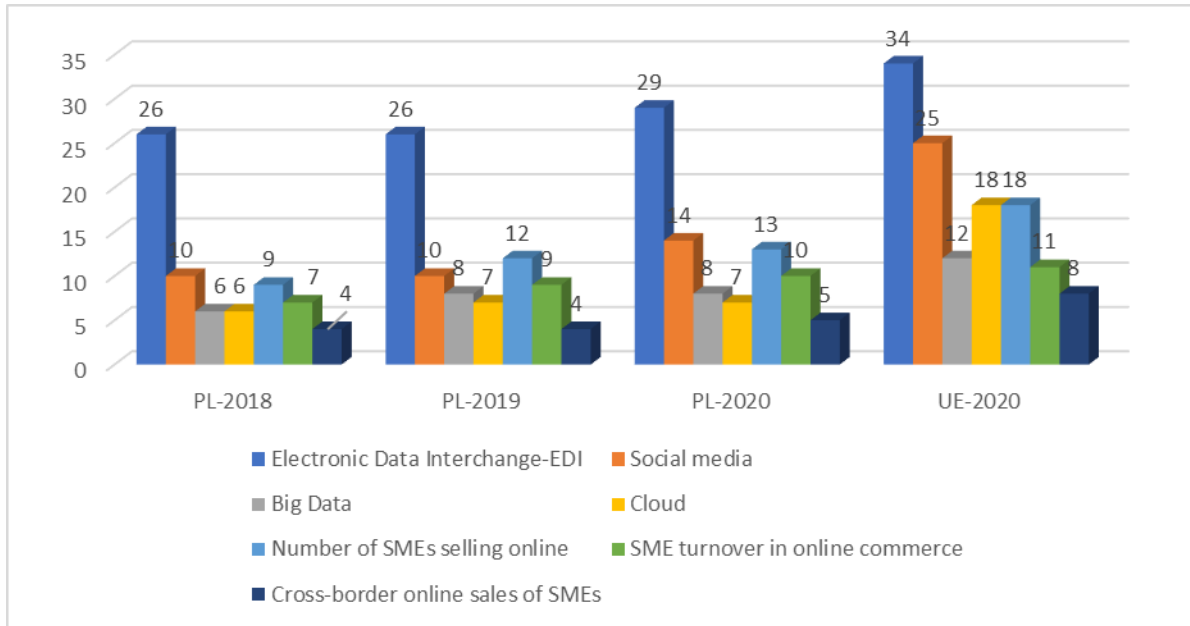


Fig. 3. Dynamics of changes in digital technology integration by DESI for Poland (compared to the previous year in %)
Source: Author's research based on DESI Poland (2020)

Polish enterprises are increasingly taking advantage of the opportunities offered by e-commerce (Figure 3). As the report indicates, 13% of SMEs sell online, which is an increase compared to the previous year, but still places Poland below the EU average of 18%. Only 5% of all SMEs sell abroad online to customers in other EU countries. 14% of enterprises use social media (the EU average is 25%), 7% use cloud services and 8% analyse Big Data.

This means a need for significant improvements in the area of digitization, especially in the field of electronic data sharing, the use of social media, the use of Big Data solutions, as well as analyses and solutions based on the data cloud. By using digital technologies, businesses can increase efficiency, achieve lower costs and better engage with customers and business partners (Milisavljevic-Syed et al., 2020; Khayer et al., 2020)

When introducing digitization to an enterprise, the timeline for preparing development plans is important. It is only with several years of planning that we can speak of a proper assessment of the effects of digital solutions. The research carried out in March 2021 showed that the approach of enterprises to planning further development is varied. Generally, most of the analysed enterprises prepare their development plans with projections for 6-12 months (29.2% of indications). Less frequently, plans refer to development planned for 1-2 years or 2-5 years (21.6% and 20.8% of indications, respectively). The share of enterprises planning their activities well in advance (over 5 years) is only 14.2%. The same share concerned enterprises that operated based on ongoing planning for a maximum period of up to 6 months. This situation varied depending on the size of the enterprise (Figure 4).

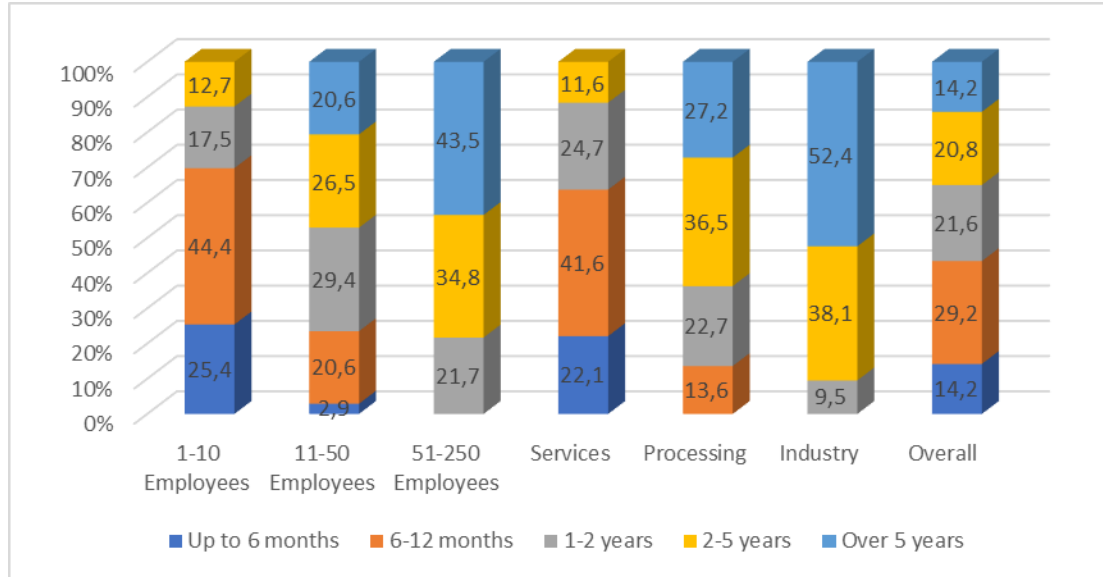


Fig. 4. Outlook on Enterprise development planning.
Source: Author's own-study based on research outcomes

Micro-enterprises employing up to 10 people in development activities focused on the short term timeline. Over 69.8% of enterprises belonging to this category planned development activities within one year. There were no enterprises within this group planning for more than 5 years. In relation to the analysed enterprises, a correlation was observed that with the increase in the number of people employed, the period of drawing up development plans was longer. In the group of enterprises employing 11-50 people, planning for over 5 years was the share of 20.6% of economic units. The same type of relationship in the case of enterprises employing 51-250 people was to be seen in 43.5% of enterprises.

Another factor that differentiated the planning period was the type of business. In service enterprises, short-term planning of up to one year prevailed. This type of approach was characteristic for 43.7% of enterprises. Processing enterprises planned the development over the longer term. For this group the share of enterprises planning their development for more than two years was 63.7%. An even greater share of this form of planning took place among industrial enterprises, constituting 90.5% of entities.

Realistic plans for investments in software for enterprises in the coming year were also assessed (Figure 5).

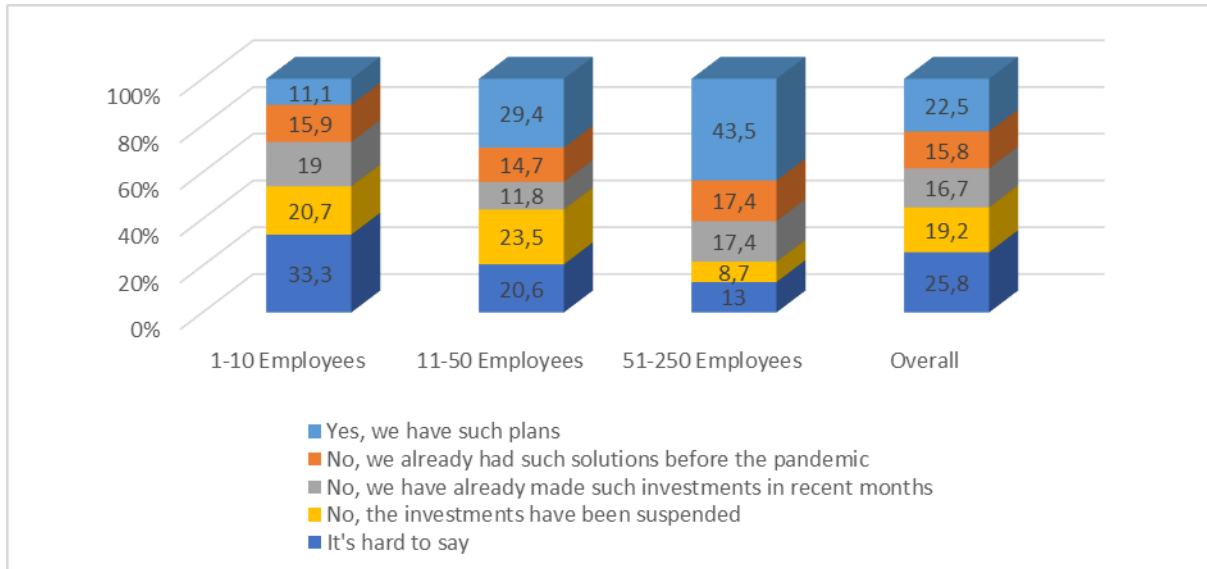


Fig. 5. Plans for investments in digitization for companies in the coming year

Source: Author's own-study based on research outcomes

Digitization has acted as an important process in the activities of the analysed enterprises. Every fifth (22.5%) surveyed enterprise had plans for investments in software and wanted to implement them within the coming year. 15.8% of enterprises declared that they had implemented such plans even before the coronavirus epidemic. For 16.7% of enterprises, digitization turned out to be a great help during the epidemic and it was the factor that contributed to investments in this area. At the same time, every fourth enterprise did not yet have specific plans for introducing digitization into the sphere of their operations, but did not make any reservations that it is against such activities. For 19.2% of enterprises, the effects of operating in the new economic realities were so severe that they were forced to suspend investments in the area of digitization.

The relatively most common sphere of investment in digitization is that of enterprises with 51 to 250 employees. Over 78% of this group of enterprises has either already made such investments or planned to carry them out within the next/coming year. Such an attitude to digitization was shared by over 55% of enterprises employing from 11 to 50 employees, and in almost 40% in the case of micro-enterprises.

The research results published in the report "Enterprises in the pandemic era" confirm that Polish entrepreneurs rely on digital tools to meet the current and upcoming challenges. According to these studies, 70% of enterprises in Poland have already made plans or plan to purchase software for enterprises in the coming months. However, 27% had this kind of software before the pandemic broke out. Of these, 15% bought software/technological solutions in recent months, and 28% plan to make such purchases in the near future (Report: Enterprises in the pandemic era, 2021).

Respondents from enterprises that have already invested in digitization or are planning to do so in the future were asked about the directions of their activities (Figure 6).

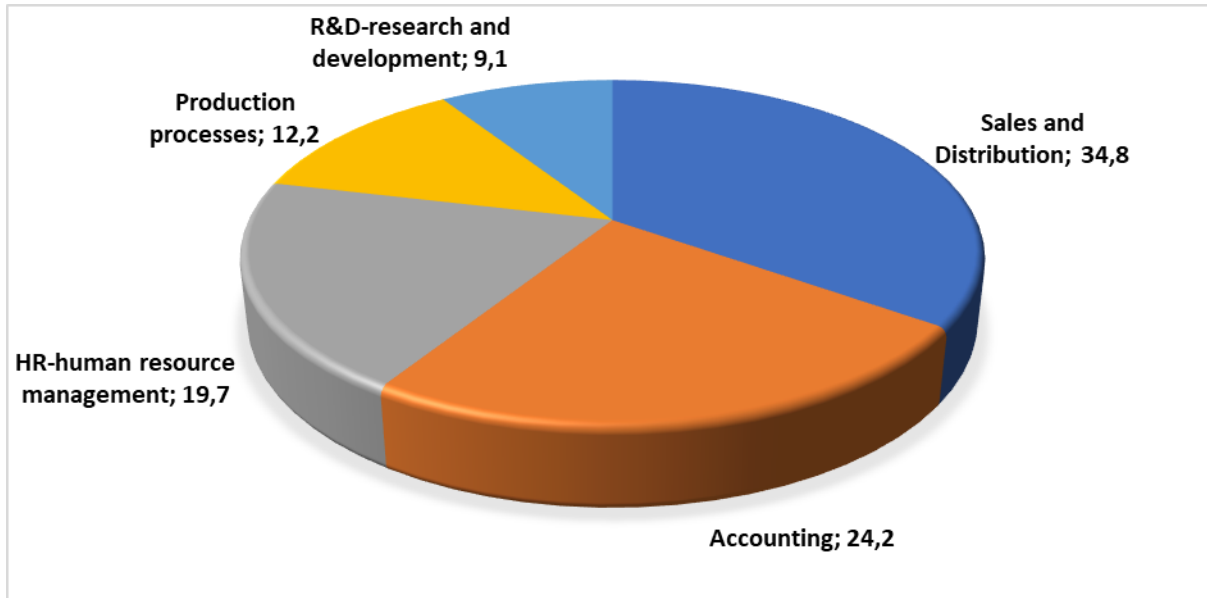


Fig. 6. Spheres of occurrence and implementation of digital solutions (% share)

Source: Author's own-study based on research outcomes

As the analysis of the surveyed enterprises showed, the most common area of digital applications was sales and distribution (34.8% indications). The coronavirus epidemic made it necessary to build new distribution channels for services or products through the increasing importance of the e-commerce market. This form of digitization was chosen most often by manufacturing and service enterprises employing less than 50 people. The second and third place among the areas of digital activity was taken by accounting (24.2% of responses) and human resources management (19.7% of responses). Production processes and research and development areas turned out to be much less frequently chosen areas in terms of the occurrence and implementation of digital solutions. The share of responses amounted to 12.2% and 9.1%, respectively. This type of activity was indicated mainly by processing and production enterprises employing over 50 people located in large urban centres.

An important issue was also the analysis of the benefits of introducing digital solutions to enterprises (Figure 7). Here, a maximum of two answers could be given.

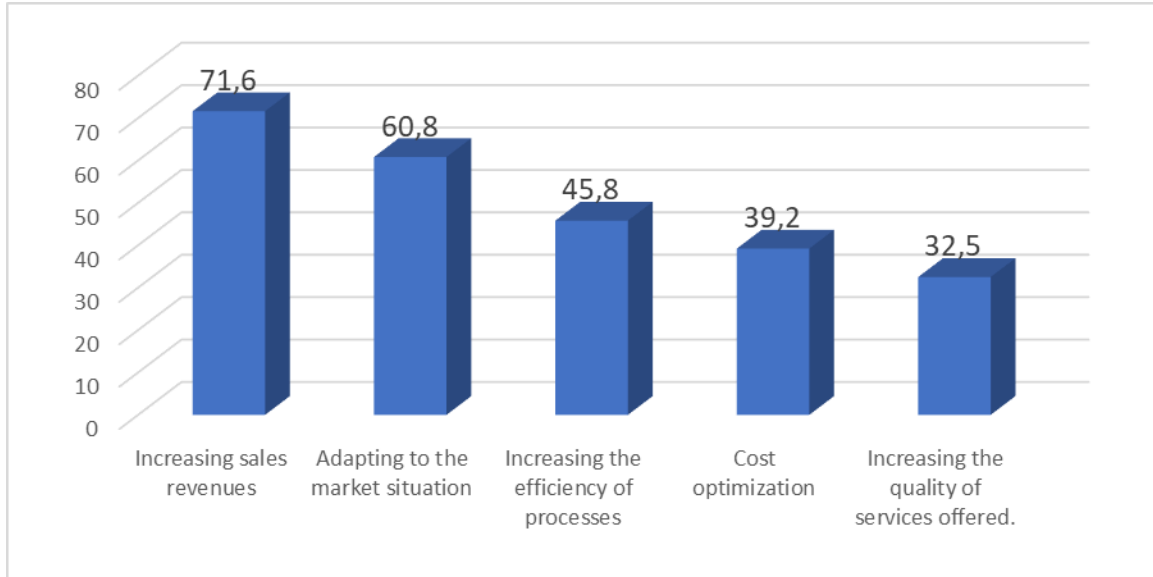


Fig. 7. The benefits of introducing digital solutions.
Source: Author's own-study based on research outcomes

Business decisions about the expected benefits of digitization have been very practical and in the main closely related to economic conditions. The main benefits include striving to increase the enterprise's revenues (71.6% of responses). The willingness to adapt to the market situation turned out to be an equally important benefit. This type of conditions was directly related to the epidemiological situation in 2020 and the drive to transfer significant areas of activity to the Internet. The increase in the efficiency of processes, mainly in processing and production enterprises, was also given as a significant reason for introducing digitization (45.8% of responses). The next places in the hierarchy of importance are cost optimization and increasing the quality of the products and services offered. The last indicator in particular translates into an increase in customer service standards and an improvement in customer relations (Mittal et al., 2018; Niemeyer et al., 2020).

Decisions regarding investments in digitization in 2020 were significantly influenced by changes in the volume of revenues (Figure 8).

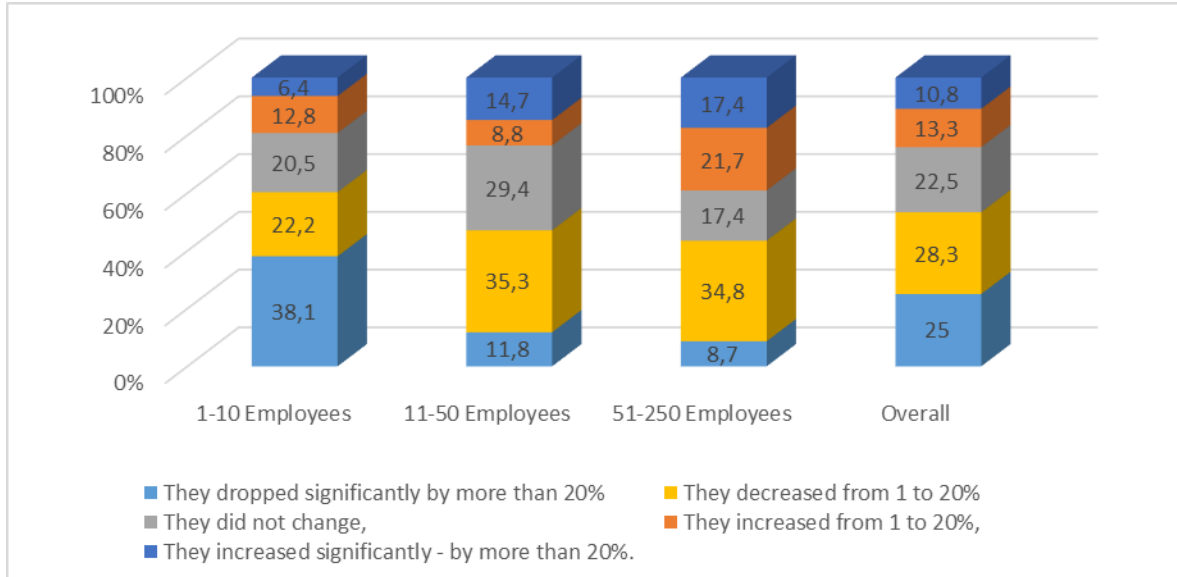


Fig. 8. The scope of changes in the enterprise's revenues in 2020
Source: Author's own-study based on research outcomes

The epidemic period brought about significant changes in the volume of revenues of the analysed enterprises. As research has shown, in every fourth of the analysed enterprises, revenues dropped by more than 20%. The decrease in revenues up to 20% occurred in 28.3% of enterprises. The unchanged value was recorded in 22.5% of entities. Only 10.8% of the analysed enterprises indicated increases in revenues by more than 20%.

The size of the enterprise influenced the shaping of the economic situation. In entities employing from 51 to 250 people, a decrease in revenues by more than 20% occurred in 8.7% of enterprises. The same situation in the group employing 11-50 people occurred in 11.8% of entities, and in the case of micro-enterprises in as much as 38.1% of enterprises. This had a direct impact on the investment situation in the Digital economy as well.

Research conducted by the Humanites Institute also points to the relationship between the level of digitization of business processes and the generation of revenues (Report: Barriers and Trends. Technological Transformation of Enterprises in Poland, 2021).

They indicate that among enterprises with a high level of digitization, 27% declared an increase in revenues, whereas 49% declared a decrease. In enterprises not particularly advanced in this area, 66% of enterprises declared a decrease in revenues, and an increase was noted by 20%.

Cloud solutions are a specific area of digitization investments (Peillon & Dubruc, 2019; Ranke et al., 2020). Here, however, there are barriers, and they are of a varied nature (Figure 9).

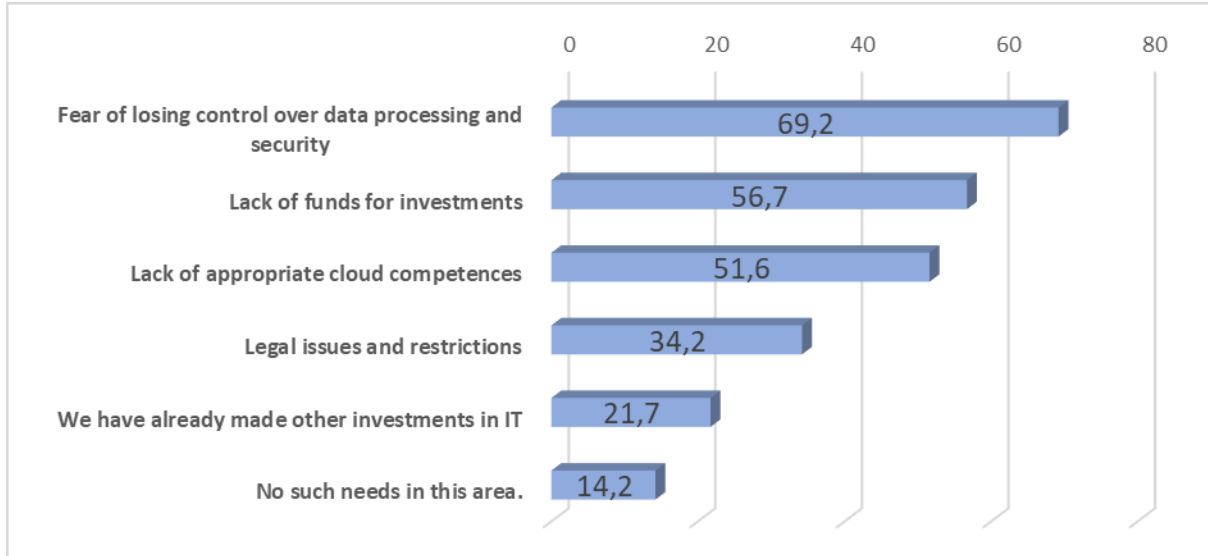


Fig. 9. Reasons for the lack of investments in cloud solutions

Source: Author's own study based on research results.

Among the reasons for the lack of investments in cloud solutions, the respondents most often indicated a fear of losing control over the transmitted data. Such a situation was indicated by as many as 69.2% of respondents. An equally important reason was the lack of funds for investments (56.7% of responses). Only 21.7% of the analysed enterprises admitted that they had already made such investments.

Despite the above-mentioned limitations in terms of investments in cloud solutions, the authors of the report "Digitization, cloud and new technologies. SMEs on the way to digital transformation," indicate that the process of cloud adaptation among small and medium-sized enterprises has clearly accelerated, and 36% of enterprises from the SME sector have successfully completed the implementation of such solutions. The most important benefit of the cloud has been enterprises' ability to focus on their core business and achieve access to new, innovative technologies, without the need of investing in their own IT infrastructure (Report: Digitization, cloud and new technologies. SMEs on the way to digital transformation, 2021).

The same research showed that 23 % of polish enterprises from the SME segment want to increase expenditure on IT, and as much as 41 % plans to maintain the current budget for digitization. 1/3 of enterprises define their transformation towards the network as advanced, whereas every fifth entity is already in the phase of implementing digital solutions.

Conclusions

The analysed DESI indicator shows that Poland needs to accelerate its efforts so that enterprises may start availing of the possibilities of digital technologies. In the long term, the measures taken should have positive effects through better connectivity, the higher digital skills of society and workers, and the greater involvement of businesses in the digital economy. Unfortunately, Poland is still lagging behind in this field, although there has been a stable increase in this area as compared to the EU average.

In the coming years, this area requires further development and must be integrated with other dimensions, e.g. with the availability of high-speed Internet connections, affordable devices and services of professionals from the ICT sector, and also be supported by development activities stimulated at the national level by public administration.

The analysis of enterprises from the SME sector showed that over 44% of enterprises operate on the basis of action plans not exceeding one year. This type of planning was particularly common in micro-enterprises employing up to 10 people and running a service activity. This was partly due to the specific conditions in which economic entities had to operate and the need for quick adjustments to the changing situation.

Digitization acted as an important process in the activities of the analysed enterprises. Every fifth surveyed enterprise had plans to invest in software and digital solutions for enterprises; and wanted to implement these plans within the next year. In the group of enterprises employing from 51 to 250 people, over 75% entities have either already made such investments or plan to carry them out over the course of the coming year.

As shown by the analysis of the surveyed enterprises, the most common area of activity and implementation of digital solutions was sales and distribution. This was due to the need during the pandemic to build new distribution channels for products or services through the increasingly important e-commerce market. The benefits were very practical, and in the main closely related to economic conditions. Among the benefits of using digitization, the most frequently mentioned were the desire to increase the enterprise's revenues and a willingness to adapt to the market situation. These types of conditions were directly related to the epidemiological situation in 2020 and the drive to transfer significant areas of activity to the Internet.

Research has shown that the Covid situation has led to significant changes taking place in the economy of enterprises. In every fourth of the analysed enterprises, revenues dropped by more than 20%. An up to 20% decrease in revenues occurred in 28.3% of enterprises. This must have had a negative impact on investments also in the area of digitization. More than half of the analysed enterprises indicated a lack of financial resources as a barrier when introducing cloud solutions. This confirms the hypothesis presented in the introduction.

The COVID-19 outbreak has resulted in a sharp and significant decline in transport, production and consumption. At the same time, thanks to the development of digitization, it has become possible to work and learn remotely. It turned out in practice that information and communication technologies (ICT) play an important role in the life of modern people. These technologies become an inseparable part and accompany him in every area of life. They also affect the replacement of energy-consuming working methods and lifestyles with more ecological ones, in line with the idea of sustainable development.

It is to be hoped that the research and analysis of issues related to the functioning of digitization in enterprises from the SME sector will allow at least a part to fill the existing gap in the literature. Aspects related to the use of digitization introduced in the era of the Covid 19 epidemic should be permanently included in the strategies of operations of enterprises from the SME sector. Increasing the support for new digital and innovative business models, and the further encouraging of digitization, would help enterprises to enhance efficiency, as well as enabling SMEs to become both more efficient and more competitive.

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ACCOUNTING AND TAX ASPECTS OF EXPENSES IN DOUBLE ACCOUNTING IN SLOVAKIA*

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Abstract. Accounting aspects of costs are defined in the Act on Accounting and Accounting Procedures, tax aspects resp. tax deductibility of costs are defined in the Income Tax Act. The aim of the article is to point out the accounting and tax aspects of costs for public administration entities as well as for business entities in the Slovak Republic. In fulfilling the set goals, the scientific method of comparison is used, which will help to identify the differences and similarities of tax and accounting aspects of cost accounting in the double-entry bookkeeping system. The comparison method will help to identify the tax and accounting aspects of cost accounting in the double-entry bookkeeping system in the Slovak Republic.

Keywords: costs; expenses; accrual settlement; taxes; tax transformation

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1. Introduction

Costs play a crucial role in an organization's economy because each managerial decision is based on a cost-benefit comparison. Costs that are recorded and reported in the accounts and financial statements represent the accounting aspect of the concept. At present, however, the tax aspect, which affects the finances of the state, is also important, and therefore the tax policy that determines the tax aspects in double-entry bookkeeping is in line with the needs of the state and also in the overall context of the European Union. In this article, we will focus on comparing these 2 aspects.

2. Literature review

In literature in this area, no special attention is paid to the comparison of these 2 aspects, which we deal with in the presented article (Henrique et al., 2020; Hajnal, 2021; Hillebrandt, Leino-Sandberg, 2021; Patel, Harrison, 2021; Polzer et al., 2021). In accounting, we report taxes as costs by type, which represent a burden for entrepreneurs and serve to signal the amount of output and sales and control expected contributions to the state budget. These are mainly income taxes, which record:

- income tax payable,
- deferred tax on income from ordinary activities,
- extraordinary activity tax payable,
- deferred tax on extraordinary activities and additional income tax levies.

Thus, it is a tax liability for the tax accounting period, or a deferred tax liability until future accounting periods. The amount of taxes payable is recorded as a liability to the tax authority (tax office). The amount of deferred income taxes is the difference between the tax base and the pre-tax profit, ie the difference between accounting and tax costs. Such an understanding has an impact on the receipt of taxes in public finances in terms of time, which sometimes causes problems in the revenue side.

Reporting deferred tax liability is important information (for both the entity, and the public authorities) that should be presented in the financial statements of companies (Jensen, 1986; Tancosova, 2014; Lee et al. 2015). The basic structure of financial statements is defined in International Accounting Standards. The authors state, in the given book, that incorrect presentation of deferred tax liability can lead to the application of basic accounting principles (Bernstein, Wild, 1999).

The financial statements and the link to the profit and loss account must also present the tax liability, which must be transparent and calculated in time. The connection and acceptance of international accounting standards IAS/IFRS is obvious and it also compares the financial statements with the US - US GAAP standards (Mládek, 2005, Epstein, Mirza, 2006; Kieso, Weygandt, 2007; Šuranová, Škoda, 2007; Drury, 2017).

The harmonization of accounting is necessary, because entities carry out business activities without borders, thus reporting tax liability in the financial statements should be harmonized with international accounting standards. Of course, the calculation and rate of taxes are individual in each country. Again, it is the harmonization of accounting and from the perspective of international compatibility and thus the possibility of comparison accounting world (Gernon, Meek, 2001).

The article is the first part of our research task, in which we will deal with:

- Legislation of the Slovak Republic in the area of tax policy management and elements of tax management from the point of view of financial administration – i.e. income tax, extension to motor vehicle taxes, also indirect taxes.
- Comparison of laws in individual areas of financial control, in which we consider it necessary to perform a partial financial analysis, associated with the analysis of the underlying information system.
- The methods of solution will be: statistical methods-analysis, synthesis, comparison with evaluation, obtaining factual material in the way: face to face, questionnaires. This is an important area of creating the economic result, which is the main part of tax revenues and thus the fulfillment of state finances.

3. Accounting aspects of costs

Costs from the point of view of accounting are defined in Act no. 431/2002 Coll. on accounting as amended. (Foltínová 2007). The rules for cost accounting for business entities are contained in the measure of the Ministry of Finance of the Slovak Republic no. 23 051/2002-92 laying down the details of the procedures and general chart of accounts for entrepreneurs accounting in the double-entry bookkeeping system. For self-government entities, the measure of the Ministry of Finance of the Slovak Republic no. 16786/2007-31, which lays down similar details for budgetary organizations, contributory organizations, state funds, municipalities and higher territorial units (Farkaš 2020).

Costs show the monetary performance of consumption and wear and tear of assets and the consumption of borrowings in order to achieve revenue. This is a reduction in the entity's economic benefits during the period that can be measured reliably. The incurrence of an expense will create an opportunity, directly or indirectly, to reduce the entity's cash.

Costs in the double-entry bookkeeping system are charged to the profit and loss accounts of account class 5 - Costs. (Tumpach 2006). They have an increasing equivalent and are accounted for from the beginning of the accounting period. In this context, we distinguish between costs and expenses. While costs are charged to the income statement, expenses are, according to the Accounting Act, characterized as a decrease in cash or an increase in the cash equivalents of an entity and are recognized in the balance sheet accounts.

It means:

- Cost \neq expense (cost need not be an expense of money, for example, depreciation of fixed assets) (Riahi-Belkaoui 2000)
- Expenditure \neq an expense (the expense need not be an expense, for example, the purchase of a fixed asset)
- Expenditure = an expense (an expense is recognized as an expense, for example, when paying postage in cash from a cash register), or the expense may be equal to an expense of cash (for example, in the purchase of current assets in method B that is immediately consumed).

A comparison of the cost structure of business entities and self-government entities according to the general chart of accounts is given in Table 1.

Table 1. The cost structure by accounting groups

Business entities	Self-government entities
50 Consumed purchases	50 Consumed purchases
51 Services	51 Services
52 Personnel costs	52 Personnel costs
53 Taxes and fees	53 Taxes and fees
54 Other costs of economic activity	54 Other operating expenses
55 Depreciation and adjustments to fixed assets	55 Depreciation, provisions and adjustments from operational and financial activities and accrual settlement
56 Financial costs	56 Financial costs
59 Income taxes and transfer accounts	57 Extraordinary costs
	58 Transfer costs and costs from income payments
	59 Income taxes

Source: own processing based on measure of the Ministry of Finance of the Slovak Republic no. 23 051/2002-92 and 16786/2007-31

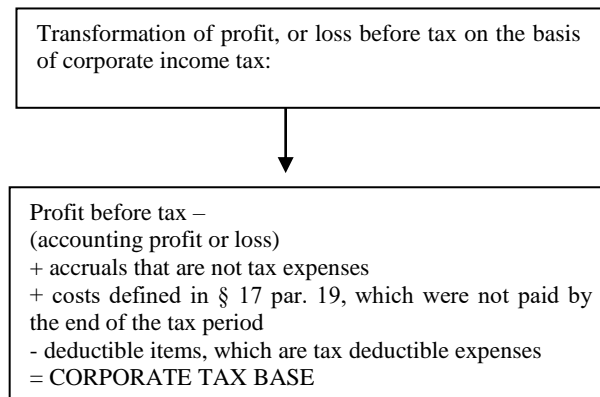
When accounting for costs for both monitored entities, accrued costs are applied in the accounts 381 - Deferred costs, 382 - Complex deferred costs and 383 - Deferred expenses. Accruals mean the application of the accrual principle, i.e. that costs, expenses, income and revenues are recognized in the accounting period to which they are temporally and materially related. The principle of accruality emphasizes the independence of accounting periods, which is important in quantifying the profit, or loss for the current accounting period. A micro-entity need not use accrual accounts in the case of insignificant and recurring accounting events that relate to the recognition of costs and revenues between two accounting periods, except in the case of an accounting for the accounting of grants and emission allowances.

4. Tax aspects of costs

The application of the accrual principle is very important in business entities accounting in the double-entry bookkeeping system, as they calculate the pre-tax profit according to the recorded costs and revenues. This quantified economic result is the basis for the calculation of the income tax base. They calculate income tax by transforming the pre-tax profit into an income tax base.

The transformation of the economic result means adding to the economic result non-tax deductible costs, which are defined in § 21 of Act no. 595/2002 Coll. on income tax, as amended, to analyze the costs that can be tax deducted only after payment according to § 17 par. 19 and deduct costs that are tax deductible costs under § 19 of the Income Tax Act.

The method of transformation of the pre-tax profit on the basis of corporate income tax is shown in picture No 1 below.



Picture 1. Transformation of profit or loss for tax purposes
Source: own processing

a) Eligible items - non-tax deductible costs are the following costs:

- representation costs,
- deficiencies and damages in excess of the compensation received,
- donations, including the residual value of permanently disposed of assets by donation,
- provisioning not recognized as a tax expense,
- creation of reserves,
- the purchase price of stocks of discarded goods,
- fees (commissions) for debt collection, exceeding 50% of the debt receivables,
- the cost of raising capital, including repayment of loans,
- costs of acquiring tangible assets, intangible assets and tangible assets excluded from depreciation,
- costs of paid-out profit shares, including profit shares of members of statutory bodies and other bodies of legal persons,
- costs of technical revaluation of fixed assets, - income costs not included in the taxable amount, - the cost of purchasing own shares in excess of the nominal value of the shares,
- creation of a reserve fund, a capital fund from contributions and other special-purpose funds in addition to the obligatory allocation to the social fund pursuant to the Social Fund Act,
- shortages and damages in excess of the compensation received, except for losses in retail sales on the basis of economically justified standards for the loss of goods set by the taxable person,
- corporation tax,
- taxes paid for another taxpayer,
- value added tax for value added tax payers,
- costs of personal consumption, including the costs of protecting the taxpayer and his relatives, the protection of the taxpayer's property which is not part of the taxpayer's business assets and the taxpayer's relatives,

Costs that the Income Tax Act calls as accruals are recorded in the accounts, but the Income Tax Act does not recognize them for tax purposes, so the entity - business entity adds them to the pre-tax profit or loss.

a) The second large group of costs for which tax deductibility is monitored are costs defined in the Income Tax Act only after payment by the end of the tax period. These costs are defined by the Income Tax Act in the provision of § 17 par. 19.

The most common costs of this type are :

- compensatory payments paid under Act 250/2012 on the regulation of network industries to their debtor,
- rental costs for the letting of movable property, immovable property, remuneration for the granting of a right to use or for the use of an industrial property object, computer programs (software), designs or models, plans, technical and other know-how and remuneration for granting the right to use or for the use of copyright; or the rights related to copyright, while these costs and fees paid to a natural person for the relevant tax period are recognized up to the amount of the accrued amount pertaining to the tax period, - the cost of marketing studies and other studies and market research of the debtor,
- fees (commissions) for mediation with the recipient of the service, even in the case of mediation on the basis of mandate agreements
- advisory and legal services,
- contractual penalties, late fees and interest on late payments to the debtor and severance pay to the beneficiary,
- sponsorship costs for a sponsor under a sports sponsorship agreement provided during the term of the sports sponsorship agreement,
- advertising costs provided to a non-profit organization.

b) Deductible items are costs that the Income Tax Act recognizes as a tax deductible expense. For example :

- tax depreciation of tangible and intangible fixed assets,
- costs incurred for the care of employees' health,
- cost of fuels consumed,
- interest on loans for the acquisition of tangible fixed assets
- remuneration (commissions) for the recovery of a receivable up to a maximum of 50% of the recovered receivable,
- interest expense on finance leases for the entire duration of the finance lease,
- membership fee resulting from compulsory membership of a legal person,
- membership fees resulting from the optional membership of a legal person established for the purpose of protecting the interests of the payer in total up to 5% of the tax base, but up to a maximum of EUR 30,000 per year,
- travel allowances booked under the Travel Allowances Act,
- advertising costs incurred for the purpose of presenting the taxpayer's business, goods, real estate services, trade name, trade mark, trade name of products and other rights and obligations related to the taxpayer's activity,
- fuel consumption costs,
- costs for which subsidies, subsidies and contributions provided from the state budget, municipal budgets, budgets of higher territorial units, state funds and the National Labor Office were included in revenues,
- damage not caused by the taxpayer as a result of a natural disaster, such as an earthquake, flood, hail, avalanche or lightning. Also damage caused by an unknown perpetrator during the tax period in which this fact was confirmed by the police,
- vehicle tax,
- contributions to supplementary pension savings paid by the employer on behalf of employees pursuant to the Act on Supplementary Pension Savings,
- the residual value or acquisition cost of tangible assets transferred free of charge to state ownership
- the residual value of tangible assets and intangible assets disposed of due to damage up to the amount of income from compensation included in the tax base, including payments received from the sale of disposed of assets,

- costs incurred by the taxpayer in the form of donations provided for the purpose of material humanitarian aid abroad on the basis of a donation contract concluded with the Ministry of the Interior of the Slovak Republic, expenditure (costs) on working and social conditions and health care incurred on:
 1. safety and health protection at work and hygienic equipment of workplaces,
 2. care for the health of employees to the extent provided by special regulations
 3. training of the employee, which is related to the activity or business of the employer, own educational facilities,
 4. allowances for staff meals, allowances for staff recreation and allowances for the child's sports activities provided under the conditions laid down in a special regulation,
 5. wage and other employment rights of employees to the extent stipulated by employment regulations,
 6. corporate scholarships provided to university students according to a special regulation, the cost up to the amount of the write,
- down of the nominal value of the claim which was included in taxable income, including the principal of an outstanding loan, if:
 1. the court rejected the petition for bankruptcy due to lack of assets or stopped the bankruptcy proceedings due to lack of assets, or canceled the bankruptcy on the grounds that the debtor's assets are not sufficient to cover the expenses
 2. it follows from the result of bankruptcy proceedings, restructuring proceedings
 3. the debtor has died and the claim could not be satisfied even by recovery from the debtor's heirs,
 4. the execution or enforcement of the decision shall be stopped by the court or the executor on the grounds that, after the creation of the execution title, the circumstances occurred which caused the termination of the enforced claim
 5. this follows from the decision of the Crisis Management Council
- provisions consisting of:
 1. to the acquired property,
 2. to non-expired receivables,
 3. receivables from debtors in bankruptcy proceedings, restructuring proceedings and receivables from debtors to whom the court has set a repayment schedule,
 4. non-expired receivables formed by banks and branches of foreign banks and the Export-Import Bank of the Slovak Republic,
 5. non-expired insurance receivables in the event of termination of insurance, which consist of insurance companies and branches of foreign insurance companies,
 6. non-expired claims of health insurance companies
- creation of reserves created for:
 1. untaken leave, including insurance premiums and contributions, which the employer is obliged to pay on behalf of the employee,
 2. forest cultivation activity carried out in accordance with the Forest Act. The creation of a reserve for forest cultivation activities is determined in the forest cultivation activity project
 3. liquidation of major mining works, quarries and waste from mining or mining activities and for the reclamation of land affected by mining activities
 4. landfill closure, reclamation and monitoring
 5. management of waste electrical waste from households, if the amount of the reserve calculated and proved by the taxpayer corresponds to the costs associated with the management of electrical waste

After calculating the tax base, the entity calculates the corporate tax liability and then calculates the net profit. Picture No 2 contains the calculation of tax liability and net profit.

Corporate income tax base times tax rate = tax liability
Profit before tax minus tax liability = profit after tax (net profit)

Picture 2. Calculation of profit after tax

Source: own processing

Profit in general is the goal and stimulus of business, it is the main source of growth. It also performs other functions:

- is a criterion for decision-making
- on economic issues of the organization
- is the main source of accumulation
- the creation of financial resources for the further development of the organization
- is the basic motive of business, as well as material involvement.

The distribution of profit after tax (net profit) in business practice is decided by the general meeting of the company. The legal obligation in the distribution of profit after tax is the creation of a statutory reserve fund, with limited liability companies at least 5% of net profit, at joint stock companies at least 10% of net profit. Both companies are obliged to replenish this reserve fund every year, namely limited liability companies at least up to 10% of the share capital and joint stock companies up to 20% of the share capital. The balance of net profit either remains in the company in the form of retained earnings or can be paid out in the form of shares to shareholders.

Conclusions in terms of comparison of accounting and tax aspects

In Slovak Republic, there are the following entities for which it is possible to compare tax and accounting aspects (Table 2).

Table 2. Number of business entities and public administration in 2020

No.	Type of entity	Number
1	Micro accounting units	136 000
2	Small entities	77 000
3	Large entities	4 500
4	Public interest entities	160
5	Entities of self-government (municipalities and cities)	2 927

Source: own processing, based on Farkaš (2020)

Accounting aspects of costs for business entities, as well as for public administration entities in the Slovak Republic, accounting in the double-entry bookkeeping system, result from the measures of the Ministry of Finance of the Slovak Republic and serve to quantify the pre-tax profit.

In conclusion, we can summarize the differences and similarities of these subjects in terms of comparison as follows:

Differences: businesses do not have accounts in the framework chart of accounts that belong to account groups 57 - Extraordinary expenses and 58 - Transfer costs and income tax costs. Business entities are established for the purpose of making a profit and are therefore not supported by the state budget, these accounting groups are not relevant in this context. On the other hand, self-government entities are established for the purpose of fulfilling original and transferred competencies from the state; So we see for these entities exclusively the accounting aspects of cost accounting.

As we have already mentioned, this is the main activity, because municipalities can also carry out business activities, and then the accounting and tax aspects will apply to them. The tax aspect points us to the amount of income to the state budget from business activities and is one of the indicators of the state's tax policy. On the basis of these revenues as well, the state fulfills its expenditure function in trusted finances.

In the Slovak Republic, the tax authorities perform accounting audits as well as tax audits focused on corporate income tax, VAT and other taxes (except for excise duties and real estate taxes). As part of tax audits, they point out violations of legal regulations and secure the revenue part of the state budget (Table 3).

Table 3. Number of inspections performed by tax authorities in the period 2018 - 2020

Year	Number of inspections performed		
	Corporate income tax	Personal income tax	Checking the correctness of accounting
2018	1.005	1.090	102
2019	1.021	1.100	175
2020	1.125	1.256	198

Source: Annual Report of the Financial Administration of the Slovak Republic - periods 2018 to 2020

Based on the number of inspections performed by tax authorities in the Slovak Republic, it follows that the structure and number of performed inspections for the monitored periods are similar. It is technically impossible to inspect all business entities and public administration entities in terms of time, so the tax administration carries out inspections on the basis of a plan that determines the detailed focus of the inspection.

The tax administration intends to streamline tax audits, focusing on detecting tax evasion even though the number of audits will be smaller but the quality will be higher.

Similarities: here we can include the accounting aspect of costs, which is information about the result of management before tax and this is processed in the Profit and Loss Statement for business entities and similarly for government entities. In the profit and loss statement, we also see the tax aspect (for public administration entities only in the case of business activities) in the part of the profit and loss statement "income tax". This item consists of two parts, namely: - income tax payable, and - deferred income tax. The total economic result for the accounting period is adjusted by this tax, which is a benefit for the state budget.

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DETERMINANTS OF ENTREPRENEURSHIP DEVELOPMENT IN POLAND OVER THE LAST 5 YEARS

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Abstract. The main objective of the article is an attempt to identify factors/determinants conditioning the development of enterprises in Poland over the last 5 years. The author will also try to indicate the dominant behaviours related to the notion of entrepreneurship among the owners of the enterprises under study and identify the relations between the variables related to enterprise management and its development and growth. In addition to the literature analysis, the author chose a survey in the form of a structured interview with business owners as another research method - the survey was carried out in 2018 and 2019 in 200 purposively selected enterprises from the SME sector, which are based in Poland and were established in the last 5 years. After the analysis of the literature and the results of the conducted survey, obviously bearing in mind its pilot character, the author clarified the names of the selected indicators/determinants and expanded their list by those he considered useful from the point of view of the general purpose of the survey - 9 indicators/determinants. In the author's opinion, the developed indicators/determinants make it possible to assess the level of enterprise development (direction and pace of changes) depending on selected factors of the local and institutional environment, internal factors, the level of achieved financial results, sources of financing.

Keywords: entrepreneurship; entrepreneurship development; determinants / factors of enterprise development

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JEL Classifications: M12, M13, O11

1. Introduction

Already A. Smith pointed out that economic development depends on the three prerogatives that the individual is entitled to - the pursuit of his own interests, the division of labour and freedom of trade. In economic practice, all of them are used, giving the opportunity to achieve the purpose for which economic entities are created (O'Rourke, 2019).

The very concept of entrepreneurship is a very broad, multifocal, interdisciplinary term. Analyzing the scientific literature, we can see how many definitions of this term work. For the author of the article, the contemporary evolution of the concept of entrepreneurship, which focuses on human attitudes and behaviors, is important. The process of these theses is identified with achieving success, seeing new opportunities, searching for opportunities, achieving goals effectively and maximizing profits. In this context, we should first understand entrepreneurship as the ability of a person or organization to seek and apply new solutions. Secondly, this requires initiative, energy, ingenuity and the ability to estimate the necessary material, financial and time expenditure. Thirdly, we should strive for achievable benefits in the area of existing limitations and opportunities and the willingness to take risks and take responsibility for decisions and actions taken (Say, 2018).

Turbulent economic environment, reinforced by unprecedented technological progress, ubiquitous globalization and global crises, such as the global pandemic COVID 19, which are causing huge changes in national economic markets, including their main players - companies. In the 21st century, against the background of ever-new economic challenges, the development of entrepreneurship has become a basic condition for the sustainable development of each country. After all, it is its dynamics, regardless of differences in the understanding of its subject and subject structure in economic theory that is an interpretation of economic growth and development. Undertaking economic activity contributes to the revival and social and economic development of entire economies. It also manifests itself in reducing the level of unemployment and increasing revenues to state budgets. Therefore, as the main objective of the article, its author considered the identification of factors determining the development of SME enterprises in Poland in 2018-2020. Of course, taking into account the situation related to the global pandemic, the research covered only the beginning of 2020. However, it is certainly worth returning to them, at the time of "return to normality", because, in the author's opinion, most of the identified factors have certainly significantly changed their value.

An important element of the research work was to conduct research, at the turn of 2018 and 2019 in 200 intentionally selected enterprises from the SME sector, which are based in Poland and were established in the last 5 years. The information and opinions obtained in this way referred to the current situation of the company and the evaluation of its development in the last 5 years. And also, in a few cases, to opinions on the development prospects of the enterprise in the coming years.

2. Theoretical background

The term "entrepreneur" appeared in economic literature at the turn of the 17th and 18th centuries, and it is derived from the French word „entrepreneur”, which describes persons undertaking a certain activity. Suppliers, intermediaries and contractors, for example, began to be referred to as such. The word „entreprendre”, also derived from French, means to undertake. In French, we can also find the term „entreprenant”, which describes a bold, bold, self-confident person, that is, one that has entrepreneurial qualities (Łochnicka, 2016).

However, by analysing the genesis of this concept, we can assume that it has existed since man appeared. On the other hand, we are not able to accept when entrepreneurship appeared in human life - there is no uniform and clearly defined beginning. Of course, the meaning of the term has evolved over the years, and we can give an example or suppose that this was the case at the very beginning of human life on earth.

However, the notion, through the continuous development of mankind acquires more and more new characteristics. Already looking at the primitive people, we can see the beginnings of entrepreneurship - after all, their chances of survival depended largely on creativity, acquired skills and the idea of how to use these skills to hunt the animals or otherwise provide food for themselves and their loved ones. This feature perfectly fits the definition of entrepreneurship known today. By analyzing closer the development of man on earth, we can see the various forms of work, his own ventures, which he has undertaken over the centuries. It has always been

necessary to look for a job that will meet the expectations of other people and, consequently, bring a measurable income. Profit is nowadays something we directly associate with entrepreneurship.

R. Cantillon is considered to be the precursor of the term entrepreneurship in literature. He drew attention to traders seeking to make money by looking for cheap goods and selling them in places where they will get a higher price. He also pointed out that a typical businessperson takes risks in order to make money - which works perfectly well nowadays, because every attempt to make money on your own, to create a business always involves risk (Thornton, 2019). Whereas according to S. Shane and S. Venkataraman (2013) are all activities that consist of identifying, evaluating and exploiting opportunities to introduce new products and new services, or ways of organizing, new markets.

Analyzing the definitions described above, the author of the article noticed that entrepreneurship can be described in the simplest way as the art of coping with various life situations - it can be trained and learned. However, in the face of complex and rapidly changing reality, the entrepreneurship paradigm is more suitable for explaining contemporary phenomena. Instead of technocratic determinism, a paradigm of a subjective, active role of a person (entrepreneur), who is involved in the competition process through creativity and ingenuity, is proposed. Moreover, he acts under conditions of uncertainty (Kaliszczak & Sieradzka, 2020). As far as the person of an entrepreneur is concerned, J.B. Say (2012) claimed that an entrepreneur is the one who has his own enterprise - he owns or fully controls it. He is a person who is able to see the opportunities for development and is not afraid to risk it for profit. He introduced a division into types of entrepreneurs: industrial entrepreneur, entrepreneur of the agricultural industry, entrepreneur of the handicraft industry, entrepreneur of the commercial industry - merchant.

The approach to entrepreneurship as an attitude emphasizes the importance of entrepreneurial characteristics: personality, predisposition, general and market knowledge. These are also specific ways of reacting and being ready to take action. The attitude determines behavior and influences its effectiveness. Entrepreneurship is reflected in a creative and active pursuit of improvement of existing states of affairs and expresses readiness to take new actions or expand existing ones. Thus, it is aimed at achieving complex, multi-faceted material benefits. This results in increased income and improved working and living conditions. Entrepreneurial attitudes consist of three elements (Białasiewicz, 2016):

- emotional - moods and feelings;
- behavioral - predispositions to certain behaviors in certain situations;
- cognitive - information, opinions, knowledge, skills.

Despite the passage of many years, since the creation of the above definitions, their validity has survived until today. There are still many companies that only trade, that is, buy goods at certain prices and sell them at a higher amount. It is a much more developed trade considering new means of transport and media, and it still involves a high risk. Looking further ahead, the production and processing of raw materials, i.e. production is not only economically necessary. People need products, and this need is increasing with time, because today's mankind has learned so many conveniences that it would be difficult to do without them and there will be more and more innovative goods. Also portioning in products in smaller quantities is an example of retail trade - the most widespread today. People want to buy products, but in quantities appropriate for them, without bending their budget and systematically buy as the goods are consumed. And it certainly cannot be discussed nowadays that an entrepreneur is the one who has his own company or has full control over one, because he can prove his entrepreneurial skills without having control over any.

When it comes to formal and legal issues in contemporary business practice in Poland, we can find basic forms of doing business:

1. One-person activity of a natural person: activity conducted by one owner who is responsible for the enterprise with his own property. The owner has full decision-making power. This is one of the simplest forms of setting up a business due to the relatively simple opening process and lack of obligation to make a capital contribution.
2. Civil partnership: the activity is established by at least two persons on the basis of a contract, which should be made in writing. Similarly as in the case of one-person activity, the partners are responsible for the company both its and its property.
3. General partnership: is established by at least two persons on the basis of a contract which should be drawn up in writing under pain of nullity. Each partner is responsible for the partnership with all his assets and must contribute to it. It may be a financial contribution, in kind or intangible.
4. Partnership: is created by the partners (hereafter referred to as partners), who are obliged to run the company in order to exercise their free profession. It can only be created by natural persons. The responsibility for its operation is borne by each partner separately, so that a mistake of one partner does not make the other one responsible.
5. Limited partnership: it is created by the partners on the basis of a notarial deed. It is characterized by the fact that at least one of the partners is responsible for the partnership with all its assets and at least one has limited liability.
6. Limited liability company: a capital company, opened by one or more partners. The partners are not responsible for the company with their own property, but only with the property gathered by them.

To sum up, since the initiation of the term entrepreneurship, its meaning has gradually but systematically changed. In fact, according to the author of the article, under the influence of external determinants, the meaning of its components that make up its meaning has changed. Nowadays, an entrepreneur is associated with a person who has an enterprise and is able to adapt to changing market conditions, which involves taking risks. Additionally, these people must, of course, be boldly committed and dynamic, which translates into an innovative attitude and creativity. They must be gifted with imagination, a feature that is necessary to plan and avoid bad consequences of their decisions. But on the other hand it must be based on „common sense”, because not every decision can be predicted. On the other hand, if bad actions are taken, entrepreneurs must know what steps to take to ensure that the negative impact has the least possible impact on the further operation of their business.

Furthermore, running a business is one of the paths to professional development. Of course, this form has numerous advantages, but often we can also see disadvantages. Undoubtedly, the main advantages include: independence, autonomy in decision-making, freedom to choose the time and place of work. Unfortunately, it is also associated with responsibility, which, as a rule, is borne individually, and quite a high risk of running this type of business may be even greater due to the turbulent environment in the 21st century.

3. Research Methodology and data

The main basis for the briefly described conclusions in the chapter (this is described in detail by the author of the article below) was a study consisting in the assessment of national conditions for the development of entrepreneurship in the micro, small and medium-sized enterprise sector - based on the opinions of entrepreneurs and the analysis of actions taken. The main objective of the study was to identify factors / determinants that determine the development of economic entrepreneurship in Poland over the last 5 years. Author had to apply the following set of research methods:

1. Analysis of the subject literature - to systematize the language of concepts related to entrepreneurship and development.

2. Questionnaire in the form of a structured interview with business owners - the main element of research work. The author conducted research in 2018 and 2019 in 200 intentionally selected enterprises from the SME sector, which are based in Poland and were established in the last 5 years (Table 1). The information and opinions obtained in this way referred to the current situation of the enterprise. The author also evaluated the development of the enterprise in the last 5 years and in a few cases - to the opinions on the prospects of the enterprise development in the coming years.

Unfortunately, due to financial and organisational limitations, the collected sample does not have the characteristics of the entire population (it should be 72 thousand entities). Therefore, the presented research results are not a complete set - they are the basis for extending the research process in the future - it is a pilot study for now. The author created the questionnaire himself. He chose entrepreneurs as respondents, because they have the greatest knowledge about their companies. The author was also interested in their approach to entrepreneurship, their motivation and their feelings. In this way the author was able to obtain the most suitable information for the purposes of the study. The author used the evaluation method to determine the determinants of entrepreneurship development and actions taken in this area, in the face of new economic challenges. Of course, the author agrees with the opinion that evaluation is always in some way a subjective method. However it is difficult to find a more objective research tool that would be simple enough to induce respondents to participate in the survey. In turn, the author used Statistica version 12. and a Microsoft Excel spreadsheet to carry out statistical calculations.

Table 1. Description of the group of respondents

companies					
200					
size					
micro	small			average	
36	53			111	
kind of					
business activities	ltd.			partnership	
98	80			32	
life span					
up to 1 year	2 to 4 years			4 to 5 years	
23	137			40	
industry					
maritime	food	construction	transport	commercial	advisory
35	30	29	41	29	36
entrepreneur					
200					
sex					
women			men		
69			131		
age					
up to 30	from 31 to 50			over 51	
20	138			42	
education					
professional	average			higher	
21	81			98	

Source: own study

4. Results

The author of the article believes that the determinants of the development of enterprises can be divided into two basic categories: factors influencing enterprises from the external environment and internal determinants usually created by the enterprise itself. Going this way and following J. Targalski (2014), the external factors include,

among others: globalization of the economy; economic prosperity; situation on the foreign and domestic market; innovations; state fiscal policy and legal regulations; level of economic growth; free movement of goods and services. And the composition of the internal factors is: processes taking place in the company; material resources held; management efficiency; business partnerships; objective and strategy; human capital; quality; competitiveness of products and services.

However, for the purposes of this article, the author, after analysing the literature and observing the economic processes taking place on the Polish economic market in recent years, has divided all these factors into four categories: economic, social, administrative / legal and cultural. It is a unique driving force of the company's development or, if the potential is misused, it may become an impulse for the irrevocable failure of the company.

At the beginning it is worth noting that each of the categories contains specific aspects that are able to motivate or demotivate individual individuals to start their own company or not. However, in the opinion of the author of the article, the launch of a particular enterprise will depend solely on the idea of this process of a particular person. Moreover, it will depend on the personal qualities, knowledge, experience and a number of skills and competences, about which the author has already written in a separate study.

Table 2. Determinants/factors of enterprise development in Poland

Economic factors
<p>All sources of external capital that a particular business is able to raise (certainly with a favourable offer this will be an incentive to run your own business).</p> <p>Equity capital- cash or in-kind product contributed by the owner or co-owners that will facilitate the development or start-up of the business.</p> <p>From the analysis of the data after the survey (details in Chapter 4) it turned out that nearly 80% of the companies surveyed used equity capital.</p> <p>Foreign or debt capital, i.e. financing of the enterprise from various sources on the basis of contracts, for example: credit, leasing, bonds.</p> <p>3. grants and subsidies from the European Union.</p> <p>Unfortunately, due to the transitional period, connected with the implementation of the new programming period of the EU funds in Poland, the respondents were not able to use this option. However, almost 70% of the surveyed respondents indicated that they are interested in this form of support in the future.</p>
Social determinants
<p>In addition to the fact that owning their own business can provide the financial income needed, many people aspire to something more - they want to create jobs for themselves and their potential employees. The desire for self-fulfilment, independence, well-being or prestige can also fall into this category. Often, these factors play a major role in the decision to become self-employed.</p>
Administrative/legal determinants
<p>Over the last few years, the system that makes it possible to start up a business has become much simpler:</p> <ul style="list-style-type: none"> - The amendment of the Act of 2 July 2004 on freedom of economic activity, which made it possible to register a business via the Internet. <p>Nearly 95% of the surveyed business owners indicated this fact as not influencing their decision to start a business. This may reflect the prevailing fear of "Polish bureaucracy". It is probably a matter of well established stereotypes.</p> <p>The thesis of being guided by stereotypes was also confirmed by the fact that only 9% of the respondents pointed to the possibility of choosing simplified accounting as a factor influencing the decision to run a business.</p>
Cultural determinants
<p>The relationship between a country's culture and the level and nature of entrepreneurship has long been the subject of research.</p> <p>For the purpose of the survey, areas of business management were identified that may be affected by cultural factors - respondents were asked how they react in difficult situations in these areas:</p> <ul style="list-style-type: none"> - the majority of business owners (87%) stated that they react too emotionally to problematic situations, - do not approach business issues with detachment (76%), - they make most business decisions not after thorough analysis and determination of the level of risk, but on a hunch (56%).

Source: own study

Then, on the basis of the results of the analysis of individual components of entrepreneurship development, the author specified the names of selected indicators/determinants. Ot also extended their list by those he found useful from the point of view of the overall goal of the study - a total of 9 indicators/determinants were developed, which are based on initial methodological assumptions. According to the author of the study the indicators/determinants

make it possible to assess the level of development of enterprises (direction and pace of changes) depending on selected factors of local and institutional environment, internal factors, level of achieved financial results, sources of financing.

Below (Table 3), the author of the article presented the evaluation of indicators/determinants of development of new and developing companies, made by their owners. It is noteworthy that in each subsequent time period (each year) this evaluation is better than that of the previous year. Most of the nine areas forming the national entrepreneurship determinants identified in this study were rated higher. The best rated areas include:

- access to technical infrastructure - respondents highly evaluate the availability of telecommunications services for new and growing companies, and the costs associated with basic utilities (gas, water, electricity, sewage) are not a problem for them;
- the dynamics of the internal market - according to business owners, the Polish market of consumer goods and services and business-to-business is changing significantly from year to year;
- access to external financing - this is an area which is getting better and better evaluated by the respondents year after year and which does not significantly limit the commencement and development of activities in Poland.

In 2019 a significant improvement, according to the respondents, took place in the following areas:

- entrepreneurship education at the level of higher education and lifelong learning;
- commercial and service infrastructure - the respondents better assessed the ease of obtaining good banking services and professional lawyers and accountants, as well as the ease of obtaining good subcontractors and consultants;
- cultural and social norms - the statements on cultural and social norms were best evaluated in this area in the context of emphasis on self-sufficiency and self-initiative and emphasizing personal responsibility in managing one's life.

In several cases, the ratings of entrepreneurs have decreased, which may indicate a more difficult situation in these areas. These include: burdens related to market openness, dealing with bureaucracy (regulations, consistency and predictability of taxes) and issues related to research and development - for example, effectiveness of technology transfer, access to new knowledge, possibility of acquiring new technologies by young companies. We must also remember that all this information and opinions were collected before the pandemic - the author believes that currently, that is in the fourth quarter of 2020, the situation has certainly changed the opinion of the owners who took part in the survey.

Table 3. Assessment of designated indicators/determinants by respondents

No	indicators / determinants	Poland	Poland	Poland
		2015	2017	2019
1.	access to technical infrastructure	71	96	137
2.	the dynamics of the internal market	73	93	128
3.	consumer goods and services	56	87	119
4.	entrepreneurship education at the level of higher education and lifelong learning	78	83	112
5.	commercial and service infrastructure	52	76	99
6.	cultural and social norms	56	66	89
7.	burdens related to market openness	54	57	50
8.	dealing with bureaucracy	41	43	29
9.	issues related to research and development	14	25	19

Source: own study

A very large number of data that the author obtained during the survey allowed to group and present them in two areas. The first area concerns behaviors related to the concept of entrepreneurship of their owners and their

subjective opinion about their company. The second area is specific information related to the relations between variables, which are related to the management of the studied entities and their development and growth - these data are discussed and used in another study.

In the first place, according to the author of the article, he must show the motives behind the decision to start his own company. As the main motive were indicated economic issues, which result from the desire to improve the financial situation (73%). Next, the desire for self-fulfillment and fulfillment of life's desires (60%), as well as the fear of unemployment (49%), low income obtained in the previous work, persuasions of family and friends and the willingness to invest their financial resources. There were also voices about the willingness to spend free time, family traditions, as well as necessity - sudden loss of job or lack of suitable offers. A very important element connected with motivation to start a company and also with the development of the company are personality traits of entrepreneurs, which very often determine success in business. These include industriousness, as well as the knowledge resources necessary for making decisions and the risks associated with it, knowledge about the management of the company and the implementation of individual management functions. Also important were professional competences, gained in previous professional experience, as well as consistency in action and perseverance. The respondents considered creativity, responsibility or decision making skills to be less important. This surprised the author of the article (detailed distribution of answers related to motivation and personality traits is shown in Figure 1.

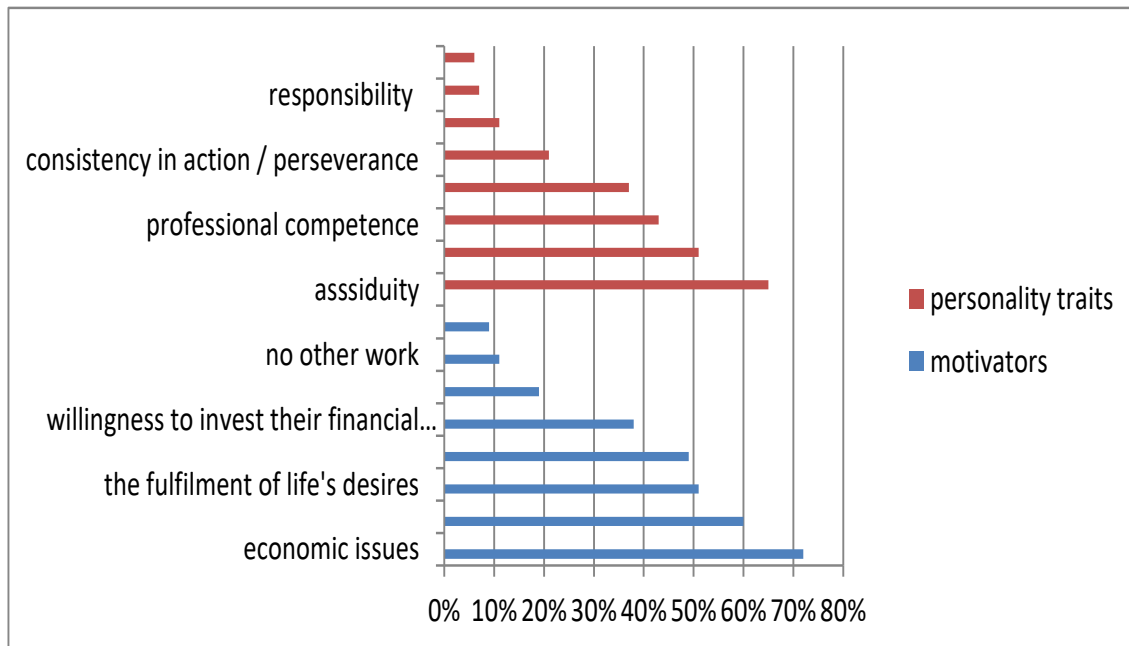


Figure 1. Motives for starting up your own business and personality traits that determine success in business

Source: own study

Analyzing the collected data in terms of sources of financing at the start of business activity, the author stated that the respondents indicated mainly their own funds and bank loans. Among other sources they also pointed to loans from family and non-bank financial institutions. On the other hand, loans from friends, donations, shareholders' own contribution or inheritance received were the least frequently used. This tendency was also confirmed when asked about the most important barriers (limitations) to the development of business activity, which the

respondents included the lack of funds to start up, high costs associated with the activity (including too high taxes) and difficulties in completing an optimal staff. This confirmed the author's assumptions about the commonly known weakness of small companies, which consists in the lack of own financial resources and difficulties in obtaining credit. This does not only apply to the initiation phase, but also to the development phase. On the one hand, small scale of activity, on the other hand, very high unit costs of created products/services, cause significant disproportions between entities from the SME sector and large enterprises, in terms of costs and revenues incurred. Moreover, smaller companies are more susceptible to competition, which is a result of market saturation with entities with similar offer. All this combined with the internal conditions related to the resources of these economic entities causes that the number of barriers and unfavorable factors makes it permanently difficult for them to function on the already turbulent economic market (Figure 2).

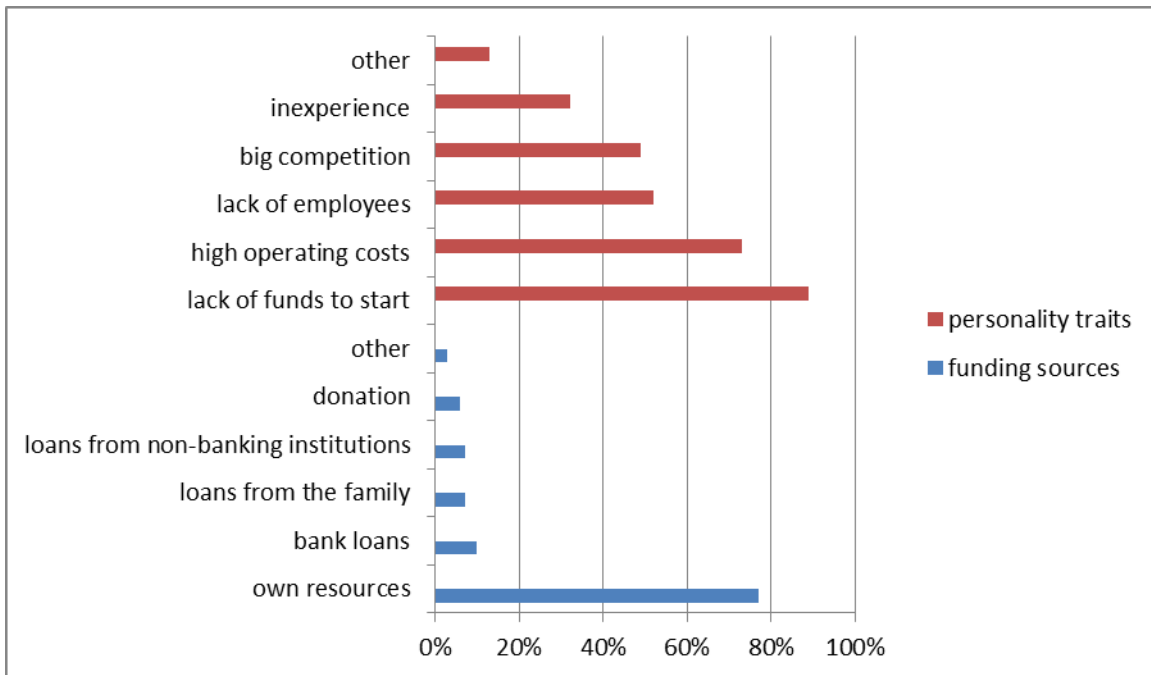


Figure 2. Sources of business financing and barriers that hinder development

Source: own study

In their attempt to assess the possibilities of development of their own company, the respondents strongly emphasized three main areas of their activity: the level of sales, the portfolio of products/services and the sales market. What is important in their forecasts, they looked positively into the future - more than 70% of the respondents believed that they would increase their sales thanks to the extended portfolio (71%), and 69% of them were sure to increase their current sales market (Figure 3).

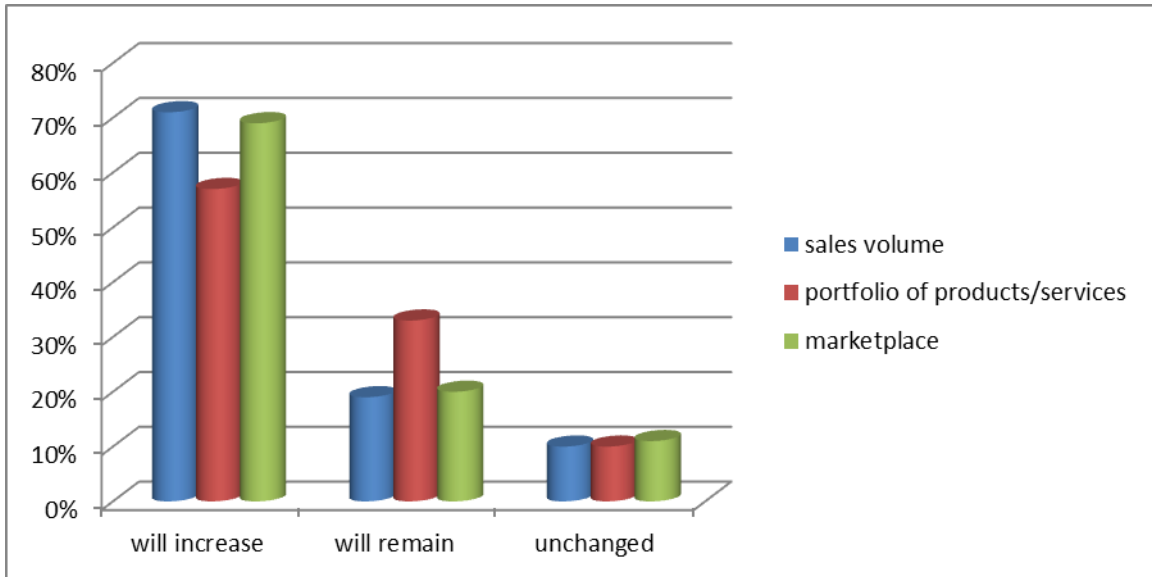


Figure 3. Assessment of the respondents' own business development opportunities

Source: own study

Such plans of the respondents are, of course, associated with the need for their companies to gain an advantage over their main competitors. They were to be helped by the advantages described in Figure 4. They put good atmosphere at work, employee loyalty, interpersonal relations and level of business experience in the first place. They considered the level of financial resources or creativity to be less important, but this cannot come as a surprise after previous data analysis.

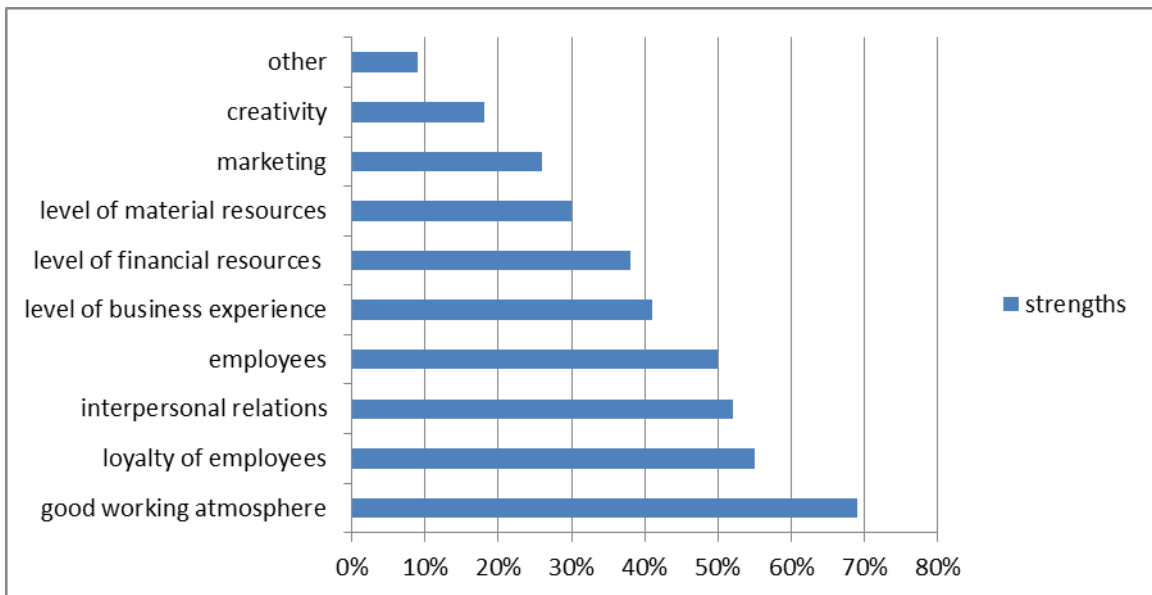


Figure 4. Strengths in building competitive position of the surveyed companies

Source: own study

In this part of the analysis of research results, the author decided to focus on the internal conditions of enterprise development, i.e. determinants related to the characteristics of enterprises, their management systems and actions taken by entrepreneurs. The obtained data and conclusions are certainly consistent with modern business models of enterprises, which in the era of knowledge-based economy, attach great importance to human capital, business cooperation and intense competitive competition. Taking into account the functioning of the surveyed enterprises in terms of the number of employees, served clients, the value of equity capital, the size of revenues, the author noted that the vast majority of respondents stated an improvement in the situation in their enterprises. Most people referred to the increase in the value of net revenues - for 72% of entities and to the improvement in the competitive position of entrepreneurs - 66% of entities (Figure 5).

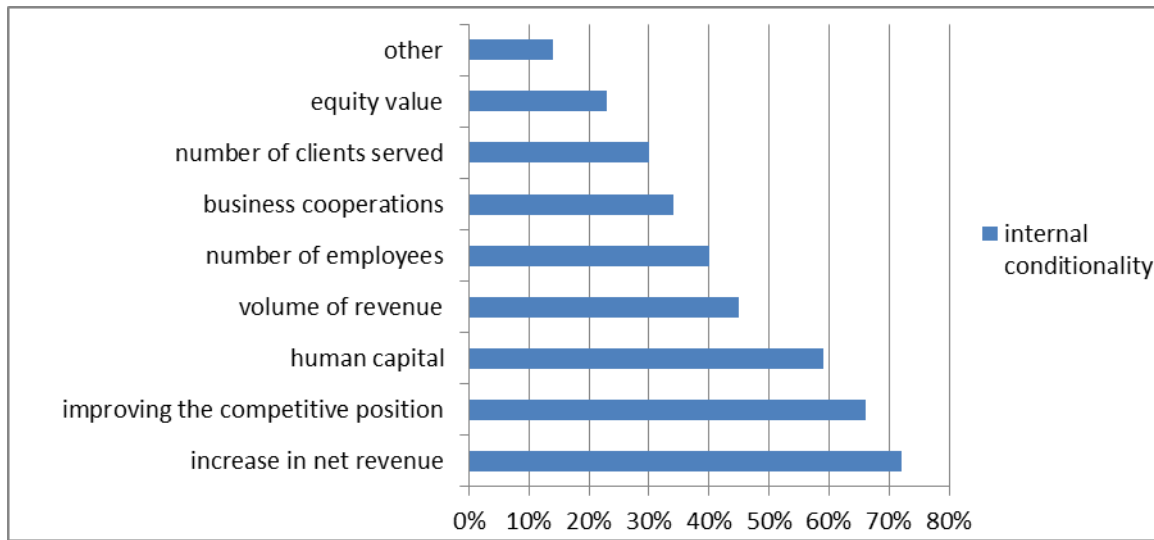


Figure 5. Conditions for internal development of enterprises

Source: own study

Another important factor, which the respondents have commented on, is business cooperation with other entities, including suppliers. Their selection is determined by specific criteria and the importance attributed to them by the respondents. The quality of offered goods/services, prices, availability, offer and market position were considered the most important. Small importance was assigned to the location of partners (distance), type of business or direct knowledge of it (Figure 6).

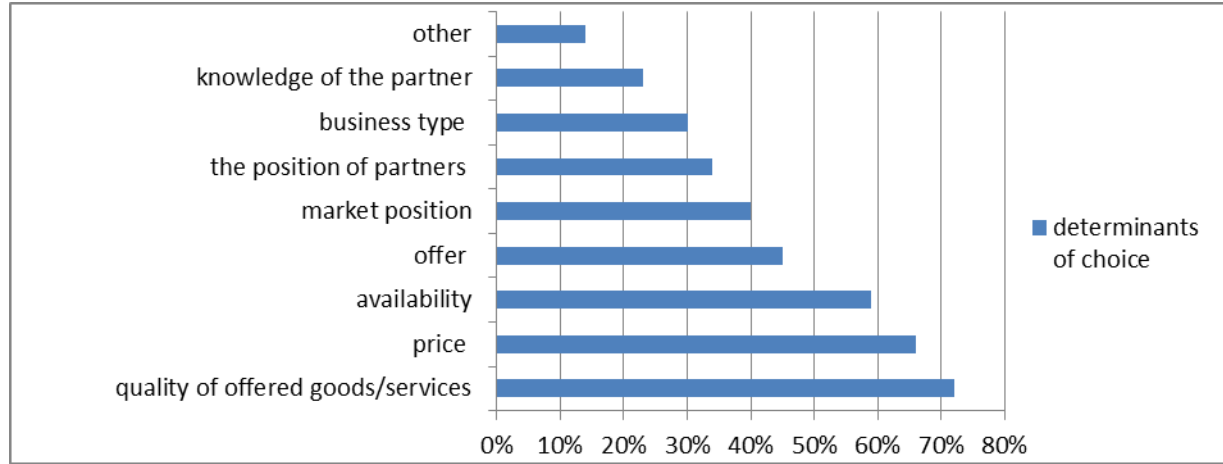


Figure 6. Determinants for selecting business partners

Source: own study

The internal conditions of conducting business activity may also include the impact of actions taken by entrepreneurs in relation to their competitors during the fight for the client. The analysis of the collected data shows that there is quite a lot of competition on the market, which was evaluated at the level of 4.6 points on a 5-stage scale and which is noticed by 89% of the surveyed persons. Respondents, in order to win and keep their customers, most often bet on nice service, high quality of goods, products and services and working hours adjusted to customers' needs. They try to influence purchasing decisions by applying discounts. Depending on the industry and size of their business they also provide free transport and additional gratuities in the form of so-called gifts. They also make it possible to make purchases in installments and offer loyalty cards.

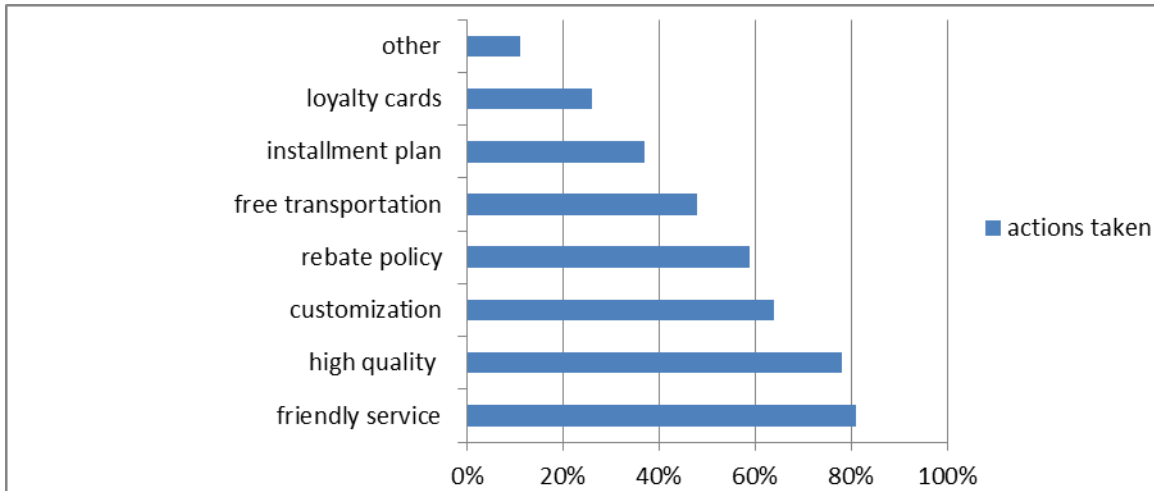


Figure 7. Activities used in the „fight for the customer”

Source: own study

In order to assess the investment prospects of the surveyed companies (development plans), the author of the article included in the questionnaire the questions which concerned the planned investments in the next 3 years:

investments in fixed assets, innovative activities, research and development and the increase in employment of specialists. In the light of the results obtained, more than half of the entrepreneurs planned investment outlays on fixed assets, 23% on the increase in employment, and about 10% on innovative and research and development activity (Figure 8). These are surprising results in the context of the identified gap in the improvement of their management systems - only 18% of the respondents have implemented activities in this area in the last two years of activity. To make matters worse, only 10% of this group stated that they managed to achieve a positive effect of the actions taken. Such results allow us to conclude that there is a very large, so far unused development potential, which, if used well, can definitely increase the effectiveness of the SME sector in Poland (Figure 9).

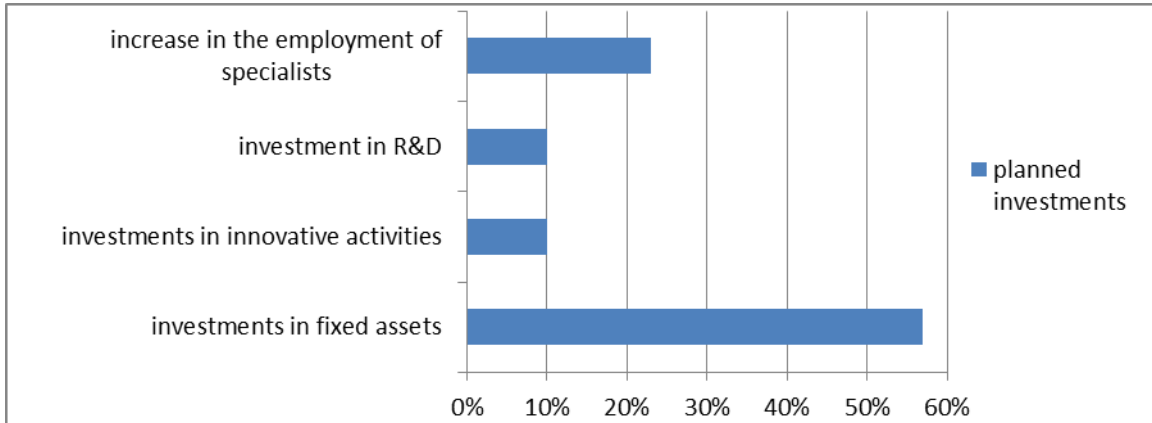


Figure 8. Investment perspectives of the surveyed companies
Source: own study

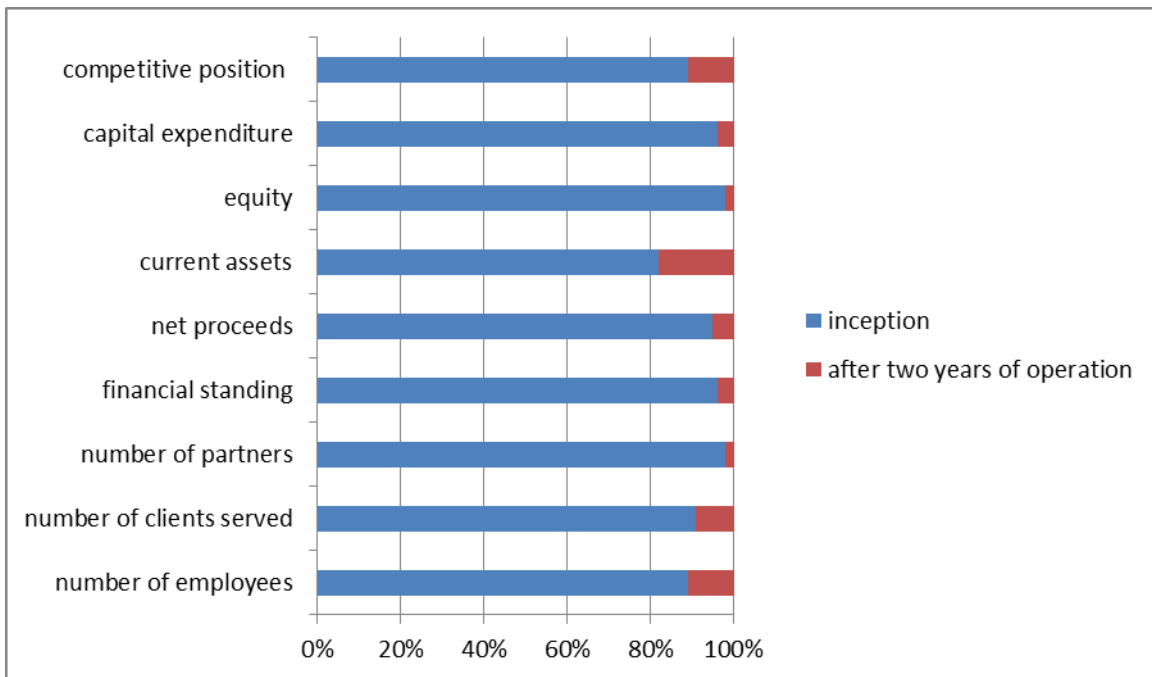


Figure 9. Identified investment gaps in management systems
Source: own study

Obviously, the biggest challenge may be to obtain the necessary financial resources. In many cases the barrier is also the inability to organize cooperation with business partners, due to organizational and technological immaturity. However, on the basis of the collected material, the author claims that there is quite a common awareness among Polish entrepreneurs of the importance of human capital and its optimal management. They know that they have to get as much of their employees as possible to succeed. They try to build commitment of the team, while they strive for 28.4% of teamwork, cooperation and care about building an integrated team. They know that in the 21st century this is a key determinant of the market success of their companies. Unfortunately, the lack of an appropriate organizational culture and failure to implement programs for the company's most important employees makes it impossible for them to retain key employees. They also cannot find new, equally talented employees in their place. What should be the foundation of the new order in the company? It turns out that the owners of the surveyed entities are perfectly aware of it, see Figure 10.

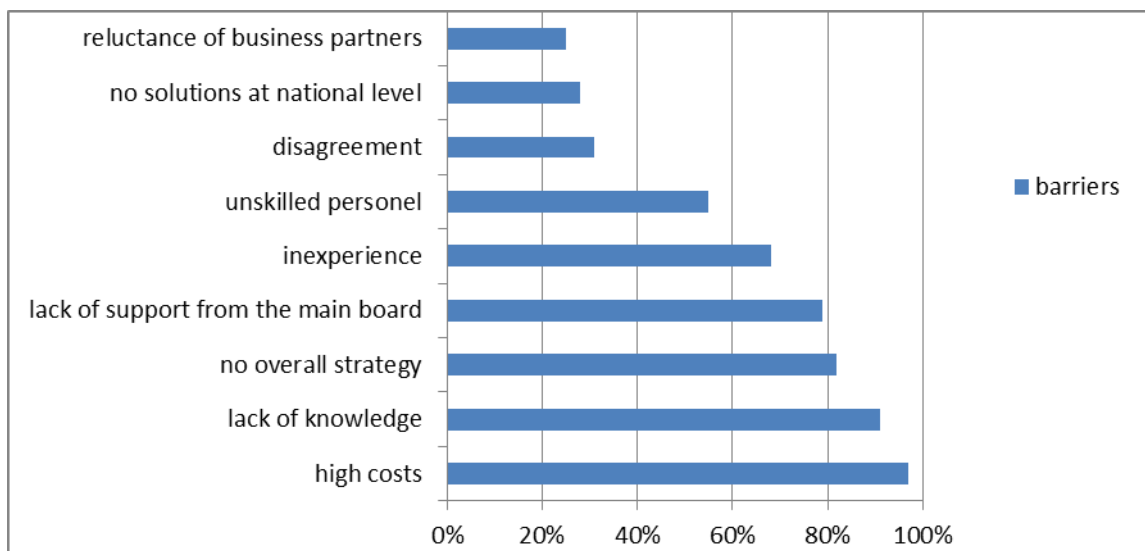


Figure 10. Barriers to optimal human capital management

Source: own study

As we can see it is above all cooperation that bypasses existing structures and divisions. In many companies, a very big problem is the separate functioning of people responsible for business, and separate for technology. This effectively makes it difficult to take advantage of the opportunities brought about by economic changes. Of course, it is also necessary to have clear leadership, which does not run away from difficult decisions and treats subordinates in a partner way. And most importantly, you need to define your capabilities and establish strategies to avoid falling behind. After all, the key success factor is not technology per se, but people who can use it effectively. But why don't we do it? Don't we want to use people's potential as a weapon to fight new challenges? Don't we forget about the necessity of system solutions, starting with changes in organizational structures and cultures. These questions are undoubtedly the starting point for identifying innovative tools of human capital management in new economic conditions.

5. Discusstion

Entrepreneurship, as the author of the article has already written, is a very broad, multifaceted and interdisciplinary issue. There are many definitions of entrepreneurship in the scientific literature. We can see a certain evolution of views that emphasize various aspects of entrepreneurship - for example, in the dimension of

behavior, entrepreneurship is identified with the ability to see new opportunities, the search for opportunities, the effectiveness of achieving goals, maximizing profits, achieving success. The author also assumed that the development of an enterprise is an aggregate of its growth, development, competitive position, development intentions and the current balance of the enterprise, both in the material and social sense. Currently, there is no fixed list of factors of development of the SME sector. Its variability results from the fact that in various studies of enterprises, new factors determining significantly their development and growth processes are usually determined. An example of such a factor is the so-called entrepreneurial orientation, which is an aggregation of the pursuit of implementing innovative solutions that refresh and improve the market offer, the ability to take the risk of implementing untested solutions and being more proactive than rivals in the use of market opportunities. Other variables of this type are market orientation, which is related to market monitoring and introduction of new business models. It may also be the introduction of human resource management models that are based on participation, commitment and activity.

Currently, there is no fixed list of factors of development of the SME sector. Its variability results from the fact that in various studies of enterprises, new factors determining significantly their development and growth processes are usually determined. An example of such a factor is the so-called entrepreneurial orientation, which is an aggregation of the pursuit of implementing innovative solutions that refresh and improve the market offer, the ability to take the risk of implementing untested solutions and being more proactive than rivals in the use of market opportunities. Other variables of this type are market orientation, which is related to market monitoring and introduction of new business models. It may also be the introduction of human resource management models that are based on participation, commitment and activity.

The development process is a long-term phenomenon that operates in the economy and includes quantitative and qualitative changes. The quantitative changes include: production growth, investments, employment, employment structure, income, the size of the operating capital, and other economic quantities that exist in the quantitative sphere of the economy. In practice, the quantitative changes that occur most often result in qualitative changes (Komańda & Kłosa, 2020). According to the author of the article, the most important of them is the change in the organization of society. In such a situation we can consider as the basic factors of economic development: human capital, entrepreneurship, land and raw materials, technical progress and investments. This phenomenon is particularly visible on the economic market in the first twenty years of the XXI century. Of course, this process is dominated by intensifying globalization processes, causing permanent market turbulence. This phenomenon leads to the emergence of new, previously unprecedented changes. Thus, we can distinguish many factors determining the development of economic activities, which may differ significantly or be practically identical.

Therefore, it is difficult for us to create a single, comprehensive and, most importantly, universal definition of the company's development. After all, this concept is difficult for us to identify and interpret, let alone define. According to the author of the article, the main reason for these problems is the fact that in every economic organization that carries out a specific activity, the development may take place in completely different areas of the economy or will be associated with different goals. Of course, you can try to define economic development following M. Krezymon (2018) - this is a development taking place during the process of change, which may concern a part of the company or its whole and relate to all or one area of operation. The company's development can be considered as the elimination of developmental discrepancies, i.e. the so-called development gap or as a process of improving the place occupied by the company in its environment (Augustyńczyk, 2020). According to other researchers, development is a process based on values, cooperation and science. This leads to improvement and strengthening of the company strategy. This is done by simultaneously strengthening processes, strategies, cultures and people forming one company. This leads to an increase in the efficiency of the business unit. As elements of development we can distinguish here changes in the structure of systems, improvement of the existing system or its elements and introduction of innovative changes to the existing system (Glinka & Piaseczny, 2015).

Development is also more and more often defined as quality, which is another factor in the company's development. The customer currently has a wide range of the same or similar products or services that are offered by companies. Therefore, their quality should meet certain standards or be higher than customers' expectations. Quality is a good thanks to which an entrepreneur has a possibility to build permanent, based on mutual trust, relations with a client and is one of the most important factors of a company's development. The development can also refer to the desire to survive on the market, maintaining the chosen scale of production and form of activity. Then its determinant becomes a person or persons managing an economic unit. Their strategic, marketing and analytical activities lead to maintaining market stability (Mitek & Micuła, 2013).

To sum up, a survey with 200 business owners, which was launched in Poland over the last 5 years, allowed the author to collect data which, in his opinion, will allow him to try (this is a pilot study for the time being) to create the construction of the previously described measures of entrepreneurship development. These measures were used in the analysis as dependent variables, the effects of certain groups of factors. This means that the sequence of research tasks carried out in this article allowed, in the author's opinion, to develop and implement the main objectives of the prepared material set out at the outset. On the other hand, the obtained conclusions may find theoretical and practical application - serve for better cognition, understanding and improvement of the management of the determinants of entrepreneurship development in the face of new challenges.

On the other hand, we can certainly say that determinants of entrepreneurship development will permanently remain an element of management - as they have become tangible assets, organizational structures, strategies, processes, systems, financial and information resources. If we take into account the permanent changes, which are taking place in the economy, the determinants connected with the development of entrepreneurship will also change - and this is the most important value for the economy in the 21st century. All the more, so in view of the fifth industrial revolution. In science, on the other hand, we can hope that the need to develop these and new conceptual frameworks, together with methods for studying the determinants of entrepreneurship development, will not disappear.

Conclusions

In this article the author has attempted to identify the factors / determinants of the development of entrepreneurship, which are most important from the point of view of entrepreneurs themselves. In his research he paid special attention to external and internal conditions.

Certainly, the financial aspect had the greatest influence on making the decision about „own business” among the surveyed respondents, and only then the pursuit of self-fulfilment and the desire to be independent. However, the main sources of financing for the development of companies from the research group were considered to be own resources. This confirms the common conviction about piling up barriers on the way to acquiring foreign capital, i.e. loans or financial resources from loan funds. For the respondents, the development of the companies turned out to be conditioned also by acquiring and, what is important, retaining clients, which resulted in indicating many implemented actions that are to be a guarantee of success in this respect.

Moreover, from the collected empirical material it appeared that entrepreneurs saw the importance for the development and success of many of the analyzed internal factors - they attributed great importance to innovative management methods and human capital. They also did not forget about increased competitive competition, in the face of market saturation with entities of similar size, which have similar or even identical products or services in their offer. Certainly, an important factor connected with the development of business activity is the owner's person - his personality traits of entrepreneurs, for example professional competence or consistency in action.

Additionally, the author, thanks to the analysis of source data, managed to obtain information from which we can obtain very interesting conclusions, which were not described above. Almost 19% of adults are involved in entrepreneurship in Poland - just over 15% in Europe. The percentage of companies that have not been operating on the market for more than 5 years (they are the main research group) is now almost 9%. Interestingly, if we translate this into figures, we can state that 2.2 million Poles run the so-called young companies - for comparison, the percentage in Europe is 8.1%. This is a sure sign that nowadays more and more adults in Poland think that their own company is a good way to make a career. On the other hand, people who have set up their own companies and succeeded in their business should be recognized. Poles are also more and more often able to see business opportunities in their environment and, what is important, they believe that they have enough skills and knowledge to run a company.

To sum up, according to the author of the article, the conditions for the creation and development of enterprises in Poland against the background of economies focused on innovation are not the best. However, there is a basis for optimism for the future, as most of the nine areas that form the primary basis for the identification of indicators / determinants of entrepreneurship development in Poland, in this survey was assessed positively by respondents. Unfortunately, all of the results of the survey are for the period up to 2020 and, in the author's opinion, reflect a very good economic situation and good situation on the labour market. This makes it easier to see the chances of setting up a company in their environment and at the same time less afraid of failure. We can only hope that in the new economic landscape, the landscape after the COVID-19 pandemic, the mood but also the actual state of the existing economy will also encourage optimism. Certainly, in connection with the dynamic changes taking place on the economic markets and the growing demand for information on the determinants of development and building competitive advantage of the SME sector, the author of the article plans to implement the described study on a larger group of entrepreneurs and their enterprises so that the results obtained are adequate for the entire population.

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DEA MODEL AND EFFICIENCY OF UNIVERSITIES – CASE STUDY IN SLOVAK REPUBLIC*

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Abstract. Measuring the efficiency of organizations relates not only to economic parameters but also to non-economic ones at present, for example in organizations providing education. However, in the case of educational institutions in the form of public universities, we cannot consider profit as the main goal, but the quality of education. We do not find a lot of work on this issue in domestic and foreign literature from the point of view of universities. Universities report only data that are set by current legislation, and for this reason, measuring efficiency is a relatively challenging matter with ambiguous quantification. Measuring the efficiency of an educational institution cannot be carried out as unambiguously as in the case of companies whose mission is to produce products and services for the purpose of selling them. The aim of the presented study is to clarify the optimal way of evaluating and measuring the efficiency of higher education institutions through DEA analysis. To achieve this goal, we used the methods of descriptive statistics, mathematical-statistical calculations, DEA analysis of indicators and the method of comparison, induction, deduction and synthesis. The result is a model that will allow the comparison and evaluation of universities.

Keywords: education; efficiency of universities; performance of universities; DEA model

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JEL Classifications: I22, I23, J21, J00

1. Introduction

According to Jablonský and Dlouhy (2004), economic theory defines efficiency as a state where it is not possible to produce one unit more for a given resource without the need to limit the production of another good. Tumpach (2008) considers efficiency to be one of the key criteria for evaluating the company's results, it expresses the extent to which the set goals are being met and the conditions are being created for their fulfillment in the future.

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According to Lisý (2007), an economy, company or production unit is efficient if it operates at the limit of production possibilities. Heyne (1991) understands efficiency as the virtue that is most valued among economists. He and other authors understand the term efficiency as the ratio of specific inputs and outputs of the observed transformation process. What we can identify with in the case of evaluating the non-economic efficiency of the educational institution, in this case the added value is the achieved education of the individual.

The authors focused mainly on measuring financial indicators in measuring and evaluating efficiency in the previous period. In accordance with the development of modern methods of efficiency evaluation, methods such as Balance score card, Corporate Performance management, DEA models, or others are beginning to be used. In our study, we focused on evaluation through the DEA model, which was originally developed to measure the efficiency of non-profit organizations such as schools, hospitals, government and public administration. Later, its use was extended to various enterprises, services, the banking sector, as well as to measuring the performance of national economies. As stated by Malega and Bialková (2011), the level of efficiency expresses the quantitative and qualitative degree of compliance of the objectives (determined on the basis of knowledge and use of objective socio-economic laws) and the means needed to meet them.

2. Theoretical background

Figure 1 shows the conversion of inputs to outputs. If we want to measure efficiency, it is necessary to correctly identify and quantify inputs and outputs. Inputs are considered to be factors of production that were invested or consumed in the enterprise. In our case, we considered pedagogical, researchers and students to be inputs.

Outputs represent performances created over a period of time, in the first place it should be successful graduates whose institution has educated, but we also considered the outputs to be the number of implemented scientific projects, the number of publications. Another factor in terms of outputs is the success of graduates in the labour market.

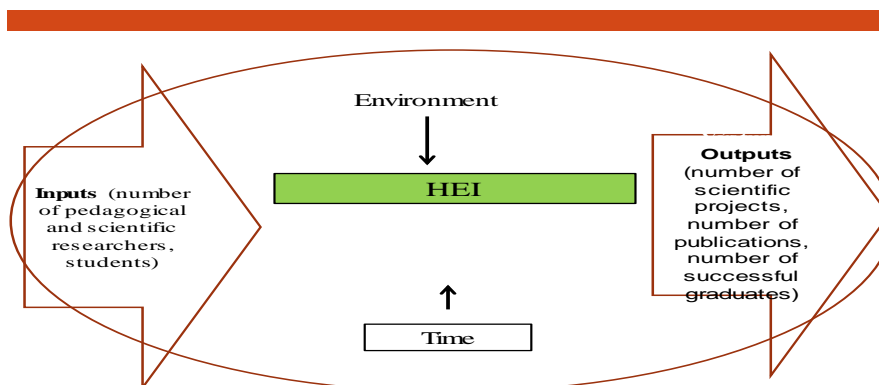


Figure 1. Transformation process of inputs to outputs in educational institutions

Source: Own processing

It is necessary to distinguish the concept of performance from the concept of efficiency. According to Wagner (2009, p.12), performance is defined as “a characteristic that describes the manner or course in which an object performs an activity, based on similarity to the reference method of performing that activity. Interpretation of this characteristic presupposes the ability to compare the investigated and the reference phenomenon in terms of a set range of criteria.” According to Fibírová and Šoljaková (2005), the term performance is used in connection with the definition of the very essence of the company's existence in the market environment, its success and ability to survive in the future. Sedláček, Suchánek and Špalek (2012) add that this concept is associated with performance,

ie with the realized output of the company and performance can be relatively easily quantified and then further analyzed. Šulák, Vacík (2003) define performance as the ability of a company to make the best use of the funds invested in business activities. And it may not be the case that a high-performing company must have good economic results. It is necessary to realize that the performance of an organization is evaluated by different entities from different perspectives. These entities can be internal or external.

One of the methods of measuring efficiency are DEA models, which belong to the non-parametric methods of efficiency evaluation. Their application is possible in different areas, because they also make it possible to compare the efficiency of non-profit-oriented entities, such as the efficiency of primary schools, the efficiency of hospital facilities and the like. The DEA method has been used to evaluate the relative efficiency of higher education published in a number of scientific studies. The first mention of this issue was in an article from 1992 by Johnes. Some articles focused on the teaching and production of students (Archibald, Feldman, 2008; Agasisti, Dal Bianco, 2009), others on publishing activities (Abramo, D'Angelo, 2009), or for research the output of which is patents (Thursby, Kemp, 2002). Other authors have focused on faculties or universities (McMillan, Datta 1998; Abbott, Doucouliagos 2003; Kao, Pao 2009). The validity of the use of DEA as an assessment tool has been addressed by Bougnol and Dula (2006) (Jeck, T., Sudzina, F., 2009).

3. Research objective and methodology

The aim of study was to clarify the optimal methods of evaluating and measuring the efficiency of higher education institutions through DEA analysis. Measuring the efficiency of education is a very complicated problem, as the output of education is taken away by the individual as his social competence, for this reason it is relatively difficult to measure. For the needs of our study, we decided to use the DEA model, which we used to assess the level of efficiency of education in the period under review, taking as inputs the total number of pedagogical, research staff and the number of students enrolled in a given year. We chose the number of successful graduates, the number of solved scientific projects, the total number of publications, the number of publications in peer-reviewed journals, based on valid quality standards for universities in the Slovak Republic. Models can be input or output oriented. In input-oriented models, DMUs (HEIs) have an efficiency rate of less than or equal to one. The degree of efficiency of an inefficient DMU in an input-oriented model expresses how much inputs need to be reduced in order for a DMU to become effective. The lower the DMU value from 1, the further away the DMU is from the data envelopment.

We determined the basic statistical characteristics of the data set before analyzing the data. Quantitative methods of descriptive statistics include procedures for determining the parameters of a set. The basic characteristics of the position are the arithmetic mean and the median. The methods of descriptive statistics will be applied to selected indicators characterizing the inputs and outputs of public universities. We analyzed 20 public universities based on available data. The analysis was focused on individual indicators that are necessary in the transformation process of the university environment.

4. Results and discussion

The first monitored indicator is the number of all pedagogical and research employees in the Slovak Republic. This indicator includes the numbers of professors, associate professors, assistant professors, assistants, lecturers and researchers. The number in each year is given in Table 1.

Table 1. The total number of pedagogical and research employees in the Slovak Republic in the years 2011-2019

	2011	2012	2013	2014	2015	2016	2017	2018	2019
UK Bratislava	2 379,9	2 364,4	2 398,0	2 437,0	2 442,2	2 413,0	2 439,6	2 474,0	2 511,1
UPIŠ Košice	707,1	711,7	729,4	766,9	775,1	776,9	783,3	796,5	810,3
PU Prešov	562,9	586,0	550,3	547,7	554,9	553,6	559,1	561,2	569,0
UCM Trnava	290,3	327,3	317,0	342,3	330,9	308,9	307,5	295,9	308,3
UVLF Košice	201,0	208,1	222,8	234,6	243,0	251,0	253,5	253,0	256,4
UKF Nitra	566,5	552,0	559,0	575,5	557,8	541,3	539,8	519,4	519,2
UMB Banská Bystrica	630,8	622,3	623,9	608,7	576,9	551,1	530,9	517,7	497,4
TvU Trnava	325,4	324,5	322,0	325,6	317,1	309,4	300,3	296,6	283,3
STU Bratislava	1 457,3	1 459,0	1 470,6	1 457,8	1 409,5	1 368,4	1 328,2	1 323,9	1 302,0
TU Košice	969,9	979,0	973,0	960,7	951,1	902,9	885,6	880,4	885,3
ŽU Žilina	809,5	808,0	802,9	825,4	816,9	768,3	746,5	740,6	728,5
TUAD Trenčín	195,0	184,0	183,5	186,9	173,2	149,1	139,2	138,9	141,6
EU Bratislava	655,0	653,3	659,6	620,1	596,1	557,8	523,9	510,1	495,3
SPU Nitra	550,3	537,4	514,1	514,5	523,9	527,1	526,3	518,1	516,8
TU Zvolen	325,4	321,4	321,2	306,7	299,0	302,6	290,2	280,6	273,5
VŠMU Bratislava	195,8	197,9	198,5	202,2	197,0	189,6	191,8	198,2	202,3
VŠVU Bratislava	122,9	122,6	123,8	126,2	127,6	129,6	120,4	120,4	123,3
AU Banská Bystrica	103,2	104,6	105,7	112,1	114,0	112,3	116,7	117,3	120,7
KU Ružomberok	386,4	390,8	384,2	393,4	387,5	355,6	334,6	312,4	298,6
UJS Komárno	85,7	92,6	96,7	97,7	103,5	107,2	113,8	115,6	120,1
SPOLU SR	13 531,3	13 558,9	13 569,2	13 656,0	13 512,2	13 191,7	13 048,2	12 988,8	12 982,0

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic

Based on Table 1, it is possible to observe a slight decrease in the total number of employees since 2015. In absolute terms, this decrease represents 549.3 employees, while the percentage decrease in 2019 is 4.05% compared to 2011. We consider it necessary to note that in absolute terms in some numbers, some employees are counted multiple times because they could work part-time at several universities in the Slovak Republic. In Slovakia, was recorded in 2019 compared to 2011 in the category professors decrease of 0.55%, while associate professors when we recorded an increase of 14.92%. The increase in the number of associate professors was caused by the professional growth of the assistant professor category. It is clear from the above table that despite a slight decrease in professors as well as the total number of teaching and research staff, the qualification structure of employees at public universities did not change significantly in the period under review, on the contrary, there was an improvement in the number of associate professors. To confirm this conclusion, we recalculated the number of employees through the index as a share of the weighted sum in the total number of teaching staff, and the weights were assigned as follows: professor - 3, associate professor - 2, assistant professor and researcher - 1, lecturer and assistant 0. By determining these weights we tried to approximate the IKA coefficient, which was used in evaluating the quality of universities in the system of comprehensive accreditation. In determining, we proceeded from the assumption that lecturers and assistants have not completed the third level of higher education. The development of this indicator is shown in Figure 2.

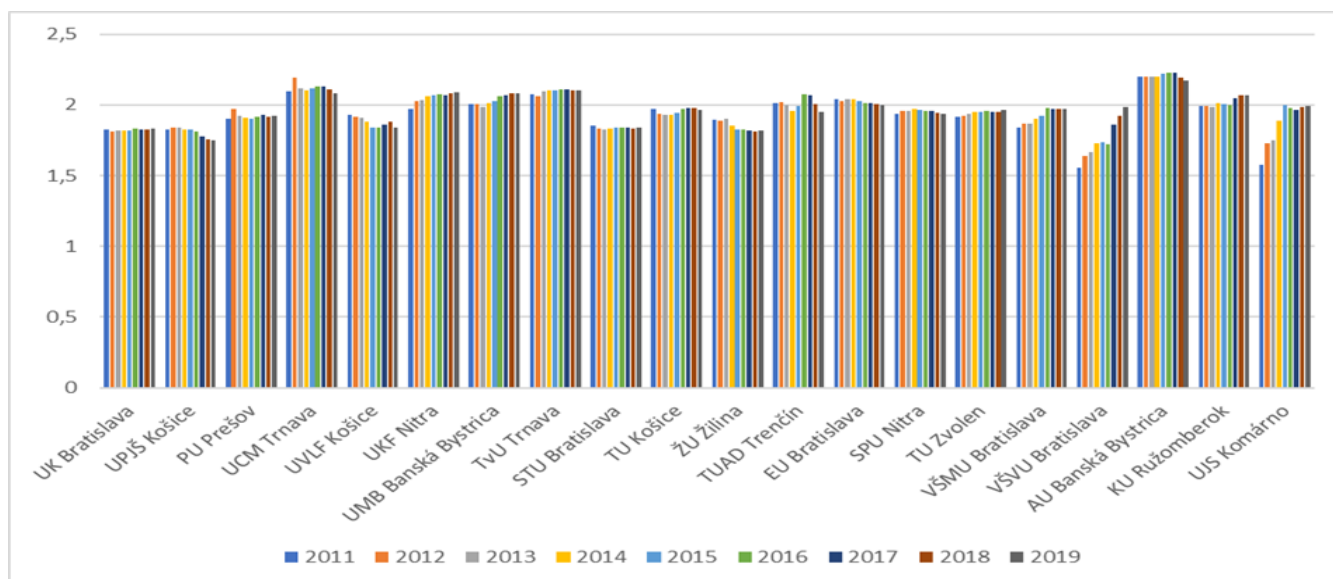


Figure 2. Development of the quality of the qualification structure of employees (IKA index)

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic, own calculations

In the case of 11 public universities, the growing trend in the quality of the structure of pedagogical and scientific researchers was confirmed to us.

Another monitored indicator on the input side, which we will use to evaluate the efficiency of the university is the number of students. We monitor the total number of university students in all levels and forms of higher education. This indicator recorded the most significant change compared to the beginning and end of the period under review. The demographic development of weak population grades, the possibility of studying abroad, caused a significant drop in the number of students at all public universities. The decrease in the number of students at all public schools in 2019 compared to 2011 was by 33.31%. In 2011, a total of 172,993 students studied, in 2019 it was 115,366 students. The development of the number of students and graduates of public universities is shown in Figure 3.

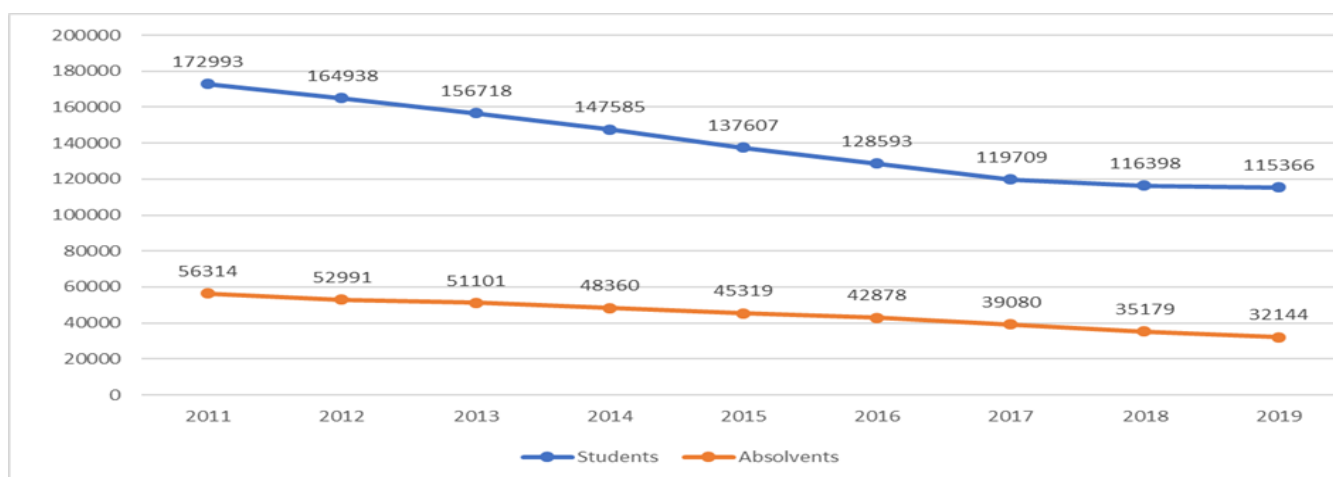


Figure 3. The development of the number of students and graduates of public universities in Slovak republic (2011-2019)

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic

An important indicator of quality in education is the number of students per teaching staff. The above findings show that if the number of students decreased, while the decrease in the number of teaching staff was not so significant, then this indicator records a positive development trend at public universities in the Slovak Republic. The average number of students at a public university per one pedagogical employee is shown in Figure 4. We can observe the decline during the entire researched period. In 2019, we record a slight increase to 12.2 students per employee. This increase is due to an increase in the number of students in 2019 compared to 2018. Based on demographic developments, it can be expected that this growth will continue in the future.

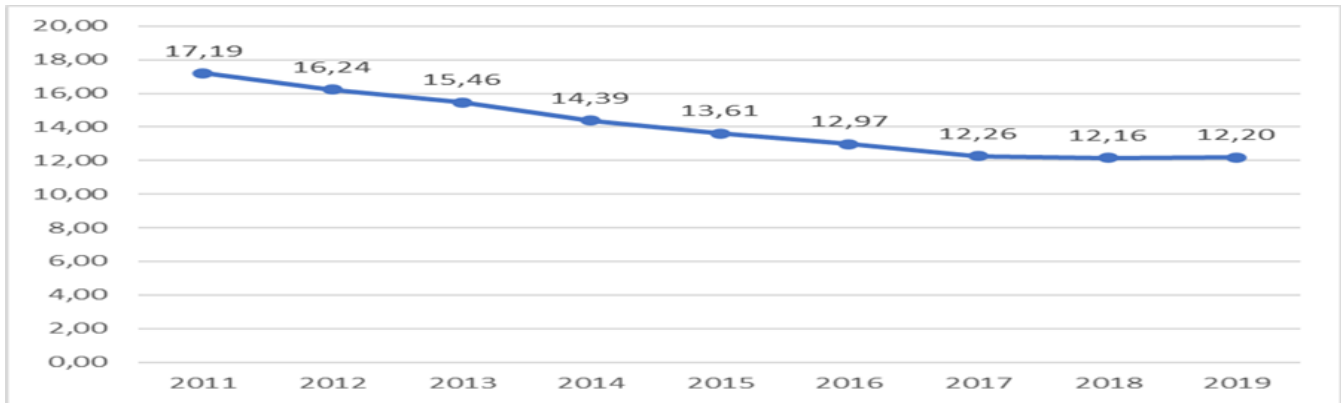


Figure 4. The average number of students at a public university per one pedagogical employee in Slovak republic (2011 – 2019).

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic

Based on the development of the number of students and graduates of public universities, we compiled a graph in which a polynomial development trend is added, which confirms the declining trend in the following period of five. The reliability of this statement is given by the value of R^2 , which in the case of students and graduates reaches almost 100 percent reliability, in the case of the development of the number of students it is at the level of 0.990 and in the number of graduates it is 0.998.

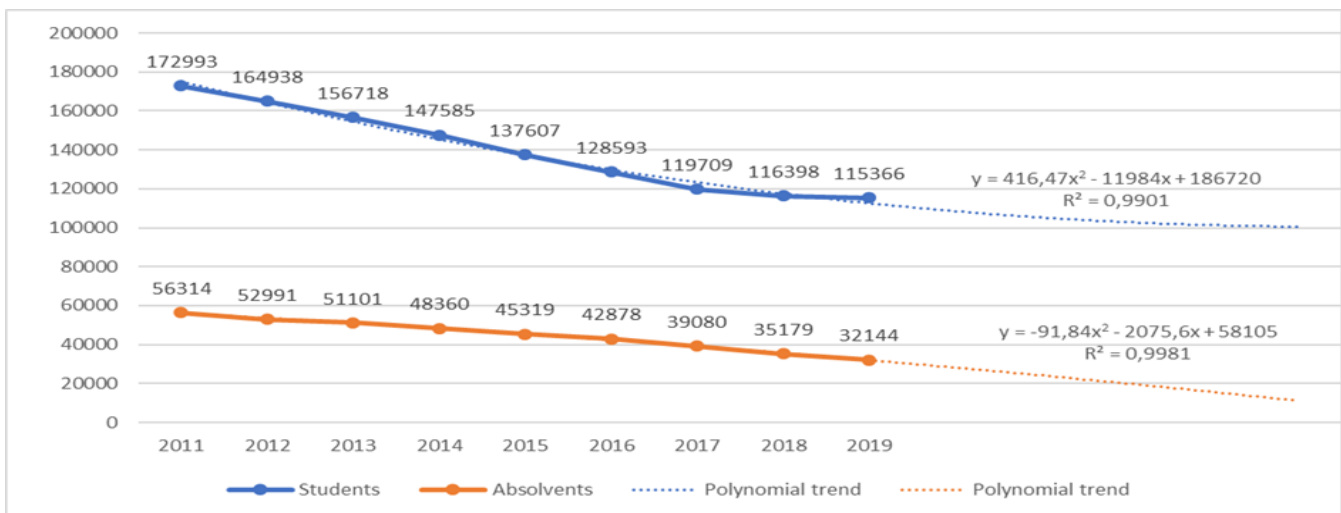


Figure 5. Polynomial trend in the number of students and graduates of public universities and its prediction for the next 5 years.

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic, own calculations

Scientific research projects are one of the main activities for any university, which is one of the important sources of funding for the operation of the university. Within the Slovak Republic, universities have the opportunity to participate mainly in research projects VEGA, KEGA and APPV. Universities are solvers of scientific research

projects at the international level within the framework of operational programs announced in the European Union, projects resulting from bilateral agreements between states, resp. their groupings such projects Visegrad Fund. We focused on projects of a scientific nature, which are provided within the Slovak Republic through the agencies of the Ministry of Education. Project activity is one of the main indicators of the efficiency of the university on the output side for the needs of our study. The following table shows the share of employees in solved projects in individual years at public universities in the Slovak Republic.

Table 2. Share of projects per pedagogical and scientific researchers (2011-2019)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
UK Bratislava	0,21	0,18	0,23	0,22	0,20	0,21	0,23	0,22	0,22
UPJŠ Košice	0,20	0,20	0,22	0,19	0,16	0,19	0,23	0,23	0,23
PU Prešov	0,18	0,15	0,21	0,21	0,18	0,20	0,23	0,23	0,24
UCM Trnava	0,04	0,03	0,07	0,06	0,07	0,07	0,08	0,13	0,14
UVLF Košice	0,37	0,35	0,39	0,29	0,25	0,25	0,27	0,22	0,21
UKF Nitra	0,15	0,14	0,18	0,15	0,15	0,16	0,17	0,19	0,20
UMB Banská Bystrica	0,14	0,12	0,14	0,13	0,13	0,18	0,21	0,24	0,25
TvU Trnava	0,19	0,15	0,18	0,18	0,20	0,20	0,21	0,24	0,26
STU Bratislava	0,22	0,18	0,23	0,21	0,20	0,20	0,23	0,23	0,25
TU Košice	0,21	0,16	0,21	0,20	0,20	0,23	0,24	0,25	0,27
ŽU Žilina	0,24	0,17	0,20	0,19	0,18	0,19	0,20	0,23	0,23
TUAD Trenčín	0,08	0,05	0,04	0,06	0,06	0,09	0,09	0,14	0,13
EU Bratislava	0,13	0,11	0,14	0,15	0,16	0,18	0,17	0,16	0,17
SPU Nitra	0,23	0,16	0,22	0,23	0,21	0,20	0,21	0,24	0,27
TU Zvolen	0,25	0,20	0,26	0,24	0,21	0,24	0,30	0,32	0,35
VŠMU Bratislava	0,05	0,03	0,04	0,03	0,03	0,05	0,07	0,07	0,06
VŠVU Bratislava	0,04	0,07	0,06	0,06	0,04	0,08	0,07	0,09	0,08
AU Banská Bystrica	0,07	0,02	0,04	0,03	0,04	0,03	0,02	0,01	0,00
KU Ružomberok	0,07	0,06	0,08	0,07	0,07	0,06	0,07	0,07	0,11
UJS Komárno	0,08	0,06	0,07	0,08	0,07	0,06	0,03	0,03	0,07
Priemer SR	0,16	0,13	0,16	0,15	0,14	0,15	0,17	0,18	0,19

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic, own calculations

The development of the number of projects per employee shows that the field of scientific research is stable at most universities. The trend is set by public universities, which have been operating on the Slovak education market for many years. The progress in the number of projects per employee is obvious in the case of UCM Trnava and TUAD Trenčín. Universities are marked in green, which in a given year reached a higher number than the average in the Slovak Republic. We stated amount of funds per employee in Table 3. These conversions do not take into account funds raised in international EU projects and so on.

Table 3. Funds received from VEGA, KEGA, APVV projects per employee in the years 2011-2019

	2011	2012	2013	2014	2015	2016	2017	2018	2019
UK Bratislava	1758,67	2333,75	2659,57	2741,98	2741,86	2898,35	3567,30	3668,00	4093,91
UPJŠ Košice	2090,20	2534,02	2499,17	2554,01	2565,56	2599,72	3444,00	3987,16	4099,14
PU Prešov	941,99	1287,89	1587,91	1608,17	1696,11	1465,71	1911,74	2107,13	2621,75
UCM Trnava	250,01	361,25	675,68	832,69	660,93	673,65	1071,19	1591,74	2166,98
UVLF Košice	4380,35	5591,22	5643,07	3745,21	3460,28	3387,91	4066,21	3797,92	3546,40
UKF Nitra	811,96	921,79	946,72	956,24	934,69	1256,99	1643,74	1612,01	2038,24
UMB Banská Bystrica	610,90	769,19	859,09	922,45	1006,36	1232,28	1330,63	1544,72	2018,89
TvU Trnava	1052,64	1030,72	1220,23	1588,02	1962,18	2096,39	2506,73	3054,29	3132,52
STU Bratislava	2673,41	3102,51	3591,03	3667,65	3592,14	3735,78	4373,86	4925,43	5641,10
TU Košice	1937,96	2376,01	2556,67	2488,85	2790,31	3239,48	4155,74	4544,27	4780,95
ŽU Žilina	2632,86	2391,34	2375,56	2301,41	2614,12	2974,32	3420,08	3632,15	4025,64
TUAD Trenčín	503,17	475,91	588,09	625,64	781,51	600,91	921,96	1244,23	1513,90
EU Bratislava	555,71	781,49	743,59	843,72	885,74	1291,85	1687,10	1693,16	1584,88
SPU Nitra	1729,65	1453,96	1741,52	2211,05	2381,71	2353,98	3015,92	3538,88	3775,89
TU Zvolen	2330,94	2343,03	2447,13	2961,72	3314,74	3699,33	5119,74	5540,77	6569,81
VŠMU Bratislava	224,36	204,61	179,76	187,16	103,30	269,80	377,89	392,43	318,26
VŠVU Bratislava	219,99	866,84	472,30	607,82	534,19	613,95	652,67	938,07	821,44
AU Banská Bystrica	266,44	78,57	242,40	124,60	244,80	583,01	105,96	41,36	0,00
KU Ružomberok	226,29	267,38	307,73	295,26	277,39	75,23	236,68	294,80	458,10
UJS Komárno	287,18	433,30	216,48	212,85	203,18	156,80	139,26	139,10	302,56
Priemer SR	1274,23	1480,24	1577,69	1573,83	1637,55	1760,27	2187,42	2414,38	2675,52

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic, own calculations

The share of funds received per employee has a growing trend in the monitored period at all public universities in the Slovak Republic. The growing trend in the average value in Slovakia is caused mainly by the growth of funds from projects for faculties that have highly demanding material security (technology, healthcare), which is also confirmed by the values of this indicator. Low values at VŠMU Bratislava, VŠVU Bratislava and AU Banská Bystrica are given by their specific focus, although in the case of VŠVU it is possible to observe a growing trend. The next monitored output is an index expressing the ratio of the number of solved projects and the number of submitted projects. The development of this indicator is shown in Table 4.

Table 4. The ratio of the number of solved projects and the number of submitted projects

	2011	2012	2013	2014	2015	2016	2017	2018	2019
UK Bratislava	1,50	1,46	1,95	1,98	1,83	2,04	1,87	2,15	2,18
UPJŠ Košice	1,38	1,47	2,12	2,19	1,40	1,60	1,74	2,28	2,72
PU Prešov	0,99	0,90	1,10	1,16	1,00	1,01	1,07	1,39	1,58
UCM Trnava	0,57	0,61	0,78	0,47	0,81	0,79	0,72	1,23	1,40
UVLF Košice	1,36	1,41	2,53	2,09	1,09	1,62	1,73	1,51	1,35
UKF Nitra	0,87	0,89	1,09	1,14	0,90	0,92	0,92	1,04	1,59
UMB Banská Bystrica	0,98	1,09	0,99	0,88	0,85	1,02	1,29	1,32	1,35
TvU Trnava	1,03	1,07	1,20	1,46	1,35	1,48	1,51	1,85	2,34
STU Bratislava	1,60	1,19	1,82	2,10	1,76	1,77	2,00	2,25	2,79
TU Košice	1,13	1,07	1,47	1,38	1,18	1,45	1,52	1,51	2,07
ŽU Žilina	1,08	0,96	1,44	1,32	1,34	1,65	1,14	1,33	1,62
TUAD Trenčín	0,56	0,77	0,47	0,44	0,79	0,87	0,62	1,46	1,73
EU Bratislava	1,23	1,07	1,15	1,00	0,91	1,32	1,01	1,05	1,28
SPU Nitra	1,43	1,02	1,16	1,20	1,38	1,11	1,01	1,33	1,53
TU Zvolen	1,67	1,07	2,00	1,52	1,28	1,47	1,62	2,65	2,50
VŠMU Bratislava	1,13	0,38	1,75	2,33	0,63	0,71	2,00	2,80	1,50
VŠVU Bratislava	0,56	0,67	1,00	1,14	1,25	1,22	3,00	2,20	1,00
AU Banská Bystrica	1,75	1,00	0,44	0,75	2,00	0,21	0,67	0,25	0,00
KU Ružomberok	0,45	0,50	0,65	0,55	0,90	0,66	0,53	0,63	0,74
UJS Komárno	0,54	0,67	0,47	0,47	0,78	3,00	0,38	0,40	0,53
Priemer SR	1,09	0,96	1,28	1,28	1,17	1,30	1,32	1,53	1,59

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic, own calculations

Even in this indicator, universities maintain a stable development trend in individual years, while the highest increase compared to the beginning of the observed period was recorded by TUAD Trenčín. Based on the above-mentioned developments of indicators in project activity, we can state that public universities are constantly improving results in this area. Younger and smaller universities in the observed period have a higher year-on-year growth rate, especially in the last two monitored years.

The last monitored indicator on the output side is publishing activity. For our needs, we used an indicator of the number of publications per employee as well as the number of outputs per employee in scientific journals. Data on publishing activities were available only from 2013, so we will examine this part in a shorter period 2013-2019. Figure 6 shows the percentage change in 2019 compared to 2013. There was a decrease in the number of publications per employee at all public universities, except UVLF Košice and TVU Trnava. This decrease was accompanied by an increase in the share of outputs in current journals per employee. We also see an increase in the share of outputs in current journals in the total number of university outputs.

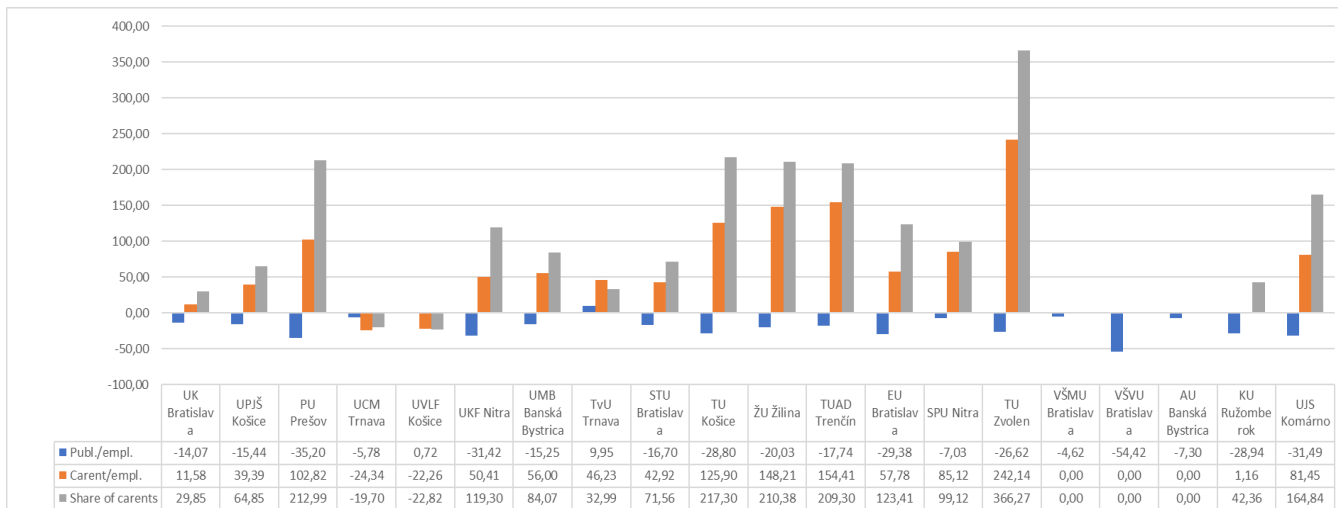


Figure 6. Percentage change in the publishing activities of universities in 2019 compared to 2013

Source: The Ministry of Education, Science, Research and Sport of the Slovak Republic

To verify our assumption of specified inputs and outputs, we performed a correlation analysis of the following indicators: number of employees, number of implemented projects and the total number of publication results. The results of the correlation analysis are as follows (Table 5):

Table 5. Correlation analysis

	Employees	Projects	Publications
Employees	1		
Projects	0,98394415	1	
Publications	0,971183146	0,950358645	1

Source: own calculations

As we expected, our strong dependence of the number of projects (0.98) as well as the number of publications (0.97) on the number of employees was confirmed. The assumption that projects are a prerequisite for publishing activities was also confirmed, while the dependence is at the level of 0.95. The 140 values for each correlation indicator were used, with the following statistical values within the data set. In the case of the number of employees, the median level was 444.35, the maximum value was 2511 employees (UK Bratislava year 2019) and the minimum value was 96.7 employees (UJS Komárno year 2013). Modus stood at 523.9, standard deviation

535.19. In the case of the number of solved projects, the median was 85.5, modus was 7 and the standard deviation was 124.56. The maximum number of solved projects in the monitored period was 561 (UK Bratislava in 2019). In the case of the number of publications, the median was 1962 publications, with a minimum number of publications of 82 and a maximum of 10450.

We used DEA analysis to evaluate the efficiency of public universities, using a model for constant returns to scale. In the case of inputs in the form of the number of employees and in monitoring outputs as the number of publications, projects, it is not possible to consider increasing revenues from scale. First, we evaluated public universities according to the number of employees and the total number of publications. The results of the DEA analysis are shown in Table 6.

Table 6. Efficiency of universities according to the CCR DEA model (staff and publications)

	2019		2013	
TvU Trnava	1,00	1,00	0,68	0,40
PU Prešov	0,87	1,75	1,00	1,00
EU Bratislava	0,79	1,37	0,83	0,99
UCM Trnava	0,75	0,81	0,59	0,34
UMB Banská Bystrica	0,73	1,29	0,64	0,73
TUAD Trenčín	0,73	0,36	0,66	0,22
SPU Nitra	0,72	1,31	0,57	0,54
UJS Komárno	0,67	0,29	0,73	0,13
TU Košice	0,67	2,08	0,70	1,23
UKF Nitra	0,65	1,20	0,71	0,72
UVLF Košice	0,65	0,59	0,48	0,20
UK Bratislava	0,65	5,75	0,56	2,44
UPJŠ Košice	0,59	1,68	0,52	0,69
ŽU Žilina	0,58	1,50	0,54	0,79
KU Ružomberok	0,58	0,61	0,61	0,42
TU Zvolen	0,56	0,54	0,57	0,33
STU Bratislava	0,55	2,54	0,49	1,32
AU Banská Bystrica	0,24	0,10	0,19	0,04
VŠMU Bratislava	0,14	0,10	0,11	0,04
VŠVU Bratislava	0,12	0,05	0,19	0,04

Source: own calculations

Based on this analysis, TvU Trnava appears to be the most effective in this area in 2019, which was in 6th place at the beginning of the monitored period. Overall, it can be stated that the differences in the efficiency of individual universities in 2019 were to a lesser extent than in 2013. Universities that significantly exceeded other universities in the absolute number of published outputs in this comparison reached a median level of 0.65. Even in the case of DEA analysis, the lowest efficiency was achieved by AU Banská Bystrica, VŠMU Bratislava and VŠVU Bratislava.

In the case of the analysis of the number of employees per the number of solved projects, the results of the efficiency of public universities are shown in Table 7. Evaluation according to outputs in the form of solved projects in a given year, TU Zvolen is the most effective. The least effective in this area are UJS Komárno, VŠMU Bratislava and AU Banská Bystrica. The median in 2019 increased to 0.624 compared to 2011, when it reached the level of 0.439. The average value of efficiency increased from 0.421 in 2011 to 0.539 in 2019. Based on these facts, we can state that the efficiency of public universities in this category is increasing and the differences between individual universities are decreasing.

Table 7. Efficiency of universities according to the CCR DEA model (employees and number of solved projects)

P. č.	DMU Name	2019		2011	
		Efektívnosť	Lambda	Efektívnosť	Lambda
1.	TU Zvolen	1	1	0,675353411	1,093333
2.	TU Košice	0,773963034	2,505263158	0,555397464	2,68
3.	SPU Nitra	0,768759166	1,452631579	0,628239142	1,72
4.	TvU Trnava	0,76216397	0,789473684	0,518869084	0,84
5.	UMB Banská Bystrica	0,729287029	1,326315789	0,378123018	1,186667
6.	STU Bratislava	0,723053602	3,442105263	0,577451451	4,186667
7.	PU Prešov	0,703292942	1,463157895	0,485627998	1,36
8.	UPJŠ Košice	0,65729392	1,947368421	0,538198275	1,893333
9.	ŽU Žilina	0,652060832	1,736842105	0,632340951	2,546667
10.	UK Bratislava	0,64318007	5,905263158	0,549535695	6,506667
11.	UVLF Košice	0,606330569	0,568421053	1	1
12.	UKF Nitra	0,582221637	1,105263158	0,392656664	1,106667
13.	EU Bratislava	0,499877799	0,905263158	0,355969466	1,16
14.	UCM Trnava	0,392201717	0,442105263	0,120013779	0,173333
15.	TUAD Trenčín	0,386299435	0,2	0,206153846	0,2
16.	KU Ružomberok	0,308527514	0,336842105	0,187267081	0,36
17.	VŠVU Bratislava	0,233491271	0,105263158	0,109031733	0,066667
18.	UJS Komárno	0,191770016	0,084210526	0,218903151	0,093333
19.	VŠMU Bratislava	0,170772953	0,126315789	0,123186925	0,12
20.	AU Banská Bystrica	0	0	0,181782946	0,093333

Source: own calculations

In the following table we present the efficiency of public universities according to the obtained funds for solved scientific research projects. Even in this case, the growing trend of efficiency in the given numbers of pedagogical and scientific researchers was confirmed in most public universities. The average value of efficiency increased from 0.29 in 2011 to 0.41 in 2019. The median value reached 0.36 in 2019 compared to 0.20 in 2011. The results and ranking of public universities for this output are shown in Table 8.

Table 8. Efficiency of universities according to the CCR DEA model (employees and volume of obtained funds)

P. č.	DMU Name	2019		2011	
		Efektívnosť	Lambda	Efektívnosť	Lambda
1.	TU Zvolen	1	1	0,532135157	0,861477
2.	STU Bratislava	0,858639308	4,087563	0,610319305	4,424967
3.	TU Košice	0,727715432	2,355563	0,442421348	2,134848
4.	UPJŠ Košice	0,623936411	1,84854	0,477175567	1,678661
5.	UK Bratislava	0,623140499	5,721273	0,401490934	4,753773
6.	ŽU Žilina	0,612748157	1,632128	0,601062596	2,420697
7.	SPU Nitra	0,574733906	1,086005	0,394866945	1,081071
8.	UVLF Košice	0,53980332	0,506053	1	1
9.	TvU Trnava	0,476806121	0,493891	0,240308919	0,389037
10.	PU Prešov	0,399060716	0,830221	0,215049042	0,602244
11.	UCM Trnava	0,329839008	0,371808	0,057075447	0,082433
12.	UKF Nitra	0,310244001	0,588953	0,185365329	0,522435
13.	UMB Banská Bystrica	0,307298393	0,558867	0,139463898	0,437681
14.	EU Bratislava	0,241236256	0,436871	0,126863976	0,413412
15.	TUAD Trenčín	0,230432663	0,119303	0,114870857	0,111442
16.	VŠVU Bratislava	0,125031896	0,056367	0,05022246	0,030708
17.	KU Ružomberok	0,069727731	0,076127	0,051660007	0,099311
18.	VŠMU Bratislava	0,048443571	0,035832	0,05121887	0,049894
19.	UJS Komárno	0,04605252	0,020223	0,065560129	0,027953
20.	AU Banská Bystrica	0	0	0,060827081	0,031231

Source: own calculations

Also in this case, TU Zvolen took first place in 2019, while in 2011 it reached only the level of 0.532 efficiency compared to the first UVLF Košice in that year. UVLF reached an efficiency level of 0.539 in 2019 and ranked 8th in the efficiency ranking. As AU Banská Bystrica did not implement any scientific research project in 2019, it shows an efficiency of 0 in this case. The least effective include KU Ružomberok, VŠMU Bratislava and UJS Komárno.

When comparing the efficiency of public universities in the field of project activities, despite the fact that some universities show high performance in the number of solved projects, when comparing with the efficiency of the obtained funds, they are on lower serial numbers. SPU Nitra in the number of solved projects is on the 3rd place in efficiency, but in the monetary expression of the projects it fell to the 7th place. TVU Trnava from 4th place to 9th place and UMB Banská Bystrica from 5th place to 13th place. Other changes in the order are not significant. The last DEA model, which we used to evaluate the efficiency of public universities, was based on measuring the efficiency of the university based on the input, which represented the number of teaching and research staff, and on the output side we used the following indicators: number of projects implemented in a given year, funds obtained for projects, the number of publications published in a given year, the number of publications in peer-reviewed journals and the number of graduates. The results of the multiplied DEA model at constant range returns are shown in Table 9.

Table 9. Evaluating the efficiency of public universities with a multiplied DEA model

2013			2019		
P.č.	VŠ	Efektívnosť	P.č.	VŠ	Efektívnosť
1.-7.	PU Prešov	1	1.-5.	UPJŠ Košice	1
1.-7.	UPJŠ Košice	1	1.-5.	TvU Trnava	1
1.-7.	UKF Nitra	1	1.-5.	TUAD Trenčín	1
1.-7.	TUAD Trenčín	1	1.-5.	UCM Trnava	1
1.-7.	UVLF Košice	1	1.-5.	TU Zvolen	1
1.-7.	SPU Nitra	1	6.	SPU Nitra	0,986875449
1.-7.	UJS Komárno	1	7.	EU Bratislava	0,981924187
8.	UK Bratislava	0,997092043	8.	UMB Banská Bystrica	0,978128748
9.	TvU Trnava	0,984686514	9.	PU Prešov	0,957976136
10.	TU Košice	0,976885224	10.	TU Košice	0,952890494
11.	TU Zvolen	0,934106777	11.	UK Bratislava	0,929819534
12.	EU Bratislava	0,933289457	12.	STU Bratislava	0,908246052
13.	STU Bratislava	0,901153487	13.	UKF Nitra	0,888865317
14.	UMB Banská Bystrica	0,885594657	14.	UJS Komárno	0,88219065
15.	KU Ružomberok	0,880376708	15.	ŽU Žilina	0,854388868
16.	UCM Trnava	0,852784169	16.	UVLF Košice	0,797327499
17.	ŽU Žilina	0,844542852	17.	KU Ružomberok	0,696552678
18.	VŠMU Bratislava	0,267631527	18.	VŠMU Bratislava	0,35920141
19.	VŠVU Bratislava	0,258727891	19.	AU Banská Bystrica	0,317763984
20.	AU Banská Bystrica	0,252725917	20.	VŠVU Bratislava	0,311891528

Source: own calculations

7 universities were effective in 2013, while in 2019 this number dropped to 5 universities. Two universities, TUAD Trenčín and UPJŠ Košice, maintained the highest level of efficiency in both years. As part of changes in the basic indicators of descriptive statistics, we observe a decrease in medians from 0.955 in 2013 to 0.941 in 2019. At the same time, in the case of specific universities AU Banská Bystrica, VŠVU Bratislava and VŠMU Bratislava we can observe a slight increase in efficiency despite previous evaluations of partial indicators. The average efficiency value in 2013 was 0.848, which means that there was a slight decrease to 0.840 in 2019.

Conclusions

Universities have a specific position in terms of evaluating efficiency as well as performance. The evaluation of efficiency using the DEA model that we proposed eliminates inaccuracies in the case of evaluations based on absolute values. It is necessary to realize that individual universities differ in size, number of students, number of employees as well as different length of existence. The efficiency evaluation proposed by us is based on the evaluation of the efficiency of higher education institutions on the basis of share indicators. The evaluation compiled in this way can be used to evaluate not only universities. Universities can use this assessment to compare their individual faculties. This method of evaluation is the basis for evaluation for the purposes of accreditation. The results can also be used in the field of university promotion in the higher education market at the international level. Each school can choose other indicators for its needs, which will enter the model. One of the important outputs could be data on the employability of graduates in the labour market. We did not use this indicator as data is not currently available to the extent necessary. The total number of university graduates was 35,017 in 2019. 46% found employment, the unemployed accounted for 4% and 37% continued their studies. In case of using these data for a longer monitored period at individual universities, we will include them in the models of efficiency evaluation. However, even without the use of this indicator, it has been confirmed that most universities achieve high efficiency and differences in evaluation using DEA models are minimal. The trend of maintaining quality and performance is positive. Young universities achieve the same and in some cases better results than schools with a long tradition. The issue of university evaluation requires further research, which we will address in further research activities.

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INTEGRATION OF SLOVAKIA'S DOUBLE-ENTRY BOOKKEEPING INTO THE EU SYSTEM*

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Abstract. At present, the basic principle of double-entry bookkeeping in Slovakia as well as according to international accounting standards is the accrual principle. Accounting in the world as well as in Slovakia has undergone a long development, as long as the accounting units could apply this principle in practice. The article is based on the requirements of the European Union and takes into account two assumptions: accrual basis and continuous duration in terms of business operation. The aim of the presented article is to compare the cash and accrual principle in the accounting of the Slovak Republic according to international accounting standards. In the article, we applied the research method - comparison / accrual and cash principle. We used the method of comparison and the method of analysis of performed controls. The article contains a presentation of the results of the control activities of the Supreme Audit Office of the Slovak Republic and the Financial Administration of the Slovak Republic, which these institutions performed at public administration entities and business entities.

Keywords: international standards; accrual system; cash system, control of accrual accounting

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1. Introduction

The development of accounting in the Slovak Republic has gone through various phases. The development of accounting was a complex process in order to reach a level so that international accounting standards can be applied to the legislation in force in the Slovak Republic. An important change in the legislation of the Slovak Republic - within the application of international accounting standards - was the introduction of the obligation to apply the accrual principle to accounting for public administration entities as well as for business entities. This obligation has been introduced into accounting procedures through accounts that are in account group 38 - Accruals also affect the application of costs in accounting units.

2. Literature review

Quality financial information is important for effective management in the public, private, but also business sectors. Providing databases of relevant information is the task of accounting and for the presentation of results within the European Union. This information must comply with the international accounting standards IAS / ISFR.

Thorough harmonization means correct reporting of business activities and this is what the authors deal with in the work (Jensen, 1986; Riahi-Belkaoui, 2000; Riahi-Belkaoui, 2000; Tumpach, 2006; Saxunová, et al. 2009; Kršková, 2011; Farkaš, 2020; Beretta, Cencini, 2020; Sidak, Hajnišová, Fabuš, 2020; Schroeder, 2000; Hajnal, 2021; Hillebrandt, Leino-Sandberg, 2021). Similarly, other literature (Epstein, Mirza, 2006) pays attention to accounting standards in terms of their origin and their subsequent interpretation in various types of organizations across their breadth.

International Accounting Standards IPSAS mean the unification of accounting and reporting of public administration with the business sphere. This requires the need for comparison and evaluation of organizations in individual EU countries. The standards cover various areas of the organization's functioning and make up a total of 31. Their application and implementation is a complex process that is dealt with in detail by the authors.

3. Present EU accounting requirements

The basic legal framework for the European Union's accounting is international accounting standards. After the accession of the Slovak Republic to the European Union, it was necessary to harmonize indicators for the evaluation of individual areas of state functioning; this also applies to indicators that express the outputs of the processes of companies and various institutions. And these outputs are represented by double-entry bookkeeping, which we deal with in this article.

International Accounting Standards mean the unification of financial accounting and reporting. This was necessitated by the need to compare and evaluate entities in individual EU countries. The common focus in the countries of the European Union is the effort to unify the accounting of the state and public sector on an accrual basis, while the European Commission recommends the use of International Accounting Standards for the public sector.

The International Federation of Accountants (IFAC) plays an important role in relation to international accounting standards. Founded in 1977, the company currently consists of 172 members and partners in 129 countries, representing approximately 2.5 million accountants from practice, education, civil service, industry and commerce. This federation contributes to the development, adoption and implementation of high quality international accounting standards (Štangová, Víghová, (n.d)). IFAC publishes manuals, standards and other publications and owns the copyrights (Kršeková, 2011).

IFAC has established the International Accounting Standards Board. At present, there are international accounting standards for:

- Public Sector Accounting Standards (IPSAS), and
- Business entities International Accounting Standards IAS (International Accounting Standards) until 2002, from 1st January 2003 International Financial Reporting Standards - IFRS (International Financial Reporting Standards). Within the European Union, the Commission is working to modernize the management of EU funds. In December 2002, the Commission presented an action plan for the transition to the accrual principle. In practice, this means that a new accounting system called "Accrual Based Accounting" has been introduced since January 2005 and new accounting rules have entered into force.

International Public Sector Accounting Standards IPSASs contain a set of 32 standards. IPSASs are aimed at improving quality and transparency in the public as well as in the business sector of financial accounting and reporting, as well as accounting methodology. Countries such as Switzerland, Austria, the Netherlands, France have already fully or partially implemented this standard in their legislation.

In terms of content, IPSASs must comply with International Standards IAS / IFRS. Table 1 provides an overview of standards based on the accrual principle.

Table 1. Overview of standards based on the accrual principle.

IPSAS Standard	Release date	IAS / IFRS on which the relevant IPSAS is based
IPSAS 1	2000	IAS 1 – Presentation of Financial Statements
IPSAS 2	2000	IAS 7 – Cash Flow Statements
IPSAS 3	2000	IAS 8 – Accounting policies, Changes in Accounting Estimates and Errors
IPSAS 4	2000	IAS 21 – The Effects of Changes in Foreign Exchange Rates
IPSAS 5	2000	IAS 23 – Borrowing Costs
IPSAS 6	2000	IAS 27 – Consolidated Financial Statements and Separate Financial Statements
IPSAS 7	2000	IAS 28 – Investments in Associates
IPSAS 8	2000	IAS 31 – Interests in Joint Ventures
IPSAS 9	2001	IAS 18 – Income from Ordinary Activities
IPSAS 10	2001	IAS 29 – Financial Statements in Hyperinflationary Economies
IPSAS 11	2001	IAS 11 – Contracts
IPSAS 12	2001	IAS 2 – Inventories
IPSAS 13	2001	IAS 17 – Leases
IPSAS 14	2001	IAS 10 – Events After the Reporting Date
IPSAS 15	2001	IAS 32 – Financial Instruments – Disclosures
IPSAS 16	2001	IAS 40 – Investment Property
IPSAS 17	2001	IAS 16 – Property, Machines and Equipment
IPSAS 18	2002	IAS 14 – Reporting Segment Information
IPSAS 19	2002	IAS 37 – Reserves, Contingent Liabilities and Contingent Assets
IPSAS 20	2002	IAS 24 - Related Party Disclosures
IPSAS 21	2004	IAS 36 – Impairment of Assets

IPSAS 22	2006	There is no relevant IAS/IFRS on which the IIPSAS is based
IPSAS 23	2006	There is no relevant IAS/IFRS on which the IIPSAS is based
IPSAS 24	2006	There is no relevant IAS/IFRS on which the IIPSAS is based
IPSAS 25	2008	IAS 19 - Employee Benefits
IPSAS 26	2008	IAS 36 - Impairment of Assets
IPSAS 27	2009	IAS 41 - Agriculture
IPSAS 28	2010	IAS 32 – Financial Instruments: Presentation
IPSAS 29	2010	IAS 39 – Financial Instruments: Recognition, Measurement
IPSAS 30	2010	IFRS 7 – Financial Instruments: Disclosures
IPSAS 31	2010	IAS 38 – Intangible Assets

Sources: Kršková (2011) p. 25; Štangová, N., Výchová, A. (n.d).

The accrual accounting system has been implemented in International Accounting Standard IAS 1 - Presentation of Financial Statements. This standard requires entities to present costs and revenues on an accrual basis in the comprehensive income (statement of comprehensive income - uses IAS 1, in Slovakia it is called the income statement).

According to International Accounting Standards, the preparation of financial statements is based on two basic assumptions, namely the accrual basis and the principle of going concern.

a) Accrual basis - According to this principle, the effects of transactions and other events are recognized and recognized when they arise, and not when the cash or cash equivalents associated with those transactions are received or received. paid. This is a basic principle of double-entry bookkeeping. It must be the case that the transactions are recorded in the books and reported in the financial statements in the period to which they relate. Therefore, the financial statements, which are prepared on an accrual basis, inform users not only of past transactions but also of the obligation to pay cash and cash equivalents in the future. The objective of an accrual basis of accounting is for the financial statements to provide a realistic view of its elements, making it as useful as possible for its users in making economic decisions. The accrual basis of accounting is characterized by two basic principles, namely the implementation principle - in relation to the company's revenues, and the principle of assigning costs to revenues.

b) The principle of continuous business duration. The financial statements are prepared on a going concern basis and will continue to operate in the near future. Therefore, it is assumed that the entity does not intend or is not forced to liquidate or substantially reduce the scope of its operations. (Krištofik, Šuranová, Saxunová, 2009).

Accounting according to international accounting standards must also meet qualitative characteristics.

These are the features that make the information in the financial statements useful to users.

International Accounting Standards define four primary qualitative characteristics of financial statements, namely: comprehensibility, relevance, reliability and comparability.

Comprehensibility - Users are expected to have sufficient knowledge of business and economic activities, accounting and a willingness to examine information with due care.

Relevance - Information from financial statements can be considered relevant when it influences users' economic decisions by helping them to assess past, present or future events.

Reliability - means that information from financial statements is useful, it must be reliable. Information is reliable if it does not contain a serious error and is not one-sided.

Comparability - Users of accounting information must be able to compare the entity's financial statements over time in order to identify trends in its financial position and profitability.

Accounting harmonization is the process of approximating accounting principles, accounting methods, accounting and balancing rules, and in particular the content of countries' financial statements, so that they are comparable and transparent to users of financial statement information in any country in the world.

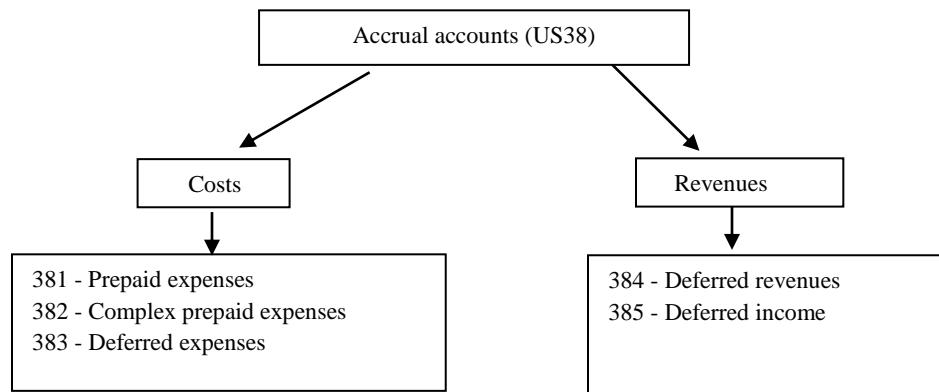
The process of international harmonization of accounting in the world takes place in several directions, which manifest themselves as:

1. Harmonization within a given community of countries (eg within the European Union, within the countries of South Africa, in Asia, in South America, etc.)
2. Global harmonization of accounting, in which there are two comprehensive sets of standards:
 - International Financial Reporting Standards - IFRS
 - US Generally Accepted Accounting Principles (US GAAP). (Šlosár, Novák, 2010).

The implementation of EU accounting regulations into Slovak legislation was necessary with the moment of Slovakia's accession to the EU. (Mládek, 2005). Accounting units also perform business activities outside the territory of the Slovak Republic (for example, through organizational units, permanent establishments). At the same time, the valid Act on Accounting in the Slovak Republic in § 17a precisely defines which accounting units are obliged to compile financial statements exclusively only in accordance with international accounting standards. For example: banks, a management company, an insurance company other than a health insurance company, a reinsurance company, a branch of a foreign bank, a branch of a foreign management company and other entities listed in the law. There are entities that may account in accordance with IAS / IFRS: if it issued securities during the accounting period and these were admitted to trading on a regulated market. In EU Member States, these entities are required to account for and report data under IAS / IFRS, the number of which in 2020 is 7,365.

The first law on accounting in the Slovak Republic was Act no. 563/1991 Coll. on accounting. This law did not yet contain elements of accrual accounting. Only another law on accrual accounting was introduced in the Slovak Republic from 1.1. 2003 when Act no. 431/2002 Coll. on accounting. The individual framework chart of accounts contains account group 38 - Accruals. European Union directives have been implemented in this legal norm.

For the first time, the accrual accounting system was introduced in the Slovak Republic by Act no. 563/1991 Coll. into which legal norms the directives of the European Union have been implemented. Prior to this period, in the Slovak Republic, entities did not account for accruals of costs, revenues, income and expenses. From 1.1. 2003 is valid law no. 431/2002 Coll. on accounting, which shows all accounting entities accounting in the double-entry bookkeeping system to apply the accrual principle, ie accrual of costs, revenues, income and expenses. This applies to public administration entities, business entities (small and large accounting units), non-profit organizations. The individual framework chart of accounts contain (Picture 1).



Picture 1. Accrual Accounts for the Accrual Principle
Source: authors' own processing

4. Accrual versus cash accounting system

a) Cash system

Cash accounting provides information on the flow of cash, while the cash basis is easily controllable in terms of the collection of tax revenues. Allows you to control expenses. It ignores other cash flows. The cash system is simpler and less subjective. The compilers of financial statements are not forced to make decisions in determining the amount of cash flows and have the ability to control the timing of cash flows by withholding payments and, where appropriate, to influence financial results in a positive or negative sense. Thus, all cash receipts and expenditures, regardless of their type, are recognized at the time they are received or provided. However, this system does not represent the satisfaction of information needs at present.

b) Accrual system

This system takes into account costs and revenues, income and expenses - in the accounting period in which they were incurred, it also provides information on assets and liabilities, regardless of the date of their payment or collection (Drury 2017). It is provided by accruals and thus expresses the independence of accounting periods, which is important in quantifying the economic result for the current accounting period. These transactions are recognized in the period in which they arise and not in the period in which the cash associated with the transactions is received or paid. The accrual principle contributes to the financial statements presenting the facts about the management of the organization faithfully and truthfully. The accrual model is linked to the chart of accounts in accordance with International Accounting Standards IAS / ISFR.

When comparing these two systems, we see the following facts:

Cash system:

- reporting transactions only in the case of receipt or payment of funds
- does not distinguish between the purchase of assets and the payment of expenses
- does not track revenues, only costs.

Accrual system:

- records related transactions in the period in which they are incurred,
- monitors costs and revenues in a certain correlation,
- gives a good overview of assets and liabilities,
- facilitates liquidity provision,
- from an analytical point of view, it allows transparency and accountability.

5. Accounting Information Reporting

In order to meet the needs for the information system of the European Union, double-entry accounting in the Slovak Republic must have absolutely reliable reporting. Accounting information is used by the management of the accounting entity, therefore it is expected from them completely correctly processed accounting information in terms of content and form. They are affected to some extent by the type of entity and the purpose for which the information will be used. Reporting therefore shows financial transactions and especially their effects and economic events in the organization. These are mainly financial statements whose basic components are directly related to the measurement of the financial situation - in the balance sheet, which includes assets, liabilities and equity, and the measurement of profitability - in the income statement in terms of costs and revenues. Reporting these components in individual reports requires further breakdown. The basis of reporting is to point out and know the links and internal logic using the created reporting indicators, according to which the performance of the organization will be measured. Therefore, in order to be meaningful, every reporting must follow certain rules, namely: goal orientation, problem location orientation, also activity orientation.

The method of presentation is also important in order to meet the information needs and requirements of users. Approaches to the reporting view can be as follows:

5.1. By subject

Here we start from the accounting defined by the Accounting Act, where the basic types of accounting information relating to assets and resources and expenditures and revenues, costs and revenues and the resulting profit are identified. (Šuranová, Škoda, 2007). This information is presented in the financial statements and can be presented as follows (Table 2):

Table 2. Quantitative indicators, arranged by purpose

The Goal	Information for Decision-Making		
Financial Characteristic	Financial Situation	Profitability	Detailed Information
Statement	Balance Sheet	Profit and Loss	Notes
Type of information	Financial Structure	Profitability	
	Liquidity	Efficiency	
	Solvency		
	Indebtedness		

Source: Authors' own processing

The table contains quantitative indicators, arranged according to **the purpose** in a clear and comparable way.

5.2. According to the method

Here, tabular processing and detailed elaboration of notes on individual accounting data are important. (Farkas 2020).

Emphasis should be placed on:

- fixed assets, their valuation, depreciation and also the source of their financing
- receivables and the need for provisions
- financial accounts in terms of the source of their use
- equity and its movement - liabilities and their maturity
- reserves and their drawing and creation
- finally, costs and revenues by type.

5.3. According to time

Accounting information of several time periods has a better explanatory power, from which the development is visible in the current as well as time shift, which will enable the prediction of development trends of a certain area in the organization.

5.4. By type

This aspect makes it possible to monitor the actual and planned information and especially the differences resp. deviations between them, which is important for the company's management, because it directs attention to the problems in the form of deviations and thus to their solution.

6. Performance of accrual accounting control

a. Control of compliance with accounting - including compliance with the accrual principle - in public administration entities is performed in the Slovak Republic by the Supreme Audit Office of the Slovak Republic. The Supreme Audit Office has the authority to carry out audits pursuant to the Act on the SAO in the area of management with:

- by means of budgets approved by law by the National Council of the Slovak Republic or the Government of the Slovak Republic,
- property, property rights, funds, liabilities and receivables of the state, public institutions, the National Property Fund of the Slovak Republic, municipalities, higher territorial units, legal entities with state ownership, legal entities with ownership of public institutions, legal entities with the Fund's ownership national property of the Slovak Republic, legal entities with property participation of municipalities, legal entities with property participation of higher territorial units, legal entities established by municipalities or legal entities established by higher territorial units,
- property, property rights, funds and receivables provided to the Slovak Republic, legal entities or natural persons within the framework of development programs or for other similar reasons from abroad,
- assets, property rights, funds, claims and liabilities for which the Slovak Republic has taken over the guarantee,
- property, assets, funds, debts and liabilities of legal persons carrying out activities in the public interest.

During inspections in 2020, there were found violations of generally binding legal regulations, internal regulations or the conditions of concluded contracts in 1,077 cases. In the protocols on the result of the inspection, it was proposed to the 28 inspected entities 129 recommendations to eliminate the deficiencies found during the inspection. The audited entities took a total of 454 measures to eliminate the deficiencies identified during the inspection. In the area of accounting, the following violations of the Accounting Act as well as accounting procedures were found:

- the accounting was not kept correctly, completely, provably and clearly - which can be defined as a basic rule of accounting under the Accounting Act - this rule was violated in 10 municipalities,
- the accounting documents did not contain all the requisites prescribed by law - violation found in 7 municipalities,
- non-compliance with accounting procedures in the form of incorrect accounting of accounting cases - violation found in 28 municipalities,
- recorded accounting cases to the period with which the accounting case was not related - in 7 municipalities,
- the financial statements did not contain a true and fair view of the facts that are the subject of the accounts - the breach was found in 6 municipalities,
- the municipality did not carry out an inventory of assets and liabilities and the difference between assets and liabilities under the Accounting Act - violations were found in 12 municipalities.

In 28 cases, the Supreme Audit Office reported violations of legal regulations to the relevant state administration bodies (bodies active in criminal proceedings, the Ministry of Finance of the Slovak Republic, the Government Audit Office, the Public Procurement Office) and they will carry out further proceedings.

b. Control of bookkeeping at business entities is performed by tax authorities. The founder of the tax offices is the Financial Directorate of the Slovak Republic.

Among other functions, the Tax Office performs the following functions:

- carry out tax administration,
- decide in administrative proceedings,
- control the collection and payment of administrative fees, which are revenue of the state budget, return administrative fees paid by stamps, impose fines and collect administrative fees, which are revenue of the state budget, transfer the total amount of administrative fees remitted by other administrative bodies to the state budget,
- return court fees on the basis of a decision of a court or a state administration body of the courts, transfer the total amount of court fees remitted by the courts to the state budget,
- inform taxable persons of their rights and obligations in tax matters and of special rules,
- report to law enforcement authorities suspected of having committed criminal offenses in connection with a breach of special regulations; inform the financial directorate of these suspicions,
- carry out tax audits.

They provide revenues to the state budget through tax audits. The tax authorities have the power to audit the accounting of business entities within the focus of control activities.

Table 3. Comparison of the results of control activities for the years 2018 - 2020

	2018	2019	2020
Number of Tax audits	11.823	10.965	7.916
Of which number of inspections with findings	5.683	6.475	5.469
Findings from performed inspections (in thousands of €)	701.368	670.056	618.611

Source: Annual Report of the Financial Administration of the Slovak Republic

Table 3 contains the results of tax audits, including the effectiveness of audit activity.

Conclusions

Based on the number of inspections performed by tax authorities in the Slovak Republic, it follows that the structure and number of inspections performed for the monitored periods are similar. When comparing the numbers of natural and legal persons, it is clear that it is not possible to control all business entities by the tax office. The tax administration strives to streamline tax audits with a focus on detecting tax evasion, even though the number of audits will be smaller but the quality will be higher. It is therefore important, as follows from the article, to prepare thorough reporting of the situation and thus facilitate the possibility of streamlining tax audits. Also in the preparation of the information system for tax audits is important within reporting profits and losses; of course, ensure all activities in compliance with standards and guidelines issued by the EU.

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DETERMINANTS OF AGRICULTURAL FARM PARTICIPATION IN REGIONAL ECONOMIC SYSTEMS*

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Abstract. With a growing population, epidemiological hazards, climate risks, no clear prospects for obtaining safe energy and increasing environmental pollution, food production systems need to develop in a sustainable manner, i.e. with no adverse impact on the environment or sanitary conditions and with sparing use of energy, while securing quantitative and qualitative demand for food, which is steadily increasing. In stimulating agricultural farm development, various theories of enterprises, including the consumerist and neoclassical theories, need to be taken into account. However, cooperative theories, transaction cost theories and agency theories, which favour joint action between entities (synergistic effect), should be increasingly important in this respect. To identify major determinants of agricultural farm participation in regional economic systems. The Pearson correlation coefficient was applied to determine the relationships between selected features of agricultural farms, the agri-food sector and regional economic parameters which affect the participation of farms in regional economic systems. Data for the analysis were obtained from Statistics Poland in Warsaw, Poland. The way to enhance the synergistic effect arising from strategic cooperation in food chains is primarily to increase the participation of farms in regional economic systems. Agricultural farms virtually do not compete directly with other farms for a position in the food market, but they do compete for a position in processing companies' supply systems. The ability of farms to sell raw materials is determined by the market efficiency of the food sector enterprises. The added value of the study will result, *inter alia*, from the identification of relationships between the variability of endogenous factors that characterise farms and the major exogenous factors affecting the participation of farms in regional economic systems.

Keywords: regional economic systems; cooperation; agricultural farm

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1. Introduction

With a growing population, epidemiological hazards and climate risks, no clear prospects for obtaining safe energy and increasing environmental pollution, food production systems need to develop in a sustainable manner, i.e. with no adverse impact on the environment and sanitary conditions and with sparing use of energy, while securing quantitative and qualitative demand for food, which is steadily increasing. In this context, the aim should be to create a more efficient economic system that incorporates both the production and distribution of food. The basic role in this system is served by agricultural farms, which provide raw material resources for food processing. It is their structure and productivity that determine the quantities of agricultural raw materials in individual regions.

A scientific analysis of factors affecting the development of farms should take into account various economic theories of enterprises, *inter alia* the consumerist and neoclassical theories. However, cooperative theories, transaction cost theories and agency theories, which favour joint action between entities (synergistic effect), should be increasingly important in this respect. The way to enhance the synergistic effect arising from strategic cooperation in food chains is primarily to increase the participation of agricultural farms, particularly in regional economic systems.

The purpose of the study was to identify major determinants of the participation of agricultural farms in regional economic systems. The added value of the study results, *inter alia*, from the identification of relationships between the variability of endogenous factors that characterise farms and the major exogenous factors likely to increase the participation of farms in regional economic systems.

The basic methodological assumption was to apply the Pearson correlation coefficient to determine the relationships between selected features of agricultural farms, the agri-food sector and regional economic parameters which affect the participation of farms in regional economic systems. The data included in studies by Statistics Poland were analysed for individual voivodeships in Poland.

The literature review paid particular attention to the possibilities for wider implementation in agricultural farms of economic theories referring to the cooperation and transaction costs and to the agency theory. In addition to the subject and object of the study, the research methodology includes the research hypothesis assuming that the potential of agricultural farms is insufficient to significantly expand the participation of farms in regional economic systems. In order for integration processes to be able to be implemented, greater participation of the business and institutional environment is primarily required. The study results characterising endo- and exogenous factors that have an effect on the increase in farms' participation in regional economic systems are presented in tabular form and described synthetically, with particular emphasis on the most important correlations between variables. The discussion addressed the critical reference to the study results and referred to studies conducted by other authors in the field of the theory of economics and food economy. The conclusions refer to the purpose of the study and correspond to the obtained data which show, *inter alia*, the significant effect of the business and institutional environment on the expansion of the participation of farms in regional systems.

2. Literature Review

An analysis of the economy at the mesoeconomic level considerably expands the research, analytical and application capabilities of economic sciences. The macroeconomic approach is, in certain circumstances, too general to solve problems relating to specific components of the economy, i.e. individual sectors or voivodeships, while the microeconomic approach most often focuses exclusively on the problems of managerial economics. The mesoeconomic (*inter alia*, regional) approach allows economic problems to be analysed and solved in more detail

(Bal-Domańska et al., 2020, pp. 785–810; Kijek & Matras-Bolibok, 2020, pp. 295–313; Marks-Bielska et al., 2020a, pp. 323–333; Marks-Bielska et al., 2020b, pp. 463–487; Miłek & Nowak, 2015, pp. 115–135).

Various researchers have previously proved that consideration of the determinants of the participation of farms in regional economic systems was possible because the most important - from the perspective of an economic system - components can be assigned to the regional (territorial) system, *inter alia* the system coordination mechanism, the means of production related to a particular territory and region, the entities being targeted by the regulation instruments used by the control system and the mechanism for affecting economic operators and their economic activity (Bartova & Fandel, 2020, pp. 489–509; Candemir & Duvaleix, 2021, pp. 1–27; Turina et al., 2016, pp. 353–371).

The changing situation in the field of food economy and the growing determination of agricultural farms to participate more in various types of economic systems favouring the improvement of their economic efficiency encourage the expansion of relations with suppliers and customers as well as with other actors in the agribusiness environment. These measures should be aimed at minimising transaction costs (Candemir & Duvaleix, 2021, pp. 1–27; Czyzewski & Majchrzak, 2017, pp. 93–102; Firlej et al., 2017, pp. 502–509).

Agricultural farms, when striving to expand their business relations and for greater integration, both at a horizontal (with other farms with a similar or complementary production profile) and a vertical level (with other links in the food chain), most frequently become entities that are more and more complementary in relation to the market, thus gaining a better strategic position. More relationships necessitate entering into more transactions. In this context, it is still very important to reduce the costs of searching for suppliers and customers, information, negotiation, decisions, and the execution of transactions (Bartova & Fandel, 2020, pp. 489–509; Firlej et al., 2018, pp. 28–33). Noga et al., 2020, pp. 52–65; Parzonko & Borawski, 2020, pp. 168–174).

Many previous scientific studies referred, *inter alia*, to the agency theory which is an institutional counter-proposal to the transaction cost theory. Agricultural farms (particularly those with significant economic potential) with extended integration relationships can become a market hub for contracts. The relevance of this theory in relation to agricultural farms will be growing as the virtualisation and the scale of these entities' operations increase (Candemir & Duvaleis, 2021, pp. 1–27; Noga et al., 2020, pp. 52–65).

The economic integration of farms is explicitly linked to the cooperative enterprise theory, according to which the expected factor is the maximisation of profit together with business partners. This theory holds that an enterprise's position results from the participation in cooperatives, and the economy takes two basic forms, i.e. the market economy and the network economy. The involvement of agricultural farms in systems based, among others, on cooperation, may take various forms (e.g. agricultural producer groups, economic clusters) (Bartova & Fandel, 2020, pp. 489–509; Candemir & Duvaleix, 2021, pp. 1–27).

3. Research Methodology

The subject of the study was the determinants of the participation of agricultural farms in regional economic systems. They are both endogenous (are initiated and determined by the potential and organisation of particular farms) and exogenous (arising from the situation in their market and institutional environment) in nature.

This study focused on agricultural farms and selected regional economy parameters (by voivodeship) in Poland. A detailed analysis was carried out on selected components of the characteristics of farms, their production and organisational activity and selected components of the characteristics of the regional economy with particular emphasis on the agri-food sector, arranged in order by voivodeship. The data were collected from the resources of Statistics Poland, primarily the Local Data Bank and cover the years 2018–2019.

The relationship between selected features of agricultural farms, the agri-food sector, and regional economic parameters in individual voivodeships was examined using the Pearson correlation coefficient. The relationships between the variability of endogenous factors that characterise farms and the major exogenous factors likely to affect an increase in the participation of farms in regional economic systems were identified. The standard assumptions of statistical analysis of the variability of features and the significance of study results were maintained.

The research hypothesis assumed that the endogenous potential of agricultural farms was insufficient to significantly expand the participation of farms in regional economic systems. For integration processes to be able to be implemented, significant participation of the business and institutional environment is primarily required. In regions with low potential in the business environment, a gap in integration processes often occurs.

The value of the study results, *inter alia*, from the mesoeconomic approach to endogenous and exogenous factors likely to increase the participation of farms in regional economic systems. The diagnostic variables used in the study could be a source of discussion and criticism and their range primarily results from the availability of comparable data at the regional level, which could also be a source of important information for the scientific problem under consideration.

4. Results

The participation of farms in regional economic systems was determined by two groups of factors:

- endogenous factors – initiated and determined by the potential and organisation of particular farms,
- exogenous factors – arising from the situation in their market and institutional environment.

When analysing the endogenous factors, the focus was put on the most significant components of agricultural farm potential as well as production and organisational activity which are presented (by voivodeship) in Table 1.

Particular attention should be paid to the following findings:

- the highest number of farms per 1,000 ha of agricultural land was found in Małopolskie, Podkarpackie, and Świętokrzyskie Voivodeships (the lowest number was in Zachodniopomorskie, Warmińsko-Mazurskie and Pomorskie Voivodeships),
- the highest number of farms with an area of 50.0 ha and more per 1,000 ha of agricultural land was located in Zachodniopomorskie, Lubuskie, and Dolnośląskie Voivodeships (the lowest number was in Małopolskie, Świętokrzyskie and Łódzkie),
- the highest proportion of farms specialising in specific agricultural production was found in Dolnośląskie, Podlaskie and Lubuskie Voivodeships (the lowest proportion was in Podkarpackie, Świętokrzyskie, and Małopolskie),
- the highest proportion of farms with an economic size class (in thousand EUR) of more than 15,000 was found in Kujawsko-Pomorskie, Warmińsko-Mazurskie and Wielkopolskie Voivodeships (the smallest proportion was in Podkarpackie, Małopolskie and Śląskie),
- permanently employed persons on individual farms (with the equivalent of full-time employment taken into account) were most numerous in Mazowieckie, Wielkopolskie and Kujawsko-Pomorskie (the least numerous were in Małopolskie, Podkarpackie and Świętokrzyskie),
- the highest number of agricultural tractors with a power of 100 kW and above per 1,000 ha of agricultural land was found in Opolskie, Kujawsko-Pomorskie, and Dolnośląskie Voivodeships (the smallest number was in Świętokrzyskie, Podkarpackie and Mazowieckie),

- the proportion of farms with a manager holding an academic degree was the highest in Zachodniopomorskie, Lubuskie and Warmińsko-Mazurskie Voivodeships (the lowest proportion was in Małopolskie, Podkarpackie and Wielkopolskie),
- the highest number of producer group members per 10,000 ha of agricultural land was noted for Wielkopolskie, Opolskie, and Małopolskie Voivodeships (the lowest number was in Świętokrzyskie, Podlaskie and Zachodniopomorskie).

Table 1. Selected components of the characteristics of agricultural farms and their production and organisational activity

Voivodeship	Number of farms per 1,000 ha of agricultural land	Number of farms with an area of 50.0 ha or more per 1,000 ha of agricultural land	The proportion of farms that specialise in specific agricultural production (%)	The proportion of farms with the economy size class (in thousand EUR) of more than 15,000 EUR (%)	Permanently employed persons in individual farms - in thousand AWU (the equivalent of full-time employment)	Number of agricultural tractors with a power of 100 kW and more per 1,000 ha of agricultural land (units)	The proportion of farms whose manager holds an academic degree (%)	Number of producer group members per 10,000 ha of agricultural land*
Dolnośląskie	59.2	3.4	84.9	22.1	2.8	7.0	15.5	5.2
Kujawsko-Pomorskie	58.0	2.6	75.2	42.2	7.4	7.1	12.1	5.5
Lubelskie	104.5	1.7	74.6	17.0	3.8	4.1	14.8	4.1
Lubuskie	48.4	3.8	83.3	24.7	1.9	5.6	18.1	5.2
Łódzkie	112.4	1.1	76.1	21.9	5.8	3.6	12.8	4.7
Małopolskie	203.9	0.8	71.8	6.8	1.6	3.7	9.7	7.3
Mazowieckie	96.4	1.5	79.4	26.4	17.8	3.4	14.2	3.8
Opolskie	49.3	3.4	77.5	31.9	1.8	7.7	11.9	9.5
Podkarpackie	191.9	1.5	68.7	5.1	1.6	3.2	9.8	3.9
Podlaskie	61.5	2.0	84.8	32.2	4.6	4.0	15.0	1.0
Pomorskie	47.8	3.0	72.2	33.0	3.6	6.7	14.8	5.4
Śląskie	133.2	2.1	73.9	13.2	2.9	6.2	14.0	1.3
Świętokrzyskie	153.4	0.8	69.0	14.2	1.7	3.0	13.3	0.2
Warmińsko-Mazurskie	40.9	3.1	83.6	40.6	5.2	5.6	17.1	1.7
Wielkopolskie	64.9	2.4	74.1	36.5	15.3	6.2	11.7	16.1
Zachodniopomorskie	32.2	4.4	81.4	30.5	2.2	5.7	20.1	1.2

* - excluding tobacco producers

Source: own research based on the data of Statistics Poland in Warsaw.

The potential of agricultural farms in the context of integration processes is very important, as it creates the added value generated in agricultural activities that are primarily determined by the scale of operations and the possibility of incurring material and financial expenditure with long return cycles. The potential of farms and the scale of operations are interdependent factors. The importance of the scale of production arises from the possibility of reducing unit costs under the influence of changing production volumes (in agriculture, it depends mainly on the area of agricultural land).

When referring to exogenous factors, the most important components of the regional economy, with particular emphasis on the agri-food sector, presented (arranged by voivodeship) in Table 2, should be taken into account. Particular attention should be paid to the following issues:

- the highest gross added value (current prices) was generated by Mazowieckie, Śląskie and Wielkopolskie Voivodeships (while the lowest was by Opolskie, Lubuskie and Podlaskie).

- the highest gross added value (current prices), generated by agriculture, forestry, hunting and fisheries was noted in Mazowieckie, Wielkopolskie, and Lubelskie Voivodeships (while the lowest was in Opolskie, Lubuskie and Podkarpackie),
- the highest number of food industry enterprises (more than nine employees) was found in Wielkopolskie, Mazowieckie and Śląskie (the lowest number was in Opolskie, Świętokrzyskie and Lubuskie),
- the highest value of average sales revenue per food industry enterprise (more than nine employees) was noted for Warmińsko-Mazurskie, Podlaskie and Mazowieckie Voivodeships (the lowest value was in Podkarpackie, Lubuskie and Zachodniopomorskie),
- the highest average employment rate per food industry enterprise (more than nine employees) was noted for Mazowieckie, Warmińsko-Mazurskie and Podlaskie Voivodeships (the lowest rate was in Lubuskie, Dolnośląskie and Zachodniopomorskie),
- the highest value of the procurement of agricultural products (current prices) per 1 ha of agricultural land was noted for Wielkopolskie, Mazowieckie and Podlaskie Voivodeships (the lowest value was in Podkarpackie, Małopolskie and Zachodniopomorskie).

Table 2. Selected components of the characteristics of the regional economy (by voivodeship), with particular reference to the agri-food sector.

Voivodeship	Gross added value (current prices) – total (in million PLN)	Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries (in million PLN)	Number of food industry enterprises, more than nine employees	The average value of sales revenue per 1 food industry enterprise with more than 9 employees (in million PLN)	Average employment rate per 1 food industry enterprise with more than 9 employees	The value of procurement of agricultural products by voivodeship (current prices) per 1 ha of agricultural land (PLN)
Dolnośląskie	153822	2123	86	61.0	86.3	2571
Kujawsko-Pomorskie	81681	3066	149	100.5	124.5	4744
Lubelskie	69580	3863	138	84.6	134.1	2996
Lubuskie	40401	1183	58	47.1	85.4	3125
Łódzkie	111176	3491	181	135.5	124.0	4542
Małopolskie	151211	1963	171	89.7	148.1	1948
Mazowieckie	418378	11119	320	198.3	258.0	6454
Opolskie	37957	1068	38	115.6	113.7	3889
Podkarpackie	72723	1219	77	46.0	102.7	1673
Podlaskie	41027	2810	76	200.8	189.1	5064
Pomorskie	109400	2333	134	106.0	150.9	4859
Śląskie	228103	1660	239	80.0	118.7	3942
Świętokrzyskie	43499	1859	55	58.7	116.4	3321
Warmińsko-Mazurskie	47737	2724	65	207.5	253.0	4540
Wielkopolskie	182276	6567	329	143.5	135.0	7171
Zachodniopomorskie	68512	1877	103	54.6	95.3	2559

Source: own research based on the data of Statistics Poland in Warsaw.

The economic activity of the entities related to agriculture was correlated with the general condition of the economy of the voivodeships under consideration, which is indicated by the high coefficient of coordination ($r = 0.790$) between the gross added value (current prices) generated by agriculture, forestry, hunting and fisheries, and the gross added value generated in total by the economy of voivodeships (Table 3). It should also be mentioned that there was a significant relationship between the gross added value (current prices) generated by

agriculture, forestry, hunting and fisheries and the number of agricultural producer group members in individual voivodeships ($r = 0.544$).

Table 3. The relationship between selected features of agricultural farms, the agri-food sector and regional economic parameters in individual voivodeships

Feature X in individual voivodeships	Feature Y in individual voivodeships	Pearson correlation coefficient between features X and Y (r)
Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries (in million PLN)	Gross added value (current prices) – generated by the entire economy (in million PLN)	0.790
Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries (in million PLN)	Number of agricultural producer group members	0.544
Number of farms with an area of more than 50 ha of agricultural land	Number of agricultural producer group members	0.533
The proportion of farms with the economy size class in thousand EUR - more than 15,000 EUR (%)	The proportion of farms that specialise in specific production	0.505
The proportion of farms with the economy size class in thousand EUR - more than 100,000 EUR (%)	The proportion of farms that specialise in specific production	0.588
The proportion of farms with the economy size class in thousand EUR - more than 500,000 EUR (%)	The proportion of farms that specialise in specific production	0.617
Permanently employed persons in individual farms - in thousand AWU (an equivalent of full-time employment)	Number of agricultural producer group members	0.701
The value of the procurement of agricultural products (current prices) in million PLN	Number of agricultural producer group members	0.737
The value of the procurement of agricultural products (current prices) per 1 ha of agricultural land, in PLN	Number of agricultural producer group members	0.611
The value of the procurement of agricultural products (current prices) in million PLN	The value of the food industry (more than 9 employees) sales revenue, in million PLN	0.918
The value of the procurement of agricultural products (current prices) per 1 ha of agricultural land, in PLN	The value of the food industry (more than 9 employees) sales revenue per 1 enterprise (in million PLN)	0.738
The value of the procurement of animal products (current prices) per 1 ha of agricultural land, in PLN	The value of the food industry (more than 9 employees) sales revenue per 1 enterprise (in million PLN)	0.809
The value of the procurement of agricultural products (current prices) per 1 ha of agricultural land, in PLN	Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries (in million PLN)	0.715
Number of food industry enterprises (more than 9 employees)	Number of agricultural producer group members	0.664
Number of food industry enterprises (more than 9 employees)	Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries (in million PLN)	0.775
The employment rate in the food industry (more than 9 employees)	Gross added value (current prices) – generated by agriculture, forestry, hunting, and fisheries per 1 ha of agricultural land (PLN)	0.812

Source: own calculations.

What was very important in the context of the adaptation of farms to the specificity of buyers of agricultural products was the scale of their operations. In this regard, the following correlations were found:

- between the proportion of farms with an economic size class (in thousand EUR) of more than 15,000 EUR and the proportion of farms that specialise in specific agricultural production ($r = 0.505$),
- between the proportion of farms with an economic size class (in thousand EUR) of more than 100,000 EUR and the proportion of farms that specialise in specific agricultural production ($r = 0.588$),

- between the proportion of farms with an economic size class (in thousand EUR) of more than 500,000 EUR (%) and the proportion of farms that specialise in specific agricultural production ($r = 0.617$).

There was also a correlation between the number of farms with a greater area (more than 50 ha of agricultural land) in a particular voivodeship and the number of agricultural producer group members ($r = 0.533$).

Farm owners have specific qualifications, organisational skills and motivation to act. With a greater scale of operations, they often pursue the policy of employee hiring, motivation, and development. In the voivodeships where the highest number of permanently employed persons were hired in individual farms, there was a greater tendency to associate in producer groups ($r = 0.701$).

Greater agricultural productivity encouraged a greater tendency towards the integration of agricultural farms. There was a correlation between the value of procurement of agricultural products (current prices) in particular voivodeships and the number of agricultural producer group members ($r = 0.737$) and a slightly lower correlation between the value of procurement of agricultural products (current prices) per 1 ha of agricultural land and the number of agricultural producer group members ($r = 0.611$).

The gross added value (current prices) generated by agriculture, forestry, hunting and fisheries was determined by the productivity of agricultural farms in individual voivodeships. The coefficient of correlation between the value of procurement of agricultural products (current prices) per 1 ha of agricultural land in individual voivodeships and the gross added value (current prices) generated by agriculture, forestry, hunting and fisheries amounted to 0.715.

The condition of the food industry in individual voivodeships of Poland was very important in the context of the integration of farms within regional economic systems. There was a strong correlation between the value of the procurement of agricultural products (current prices) in particular voivodeships and the value of the food industry (more than nine employees) sales revenue ($r = 0.918$), and a correlation between the value of the procurement of agricultural products (current prices) per 1 ha of agricultural land and the value of the food industry (more than nine employees) sales revenue per 1 enterprise ($r = 0.738$). The correlation was even higher between the value of procurement of animal products (current prices) per 1 ha of agricultural land and the value of food industry (more than nine employees) sales revenue per 1 enterprise ($r = 0.809$).

It is important to emphasise the relationship between the number of agricultural producer group members and the number of food industry enterprises (more than nine employees) in individual voivodeships ($r = 0.664$), and the relationship between the gross added value (current prices) generated by agriculture, forestry, hunting and fisheries and the number of food industry enterprises (more than nine employees) ($r = 0.775$). What was also correlated was the employment in the food industry (more than nine employees) in individual voivodeships and the gross added value (current prices) generated by agriculture, forestry, hunting and fisheries per 1 ha of agricultural land ($r = 0.812$).

5. Discussion

The validity of mesoeconomic research also in relation to agribusiness has already been confirmed in a variety of scientific studies (Bal-Domańska et al., 2020, pp. 785-810; Candemir & Duvaleix, 2021, pp. 1-27; Czyżewski & Majchrzak, 2017, pp. 93-102; Firlej et al., 2017, pp. 502-509; Turina et al., 2016, pp. 353-371). Firlej et al. (2017, pp. 502-509) further stress that the agri-business is the largest production sector in the European Union with regard to both the value of turnover and the generation of added value as well as the employment rate. The benefits of the participation of farms in regional economic systems have been recognised by many researchers in other European countries (Bartova & Fandel, 2020, pp. 489-509; Candemir & Duvaleix, 2021, pp. 1-27; Turina et

al., 2016, pp. 353-371). Additionally, Noga et al. (2020, pp. 52-65) point out that co-productivity can have wide application in value chains.

Many researchers have stressed the importance of endogenous factors in the development of farms, e.g. the scale of production (Bartova & Fandel, 2020, pp. 489-509; Czyzewski & Majchrzak, 2017, pp. 93-102; Firlej et al., 2018, pp. 28-33) and labour resources (Parzonko & Borawski, 2020, pp. 168-174). This is mainly due to the high specificity of agribusiness as a sector of the economy (Firlej et al., 2017, pp. 502–509). The author believes that endogenous factors were slightly less important in the development of the participation of farms in regional economic systems.

The study results are more consistent with the views referring to a greater effect of exogenous factors on the integration of agricultural farm processes. The literature contains numerous scientific studies which indicate *inter alia* the relevance of the specificity (specialisation) of the economic potential of individual voivodeships as a factor of local development (Bal-Domańska et al., 2020, pp. 785-810; Miłek & Nowak, 2015, pp. 115-135). Marks-Bielska et al. (2020, pp. 323-333) additionally stress that not only is the socio-economic development determined by the economic base and the possibility of financial support but also by the factors that involve institutions and institutional effectiveness can be defined as sustained readiness for shaping, for example, economic partnerships. Swiadek (2015, pp. 47-60) additionally links the economic potential of a voivodeship primarily to the innovation potential (including to the organisational innovation). A component of innovation may include, among others, the way in which regional economic systems are integrated.

This study did not address certain issues noticeable in other literature items, e.g. the beneficial effect of financial support on the involvement of farms in integration activities (Bartova & Fandel, 2020, pp. 489-509; Baer-Nawrocka & Blocisz, 2018, pp. 55-60). Michalek et al. (2020, pp. 1389-1401) primarily emphasise the significance of EU funding for the development of agribusiness. Bartova & Fandel (2020, pp. 489-509) note that the discontinuation of funding for agricultural producer organisations may have resulted in a restriction of these entities' activity. Candemir & Duvaléix (2021, pp. 1-27) point out that agricultural cooperatives play a major role in the economic sustainability of farms and the adoption of environmentally-friendly practices.

Conclusions

This study indicates the greater importance of factors arising from the situation in the market and institutional environment of farms in developing the participation of agricultural farms in regional economic systems (which confirms the assumed research hypothesis). What significantly determined the conditions for agriculture development was the food industry, with considerable potential for generating sales revenue, which intensified the procurement of agricultural products in individual voivodeships, and the general condition of the economy in the voivodeships. In the voivodeships with a low level of procurement of agricultural products, the activity of farms in regional economic systems (e.g. in the form of integration in producer groups) was increased.

The dependence of participation in regional economic systems on factors arising from the potential and organisation of individual farms was, in many cases, significant (but usually less correlated as compared to the above-mentioned exogenous factors). The agricultural potential of farms was, for example, very important in forming their production specialisation, which favoured both the vertical and horizontal integration in food chains. The concentration of larger farms (an area of more than 50 ha) in a particular territory and the participation of economically stronger farms favoured the involvement of these entities in regional economic systems.

The cooperation gap between agricultural farms can be significantly reduced by greater involvement in the integration processes of the food industry and the agri-business environment institutions, but also by greater involvement of science in the development of a constructive concept of an agri-food sector integration system. Voivodeships (particularly those with a significant agri-business potential) must not neglect the measures improving the condition of the business environment (e.g. in the field of the development of computerisation which facilitates the maintenance of relations between agricultural farms and processing operators and other entities supporting integration measures). It is also very important to inspire integration measures by institutions involved in the economic development of voivodeships.

The research limitations as regards the participation of farms in regional economic systems are attributed primarily to the limited availability of comparable data at the regional level, particularly those concerning the forms and the scale of cooperation between agricultural farms. The benefits of the participation of farms in regional economic systems encourage the continuation of research, particularly in the field of mechanisms of economic (regional) policy aimed at the creation and development of integration links in regional agri-business systems.

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EXPLORING BEHAVIOUR CONTROL AND ACTUAL USE OF MASSIVE OPEN ONLINE COURSES SYSTEM MANAGEMENT FOR EDUCATION SUSTAINABILITY*

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Abstract. The effect of innovation diffusion theory (IDT) activities on the adoption of Massive Open Online Courses (MOOCs) system management for education sustainability was investigated in this research. The research extended the Technology Acceptance Model (TAM) with IDT. Therefore, the aim of this study is to investigate the factors that influence business students' perceived behaviour control and actual use of MOOCs system management for education sustainability. Structural equation modeling (SEM) was used to evaluate the hypothesized relationships basis of data collected from 235 business students at Majmaah University. Business Students' feedback was classified into eight factors and analyzed to see how they perceived about their perceived behaviour control and how they used MOOCs system management for education sustainability. The results showed a strong link between perceived compatibility, relative advantage, and perceived enjoyment, as well as perceived ease of use and usefulness. Perceived usefulness and perceived ease of use influenced positively business Students' attitudes toward use MOOCs, perceived behaviour control, and actual use of MOOCs system management for education sustainability. From the results, perceived compatibility, relative advantage, and perceived enjoyment all have a positive and important effect on perceived ease of use and usefulness of MOOCs, according to the findings. Business students' attitudes toward MOOCs, perceived behaviour control, and actual MOOCs system management for education sustainability use are all positively influenced by perceived ease of use and perceived usefulness.

Keywords: innovation diffusion theory (IDT); Technology Acceptance Model (TAM); Massive Open Online Courses (MOOCs) system; management for education sustainability; Structural equation modeling (SEM)

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JEL Classifications: A2

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1. Introduction

Massive open online courses (MOOCs) system management for education sustainability are a type of online learning that attracts a vast number of business students and, in most cases, provide free courses with open access. MOOCs have transformed the way higher education services are distributed. Although MOOCs were designed to be used for informal learning, they have only recently been accepted as part of formal academic education (Hendriks, de Jong, Admiraal, & Reinders, 2020). MOOCs have been implemented as campus-like classes in a variety of settings, ranging from undergraduate to higher school (Yuan, Powell, & Olivier, 2014). Massive Open Online Courses (MOOCs) have grown in popularity in recent years as creative online learning resources that are accessible to a vast number of people without regard to time or place constraints (Jung & Lee, 2018; Kizilcec, Saltarelli, Reich, & Cohen, 2017). A multitude of MOOCs system management for education sustainability are available for global users from a range of businesses, universities, and websites (Kahl, 2015). MOOCs system management for education sustainability are also widely regarded as a significant breakthrough in higher education. MOOCs system management for education sustainability, which reflect the most recent stage in the development of open educational infrastructure, have a range of benefits over conventional educational methods. Firstly, MOOCs system management for education sustainability are much less expensive than conventional education methods, and consumers can quickly enroll in both formal and informal ways. Second, MOOCs system management for education sustainability can be reached by a vast number of people (from a wide variety of backgrounds) without the need for territorial boundaries or resource duplication. Thirdly, MOOCs system management for education sustainability are adaptable to context and time, allowing users to take control of their learning. Finally, MOOCs system management for education sustainability are distinguished by their digitization, since they present instructional opportunities through innovative information technology and various media platforms, allowing a broad variety of teaching and learning experiences to be performed digitally. MOOCs system management for education sustainability have long been known as having the ability to address issues such as boundary, race, gender, income, and logistical inconvenient (Kizilcec et al., 2017). Several researchers have used various hypotheses to investigate reasons explaining consumer adoption in online learning, with the Technology Acceptance Model (TAM) and its generalized versions being the most commonly used due to their simplicity and usefulness in explaining acceptance behaviour learning by smart technology (Davis, Bagozzi, & Warshaw, 1989; Al-Rahmi et al., 2020; Al-Rahmi et al., 2018; Mendoza, Jung, & Kobayashi, 2017; Ullah et al., 2021; Venkatesh, Morris, Davis, & Davis, 2003). By integrating TAM and social support theory, Hsu, Chen, and Ting (2018) investigated determinants of Taiwan learners' continued plan to use MOOCs system management for education sustainability. Centered on a revised version of TAM, i.e. the Unified Theory of Acceptance and Use of Technology, Fianu, Blewett, Ampong, and Ofori (2018) investigated factors that affected MOOCs system management for education sustainability adoption among business students. However, previous research has primarily concentrated on the functions of demographic and psychosocial influences in consumer adoption, such as gender, motivation, culture, personal inventiveness, and perceived behaviour control (Hsu et al., 2018; Yang & Su, 2017; Mendoza et al., 2017; Wu & Chen, 2017; Zhou, 2016; Al-Rahmi et al., 2019a; Moafa et al., 2018). Few of them offered substantial solutions to issues concerning business students' perceived behaviour control, all of which are linked to user interface and continued use of a strategy plans (Yang & Su, 2017; Venkatesh & Davis, 2000). This is a major problem because it keeps MOOCs system management for education sustainability programmers and administrators in the dark on how to increase user acceptance of MOOCs system management for education sustainability. Many scholars have also conducted research to see whether business students are ready to adopt MOOCs system management for education sustainability, which have become increasingly important for business students all over the world (Subramaniam et al., 2019). MOOCs system management for administration and sustainability is a big barrier; as a result, several universities are debating how to make MOOCs self-paced, such as restructuring MOOCs system management for education sustainability activities to eliminate instructor or facilitator involvement. Therefore, this study contributes to the literature on technology

acceptance models (TAMs) by investigating the relationship between TAM variables' novelty and the invention diffusion theory (IDT) in a related model. Within the paradigm of IDT theory and TAM model, this research suggested a MOOCs system management for education sustainability acceptance model to investigate factors influencing business students' perceived behaviour control and actual use of MOOCs system management for education sustainability.

2. Theoretical Model and Hypothesis Development

The TAM model states that five variables influence new technology adoption: perceived enjoyment (PE), perceived ease of use (PEOU), perceived usefulness (PU), attitude toward use (ATU), and actual use MOOCs (AUM). In addition, the use of the innovation diffusion theory (IDT) is influenced by two factors: perceived compatibility (PC) and relative advantage (RA) to measure business students' perceived behaviour control (PBC). Researchers proposed the IDT and TAM combined models to take advantage of the advantages of both theoretical models when studying the invention adoption process since the ideas of IDT and TAM are so identical and complementary. As a result, the IDT and TAM combined paradigms have been used to assist business students in implementing new ideas in a variety of settings. Furthermore, previous experiments that combined the two hypotheses generated excellent results (Alenazy et al., 2019; Al-Rahmi et al., 2019b; Lee, Hsieh, & Hsu, 2011). As a result, this study incorporates two major theoretical models: the TAM (Davis, Bagozzi, & Warshaw, 1989) and the IDT (Rogers, 1995). See Figure 1.

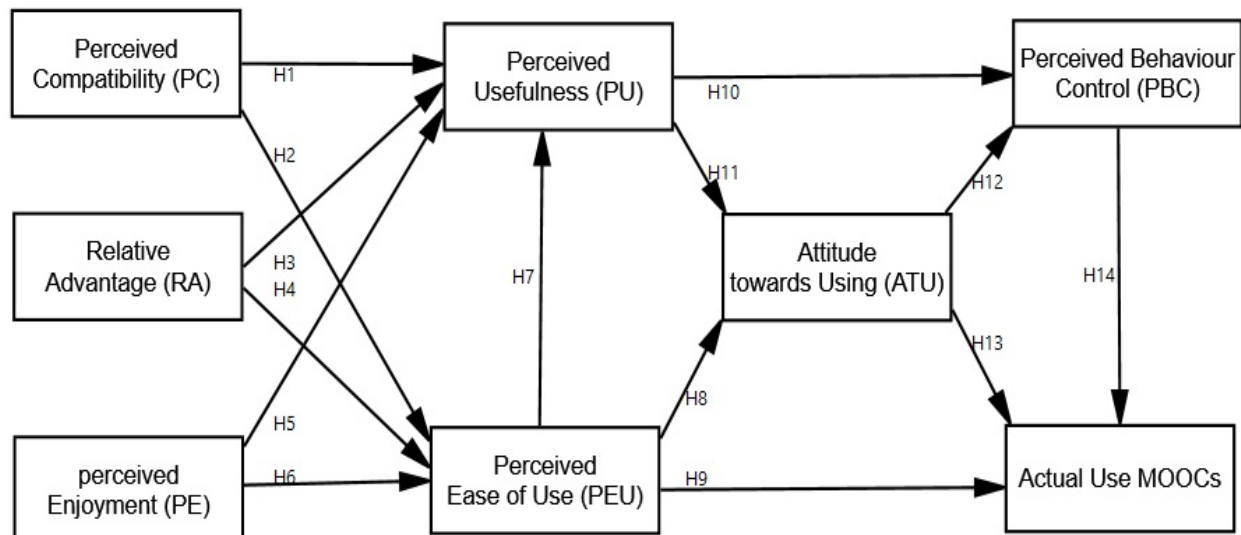


Figure 1. Research Model with Hypotheses

Source: Author

2.1 Perceived compatibility (PC)

Perceived compatibility is described as the degree to which a student believes that using a MOOCs system management for education sustainability system can enhance their learning efficiency. In the literature on MOOCs system management for education sustainability adoption, perceived compatibility has been used as a measure of attitude toward using MOOCs system management for education sustainability and behavioral intention to use (Venkatesh, Morris, Davis, & Davis, 2003). Furthermore, previous studies on perceived compatibility from different perspectives found that it influences perceived usefulness, perceived ease of use, attitude toward using the MOOCs system management for education sustainability, and behavioral purpose to use (Lee et al., 2011). The hypothesis proposed for this construct is that perceived compatibility on use MOOCs

system management for education sustainability is positively influenced by perceived usefulness and perceived ease of use.

2.2 Relative Advantage (RA)

RA is a measure of how often people feel that creativity is superior to the status quo. As a result, relative advantage is described in this study as the degree to which a student believes that using the MOOCs system management for education sustainability method can improve their learning efficiency (Al-Maatouk et al., 2020). Business students' attitudes toward using MOOCs system management for education sustainability and intent to use (MOOCs) systems among diverse participants are favorably influenced by perceived relative advantages, according to research (Lee et al., 2011).

2.3 Perceived Enjoyment (PE)

Van der Heijden (2004) defines PE as the degree to which the learning management system's (LMS) operation or services are perceived to be enjoyable, regardless of any expected performance implications. As a result, in this study, perceived enjoyment is described as the degree to which a student believes that using MOOCs system management for education sustainability can improve their attitude toward MOOCs system management for education sustainability, perceived behaviour control, and actual MOOCs system management for education sustainability usage.

2.4 Perceived usefulness (PU)

TAM guided Davis (1989) to develop the concept of perceived usefulness. Users' belief that advanced technologies can help them learn more or work more effectively is known as perceived usefulness (Davis 1989). Perceived usefulness is an antecedent that has been shown to influence attitudes toward MOOCs system management for education sustainability in many studies and has an important impact on actual MOOCs system management for education sustainability use (Alraimi et al., 2015). As a result, perceived usefulness is a critical variable that suggests ways to assist business students in understanding and improving their attitude toward use and actual use of MOOCs system management for education sustainability.

2.5 Perceived ease of use

People who believe that when technology is used, they are free from exerting effort are thought to have a normal degree of perceived ease of use (Scherer et al., 2019). In this research, perceived ease of use has an effect on business students' attitudes toward and actual use of MOOCs system management for education sustainability, either directly or indirectly. TAM has been used extensively in e-learning studies, and it has been discovered that perceived ease of use has a significant impact on attitude toward use and actual use. According to Wu and Chen (2017), perceived ease of using MOOCs system management for education sustainability influences business students' attitudes toward use and actual use indirectly through perceived usefulness in their research on MOOCs system management for education sustainability.

2.6 Attitude towards use

The degree to which a person perceives a positive or negative feeling in relation to MOOCs system management for education sustainability is referred to as attitude. The user frequently believes that they have influence over its use, which contributes to an increase in the intention to use it as a result of their perceived attitude. The actual use of technology is estimated by mindset, according to previous studies (Yang and Su, 2017). Perceptions in Using MOOCs, some researchers suggest that the classroom atmosphere (Fabunmi & Isaiah, 2007) or business students'

attention and acceptance to assignments influence business students' attitudes toward learning (Riaz, Riaz, & Hussain, 2011). According to Liaw (2008), have a impact relationships between business students' attitudes and actual use of online learning systems such as MOOCs system management for education sustainability are influenced by perceived ease of use and perceived usefulness.

2.7 Perceived Behaviour Control (PBC)

Perceived behavior control refers to whether or not a person has sufficient means and opportunities to engage in a certain behavior, as well as how well that behavior can be controlled. When a person is more knowledgeable of using a device or has more associated means, they have a greater behavioral intention to use it, resulting in more control or pleasant experiences, or both (Taylor & Todd, 1995). The constructs of perceived behavior control and attitude toward behavior were introduced by Ajzen (1985). The smaller the predicted detriment, the greater the behavioral goal of an individual, suggesting that they are more likely to conduct the behavior and indicating that their perceived behavior control is stronger (Fishbein & Ajzen, 1975). Most of the previous research has focused on the direct effect of attitude on the use of behavioural intention, perceived behavior control to see how behavioural intention influenced the mediating factors of actual behavior (Yang & Su, 2017). While the present research used perceived behavior control to see if the mediating factors in actual use were affected. Business students' perceived behaviour control in using MOOCs system management for education sustainability structures is favorably affected by perceived usefulness, and attitude towards use MOOCs system management for education sustainability, according to the theory suggested for this construct.

2.8 Actual Use Moocs System Management for Education Sustainability

MOOCs system management for education sustainability have grown in popularity since 2012, and they are one of the best platforms because they are free, and they can be used by users of all generations to study at any time, in any place, and they can learn on their own using the modules that are available (Khan et al., 2018). Although each person who completes the modules will receive a certificate for a reasonable cost (Joo et al., 2018). This is shown by the fact that in the year 2012, a total of 160000 students participated in the courses. However, it is unknown how much students' perceived behaviour control, attitude toward using MOOCs, and actual use of MOOCs in terms of learning have progressed (Deng et al., 2019; Yang & Su, 2017). It's been 13 years since MOOCs system management for education sustainability were first unveiled to the general public, and it's been 9 years since they've been popular all over the world. In terms of the number of subjects available to business students, the number of MOOCs system management for education sustainability is rapidly growing from 2012 to 2020.

3. Research Methodology

The aim of this research was to understand more about business students' perceived behaviour control and their use of MOOCs system management for education sustainability. MOOCs system management for education sustainability have been a part of the education movement since their introduction in 2012, drawing a significant number of participants. As a result, in this study, we circulated questionnaires to business students who participated in MOOCs system management for education sustainability. Users of the MOOCs system management for education sustainability from both postgraduate and undergraduate business students were selected as the study's sample. The item's survey was measured on a 5-point Likert scale. Innovation Diffusion Theory (IDT), Technology Acceptance Model (TAM), and demographic are analysis the items. The data was analyzed using the Statistical Package for the Social Sciences (SPSS). According to Hair, Sarstedt, Ringle, and Mena (2017), Structural Equation Modeling (SEM- Smart-PLS) was used as the statistical technique in the study in two stages. The first step was to construct, converge, and discriminate the measurement model's validity, while the second step was to analyze the structural model. As recommended by Hair et al. (2017) factor loadings were

used to ensure construct validity, composite reliability, Cronbach's alpha, and convergence validity for the model's goodness of fit. Cronbach's alpha was determined to be 0.901 based on standardized items. All variables were accepted in the reliability coefficient (Cronbach's alpha) for both the pilot and final test constructs, as seen in Table 1.

Table 1. Pilot Test and Final Test for All Variables

Factors	Code	Pilot Test	Final Test
Perceived Compatibility	PC	0.801	0.921
Relative Advantage	RA	0.832	0.936
Perceived Enjoyment	PE	0.793	0.931
Perceived Ease of Use	PEU	0.739	0.903
Perceived Usefulness	PU	0.807	0.942
Attitude towards Use	ATU	0.772	0.899
Perceived Behaviour Control	PBC	0.807	0.911
Actual Use MOOCs	AUM	0.821	0.932

Source: Author

3.1 Data Collection and Sample Characteristics

From October 2020 to February 2021, when colleges were suspended due to the COVID-19 pandemic, this research was performed online. A survey instrument was developed and validated prior to the key data collection to assess variables predicting student use of MOOCs system management for education sustainability. After the normality test, 12 participants' responses were omitted; such exclusions were suggested by (Hair et al., 2017), who suggested that outliers would contribute to inaccurate statistical effects and must be excluded. As a result, the responses of 235 participants were entered into the SPSS kit program. During the COVID-19 pandemic, this research focuses on postgraduate and undergraduate business students who are active users of MOOCs system management for education sustainability. Confirmatory factor analysis is used to ensure the model's validity.

3.2 Instruments of Measurement

The content validity of the measuring scales was verified by the build items used in previous studies. The study questionnaire was divided into two sections: Basic demographic data (gender, age, educational degree, and specialization) were measurement using questionnaire elements and questionnaire variables perceived compatibility, relative advantage adapted from (Karahanna, Straub, & Chervany, 1999), perceived enjoyment, perceived ease of use, perceived usefulness, attitude towards use, and actual use adapted from (Davis et al., 1989), perceived behaviour control adapted from (Pintrich and De Groot, 1990). Table 2 shows the objects and their loadings that must be loaded into the build they were created to evaluate (Chow and Teicher, 2012).

Table 2. Loadings of Items

Factors	Items	ATU	PBC	PE	PEU	PU	AUM	PC	RA
Attitude towards Using	ATU1	0.902	0.596	0.636	0.417	0.420	0.494	0.360	0.405
	ATU2	0.875	0.512	0.587	0.405	0.417	0.422	0.357	0.391
	ATU3	0.720	0.311	0.472	0.425	0.416	0.313	0.303	0.348
Perceived behaviour control	PBC1	0.374	0.785	0.393	0.534	0.535	0.437	0.263	0.460
	PBC2	0.477	0.853	0.509	0.561	0.554	0.540	0.393	0.460
	PBC3	0.533	0.833	0.527	0.495	0.462	0.443	0.281	0.359
	ASE4	0.510	0.785	0.455	0.429	0.442	0.380	0.370	0.338
Perceived Enjoyment	PE1	0.534	0.479	0.857	0.389	0.323	0.426	0.240	0.291
	PE2	0.590	0.531	0.898	0.464	0.449	0.504	0.369	0.429
	PE3	0.637	0.500	0.898	0.451	0.427	0.425	0.321	0.392
	PE4	0.638	0.534	0.879	0.451	0.455	0.391	0.318	0.396
Perceived Ease of Use	PEU1	0.404	0.518	0.409	0.849	0.607	0.422	0.449	0.560
	PEU2	0.456	0.568	0.447	0.857	0.620	0.494	0.392	0.523

	PEU3	0.332	0.359	0.348	0.711	0.421	0.371	0.334	0.319
	PEU4	0.401	0.551	0.414	0.830	0.686	0.475	0.428	0.541
Perceived Usefulness	PU1	0.461	0.572	0.457	0.578	0.825	0.491	0.506	0.550
	PU2	0.428	0.515	0.431	0.619	0.866	0.428	0.396	0.502
	PU3	0.429	0.534	0.364	0.689	0.886	0.428	0.411	0.580
	PU4	0.393	0.496	0.384	0.629	0.883	0.381	0.388	0.526
Actual Use MOOCs	AUM1	0.374	0.463	0.350	0.420	0.434	0.739	0.406	0.414
	AUM2	0.452	0.452	0.449	0.430	0.416	0.848	0.451	0.419
	AUM3	0.365	0.479	0.385	0.446	0.381	0.836	0.408	0.359
	AUM4	0.385	0.439	0.399	0.443	0.428	0.796	0.493	0.431
	AUM5	0.399	0.368	0.373	0.417	0.321	0.739	0.408	0.306
Perceived compatibility	PC1	0.340	0.355	0.310	0.424	0.437	0.459	0.864	0.393
	PC2	0.382	0.339	0.290	0.422	0.410	0.437	0.852	0.371
	PC3	0.324	0.337	0.316	0.423	0.418	0.507	0.850	0.367
Relative Advantage	RA1	0.343	0.430	0.343	0.529	0.525	0.396	0.387	0.896
	RA2	0.447	0.508	0.412	0.568	0.594	0.450	0.423	0.926
	RA3	0.442	0.409	0.412	0.549	0.571	0.473	0.384	0.888

Source: Author

4. Results and Analysis

The study uses the SmartPLS software to test the developed theoretical model using partial least squares structural equation modelling (PLS-SEM) (Hair et al., 2017). The fact that PLS-SEM can do simultaneous analysis on both structural and measurement models, resulting in more reliable tests, allows it an effective tool to use in this research. The demographic information is presented in Table 3. There were 112 female respondents (47.7) and 123 male respondents (52.3). Age 113 (48.1) from 18-22 years old, 89 (37.9) from 23-26 years old, 13 (5.5) from 27-30 years old, 9 (8.3) from 31-33, and 11 (4.7) more than 34 years old. Using MOOCs system management for education sustainability 199 (84.7) business students they use, and 36 (15.3) they not' use MOOCs system management for education sustainability. Specialization 48 (20.4) from social science, 123 (52.3) from technology, and 64 (27.2) from engineering area. Finally, education level 45 (19.1) postgraduate business students, and 190 (80.9) undergraduate business students.

Table 3. Demographic information

Factors	Frequency	Percentage	Factors	Frequency	Percentage
Famel	112	47.7	Use MOOCs	199	84.7
Male	123	52.3	Not Use MOOCs	36	15.3
18-22	113	48.1	Social Science	48	20.4
23-26	89	37.9	Technology	123	52.3
27-30	13	5.5	Engineering	64	27.2
31-33	9	3.8	Postgraduate	45	19.1
<34	11	4.7	Undergraduate	190	80.9

Source: Author

4.1 Measurement Model Assessment

The measurement model was evaluated based on two factors: reliability and validity. The tests of composite reliability (CR) and Cronbach's alpha were used to conduct reliability testing. Any of these measures should be less than 0.70 (Hair et al., 2017). Table 2 shows that both measures' values are considered acceptable, indicating that reliability has been developed. According to (Hair et al., 2017), two validities, convergent and discriminant, were evaluated for validity analysis. Factor loadings and the average variance extracted (AVE) were checked for convergent validity, with acceptable values of 0.70 and 0.50, respectively (Hair et al., 2017). Table 4 shows that both measurements fulfil the acceptance criterion, indicating that convergent validity has been developed. The

discriminant validity can be tested through correlations with an acceptable value of 0.85, according to (Henseler et al.). The results in Table 5 indicate that all of the values are acceptable, showing that the discriminant validity has been developed.

Table 4. Factor Loading and measurement model

Factors	Items	Factor loading	Composite Reliability	Cronbachs Alpha	AVE	R Square
Attitude towards Using	ATU1	0.902	0.874	0.782	0.699	0.282
	ATU2	0.875				
	ATU3	0.720				
Perceived behaviour control	PBC1	0.785	0.887	0.831	0.663	0.478
	PBC2	0.853				
	PBC3	0.833				
	PBC4	0.785				
Perceived Enjoyment	PE1	0.857	0.934	0.907	0.781	0.000
	PE2	0.898				
	PE3	0.898				
	PE4	0.879				
Perceived Ease of Use	PEU1	0.849	0.887	0.830	0.663	0.480
	PEU2	0.857				
	PEU3	0.711				
	PEU4	0.830				
Perceived Usefulness	PU1	0.825	0.922	0.888	0.749	0.600
	PU2	0.866				
	PU3	0.886				
	PU4	0.883				
Actual Use MOOCs	AUM1	0.739	0.894	0.851	0.629	0.402
	AUM2	0.848				
	AUM3	0.836				
	AUM4	0.796				
	AUM5	0.739				
Perceived compatibility	PC1	0.864	0.891	0.817	0.732	0.000
	PC2	0.852				
	PC3	0.850				
Relative Advantage	RA1	0.896	0.930	0.887	0.816	0.000
	RA2	0.926				
	RA3	0.888				

Source: Author

Table 5. Discriminant validity

Factors	Code	PBC	AUM	ATU	PEU	PE	PU	PC	RA
Perceived Behaviour Control	PBC	0.882							
Actual Use MOOCs	AUM	0.557	0.909						
Attitude towards Using	ATU	0.581	0.499	0.871					
Perceived Ease of Use	PEU	0.622	0.544	0.492	0.814				
Perceived Enjoyment	PE	0.580	0.494	0.682	0.499	0.893			
Perceived Usefulness	PU	0.613	0.500	0.495	0.727	0.473	0.897		
Perceived compatibility	PC	0.402	0.546	0.407	0.495	0.357	0.493	0.912	
Relative Advantage	RA	0.498	0.488	0.456	0.608	0.432	0.625	0.441	0.932

Source: Author

4.2 Structural Model's Analysis

The structural equation model was used to measure the interdependence of the structural model's different theoretical structures, in addition to the Smart PLS with maximum likelihood estimation (Alamri et al., 2020a; Almaiah et al., 2019; Alshurideh et al., 2020). Smart PLS was used to test the study theories and develop relationships. As a result, these constructs seem to have a lot of predictive validity (Liu et al., 2005). In general, the evidence supported all of the hypotheses. Figure 1 shows the hypothesis, Figure 2 shows the path coefficients, and Figure 3 shows the path T-Values.

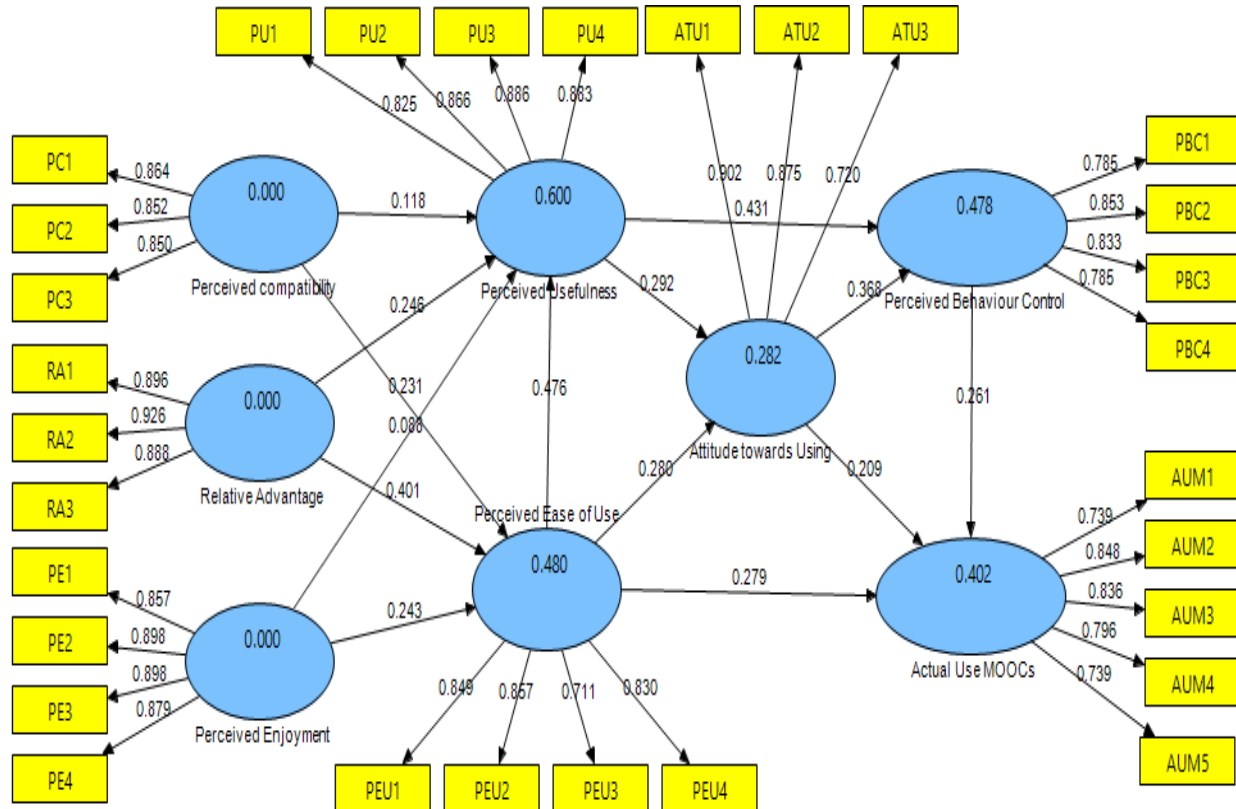


Figure 2. Path coefficients

Source: Author

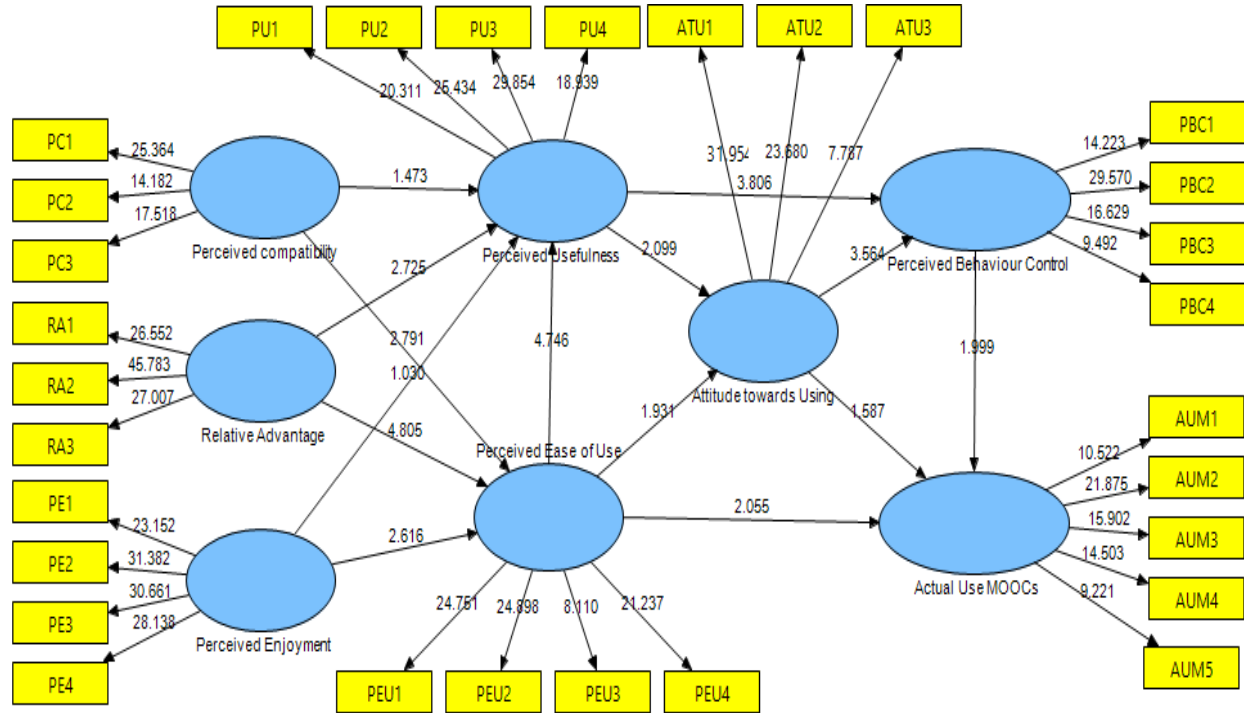


Figure 3. Path T-Values

Source: Author

Table 6. Path Hypotheses Testing

Path Hypotheses	Path Coefficients	Standard Error	T Statistics
Perceived compatibility -> Perceived Usefulness (H1)	0.118170	0.085903	1.473329
Perceived compatibility -> Perceived Ease of Use (H2)	0.231035	0.086690	2.791051
Relative Advantage -> Perceived Usefulness (H3)	0.245641	0.114250	2.724815
Relative Advantage -> Perceived Ease of Use (H4)	0.400974	0.087139	4.804870
Perceived Enjoyment -> Perceived Usefulness (H5)	0.087702	0.082855	1.029717
Perceived Enjoyment -> Perceived Ease of Use (H6)	0.243410	0.095937	2.615583
Perceived Ease of Use -> Perceived Usefulness (H7)	0.475930	0.112282	4.746353
Perceived Ease of Use -> Attitude towards Using (H8)	0.279878	0.148255	1.930887
Perceived Ease of Use -> Actual Use MOOCs (H9)	0.278507	0.141209	2.055294
Perceived Usefulness -> Attitude towards Using (H10)	0.291802	0.150115	2.098877
Perceived Usefulness -> Perceived behaviour control (H11)	0.431222	0.100184	3.805979
Attitude towards Using -> Perceived behaviour control (H12)	0.367513	0.099380	3.564498
Attitude towards Using -> Actual Use MOOCs (H13)	0.209497	0.129200	1.587432
Perceived Behaviour Control -> Actual Use MOOCs (H14)	0.261483	0.128043	1.999481

Source: Author

Table 6 shows the findings of the analysis relationship between Perceived compatibility -> Perceived Usefulness (H1) ($\beta=0.118170$, $T= 1.375628$, $P<0.001$), hypothesis was supported. Also, the relationship between Perceived compatibility -> Perceived Ease of Use (H2) ($\beta=0.231035$, $T= 2.665057$, $P<0.001$), hypothesis was supported. In addition, relationship between Relative Advantage -> Perceived Usefulness (H3) ($\beta=0.245641$, $T= 2.150028$, $P<0.001$), hypothesis was supported. The relationship between Relative Advantage -> Perceived Ease of Use (H4) ($\beta=0.400974$, $T= 4.601560$, $P<0.001$), hypothesis was supported. The relationship between Perceived Enjoyment -> Perceived Usefulness (H5) ($\beta=0.087702$, $T= 1.584981$, $P<0.001$), hypothesis was supported. Similarly, relationship between Perceived Enjoyment -> Perceived Ease of Use (H6) ($\beta=0.243410$, $T= 2.537186$, $P<0.001$), hypothesis was supported. Moreover, the relationship between Perceived Ease of Use -> Perceived Usefulness

(H7) ($\beta=0.475930$, $T= 4.238691$, $P<0.001$), hypothesis was supported. Also, relationship between Perceived Ease of Use \rightarrow Attitude towards Using (H8) ($\beta=0.279878$, $T= 1.887814$, $P<0.001$), hypothesis was supported. Similarly, relationship between Perceived Ease of Use \rightarrow Actual Use MOOCs system management for education sustainability (H9) ($\beta=0.278507$, $T= 1.972298$, $P<0.001$), hypothesis was supported. Additional, relationship between Perceived Usefulness \rightarrow Attitude towards Using (H10) ($\beta=0.291802$, $T= 1.943852$, $P<0.001$), hypothesis was supported. And the relationship between Perceived Usefulness \rightarrow Perceived behaviour control (H11) ($\beta=0.431222$, $T= 4.304321$, $P<0.001$), hypothesis was supported. Furthermore, relationship between Attitude towards Using \rightarrow Perceived behaviour control (H12) ($\beta=0.367513$, $T= 3.698041$, $P<0.001$), hypothesis was supported. Similarly, the relationship between Attitude towards Using \rightarrow Actual Use MOOCs system management for education sustainability (H13) ($\beta=0.209497$, $T= 1.621486$, $P<0.001$), hypothesis was supported. Finally, the relationship between Perceived behaviour control \rightarrow Actual Use MOOCs system management for education sustainability (H14) ($\beta=0.261483$, $T= 2.042158$, $P<0.001$), hypothesis was supported.

5. Discussion and Implications

Theoretically, this analysis contributed to the existing of information by improving understanding of how to use MOOCs system management for education sustainability by proposing a research paradigm based on business students' perceived behaviour control and actual use of MOOCs system management for education sustainability. Perceived compatibility, relative advantage, perceived enjoyment, perceived ease of use, perceived usefulness, attitude toward MOOCs system management for education sustainability, perceived behaviour control, and actual use MOOCs system management for education sustainability are all determinant TAM and IDT variables in the research model. As a result, the research model identifies TAM and IDT variables as having the greatest influence on business students' perceived behaviour control and actual use MOOCs system management for education sustainability. This comes as no surprise for a widely accepted acceptance model. Our findings are similar to those of previous research, which found that perceived usefulness was a stronger indicator of students' attitude towards use and actual use MOOCs system management for education sustainability (Hakami et al., 2017; Alyoussef et al., 2019; Zhou, 2017). The findings are also consistent with previous research (Hakami et al., 2017; Wu and Chen, 2017; Ing et al., 2020; Yang and Su, 2017), which found perceived ease of use to be a key predictor of students' attitudes toward MOOCs system management for education sustainability use. Our findings support previous research and online learning (Abuhassna et al., 2020; Alalwan et al., 2019; Azami and Ibrahim, 2018), which showed that attitude toward MOOCs system management for education sustainability use has a strong positive correlation with actual use of MOOCs system management for education sustainability. The same findings were observed in studies by Wu and Chen (2017) and Yang and Su (2017), both of which concluded that business students' attitude is a major determinant of their intention to continue use MOOCs system management for education sustainability. As a result, the hypotheses in our suggested model supported. This research attempt to combine the TAM model, the IDT theory, and business students' perceived behaviour control and actual use MOOCs system management for education sustainability. Thus, the findings show that technical variables including perceived ease of use and perceived usefulness are important predictors of business students' attitudes toward MOOCs system management for education sustainability use. The results show that the proposed theoretical model is very good at explaining the variables that influence university business students' perceived behaviour control and MOOCs system management for education sustainability use. Overall, the above findings are consistent with previous MOOCs system management for education sustainability research, demonstrating that the TAM and IDT are appropriate for business students' attitudes toward use, perceived behaviour control, and actual MOOCs system management for education sustainability use. First, perceived enjoyment, perceived ease of use, and perceived usefulness might have a high effect in the current study since the same fundamental factors were influencing business students' attitudes toward MOOCs system management for education sustainability and actual MOOCs system management for education sustainability use. Second, how business students' attitudes were assessed in this research was linked to the high correlation between perceived compatibility, relative advantage, and perceived enjoyment with perceived ease of use and perceived usefulness.

Finally, there is a strong connection between business students' attitudes toward MOOCs system management for education sustainability and their perceived behaviour control, as well as actual MOOCs system management for education sustainability use. This is consistent with results achieved by modifying Davis et al. (1989) and Taylor and Todd's scale designs (1995). As a result, as recommended by Alzaghouli (2012), the following must be noted when planning instructional content: business students must be aware of the online course's learning outcomes, the online lesson must have tests at specific sections to verify the learner's level of understanding of the material, the learning materials must be sequenced correctly to facilitate learning, and the online lesson must have tests at specific sections to check the learner's level of understanding of the material. Finally, business students must be given feedback so that they can monitor their success and, if necessary, guide future steps (Alzaghouli, 2012). All hypotheses were supported and positively linked to actual use smart learning and MOOCs system management for education sustainability, according to (Ullah et al., 2020; Alamri et al., 2020b; Alhussain et al., 2020), confirming significant ties between perceived ease of use and perceived usefulness. Business students' attitudes toward using MOOCs system management for education sustainability are influenced indirectly by factors such as perceived compatibility, relative advantage, and perceived enjoyment. The study's consequences include reinforcing and influencing business students' perceived behaviour control, as well as real MOOCs system management for education sustainability use in Saudi higher education. The findings also revealed faculty's role in demonstrating how business students can use MOOCs system management for education sustainability to learn content, as well as business students' attitudes toward using MOOCs system management for education sustainability systems for perceived behaviour control and actual use of MOOCs system management for education sustainability.

Conclusion and future work

In this article, we propose a research model based on determinant factors on TAM and IDT variables that affect business students' perceived behaviour control and actual use MOOCs system management for education sustainability. Perceived compatibility, relative advantage, perceived enjoyment, perceived ease of use, perceived usefulness, and attitude toward using MOOCs system management for education sustainability are among the variables covered. A comprehensive literature review was conducted to determine business students' perceived behaviour control and actual use MOOCs system management for education sustainability. The proposed model would, add to the current literature on MOOCs system management for education sustainability' long-term goals and serve as a guide for higher education institutions and MOOCs system management for education sustainability designers in creating good MOOCs system management for education sustainability. However, other considerations should be considered in order to gain a more systematic understanding of business students' perceived behaviour control and MOOCs system management for education sustainability use. The following are some of the limitations of our research that should be addressed in the future. This study only includes university business students who use MOOCs system management for education sustainability. As a result, our study can have a certain degree of limitation, making it difficult to generalize to other districts or areas (Yang et al., 2017). Future researchers should be able to gather information and data from various places and compare it to this study and see if there are any differences. Furthermore, the completeness of MOOCs system management for education sustainability differs by major, and the MOOCs system management for education sustainability courses that business students can take can differ, both of which may influence the business students' responses. As a result of the above, variations in majors and course characteristics can have a positive or negative impact on business students' perceived behaviour control and actual use of MOOCs system management for education sustainability. Future studies should consider these two considerations into account and use them in the best research model imaginable.

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MAPPING THE STRATEGIC LANDSCAPE FOR GLOBAL FINANCIAL INSTITUTIONS THROUGH BRAND EQUITY TREND ANALYSIS

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Abstract. This paper aims to present the strategic landscape for global financial institutions through a trend analysis for Interbrand's top 100 global brands. The study used longitudinal data of 20 years (2001 to 2020) from the top 100 global brands published by Interbrand annually. Analyses are based on Interbrand's brand equity (\$ millions), annual brand ranking, and annual growth in brand equity using descriptive statistics. This research provides three significant findings. Firstly, it supports the country of origin's effect on top Financial Institutions. American financial institutions were always ahead of financial institutions from other countries. European banks have a relatively higher growth rate. Secondly, this research proposes three clusters of global financial institutions. *Leaders* include financial institutions that appeared in Interbrand's Global brand list for at least 15 years during 2001-2020 and having minimum brand equity of USD 8.0 billion in 2020. *Challengers* include financial institutions that appeared in Interbrand's global brand list for at least five years during 2001-2020; and having minimum brand equity of USD 7.0 billion in 2020. *Extinct* include financial institutions that appeared in Interbrand's global brand list at least once during 2001-2020 but not listed for the last eight years. Finally, this paper presents the effects of the global financial crisis (2008) and global pandemic (2020) on financial institutions. The global financial crisis (2008-9) deeply affected the global banking industry. Many banks were forced to close, and governments had to bail them out. The financial stocks were crushed, and many of them were slashed. The collapse of the US financial system caused many investors to lose their money. The brand equity of financial institutions has the most significant decline. While the global pandemic crisis (2019-20) completely halted the world's economy for many months, the bank's brand equity was not severely affected. Although in 2019-20, there was a decline in the growth rate of the financial sector's brand equity compared to all other sectors, the cumulative brand equity of the financial sector was constantly on the rise. These findings have implications for practitioners and academicians to understand better the underlying patterns and changes in top global financial institutions' brand equity and devise the appropriate strategies. In addition, the findings invite future research on probing the reasons behind the drastic changes in the brand equity of various global financial institutions in the last two decades.

Keywords: Trend Analysis; Brand Equity; Financial institutions

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JEL Classifications: L26

1. Introduction

Strategy is core to any bank's growth, and often their success is due to strategic rather than operational reasons. One of the primary reasons for their success is the familiarity of their senior management with the strategic landscape in which their bank operates. In other words, those banks having a better knowledge of their strategic landscapes are likely to get a competitive advantage over their competitors. One of the critical ingredients of successful competitive strategies is following the strategic maps, which display the location of their own and rival banks. A bank's strategic landscape is typically analyzed in terms of the bank's competitive position, the banking industry conditions under which the banks operate, and the core strategies banks in the industry are following. The purpose of this paper is to present the strategic landscape for global financial institutions through a trend analysis for Interbrand's top 100 global brands.

2. Literature Review

Interbrand, the world's leader in brand management consulting business, publishes an annual ranking of the world's best 100 global brands for the last two decades (Interbrand, 2020). Interbrand's ranking receives equal acceptance and appreciation by the industry and academia (Jia, & Zhang, 2013) as it is relatively easy to understand and apply in practice (Vasileva, 2016). This research aims to present the trend analysis for Interbrand's top financial institutions (2001-2020), and it provides distinction on many counts. Firstly, literature is abundant on brand equity or its valuation methods, but brand equity research is not common (Siddiqui, 2011; Rifi, & Mostafa, 2021; Manu et al., 2021; Rambocas, & Arjoon, 2020).

Secondly, there is a plethora of literature exists on financial institutions from various perspectives. Still, financial institutions were never studied earlier for their brand equity trends. Finally, studies linking global crises to global financial institutions are limited but empirically proved that the bank's profitability suffers during the crisis (Teixeira, Silva, Costa, Martins, & Batista, 2020) either global financial crisis or Asian financial crisis. Similarly, literature linking the global financial crisis to brand equity trends is very thin (Siddiqui, Bajwa, & Elahi, 2018); mainly, financial institutions were never studied for their links with the global crisis.

Brand equity refers to "the differential effect that brand knowledge has on consumer response to the brand's marketing," having three dimensions: differential effect, brand knowledge, and consumer response (Keller, 1993). It creates value for target markets that leads to profitability and profit growth. Since its inception, there have been numerous efforts to measure brand equity, including the most prominent ones such as Simon and Sullivan's brand equity valuation (Simon, & Sullivan, 1993) and Interbrand's brand valuation methodology (Chu, & Keh, 2006). Interbrand's brand valuation approach is considered the most trusted and renowned method of measuring brand equity (Harjoto, & Salas, 2017). Interbrand estimates the brand equity by turning the future income into present value based on the financial market value technique (Chu, & Keh, 2006). In addition, Interbrand ensures multiple criteria while developing the Top 100 global brands ranking (Interbrand's criteria, 2021). Based on this evaluation method, Interbrand publishes 100 Best Global Brands list every year since 2001, and these criteria include (Table 1):

Table 1. Interbrand's Criteria for Selecting Brands in the Top 100 Brands (2001-2020)

No.	Criteria for Selecting Brands in the Top 100 Brands (2001-2020)
1.	The brand should be global, with at least one-third of earnings coming from outside the home country.
2.	The economic profit is expected to be positive over the longer term, delivering a return above the brand's cost of capital.
3.	The brand should be market-facing and should not have a purely monopolistic condition with broader awareness.
4.	The brand's parent firm must be publicly listed with publicly available financial data.
5.	The brand must have a significant presence in Asia, Europe, and North America and geographic coverage in emerging markets.
6.	The brand must have a public profile and sufficient awareness across the major economies of the world.
7.	The Economic Value Added (EVA) must be positive, and the brand value must be over USD 1 billion (USD 4 billion in 2021).

Source: Interbrand

Interbrand methodology has increasingly being used for assessing a bank's brand value (Melović, Vukčević, & Dabić, 2021). They have illustrated how the brand value of a bank is calculated using the Interbrand methodology. Empirically they have presented the role of brands in enhancing the profitability of banks. The study shows that the profitability of a bank brand is the most significant factor that influences the value of a bank brand. The paper overcomes the gap between theory and practice by focusing on the various aspects of banking. This is because implementing the Interbrand methodology in this field of study is still in its early stages. The findings of this study have positive implications for banks' external and internal stakeholders. The methodology used in this research has been optimized in order to measure the brand of banks.

Literature suggests that global banks are more vulnerable to global crises (Cetorelli, & Goldberg, 2011). A plethora of literature suggests that the global economic recession (2008-2009) affected the banks worldwide. The crisis led to a significant decline in banking (Cull, & Peria, 2013). This global crisis affected those countries which more integrated into the global economy, and therefore more vulnerable to the impact of the global economic crisis (Bartlett, & Prica, 2011; Coleman, & Feler, 2015)—also supported by the minor damage of financial crisis to the Middle Eastern banks having minor global integration with overseas asset financing (Habibi, 2009). This trend has also been observed for global financial institutions' brand equity trend analysis during the global financial crisis. The growth rate of brand equity for financial institutions went as low as -21% during the 2008 crises period (Siddiqui, Bajwa, & Elahi, 2018). Similarly, an abundance of literature suggesting the global pandemic crisis (2019-20) also affected banking systems worldwide (Demirgüç-Kunt, Pedraza, & Ruiz Ortega, 2020). Banks have taken measures to retract from supervisory COVID-19 support measures without perils for financial stability (Haselmann, & Tröger, 2021). Now, recovery signals for bank stability during the second quarter of 2020 (Elnahass, Trinh, & Li, 2021). However, the literature is almost absent on the impact of the COVID-19 crisis on brand equity.

3. Research Objective and Methodology

This paper proposes mapping the strategic landscape for global financial institutions through trend analysis of brand equity using Interbrand's Top 100 Global Brand (2001-2020). These maps enable banks to assess their strategic locations and performances longitudinally. Finally, different clusters were formed based on their brand equity performance. This study used longitudinal data from Interbrand's top 100 global brands list for 20 years (2001 to 2020). Interbrand estimates the brand equity by turning the future income into present value based on the financial market value technique. Thus, it makes the basis for the ranking of brands. During the last 20 years (2001 -2010), 19 financial institutions from seven countries appeared in the top 100 global brands (Table 2).

Table 2. Financial institutions Appeared Among the Top 100 Brands (2001-2020)

No.	Brand	Country	Region	Appearances*
1	Goldman Sachs	US	America	20
2	Citi	US	America	20
3	American Express	US	America	20
4	JPMorgan	US	America	19
5	Morgan Stanley	US	America	19
6	HSBC	UK	Europe	18
7	Allianz	Germany	Europe	14
8	AXA	France	Europe	14
9	Visa	US	America	13
10	Santander	Spain	Europe	11
11	MasterCard	US	America	9
12	PayPal	US	America	6
13	Merrill	US	America	8
14	UBS	Switzerland	Europe	8
15	ING	Netherland	Europe	5
16	Credit Suisse	Switzerland	Europe	3
17	AIG	US	America	2
18	Barclays	UK	Europe	2
19	Zurich	Switzerland	Europe	2

* Number of appearances in Interbrand's list of Top 100 Global Brands (2001-2020)

Source: Interbrand

4. Results and Discussion

Analyses are based on Interbrand's brand equity (\$ millions), annual brand ranking, and annual growth in brand equity using descriptive statistics. This research provides three significant findings: (a) country of origin effect on top financial institutions; (b) brand equity trends among financial institutions; (c) financial institutions cluster formation; and (d) effects of the global financial crisis (2008) and global pandemic (2020) on the financial institutions.

4.1 Country of origin

Regarding Interbrand's 100 best global brands for the last 20 years, the country of origin for financial institutions is restricted to only seven countries (Table 3). These countries include France, Germany, Netherland, Spain, Switzerland, UK, and the USA. Therefore, these brands can be grouped on their subcontinents (Table 4), and American brands dominate the global financial industry. These findings also support the earlier research showing the impact of country of origin (COO) on Interbrand's top 100 global brands (Siddiqui, & Sibghatullah, 2014).

Table 3. Number of Financial institutions among Top 100 Brands – Country wise Summary

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
France	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Germany	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Netherland	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Switzerland	0	0	0	1	1	1	1	1	1	3	3	1	0	0	0	0	0	0	0	0
UK	0	0	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
USA	4	6	6	6	6	6	7	8	6	6	6	7	7	7	8	8	8	8	8	8

Source: Interbrand

Table 4. Number of Financial institutions among Top 100 Brands – Region wise Summary

Region	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
USA	4	6	6	6	6	6	7	8	6	6	6	7	7	7	8	8	8	8	8	8
Europe	0	0	1	3	3	3	5	5	4	8	8	5	4	4	4	4	4	4	4	4

Source: Interbrand

4.2 Brand equity trends

Figure 1 presents a cumulative brand equity trend of all banks on Interbrand's Top 100 Global Brands list (2001-2020). In 2001, the cumulative brand equity of all banks was \$59 billion, and it has increased many folds to reach \$149 billion in 2020.

Figure 2 shows a region-wise summary of cumulative brand equity. Again, American financial institutions have performed outstandingly on the brand equity front. At the same time, European banks have also made their brand name on a global level.

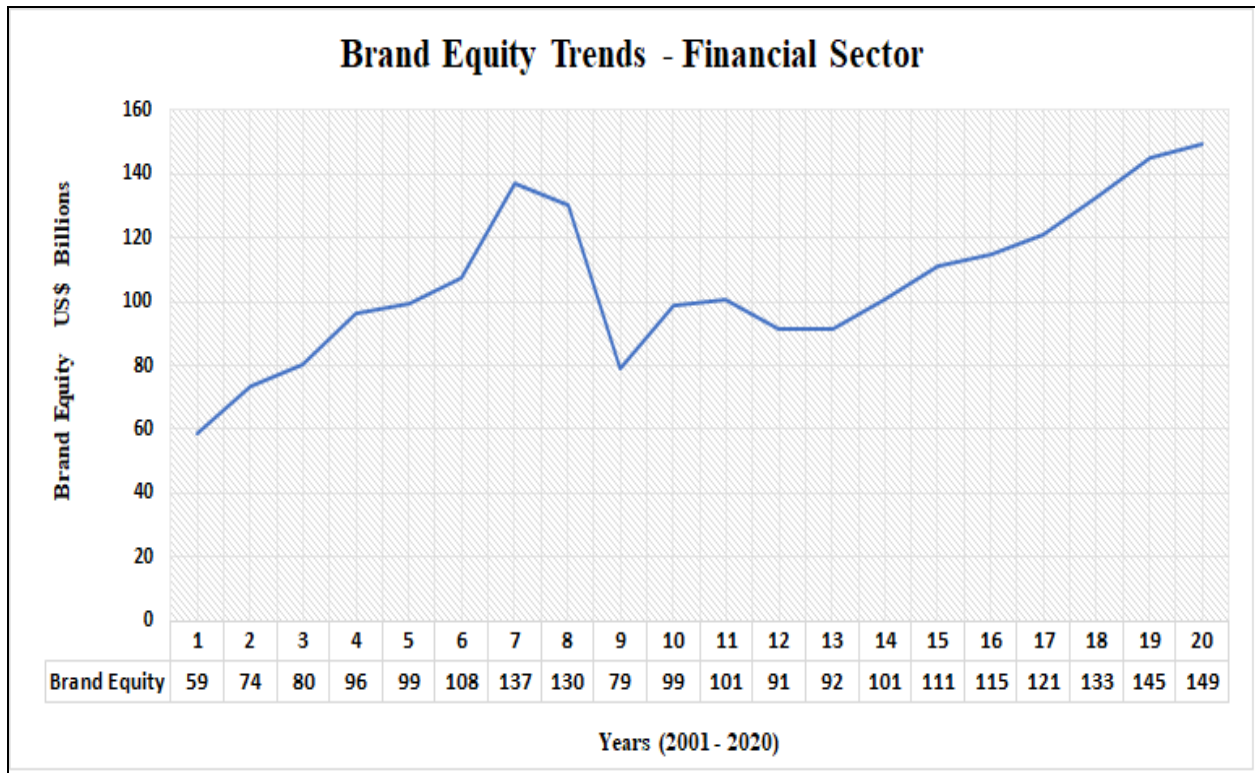


Fig. 1. Brand Equity Trends for Financial institutions (2001-2020) – Cumulative Summary

Source: Authors' contribution

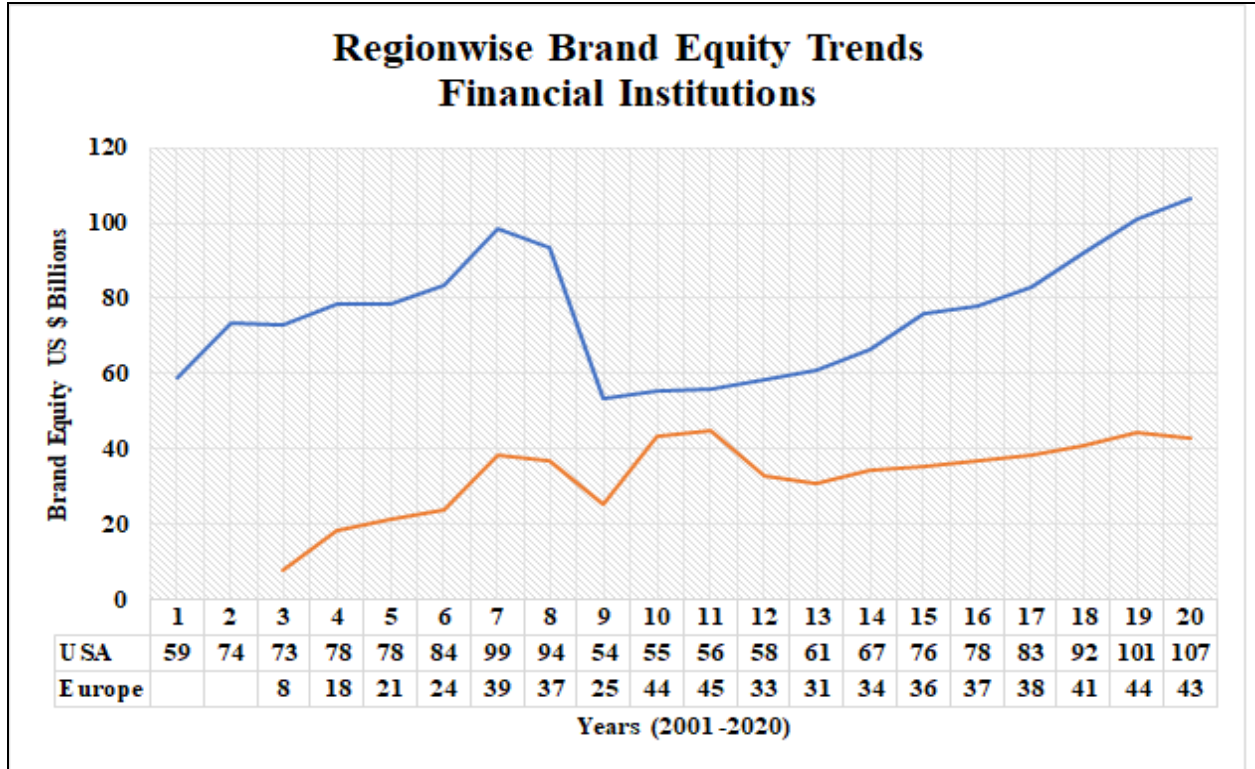


Fig. 2. Brand Equity Trends for Financial institutions (2001-2020) – Region-wise Summary *Source: Authors' contribution*

4.3 Effect of the Global Crises on the Financial Institutions

During the last two decades, the global economy has suffered from two major economic crises. Beginning in 2008, the financial crisis in the US turned into a global economic recession that affected almost all the industries and geographic regions around the globe. The Financial institution's sector was the worst affected by the aftermath of the global economic recession in 2009-10. All the global brands have gone through a rough time during 2008-09, and brand equity declined sharply, resulting in a negative growth rate in brand equity valuation of Financial Institutions. However, all financial institutions have responded proactively to this challenge. As a result, the annual aggregate brand equity of the financial institution's sector declined from \$66 billion in 2009 to \$50 billion in 2010 and regained the level of \$66 billion in 2013. The growth rate had sharply declined to -4% in 2008 from +4% in 2007 and regained to +4% in 2009.

Similarly, the coronavirus turned into a pandemic by early 2020, termed as COVID19 pandemic. Coupled with a total lockdown on almost every neighbourhood on the earth, it brought the global economy to a standstill that humanity has never experienced in modern history. It affected almost every aspect of human life, especially the economic aspect. Most industries, including Financial Institutions, have shown negative growth rates during this period. The annual aggregate brand equity of the financial institution's sector declined from \$118 billion in 2019 to \$114 billion in 2020. The growth rate had sharply declined to -4% in 2020 from +9% in 2019. Figure 3 shows the global financial crisis (2008) and global pandemic (2020) on their impact on Financial Institutions' brand equity. During both global crises, all financial institutions have shown negative growth rates as compared to other brands.

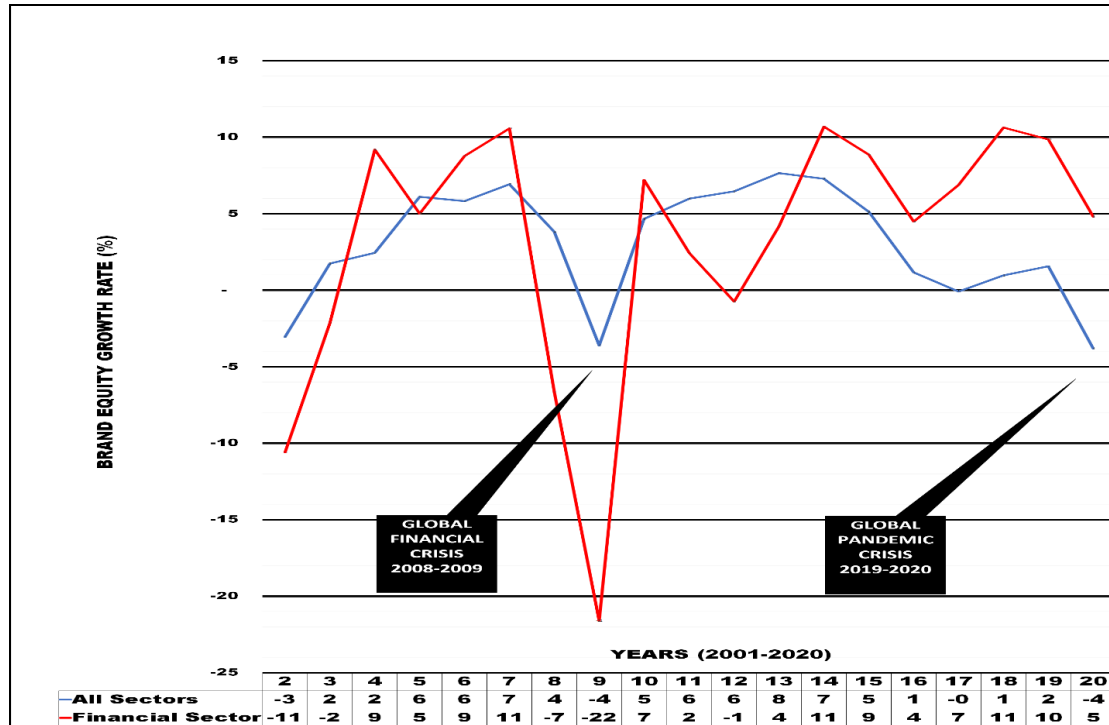


Fig. 3. Effect of Global Crises on Brand Equity Growth Rate among Financial Institutions

Source: Authors' contribution

The financial crisis that started in 2008 deeply affected the banking industry. Many banks were forced to go under, and governments had to bail them out. The financial stocks were crushed, and many of them were slashed. The investors who lost money were primarily foreigners. The collapse of the US financial system caused many investors to lose their money. The brand equity of financial institutions has the most significant decline. It has fallen sharply over the years. Two important observations can be made comparing the global financial crisis (2008-9) with the global pandemic crisis (2019-20). Firstly, the global pandemic crisis completely halted the world's economy for many months, but banks were not severely affected. Second, although in 2019-20, there was a decline in the growth rate of the financial sector's brand equity compared to all other sectors (See figure 6), the cumulative brand equity of the financial sector was constantly on the rise (Figure 1).

4.3 Cluster Formation based on Brand Equity

This research provides a cluster analysis based on 19 banks listed as Interbrand's top financial institutions (2001-2020). These brands are classified into three distinct clusters: Leaders, Challengers, Extinct. Table 5 shows a cluster with a brief description and banks included with their country of origin.

Figure 4 shows two clusters of financial institutions among Interbrand's top 100 global brands. On X-axis, 'Consistency' is placed, and it is measured as the number of appearances by the financial institutions on Interbrand's Global brand list (2001-2020) with a minimum of 5 and a maximum of 20 appearances while Y-axis has brand equity growth rate (%). The bubble size shows the brand equity of the brand (millions of USD). Figure 5 presents cumulative brand equity trends for three clusters (2001-2020). Cluster – I Leaders has high brand equity but a relatively low growth rate. Cluster – II Challengers are relatively new to the Interbrand's list but having a high growth rate. Cluster – III Extinct disappeared from Interbrand's list in 2012.

Table 5. Clusters of Financial institutions among Interbrand's Top 100 Global Brands

Cluster	Description		Brand	Country
Leaders	Banks/ Financial institutions appeared in Interbrand's Global Brand List for (a) at least 15 years during 2001-2020, and (b) having minimum brand equity of USD 8.0 billion in 2020.	1	JPMorgan	US
		2	American Express	US
		3	Goldman Satche	US
		4	Citi	US
		5	HSBC	UK
		6	Morgan Stanley	US
Challengers	Banks/ Financial institutions appeared in Interbrand's Global Brand List for (a) at least five years during 2001-2020, and (b) having minimum brand equity of USD 7.0 billion in 2020.	1	Allianz	Germany
		2	Visa	US
		3	AXA	France
		4	MasterCard	US
		5	PayPal	US
		6	Santander	Spain
Extinct	Banks/ Financial institutions appeared in Interbrand's Global Brand List at least once during 2001-2020 but not listed for the last eight years.	1	Merrill	US
		2	UBS	Switzerland
		3	ING	Netherland
		4	Credit Suisse	Switzerland
		5	AIG	US
		6	Barclays	UK
		7	Zurich	Switzerland

Source: Authors' contribution

The first cluster, named 'Leaders,' was based on financial institutions having at least fifteen appearances in 20 years for the Interbrand's top 100 global brand ranking and having at least brand equity of \$8 billion in 2020. Financial institutions included in this cluster are Goldman Satche (USA), Citi (USA), American Express (USA), JPMorgan (USA), Morgan Stanley (USA), and HSBC (UK). Figure 6 shows trend analysis for brand equity for six banks listed in this cluster (2001-2020). It shows that all banks have losses during the global financial crisis (2008-2009) and some minor losses in the global pandemic crisis (2019-2020), especially American Express and Citi banks have huge losses, but JP Morgan is continuously growing during that period. In this cluster, the average growth rate in brand equity for 20 years is – 1.8%.

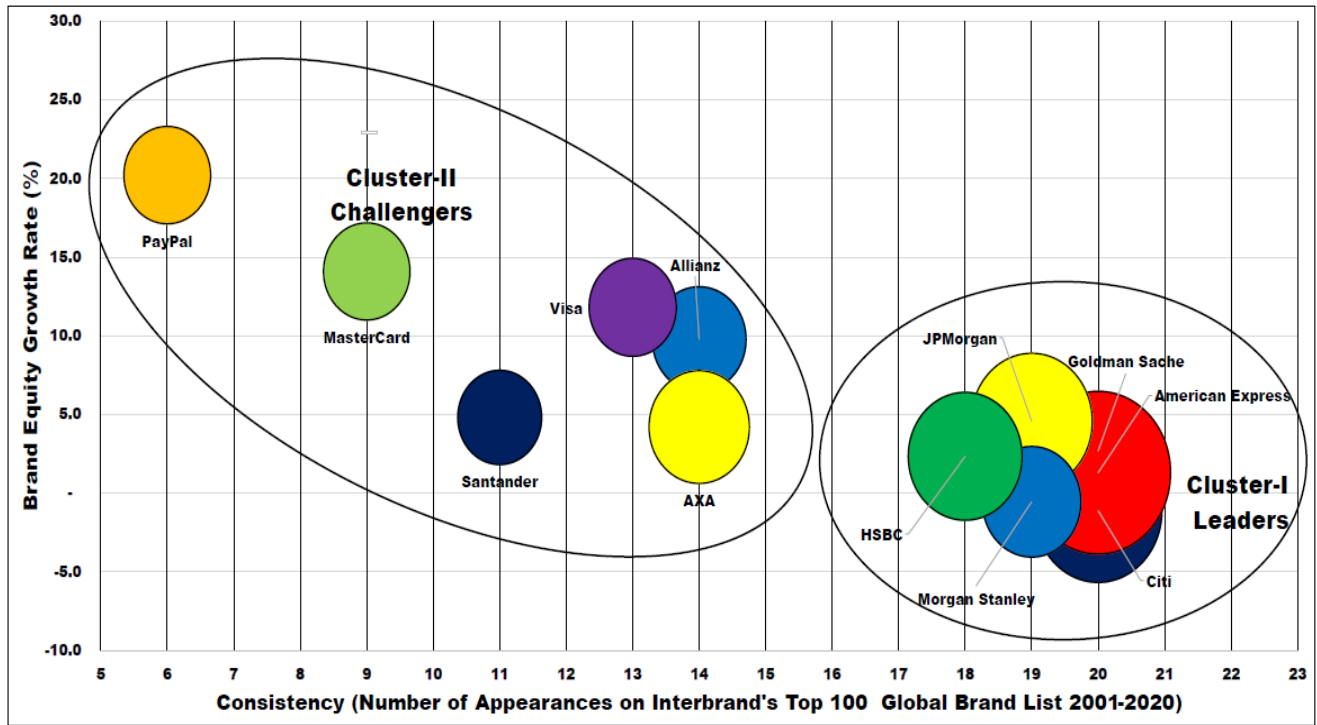


Fig. 4. Clusters of Financial institutions among Interbrand's Top 100 Global Brands

Source: Authors' contribution

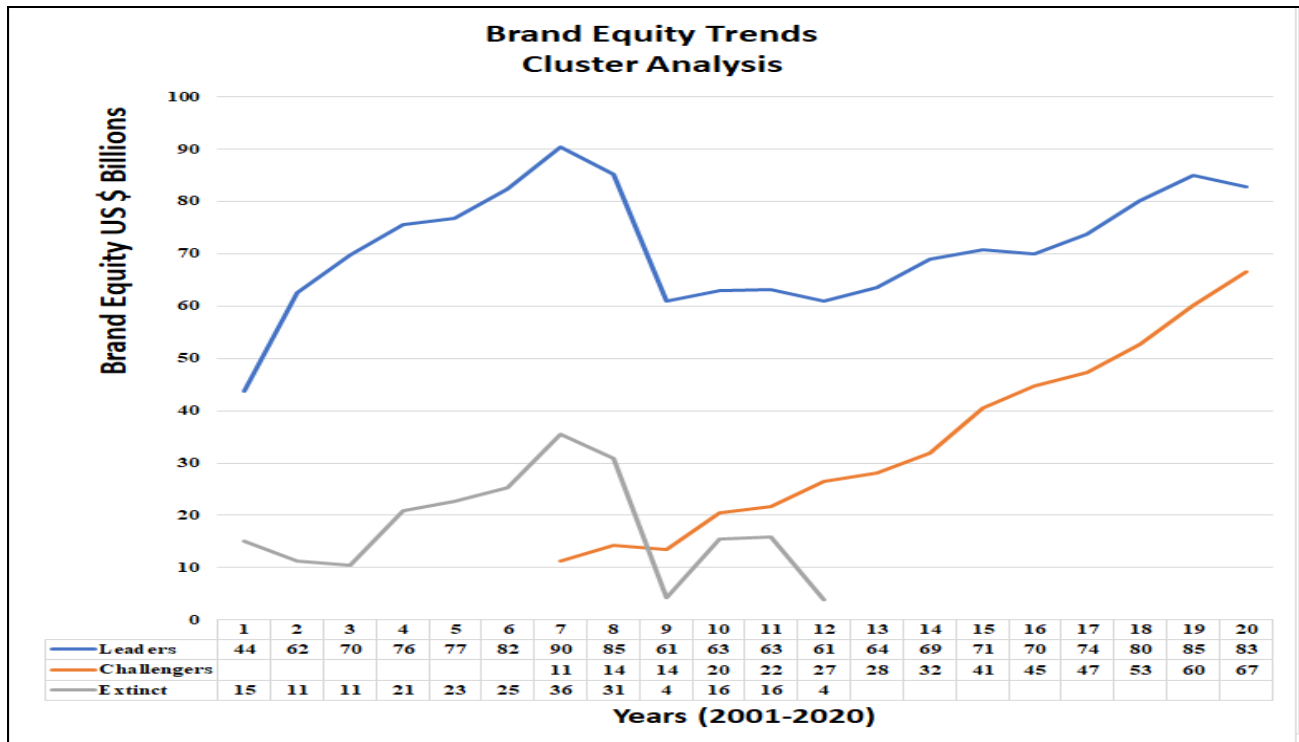


Fig. 5. Brand Equity Trends for Financial institutions (2001-2020) – Region-wise Summary

Source: Authors' contribution

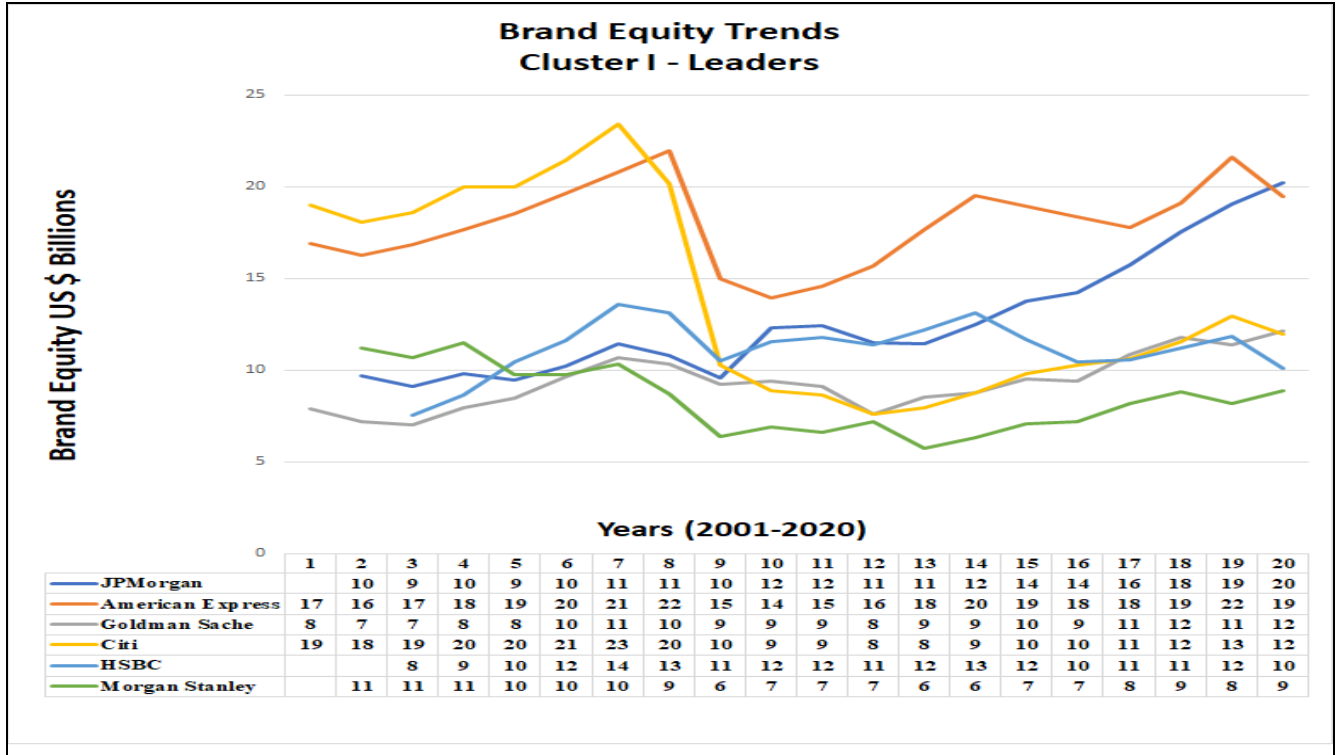


Fig. 6. Brand Equity Trends for Financial institutions (2001-2020) – Cluster I Leaders

Source: Authors' contribution

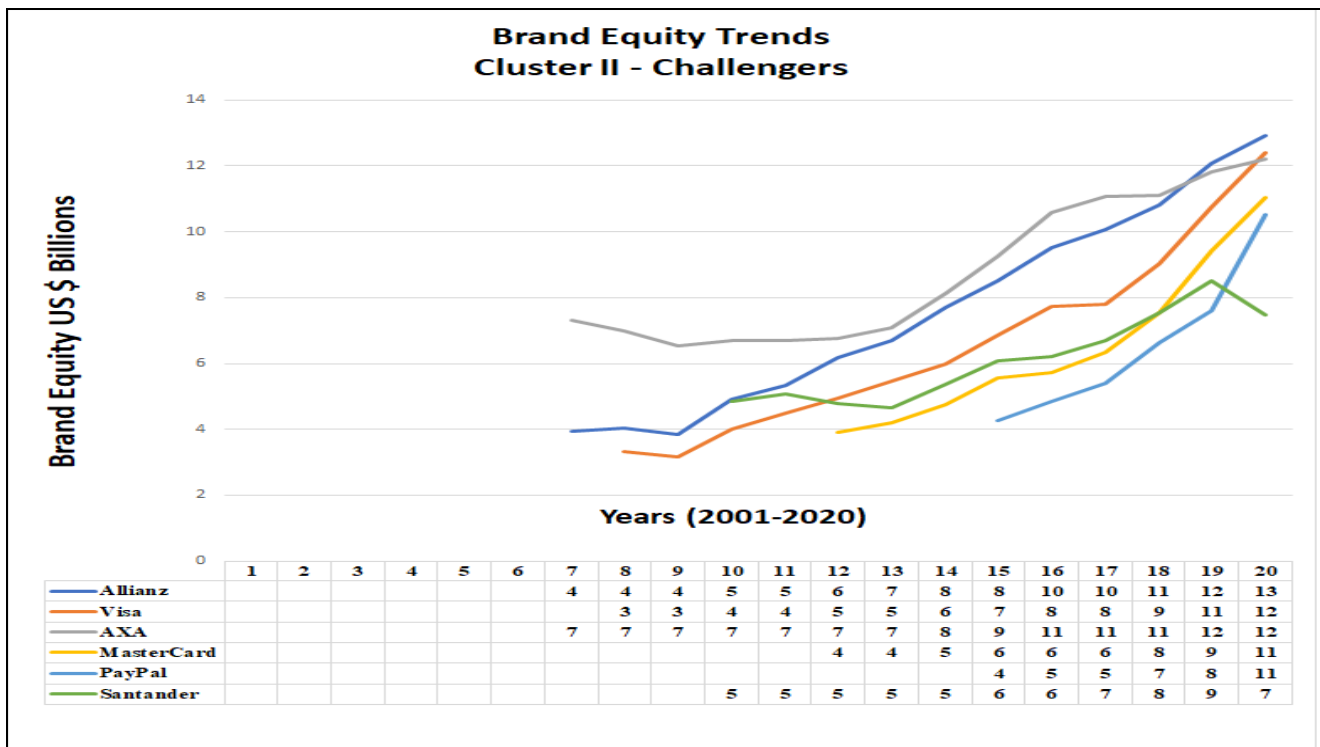


Fig. 7. Brand Equity Trends for Financial institutions (2001-2020) – Cluster II Challengers

Source: Authors' contribution

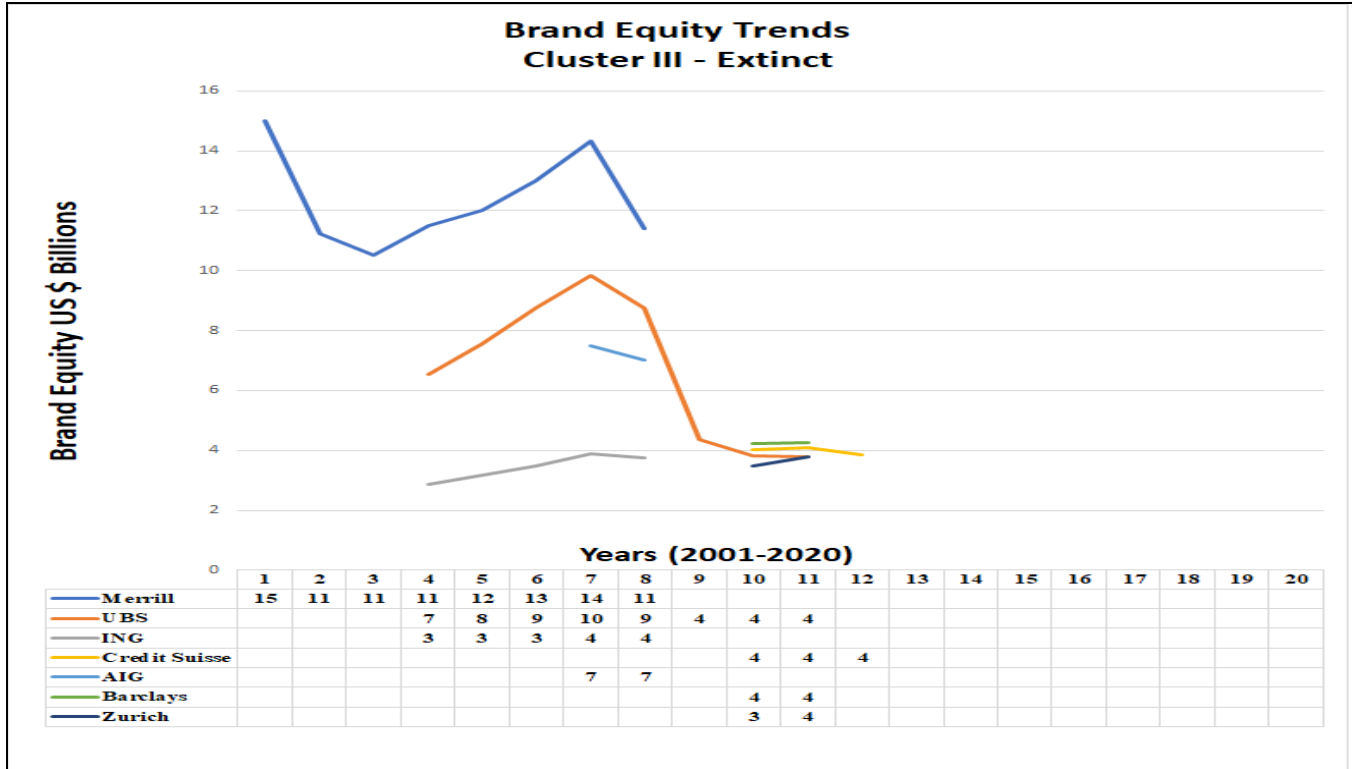


Fig. 8. Brand Equity Trends for Financial institutions (2021-2020) – Cluster III Extinct

Source: Authors' contribution

The second cluster was named 'Challengers,' having an inclusion criterion for minimum brand equity of \$7 billion in 2020 and at least five appearances in the Interbrand's top 100 global brand ranking. The reason for naming them as 'Challenger' is their growth in brand equity, reflecting aggressive branding strategies for the last couple of years. Brands included in this cluster are Allianz (Germany), AXA (France), Visa (US), Santander (Spain), MasterCard (US), and PayPal (US). Figure 7 shows brand equity trend analysis for six banks listed in this cluster (2001-2020). All banks in this cluster appeared late in this list and have shown a high growth rate. In this cluster, the average growth rate in brand equity for 20 years is 10.8%.

The third cluster was named 'Extinct,' which was based on financial institutions that appeared in Interbrand's best 100 global brand List on an irregular basis. Brands included in this cluster are Merrill (US), UBS (Switzerland), ING (Netherlands), Credit Suisse (Switzerland), AIG (US), Barclays (UK), and Zurich (Switzerland). Figure 8 shows brand equity trend analysis for seven banks listed in this cluster (2001-2020). No bank appeared on this list after 2012. The global financial crisis (2008-2009) is the primary reason for their disappearance from Interbrand's Top 100 Global Brand list.

Conclusions

Brand Equity is a crucial indicator that helps in assessing an organization's performance. It is also used to evaluate the customer preference of an individual brand. Establishing a solid brand image is the first step to gain a competitive advantage. The image of a financial institution is at stake when the country's economy goes through a significant change. This study shows that the brand equity of top banks has significantly varied during the 2001-

20 periods due to financial and pandemic crises and recessions. Our study analyzed the top 100 global financial brands in 2001. The global economic recession of 2008-09 affected the financial brands of different sectors more than others.

Contrary to this phenomenon, the pandemic crisis has not severely affected the banking sector. Nevertheless, these findings have implications for practitioners and academicians to understand better the underlying patterns and changes in top global financial institutions' brand equity and devise the appropriate strategies. In addition, the findings invite future research on probing the reasons behind the drastic changes in the brand equity of various global financial institutions in the last two decades.

Need for Future Research

This trend analysis provides a baseline for further research. The agenda for further research on financial institutions and their brand equity can be grouped into three novel ideas. Firstly, it shows consistently higher brand equity growth by Cluster – II Challengers, which has a cumulative growth rate of brand equity is 10.8% for the last 20 years. Looking at the trend for this cluster million-dollar question needs to be answered 'what strategies kept them consistently growing for many years.' Secondly, more financial data might be needed to study the Cluster-I Leaders of financial institutions proposed in this paper. Thirdly, many financial institutions have shown significant turnarounds in their brand equity figures. Knowing these turnaround strategies would be beneficial for academicians and as well as for marketing professionals. All these questions require in-depth research and analysis from a brand equity point of view.

Limitations

This study has certain limitations. Firstly, this study used secondary data from Interbrand's 100 Best Global Brands ranking from 2001 to 2020. Interbrand has its particular criteria to include the brands in the global ranking and a specific valuation method for brand equity, as discussed earlier. Therefore, it may not consider some brands that do not fulfill the criteria. Secondly, the scope of this study is limited to exploring and presenting the trends using descriptive techniques and not finding the reasons behind such patterns.

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INTRODUCTION OF EEPSE GREEN ECONOMY INDEX FOR THE ANALYSIS OF REGIONAL TRENDS*

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Abstract. The importance of analysing green economy has long been acknowledged by the international scientific community. Still there is strong demand for a comprehensive model which would serve as a scoreboard to assess a country's progress on green track and identify regional developments. Having dwelled upon this task, this article suggests using an original method – so called EEPSE Green Economy Index (which combines educational, economic, political, societal and environmental indicators), based on the Quintuple Helix Model, to analyse green economy trends in the EU countries. The results of the present study advocate the efficiency of such a tool and show its potential in performing current analysis, as well as predicting future tendencies related to sustainable development.

Keywords: green economy; Quintuple Helix model; sustainable development; EEPSE; Green Economy Index

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JEL Classifications: C43, O44, O52, O57, R11, Q20, Q30

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1. Introduction

Scientific interest towards green economy has been growing constantly since the end of the 20th century and throughout the beginning of the 21st century – the period, which saw a series of global forums devoted environmental issues, mainly to global warming. Among the most important events “Earth Summit” in Rio De Janeiro (1992), Kyoto Protocol (1997), the Copenhagen Climate Change Conference (2009), Paris agreement on climate change (2015) etc. are to be mentioned. All these events marked significant stages in elaborating a strategy for sustainable development by both scholars and decision-makers. Sustainable development in general is a continuous process of satisfying needs of the present and future generations. The definition is unanimously accepted, alas ways of implementation of this approach towards development is under continuous discussion (Tvaronavičienė et al., 2015; Strielkowski et al., 2016; Tvaronavičienė, 2017; Razminienė, Tvaronavičienė, 2018; Eddelani et al., 2019).

In Europe this issue received an additional impetus with the adoption of European Green Deal (presented on 11 December 2019) – a roadmap with actions to boost the efficient use of resources by moving to a clean, circular economy, restore biodiversity and cut pollution.

Achieving such ambitious goals goes in line with the development of green economy in European countries. Still, scholars and policymakers seem to lack an efficient instrument to measure a country’s record on this track, and to draw comparison between groups of states. In line with existing and commonly acknowledged by scientific community indexes such as The Global Green Economy Index (GGEI), The Green Growth Index (GGI), The Global Green Finance Index (GGFI), Environmental Performance Index (EPI), whose components were used in the present study, this article aims to work out a new Green Economy Index based on the Quintuple Helix model, which would take into account educational, economic, political, social and environmental aspects of the phenomenon. Thus it is proposed to call it EEPSE Green Economy Index. It is argued that with its help it’s possible not only to measure EU27 + UK countries’ performance with regard to green economy, divide them into main clusters, revealing divergence/convergence processes within these groups, but also analyse different political, economic and societal events related to sustainable development.

2. Terms and definitions

To highlight the multidisciplinary and multidimensional nature of the phenomenon the qualitative content-analysis of definitions of various green concepts has been performed (see Table 1). In this type of analysis (specifically latent analysis) data are presented in words and themes, which makes it possible to draw some interpretation of the results, and the researcher seeks to find the underlying meaning of the text (Bengtsson, 2016).

Table 1. Definitions of various green concepts

Term	The introducing entity, year	Characteristics and definitions
<i>Green economy</i>	Swart & Groot, 2020	A green economy is one which is <u>low carbon</u> , is <u>resource efficient</u> , and is <u>socially inclusive</u> ... a green economy also comprehends the design and implementation of specific <u>policy instruments</u> targeted at the <u>environment</u>
<i>Green economy</i>	Fulai, 2010	A green economy is typically understood as an <u>economic system</u> that is compatible with the <u>natural environment</u> , is <u>environmentally friendly</u> , is <u>ecological</u> , and <u>for many groups</u> , is also <u>socially just</u>
<i>Green growth</i>	OECD, 2010	Green growth means promoting <u>economic growth</u> while <u>reducing pollution and greenhouse gas emissions</u> , <u>minimising waste and inefficient use of natural resources</u> , and maintaining <u>biodiversity</u> . Green growth means improving <u>health prospects</u> for populations and strengthening <u>energy security</u> through <u>less dependence on</u> imported <u>fossil fuels</u> . It also means making <u>investment</u> in the environment as a driver for <u>economic growth</u>
<i>Green innovation</i>	Leal-Millán & Antonio, 2020	Green innovations are all type of innovations that contribute to <u>the creation of key products, services, or processes to reduce the harm, impact, and deterioration of the environment</u> at the same time that <u>optimizes the use of natural resources</u> ... and channel <u>an appropriate use of the natural resources to improve the human well-being</u> ... which could <u>contribute to sustainable development</u> .
<i>Green innovation</i>	Kemp & Pearson, 2007 (MEI project for the European Commission)	the <u>production</u> , assimilation or exploitation of a product, production process, <u>service or management or business method</u> that is <u>novel</u> to the organization (developing or adopting it) and which results, throughout its life cycle, in a <u>reduction of environmental risk, pollution</u> and other negative impacts of <u>resources use</u> (including <u>energy use</u>) compared to relevant alternatives

Source: examination of existing bibliography

As it can be seen from the definitions above (keywords are underlined), the aspects of the phenomenon include education (“novel methods”, “assimilation”), economy (“creation of products, goods and services”, “economic system”), politics (“organizational structures” and “institutional arrangements”), society (“to improve the human well-being”, “socially just”, “for many groups”) and natural environment (“environmental improvements”, “ecological”, “biodiversity”). This fact provides grounds for applying the Quintuple Helix model to its analysis.

3. Methodology

The Quintuple Helix model, which is used as basis for the EEPSE Green Economy Index, has several features. First, it is one of the models based on the quality management of effective development, restoring balance with nature and preserving Earth’s biological diversity. As Barth (Barth, 2011) puts it, this model can solve existing problems by applying knowledge and know-how, as it focuses on the social (public) exchange and transfer of knowledge within the subsystems of a particular state or a national state. Second, the innovative Quintuple Helix model explains the way knowledge, innovations, and environment (natural environment) are interrelated (Carayannis and Campbell, 2010; Barth, 2011). The Quintuple Helix model is both interdisciplinary and

transdisciplinary: the complexity of the five-spiral framework implies that a full analytical understanding of all spirals requires the continuous involvement of the entire disciplinary spectrum, ranging from Natural Sciences (due to inclusion of the natural environment) to Social Sciences and Humanities, to promote and visualize the system of collaboration between knowledge, know-how, and innovations for more sustainable development (Carayannis and Campbell, 2010). A visualized description of the model can be seen at Fig.1:

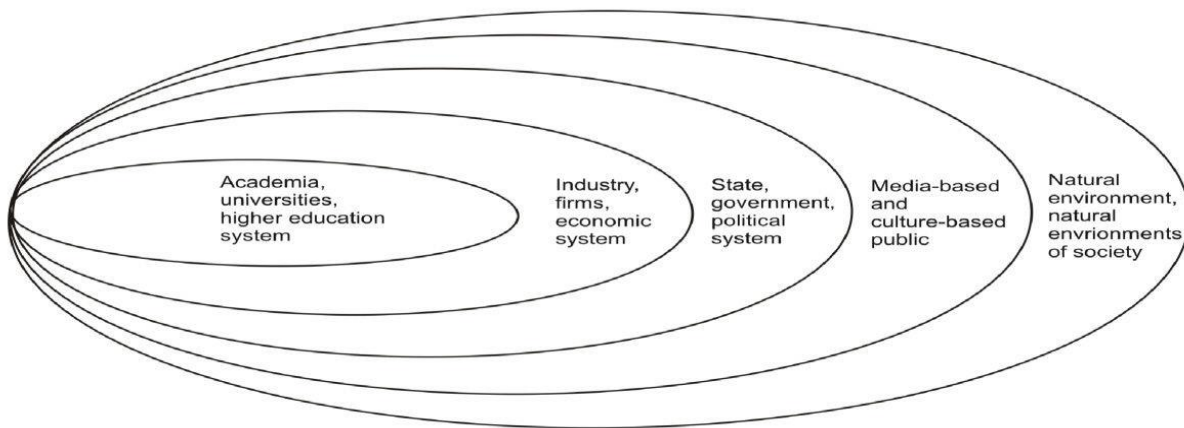


Figure 1. The subsystems of the Quintuple Helix model.

Source: Carayannis et al. 2012.; Etzkowitz and Leydesdorff 2000; Carayannis and Campbell, 2009, 2010.

As it is described at the figure, the first subsystem of this model is education, which forms the necessary “human capital”. The second – economy – focuses on the “economic capital” (namely resource productivity, energy production and consumption, sustainable entrepreneurship etc). The *third* subsystem – politics – i.e. “political and legal capital” (in our context it refers to environmental regulations, taxes, international treaties etc.). The fourth subsystem – societal – unites the “social” and the “information” capital (it includes, for instance, green economy perception, press freedom, level of democracy etc). Finally, the fifth subsystem – environment (e.g. biodiversity, pollution etc.) provides society with the “natural capital”.

All subsystems in the Quintuple Helix, as it can be seen at Figure 2, perform functions which influence each other (Ibid). In the innovative Quintuple Helix model, the natural environment is defined as an opportunity for further development and provision of sustainable development and co-evolution of the knowledge economy, knowledge society and democracy, which also influences the way we perceive and organise entrepreneurship (Etzkowitz and Leydesdorff 2000; Carayannis and Campbell, 2006, 2009, 2010; Barth, 2011; Aleksejeva et al., 2020).

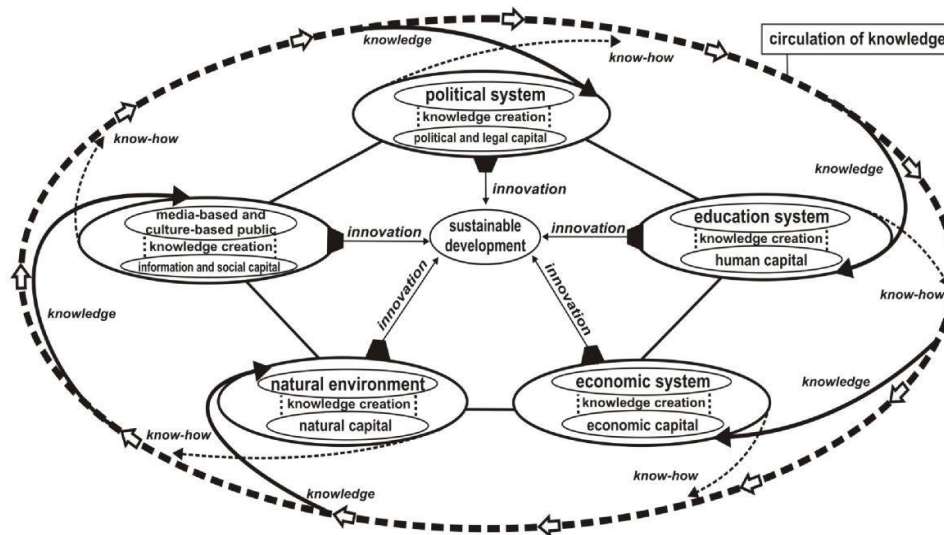


Figure 2. The Quintuple Helix model and its functions.

Source: Lavrinenko et al., 2019, by Carayannis et al. 2012

Now that the use of the Quintuple Helix has been substantiated, it seems reasonable to define specific indicators related to green economy. Previously a similar task was accomplished by the authors of this paper in 2019 (O. Lavrinenko *et al.*, 2019), and the results of that study were taken as basis. Still, this time the set of all available statistical and integrated indicators corresponding to the Quintuple Helix model in the EU countries, which comprised the empirical base of the research, has been updated and broadened, so that each of the subsystems is represented by ten indicators (which makes 50 indicators in total). New indicators have been added (see Appendix 1), the technique has been improved.

All indicators were standardized, and then, in order to perceive them better, the transition to T scale by the formula $T=50+10*z$ was made. Factors corresponding to the Quintuple Helix model are obtained as arithmetic means of the corresponding indicators; the integrated indicator is obtained as the arithmetic mean of the values of five subsystems. Hereinafter the overall indicator it is called EEPSE Green Economy Index.

Yet the feature of this paper is that it also seeks to test the potential of the proposed Index in analysing and foreseeing different political, economic and societal events related to green innovation and sustainable development. Particularly, in the present article it is applied to plug-in electric vehicle market share in the EU countries in 2020.

4. Research results

According to the results of the research, Sweden became the leader of the list of the EU countries with EEPSE Green Economy Index equalling 58,97. The second place was taken by the United Kingdom (58,14). At the same time Denmark (57,75) outscored Germany (56,42) in 2020 study. The top countries also include Finland (56.02), France (54,69) and the Netherlands (54.38).

As for the list of worst performers of the ranking, it includes Poland (43.21), Bulgaria (43.46), Cyprus (43.50), Hungary (44.94) and Romania (45.25). These results generally correspond to those, obtained during the first stage of the research (O. Lavrinenko et al., 2019).

The cluster analysis was carried out in the five-factor EEPSE space. With the help of this pattern all EU countries were grouped into two homogeneous clusters (see Map, Figure 3). The first cluster (Cluster +, Table 4) includes countries which are characterized by higher value of indicators according to all five subsystems; other countries (Cluster -, Table 5) are characterized by a lower level of these indicators. The importance of predictors was as follows: 1-st political factor (the most important); 2-nd education; 3-rd society; 4-th environment; 5-th economy (the least important). This fact appears to be very interesting, since economy has the least importance when defining clusters, while politics plays the most important role.

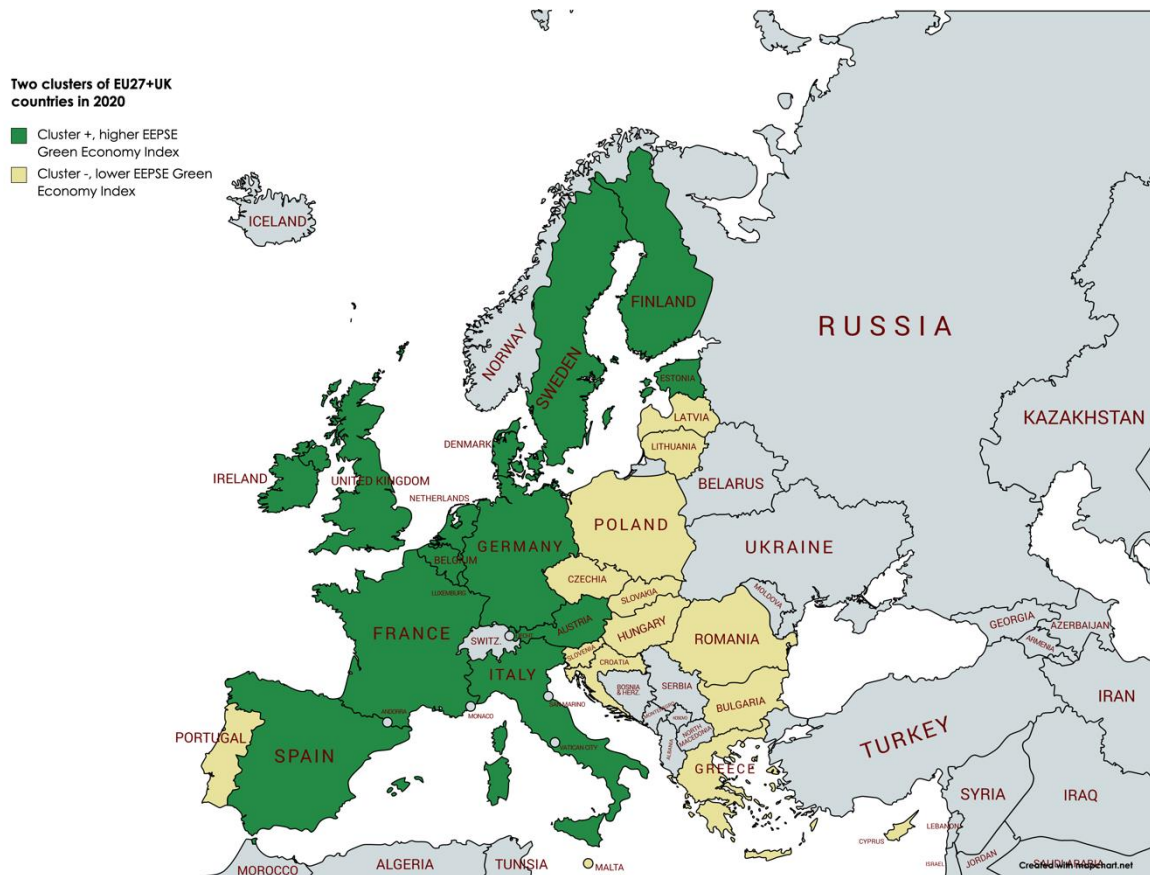


Figure 3. The EU countries plus UK divided into CL+, CL- clusters of a five-factor space of the Quintuple Helix model's subsystems in 2020

Source: the authors' calculations in SPSS according to statistical data

Considering the mean values of the subsystems in two clusters, it can be concluded that, as well as during the first stage of the research, all mean values of subsystems in the CL+ cluster exceed the mean values of subsystems in the CL- cluster. Particularly, the mean value of the "quality of education system" subsystem by 27 %, of the "political" subsystem by 18.5 %, of the "civil society" subsystem by 14.3 %, of the "economic aspects" subsystem by 14.2 %, of the "natural environment" subsystem by 11.3 %, (see Figure 4):

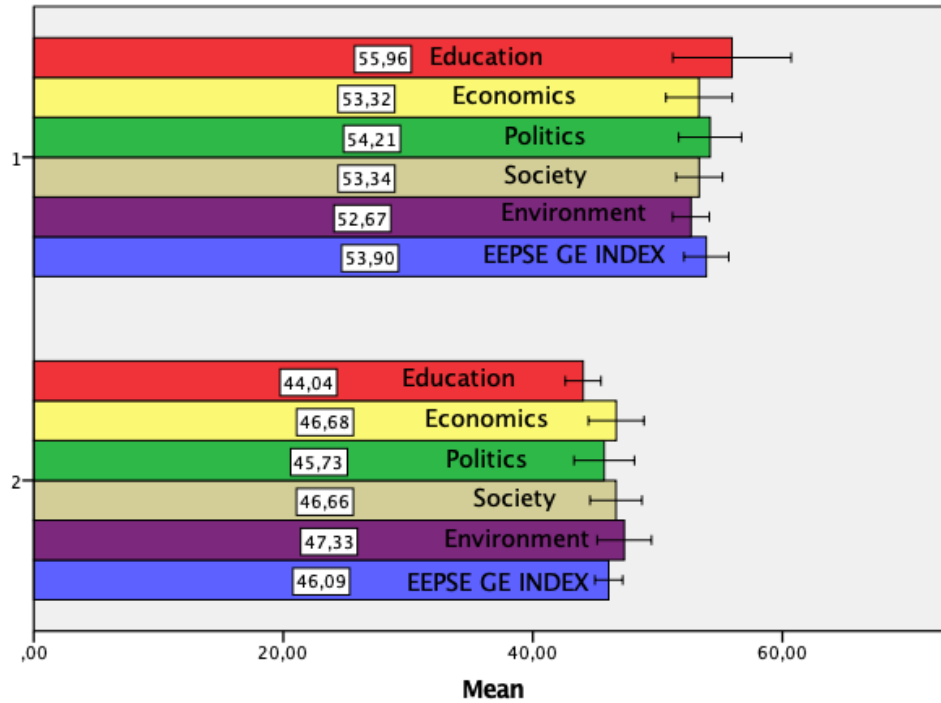


Figure 4. Comparison of Cluster + (1) and Cluster – (2).

Source: the authors` calculations in SPSS according to statistical data

As it has already been stated, Sweden became the leader by the EEPSE Green Economy Index in Cluster + (see Table 2 below), while the place in the bottom of this group is now occupied by the newcomer (as compared with the first stage of the research) – Ireland. The United Kingdom confirmed its leading positions in the educational subsystem (71.52), while another debutant of Cluster + Estonia showed the lowest academia record among the leaders (44.28). Sweden again became the leader in the economic subsystem (64.58), while Belgium is located at the bottom of the list (46.91). Sweden also has shown the best results in the “Civil society” (58,45) subsystem, while in the sphere of politics it yielded palm to Denmark (61,73) and Finland (60,92). Speaking of the “Natural environment” subsystem, Denmark scored the most (55.38) and Belgium – the least (47.85).

Table 2. Values of the cluster CL+ Quintuple Helix model's subsystems in 2020, EEPSE GEI descending

№	Country name	Quality of education system	Economic aspects	Political system	Civil society	Natural environment	Mean= EEPSE GEI
1	Sweden	57,39	64,58	59,59	58,45	54,83	58,97
2	United Kingdom	71,52	57,00	56,36	51,33	54,51	58,14
3	Denmark	55,42	59,56	61,73	56,65	55,38	57,75
4	Germany	69,28	51,72	54,71	51,28	55,09	56,42
5	Finland	53,08	56,02	60,92	57,32	52,73	56,02
6	France	63,88	51,41	54,06	50,47	53,64	54,69
7	Netherlands	58,33	51,71	56,45	53,86	51,55	54,38
8	Austria	52,37	52,67	51,22	50,35	54,48	52,22
9	Luxembourg	44,93	51,78	53,31	55,92	54,77	52,14
10	Spain	57,32	48,43	47,83	51,36	51,90	51,37
11	Estonia	44,28	52,62	51,21	54,42	52,83	51,07
12	Italy	56,68	50,12	50,19	47,16	49,96	50,82
13	Belgium	52,84	46,91	52,60	52,54	47,85	50,55
14	Ireland	46,19	51,91	48,77	55,59	47,92	50,08
CL5 = CL+							

Source: the authors' calculations in SPSS according to statistical data

Investigating the situation in the Cluster – (see Table 3), it has to be mentioned that certain differences in countries' positions have occurred here as well. As it has already been stated above, the countries with high scores which previously were in this group have managed to move to Cluster +. As a result, Cluster – group in 2020 included 14 (not 21) countries, with Slovenia (48,59) as a leader and Poland (43,21) as an underdog in terms of EEPSE GEI.

It is worth mentioning that Latvia secured strong positions in the top of the Cluster –, with overall performance being better than the one of neighboring Lithuania, and the best record in the economic subsystem among Cluster – countries, but weak educational indicators:

Table 3. Values of the cluster CL- Quintuple Helix model's subsystems in 2020, EEPSE GEI ascending

№	Country name	Quality of education system	Economic aspects	Political system	Civil society	Natural environment	Mean= EEPSE GEI
1	Poland	47,55	40,72	37,50	44,68	45,61	43,21
2	Bulgaria	42,24	43,40	42,14	42,67	46,85	43,46
3	Cyprus	42,52	40,34	43,57	51,63	39,42	43,50
4	Hungary	45,15	45,42	43,57	42,76	47,83	44,94
5	Romania	42,17	49,09	43,06	42,91	49,02	45,25
6	Malta	42,52	49,82	43,70	47,28	43,98	45,46
7	Croatia	42,32	49,50	45,24	40,85	49,76	45,53
8	Slovakia	42,33	46,92	45,58	44,98	49,93	45,95
9	Czech Republic	46,65	45,69	44,54	48,10	50,69	47,13
10	Greece	47,26	42,15	48,31	51,88	48,40	47,60
11	Lithuania	41,58	51,32	47,93	48,68	49,61	47,82
12	Latvia	40,90	52,23	51,79	48,16	48,37	48,29
13	Portugal	47,67	49,08	53,73	51,35	40,53	48,47
14	Slovenia	45,63	47,89	49,50	47,36	52,58	48,59
CL5 = CL-							

Source: the authors' calculations in SPSS according to statistical data

5. Investigating green economy trends in the European Union

As the present research has been performed in three stages (approximately 4 years of observations), the data collected through this period of time were systematised and analysed to find out if there have been convergence or divergence trends in terms green economy development in the EU countries. Such analysis was applied both to overall EEPSE Green Economy Index and its components in the period of 2017-2020.

To reveal the tendencies the sigma convergence for data throughout the three stages of the research was tested. The indicator – σ – shows the convergence and divergence tendency depending on the value of sample variance.

Such approach has been widely used by scholars in relation to the economy of the EU. Simionescu (2014), for instance, utilizes it to measure the evolution of real convergence process between the EU countries in terms of GDP per capita in 2000 and 2012. Sometimes such an approach is also used to assess convergence and divergence processes across old and new members of the European Union.

Speaking of the present research, the variation is measured for factors and overall Green Economy Index using simple indicator (the mean) and synthetic indicators (variance, standard deviation, and coefficient of variation).

In a dynamic analysis the variation in decrease allows us to conclude the existence of a more obvious convergence process. And just the reverse – variation in increase signals about the existence of a more obvious divergence process. At the same time, the most useful indicator is the coefficient of variation, because it allows to make necessary comparisons and conclusions.

The variance for different factors of green economy and its overall index in the EU 27 + UK countries was computed as:

$$\sigma^2 = \frac{\sum_{i=1}^{28} (x_i - \bar{x})^2}{28}$$

where x_i – the variable, i – index for countries (1-28), \bar{x} – simple arithmetic average:
 $\bar{x} = \frac{\sum_{i=1}^{28} x_i}{28}$.

The variance expresses the degree of variation of the values compared to the average. It is affected by outliers and by the variable measurement of unit. The variance is also used to calculate the standard deviation ($\sigma = \sqrt{\sigma^2}$) and the coefficient of variation ($CV = \frac{\sigma}{\bar{x}}$), the last one expressing in a relative form the variation compared to average.

The indicator (σ) is used to characterize the level of convergence by measuring the variance of EEPSE Green Economy Index and its components for three stages of the research, utilizing the cross- section data about EU27 + UK countries. The indicator is relevant when comparisons are made. For describing the convergence tendency, time series are used on a discrete interval from t to $t+T$. In a certain time period when the variance of the variable decreases (the indicator value decreases in time), the convergence process took place: $\sigma_t < \sigma_{t+T}$. When the variance grows, the divergence process took place: $\sigma_t > \sigma_{t+T}$.

In the first place the σ -convergence was tested for all countries under analysis regardless of the clusters (see Table 4). The results show that there is a convergence process in terms of overall EEPSE Green Economy Index in the EU countries. As it can be seen from the data in the Table, it can be attributed to convergence in the sphere of society, while coefficients of variation in the spheres of education and economy remain approximately the same.

Table 4. Comparison of indicators through three stages of the research (all countries)

Year		Factor 1 – Education	Factor 2 – Economy	Factor 3 – Politics	Factor 4 – Society ↓	Factor 5 – Environment	EEPSE Green Economy Index ↓
2017 – 2018 (1 st research stage)	Mean	50	50	50	50	50	50
	Variance	73,243	22,135	35,932	77,439	13,276	27,864
	Std. deviation	8,55821	4,70479	5,99437	8,79993	3,64367	5,27866
	Coefficient of variation (%)	17,1 %	9,4 %	12 %	17,6 %	7,2 %	10,6 %
2019 (2 nd research stage)	Mean	50	50	50,0096	50	49,9411	49,9901
	Variance	71,401	30,644	8,16	34,042	32,171	23,148
	Std. deviation	8,44994	5,53571	2,8566	5,83452	5,67193	4,81121
	Coefficient of variation (%)	17 %	11 %	5,7 %	11,7 %	11,4 %	9,6 %
2020 (3 rd research stage)	Mean	50	50	49,9679	50	50	49,9936
	Variance	72,316	28,764	36,357	22,778	17,423	22,26
	Std. deviation	8,50386	5,36324	6,02966	4,7726	4,1741	4,71806
	Coefficient of variation (%)	17 %	10,7 %	12 %	9,5 %	8,3 %	9,4 %

Source: the authors' calculations in SPSS according to statistical data

At the same time, the situation in two clusters differs. As it can be seen in Table 5, overall EEPSE Green Economy Index converges within the framework of Cluster +. It can be attributed to the convergence process in the sphere of economy and society. At the same time, there is a clear divergence process in the educational sphere. It can be explained by the fact that countries with good record on this track (the UK, Germany, France) manage to preserve their leadership and even to increase their advantages as compared to countries with lower academic results (Ireland, Luxembourg, Estonia).

Table 5. Comparison of indicators through three stages of the research (Cluster +)

Year		Factor 1 – Education ↑	Factor 2 – Economy ↓	Factor 3 – Politics	Factor 4 – Society ↓	Factor 5 – Environment	EEPSE Green Economy Index ↓
2017 - 2018 (1 st research stage)	Mean	56,3635	52,8778	53,3038	56,8073	51,1628	54,103
	Variance	58,784	24,377	31,252	42,449	11,557	17,131
	Std. deviation	7,66709	4,93732	5,59035	6,5153	3,39952	4,13901
	Coefficient of variation (%)	13,6 %	9,3 %	10,5 %	11,5 %	6,6 %	7,7 %
2019 (2 nd research stage)	Mean	55,9068	53,952	51,2549	53,9677	53,8315	53,7826
	Variance	64,666	22,857	5,337	26,69	18,137	14,358
	Std. deviation	8,04151	4,78088	2,31022	5,16619	4,25878	3,78915
	Coefficient of variation (%)	14,4 %	8,9 %	4,5 %	10 %	7,9 %	7 %
2020 (3 rd research stage)	Mean	55,9641	53,3169	54,2105	53,3357	52,6741	53,9002
	Variance	67,458	21,215	19,098	10,337	6,539	9,68
	Std. deviation	8,2133	4,60599	4,37014	3,21519	2,55719	3,11133
	Coefficient of variation (%)	14,7 %	8,6 %	8 %	6 %	5 %	5,8 %

Source: the authors' calculations in SPSS according to statistical data

Moving on to the situation in Cluster – , it has to be mentioned that σ -divergence was confirmed in the sphere of economy of the 14 countries (see Table 6).

Table 6. Comparison of indicators through three stages of the research (Cluster –)

Year		Factor 1 -- Education	Factor 2 – Economy ↑	Factor 3 – Politics	Factor 4 – Society	Factor 5 – Environment	EEPSE Green Economy Index
2017- 2018 (1 st research stage)	Mean	43,6365	47,1222	46,6962	43,1927	48,8372	45,897
	Variance	6,118	3,758	19,868	18,578	13,105	4,481
	Std. deviation	2,47354	1,93865	4,4573	4,31023	3,62004	2,11678
	Coefficient of variation	5,7 %	4,1 %	9,5 %	10 %	7,4 %	4,6 %
2019 (2 nd research stage)	Mean	44,0932	46,048	48,7643	46,0323	46,0507	46,1977
	Variance	8,481	7,149	8,271	10,105	16,08	2,74
	Std. deviation	2,91215	2,67385	2,87591	3,17889	4,00996	1,65542
	Coefficient of variation	6,6 %	5,8 %	5,9 %	6,9 %	8,7 %	3,6 %
2020 (3 rd research stage)	Mean	44,0359	46,6831	45,7254	46,6643	47,3259	46,0869
	Variance	6,122	14,83	17,645	13,005	14,246	3,68
	Std. deviation	2,47419	3,85098	4,20058	3,60625	3,77439	1,9184
	Coefficient of variation	5,6 %	8,2 %	9,2 %	7,7 %	8 %	4,2 %

Source: the authors' calculations in SPSS according to statistical data

At this point the EEPSE Green Economy Index, based on Quintuple Helix model, provided an ability to define scores for the EU countries (plus the UK) and divide them into two clusters, as well as to trace divergence and convergence processes in terms of green economy through the three stages of research.

However, proposed model would gain additional value if it has potential in analysing or predicting political/societal/economic events related to green developments. The next chapter tests correlation of EEPSE Green Economy Index with the growth of plug-in electric car share in Europe in 2020.

6. Correlation with economy: case of plug-in electric car share growth

To test such correlation, it was decided to take the indicator of plug-in electric car market share in European countries in 2020. This year was remarkable since the average market share of new passenger plug-in electric cars in Europe more than tripled in this period of time to 11.4% (from less than 3.6% in 2019). Specialists name two reasons for that – unprecedented increase of plug-in vehicle sales, and decrease of conventional ICE car sales (Kane, 2021).

Data on such indicator was available for almost all EU27 + UK countries, except for Malta and Bulgaria (see Table 7):

Table 7. Plug-in electric car share of market and EEPSE GEI of the EU countries in 2020

Nº	Country name	EEPSE GEI, descending	Passenger plug-in electric car market share, 2020
1	Sweden	58,97	0,322
2	United Kingdom	58,14	0,107
3	Denmark	57,75	0,164
4	Germany	56,42	0,135
5	Finland	56,02	0,181
6	France	54,69	0,113
7	Netherlands	54,38	0,249
8	Austria	52,22	0,095
9	Luxembourg	52,14	0,114
10	Spain	51,37	0,048
11	Estonia	51,07	0,023
12	Italy	50,82	0,043
13	Belgium	50,55	0,107
14	Ireland	50,08	0,074
15	Slovenia	48,59	0,031
16	Portugal	48,47	0,135
17	Latvia	48,29	0,028
18	Lithuania	47,82	0,011
19	Greece	47,6	0,026
20	Czech Republic	47,13	0,026
21	Slovakia	45,95	0,019
22	Croatia	45,53	0,019
23	Malta	45,46	n/a
24	Romania	45,25	0,022
25	Hungary	44,94	0,047
26	Cyprus	43,5	0,004
27	Bulgaria	43,46	n/a
28	Poland	43,21	0,019

Source: the authors' calculations in SPSS according to statistical data

From the list above it can already be observed that electric cars are sold better in countries with high EEPSE Green Innovation Index. This hypothesis was tested with SPSS software (see Table 8):

Table 8. Correlation of ECV market share in European countries with EEPSE GEI and its components

		GEI_2020	Education	Economy	Politics	Society	Natural environment
ECV_market_share	Pearson Correlation	,790**	,565**	,716**	,796**	,672**	,412*
	Sig. (2-tailed)	,000	,003	,000	,000	,000	,036
	N	26	26	26	26	26	26

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Source: the authors' calculations in SPSS according to statistical data

As it can be seen from the chart above, the correlation between EEPSE Green Economy Index and plug-in electric car market share in the EU countries in 2020 was **0,790** with a very high statistical significance (p-value 0.000), which can be characterized as very strong (classification by Political Science Department at Quinnipiac University, as cited from Akoglu 2018).

It is interesting that the strongest correlation is found with the sphere of politics (**0,796**), not economy (**0,716**). True, electric car sales can hardly be described as purely economic factor, since electrification of transport is quite a complicated phenomenon. Electric vehicles are still very expensive as compared with conventional analogues. Thus, to boost their popularity some subsidies and support from the state are needed, be it tax discounts, cheap credits, road and parking privileges etc. Relevant infrastructure, including charging stations, should be created. Such tasks definitely lay within the sphere of political system.

The calculations made in this paper present quite interesting results. Previously the differences in electric cars market share in various European countries have been attributed by specialists and manufacturers mostly to the gap in GDP per capita. For example, European Automobile Manufacturers' Association (2019) explained, that in 2018 all countries with an electrically charged vehicle (ECV) market share of less than 1% had a GDP below €29,000, including both new EU member states in Central and Eastern Europe, as well as Spain, Italy and Greece. By contrast, the manufacturers continue explaining, an ECV market share of above 3.5% only occurs in countries with a GDP per capita of more than €42,000.

Taking this into account specialists take the Norwegian market as a benchmark. They point to the fact that just like its €73,200 GDP per capita, more than twice the EU average (€30,600) in 2018, Norway's 49.1% ECV share was then exceptional for Europe.

At the same time, the countries that come second and third, Sweden (8%) and the Netherlands (6.7%), have some of the highest GDPs in the EU but much lower ECV market shares.

Having investigated these data, market-oriented specialists come to the conclusion that not only there is a clear split between Central-Eastern and Western Europe, but also a pronounced North-South divide in terms of electric transport development (European Automobile Manufacturers' Association, 2019).

Of course, such distinctions in economic indicators between different European countries cannot be underestimated. Particularly, while western and northern Europeans (conditionally, CL+) have well-developed and diversified economies and can concentrate on green shift, others members of the EU still need to ensure necessary infrastructure, acceptable level of income etc., to catch up with the levels of development in Western Europe. So, two groups of countries have no option but to place emphasis on dealing with different tasks. Second, shifting to a greener economy costs money, and leaders might not be willing to dismiss a generation of workers (their electorate).

With all the truth about such observations concerning economic subsystem, such a market-centric approach seems to be quite one-sided and to some extent even primitive. Particularly, this view presupposes that proliferation of green technologies (in this case – electric cars) depends solely on economic prosperity.

Contrary to that, the EEPSE GEI model provides a better-balanced and multifactorial view on this phenomenon, which takes into account educational, economic, political, societal and environmental factors at the same time. The effectiveness of such an approach has been confirmed with the present chapter.

7. Discussion and conclusions

Different integral indicators are widely used as a tool to describe the development of green growth. Attempts to make the assessment of green economy have been made by several researches and institutions. For example, Kasztelan (Kasztelan, 2017) used 33 selected indicators of green economy on the basis of the OECD methodologies and database to that end. Diagnostic variables defining the level of green growth for particular countries were adjusted in an attempt to meet three criteria: substantive, formal, and statistical. Based on the results obtained, the author concludes that the green growth can provide solutions to economic and environmental problems and create new sources for growth (Kasztelan, 2017), however, its level in the OECD countries is still insufficient (Ibid). In his research Kasztelan (2018), having examined the green growth level in 28 EU countries, applied the same methods and determined 4 groups of countries: Sweden (0.6477) is the leader (in this part the results of Kasztelan (Kasztelan, 2018) study are close to the present dissertation), followed by the countries from the second group (and in this part the results differ): Croatia (0.5668), Latvia (0.5447), Austria (0.5399), Finland (0.5383), the Netherlands (0.5249), Slovenia (0.4925), Denmark (0.4874), Hungary (0.4808), Belgium (0.4777), Italy (0.4722), and the United Kingdom (0.4666). Slovakia (0.4647), Lithuania (0.4589), Czech Republic (0.4570), Luxembourg (0.4538), Germany (0.4521), Portugal (0.4469), Spain (0.4461), Poland (0.4406), France (0.4336), Ireland (0.41), Estonia (0.4038), and Romania (0.4015) belong to the third group. The fourth group countries Greece (0.3913), Malta (0.3865), Bulgaria (0.3755), and Cyprus (0.3614) are at the bottom.

As it can be seen, Kasztelan (Kasztelan, 2018) divided the EU countries into four groups, contrary to two clusters found within the present article. It has to be mentioned again, that the OECD methodology (OECD 2017) which the scholar took as a basis, ignores the area of education, while the present paper assigns an important role to it.

The results and methodology of the present article can also be compared to the eco-innovation scoreboard and the eco-innovations index, which is aimed at capturing the different aspects of eco-innovation by applying 16 indicators grouped into five dimensions: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency and socio-economic outcomes (Spain, Markianidou and Doranova, 2018). The leaders according to this index are: Luxembourg (138 points), Germany (137 points), Sweden (132 points), Finland (121 points), Austria (119), Denmark (115); the worst performers are Cyprus (45), Bulgaria (50), Poland (59), Malta (59), Romania (66). Generally these results coincide with the outcome of the research performed by the authors of the present article. At the same time the differences may be caused by different methodology, because eco-innovation scoreboard places less emphasis on environmental and political issues and more on economy.

Therefore, there are both similarities in the assessment of the green economy presented in this paper and other studies, and differences, which can be affected (as well as by the methodology) by the time period, countries under research and indicators chosen. Key challenges of the indicator approach also include data availability, right balance between different indicator selection criteria, systemic understanding of the relationships between indicators, and the variable usage contexts of the indicators.

Still, the EEPSE Green Economy Index, presented within this paper – a set of policy-relevant key indicators based on Quintuple Helix model – proved usable for dealing with key green growth issues, analysing different countries' "green" performance and various economic, political and societal events related to green development.

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Appendix 1. Indicators used for each of the subsystems of the Quintuple Helix:

Subsystem 1. Education:

S_1_1 Research institutions prominence 0–100 (best) (Global competitiveness report (further – GCR) 2019);

S_1_2 Scientific publications score (GCR, 2019);

S_1_3 Gross expenditure on R&D, % of GDP (Global Innovation Index, 2020);

S_1_4 Total number of documents in Scopus, Environmental science, cumulative, 1996 – 2019 (SJR — SCImago, 2021);

S_1_5 Citable documents, 1996 – 2019 (SJR — SCImago, 2021);

S_1_6 Citations (SJR — SCImago, 2021);

S_1_7 Self-citations (SJR — SCImago, 2021);

S_1_8 Citations per document (SJR — SCImago, 2021);

S_1_9 h-index, (SJR — SCImago, 2021);

S_1_10 Patents by origin/bn PPP\$ GDP (Global Innovation Index Report, 2020); **

Subsystem 2. Economic aspects:

S_2_1 GDP per unit of energy use (Global Innovation Index Report, 2020);

S_2_2 ISO 14001 environmental certificates per bn PPP\$ GDP (Global Innovation Index Report, 2020);

S_2_3 Resource efficiency index (The global sustainable competitiveness index, 2020)**;

S_2_4 Greenhouse gas emissions score (Climate Change Performance Index, 2021);

S_2_5 Share of renewable energy in gross final energy consumption by sector, % (Eurostat, 2019)

S_2_6 The global sustainable competitiveness index (2020)**;

S_2_7 Circular material use rate, % of material input for domestic use (Eurostat, 2019)**;

S_2_8 Efficiency sectors (Global Competitiveness Report, 2019);

S_2_9 Growth of innovative companies 1–7 (best) (Global Competitiveness Report, 2019);

S_2_10 Energy transition index (Energy transition index 2020 by World Economic Forum)**;

Subsystem 3. Political system:

S_3_1 Stringency of environmental regulations, index (Travel and Tourism Competitiveness Report, 2019);

S_3_2 Enforcement of environmental regulations, index (Travel and Tourism Competitiveness Report, 2019);

S_3_3 Environment-related treaties in force count (out of 29 possible) (Global Competitiveness Report, 2019);

S_3_4 Climate policy, index – covers both national and international climate policy performance (Climate change performance index, 2021)**;

S_3_5 Climate Change Performance Index (Climate change performance index, 2021);

S_3_6 Environmental performance, index (Global Innovation Index, 2020);

S_3_7 Environmental tax revenues, % of GDP (Eurostat, 2018);

S_3_8 Intellectual property protection 1–7 (best) (Global Competitiveness Report, 2019);

S_3_9 Population covered by the Covenant of Mayors for Climate & Energy signatories – percentage of total population (Eurostat, 2019, for the UK – 2018)**;

S_3_10 Renewable energy regulation 0–100 (best) (Global Competitiveness Report, 2019).

Subsystem 4. Civil society:

- S_4_1* Attitude of European citizens towards the environment – percentage of population who consider environmental issues to be important (Eurobarometer, 2017)**;
- S_4_2* World Press Freedom Index (Reporters without borders, 2020)*;
- S_4_3* Democracy index (The Economist Intelligence Unit, 2020);
- S_4_4* Civil liberties (The Economist Intelligence Unit, 2020)**;
- S_4_5* Social Capital Index (The global sustainable competitiveness index, 2020)**;
- S_4_6* Incidence of corruption 0–100 (best), (Global Competitiveness Report 2019);
- S_4_7* Internet users % of adult population, (Global Competitiveness Report, 2019).
- S_4_8* People at risk of poverty or social exclusion, Eurostat (2019), except for Ireland, Italy, the UK (2018)**;
- S_4_9* Share of busses and trains in total passenger transport, % of total inland passenger-km (Eurostat, 2018)**;
- S_4_10* Females employed with advanced degrees, % (Global Innovation Index, 2020)**.

Subsystem 5. Natural environment:

- S_5_1* Environmental performance index (Environmental performance index report, 2020)**;
- S_5_2* Air quality (Environmental performance index report, 2020)**;
- S_5_3* Water resources (Environmental performance index report, 2020)**;
- S_5_4* Biodiversity and habitat (Environmental performance index report, 2020)**;
- S_5_5* Forest cover change, % (The Travel & Tourism Competitiveness Report, 2019)*;
- S_5_6* Wastewater treatment, % of total (The Travel & Tourism Competitiveness Report, 2019);
- S_5_7* Total protected areas, % of territory (The Travel & Tourism Competitiveness Report, 2019);
- S_5_8* Natural capital (The Global Sustainable Competitiveness Index, 2020)**;
- S_5_9* Ecological sustainability, index (Global Innovation Index Report, 2020);
- S_5_10* Agriculture (Environmental performance index report, 2020)**.

* a negative indicator (the lower it is – the better the situation for sustainable development is);

** new indicator as compared with the first stage (O. Lavrinenko *et al.*, 2019) of the research.

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EFFICIENCY OF MANAGEMENT PROCESSES IN A PRIVATE HOSPITAL*

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Abstract. Efficiency, especially in the health care sector, has been a topical issue. The examination of the health care efficiency shows the extent to which the health care system inputs are efficiently used to provide health care services outputs. The purpose of the study is to analyse technical activities of twelve departments in a private hospital in the Slovak Republic. The data used were obtained from the statistical databases of 2019 – 2020. Activities were evaluated by using the Data Envelopment Analysis (DEA). DEA is a non-parametric method, which was designed to evaluate efficiency of production units. DEA can be used to analyse a large number of inputs and outputs with a multicriteria evaluation of variants. The BCC and CCR models, which aim to minimize inputs, were employed. In the empirical part of the study, DEA was utilised to identify technical efficiency of the hospital wards. In addition, the efficiency of transforming inputs into outputs using efficiency scores is compared and input optimizing options are given. In 2019 and 2020, the Department of Neonatology and Department of Surgery reported the best efficiency scores in both models. Following the analysis, reference rates for inefficient departments are given. In the next period, the hospital management is recommended to carry out continuous evaluations of the indicators by the model used for the needs of operational management.

Keywords: Efficiency; health service; DEA Model; Efficiency Score

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1. Introduction

Measuring and evaluating efficiency play an important role in managerial activities. The issue of evaluating efficiency and performance of production units in public and private sectors has always been a topical one in terms of the management practice needs. Efficiency assessment does not mean a mere a ranking of individual

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items, but a continuous analysis aimed to find the factors with the biggest impact on the efficient or inefficient behaviour of the units under observation. Such an analysis should lead to the elimination of sources of inefficiency and improve activities of the managed units. In general, unit efficiency is expressed as the ratio of desired outputs produced by the unit and inputs consumed by the unit in the production.

Recently, costs for hospitals have increased sharply in many countries. Although huge resources are allocated to healthcare services globally, there is a need to develop the available resources and ensure that they are used efficiently to increase productivity of hospitals. Population aging, high technology medical equipment, expectations of people and knowledge about their health status, and hospital inefficiencies in resource use are some of the reasons for rising health care costs (Yaisawarng, 2002). One way to reduce health care costs in hospitals is to evaluate their performance over time by measuring their productivity and efficiency. Efficient use of resources is one of the essential activities that hospital managements are engaged in. It is possible to evaluate units with multiple inputs and outputs without providing the information on prices through Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) (Kuntz et al., 2007). This way, efficiency of hospitals and their wards can be assessed. Concerning inpatient wards, two traditional inputs of labour and capital can be distinguished. In the case of hospitals, labour refers to medical staff while capital refers to costs, revenues, or average number of days that patients spend in hospitals. Since hospitals produce different outputs, and diagnoses and treatments vary between patients, the present study is limited to some extent.

The purpose of the study was to analyse and compare efficiency of hospital departments in order to help the managerial staff take right decisions, ensure optimal utilization of available resources, and optimize input costs using DEA.

2. Theoretical background

Data Envelopment Analysis (DEA) is a set of mathematical programming based models which evaluate the relative efficiencies of Decision-Making Units (DMUs) with multiple inputs and outputs (see Data Envelopment Analysis Online Software). Process efficiency has been discussed in scientific literature for a long time and its roots can be traced back to the existence of activity or work. The central issue in the debate on efficiency is how to achieve better results in the activities that we are performing with lower costs and less equipment, how to use the existing workforce to the fullest, and how to avoid wasting material and human capital.

Generally, there are operational and overall efficiency distinguished. Overall efficiency can be decomposed into technical efficiency, allocative efficiency, scale efficiency and assortment efficiency. Unlike allocative efficiency, technical efficiency does not require price data. Technical efficiency is defined as the ability of an entity to obtain the maximum amount of outputs at a given set of inputs, or the ability to reduce the amount of inputs at a given set of outputs (Grmanová, 2010). In the following text, the notion of efficiency will refer to technical efficiency.

Charnes et al. (1978) were first to introduce Data Envelopment Analysis as an optimization method of mathematical programming developed by Farrell (1957). Historically, it was Farrell who laid the foundations of the DEA method (1957). He measured unit efficiency using one input and one output. His model was extended by Charnes, Cooperr and Rhodes (1978) who are considered to be the authors of a complex multivariable model. Their model is referred to as the CCR model employing the assumption of constant returns to scale. Later, Banker, Charnes and Cooper (1984) extended this model with the variable returns to scale (VRS) assumption, which is known as BCC model. BCC model modifies the efficient frontier, and compared to CCR model, it is capable of identifying a bigger number of efficient production DMUs (Decision Making Units). Production DMUs can represent different levels of health care, such as national or regional healthcare services provided in hospitals or wards. When applying DEA, input-oriented or output-oriented models can be distinguished. Input-oriented models for shifting to the efficiency frontier do not require a change on the output side, but they examine

what proportional reductions in inputs are required to achieve efficiency. On the other hand, output-oriented models answer the question of what maximum outputs can be achieved when employing the given number of inputs. Both models were used in the sector of healthcare.

The first studies on measuring hospital efficiency were conducted by Nunamaker (1983) and Scherman (1984). Nunamaker published a study on measuring the efficiency of the routine nursing services. Scherman, on the other hand, used DEA for calculating the overall hospital efficiency. In 2002, Andes et al. published a study using data on 115 health care units. He develops a model to help determine best practices of efficient physician offices while allowing for choices between inputs. They pointed to the fact that increasing the efficiency of these units is only possible if resources are better managed. Key works on efficiency evaluation of production units providing health care services were written by Banker et al. (1984), Linn (1998), Giuffrida and Gravelle (2001), Worthington (2004), Hollingsworth (2008). DEA has been increasingly used in the health care sector recently. Recent papers with major findings were published by Arya and Yadav (2018), Rubio and Diaz (2018), Kohl et al. (2019).

Input-oriented models are used by Czapionka et al. (2014). Hernandez and San Sebastian (2014) maintain that in the case of health care, inputs are uniform, their numbers are low, and health outcomes need to be increased. They also note that the inputs are often undersized and their reduction is not ethical. Cheng et al. (2016) justify the choice of an output-oriented model for the limited control of hospital managers due to the input limited legal standards. Oikonomou et al. (2016) also work with the output-oriented model because of the ever increasing demand for health care services. Even though they argue that the input reduction is questionable, it can be done when efficiency is evaluated objectively.

The next step in DEA is the choice of input and output variables. Input variables are the inputs that generate measurable outputs in the healthcare delivery process. They can be controlled and are directly linked to health services provided in hospitals. One of the commonly used input variables to compare hospitals is the number of hospital beds (Maniadakis and Thanassoulis, 2000; Barnum et al., 2011, Lacko et al., 2014; Stefko et al., 2018). Another input variable is the number of doctors and nurses. Sometimes, the total number of employees is taken as an input variable. The total number of staff, however, does not provide much information on the efficiency of health care services. Yet, the number of staff has an impact on rising wage costs. Cheng et al. (2016) divided the total number of employees into several categories and treated them as separate inputs. This input indicator has often been under discussion due to the recommendations on the input indicator reduction. Currently, the number of doctors and nurses is generally considered to be low, so these recommendations are considered to be unethical. Outputs are measurable indicators that reflect the level, i.e. the efficiency of input transformation to outputs in the health care services provided. The ideal healthcare output indicator should represent the level of health gained by individual patients. However, this is difficult to measure. Therefore, only measurable and reportable outputs can be used. The indicators of bed occupancy and hospital resources utilisation are often used in the literature (Belciug and Gorunescu, 2015; Dy et al., 2015). The authors note that low percentage of the total hospital beds utilised signal inefficient management of financial resources. Another frequently used output is the average treatment time. The average treatment time refers to the length of the patient's stay in hospitals (Varabyova and Schreyögg, 2013). Many works deal with external factors and their impact on the healthcare services, such as demographic, social, socio-economic and environmental factors (Varabyova and Schreyögg, 2013; Mura and Orliková, 2016; Kočíšová and Gavurová, 2019). Return on invested capital and various composite financial indicators (de Souza et al., 2014) are further examples of output indicators. The financial indicator of revenue, composed of several sub-indicators is also used as an output indicator in the present study.

Slovakia has been included in several cross-country studies comparing the performance of health care systems. In a study conducted by the OECD in the field of health, the Slovak Republic was found to perform inefficiently with a score of 0.90 (input-oriented DEA model) and 0.97 (output-oriented DEA model). The causes of this inefficiency were, however, not clearly identified. Cost-effectiveness of healthcare in Slovakia has remained low,

hospitals are seeing considerable debt and there is a low occupancy of beds (Kališ, 2018). Stefko et al. (2018) measured the regional (NUTS 3) efficiency of healthcare facilities in Slovakia using the data envelopment analysis. The indicators they analysed were taken from official databases. Input variables were the number of beds, number of medical staff, number of CT (Computed Tomography devices) and number of medical equipment together. Output variables were the Bed occupancy rate and Average nursing time in days.

In the studies conducted in Slovakia, DEA was only used to compare efficiency of several hospitals. Thus, hospitals served as the production units. This is because the data needed to conduct DEA are not officially available. It is, however, more important for managerial decision-making to compare the efficiency of individual wards in one hospital.

3. Research objective and methodology

There are several approaches to evaluate the efficiency of production units, which differ in several attributes. Parametric and non-parametric methods can be distinguished. Parametric methods include the Stochastic Frontier Approach (SFA), Thick Frontier Approach (TFA) and Distribution Free Approach (DFA). DEA is a non-parametric method based on linear programming that estimates a marginal production function. The function is the maximum possible product based on a certain number of inputs. The function shapes are convex with no points below them (3). SFA is a parametric method based on econometric models and microeconomic theory. SFA uses a combination of data (panel data) to estimate the production (cost) function with regard to a hypothesis or statistical test.

DEA models can be radial or additive. Radial models encompass Envelopment Forms, Multiplier Forms, Scale Efficiency Measurement, and Models with Value Judgments. Moreover, there are also alternative models which can be used to develop super-efficiency models. New approaches to efficiency modelling include Range Directional Measurement, Variant of Radial Measure (Beta) and Cost Efficiency Models. Another category of DEA models are network models that evaluate efficiency of production units with parallel or serial structure (Jablonský, 2015). In the study, basic input-oriented radial CCR and BCC models, i.e. with constant (CRS) and variable (VRS) returns to scale, were utilised. DEA can be used to classify each DMU as efficient or inefficient, to incorporate inputs and outputs with different units of measures and treat them as comparable, and to identify optimal production and consumption values (Cesconetto et al., 2008).

General DEA models analyse technical efficiency of a set of production units (DMUs) that are characterised by m inputs and r outputs over the same period of time. The efficiency score θ_q of each DMU_q is defined as weighted sum of outputs divided by the weighted sum of inputs by formulas (Jablonský, 2015):

$$\theta_q = \frac{\sum_{k=1}^r w_k y_{kq}}{\sum_{i=1}^m v_i x_{iq}},$$

where w_k ($w_k > 0, k = 1, \dots, r$) is weight of the k -th output, v_i ($v_i > 0, i = 1, \dots, m$) is weight of the i -th input, x_{iq} and y_{kq} are non-negative values for the DMU_q of the i -th input and k -th output respectively. The variable θ_q can be interpreted as the required input reduction rate to reach the efficient frontier and its value is less than or equal to one (Jablonský and Dlouhý, 2004). General DEA models maximize the effective score relative to other production units. This problem is solved for each DMU, which means that n optimization problems (LP optimization problems) are solved. The DMUs with $\theta_q = 1$ are lying on the efficient frontier estimated by the model and denoted as efficient units. Otherwise, the units are inefficient and the efficiency score can be explained as a rate for reduction of inputs in order to reach the maximum efficiency in the future. When evaluating DMU_q , DEA model tries to find a virtual unit that is characterized by the inputs $X\lambda$ and outputs $Y\lambda$, which are a linear

combination of the inputs and outputs in other analysed units and which are better than the inputs and outputs DMU_q . $\lambda=(\lambda_1, \dots, \lambda_n)$ is a weight vector assigned to each unit and X (Y) are the input (output) matrices.

This cross-sectional study is both descriptive and analytical. The data was obtained from a private hospital in Slovakia that provides health care services which are covered by the patients' health insurance. The hospital is one of the major healthcare providers in the region. The hospital provides medical and preventive care to almost 110 thousand people of the population in the catchment area, and 600 thousand patients received cancer treatment. In 2020, the hospital had 576 employees. A total of 11,050 patients were hospitalized using 309 beds and 86,527 patients were given treatment as outpatients

The production units analysed were 12 inpatient wards in 2019 and 2020. The following indicators served as input data: the number of doctors, number of nurses and total costs. Items included in the costs were personnel costs, medicines, special medical supplies, maintenance, rent, indirect costs and other costs. Revenue was an output indicator used to evaluate the ward efficiency. Revenues included inpatient care reimbursement, other health insurance reimbursement, indirect and other earnings. It should be noted that the types of hospital admissions were different due to the pandemic in 2020.

Input-oriented CCR and BCC models were used due to a single output variable. The research was carried out using various indicators in twelve hospital wards (DMU1) - Departments of Internal Medicine and Geriatrics, Neurology, Paediatrics, Gynecology and Obstetrics, Surgery, Clinical and Radiation Oncology, Anaesthesiology and Intensive Care, Neonatology, Long-term Sick, and Intensive Care Units: internal, neurology and surgery.

The official numbers of doctors and nurses in 2019 and 2020 are given in the table 1 below.

Table 1. Selected analysed inputs

	Department	2019		2020	
		No. of doctors	No. of nurses	No. of doctors	No. of nurses
1	Department of Internal Medicine and Geriatrics	13	23	12	23
2	Department of Neurology	8	15	6	14
3	Department of Paediatrics	5	11	5	11
4	Department of Gynecology and Obstetrics	11	16	11	16
5	Department of Surgery	12	20	14	20
6	Department of Clinical and Radiation Oncology	4	11	5	11
7	Department of Anaesthesiology and Intensive Care	8	19	9	18
8	Department of Neonatology	1	11	1	11
9	Intensive care unit – internal	1	10	1	11
10	Intensive care unit – neurology	1	5	2	4
11	Intensive care unit – surgery	2	10	2	9
12	Department of the long-term sick	2	8	2	8

Source: Author's own table (data provided by the hospital)

Costs were the next input variable. Costs are, however, not given in the study due to confidentiality reasons. DEA model was created by the Data Envelopment Analysis Online Software System (DEAOS).

4. Results and discussion

Based on the model formulation, calculations were performed using an optimization system for solving DEA models. The study analyses the efficiency of hospital wards by using two different input-oriented DEA models. Two basic radial models, such as Constant return to Scales and Variable Return to scales, were employed to carry out the research. The resulting efficiency scores for 2019 and 2020 are listed in Table 2.

Table 2. Efficiency scores of the hospital wards

	DMU	Model CCR-I (CRS)			Model BCC-I (VRS)		
		Score efficiency (%)		diff.	Score efficiency (%)		diff.
		2019	2020		2019	2020	
1	Department of Internal Medicine and Geriatrics	75,0	82,2	7,2	75,0	89,2	14,2
2	Department of Neurology	72,8	93,8	21,0	80,3	94,0	13,7
3	Department of Pediatrics	51,8	37,5	-14,3	66,5	60,0	-6,5
4	Department of Gynecology and Obstetrics	74,3	86,1	11,8	80,2	89,5	9,3
5	Department of Surgery	100	100	0,0	100	100	0,0
6	Department of Clinical and Radiation Oncology	59,0	56	-3,0	62,7	64,5	1,8
7	Department of Anesthesiology and Intensive Care	45,6	54,7	9,1	53,9	61,1	7,2
8	Department of Neonatology	100	100	0,0	100	100	0,0
9	Intensive care unit - internal	57,7	53,9	-3,8	100	100	0,0
10	Intensive care unit - neurology	94,4	82,7	-11,7	100	100	0,0
11	Intensive care unit - surgery	46,9	48,5	1,6	65,1	83,9	18,8
12	Department of the long - term sick	98,3	100	1,7	100	100	0,0
	Average	73,0	74,6	1,6	82,0	86,9	4,9

Source: author's own calculations

Efficiency scores in 2019 and 2020 are given in the graph below. On the left-hand side, the efficient scores in CCR input models are listed. On the right-hand side, the efficient scores in BCC input model are shown in Figure 1.

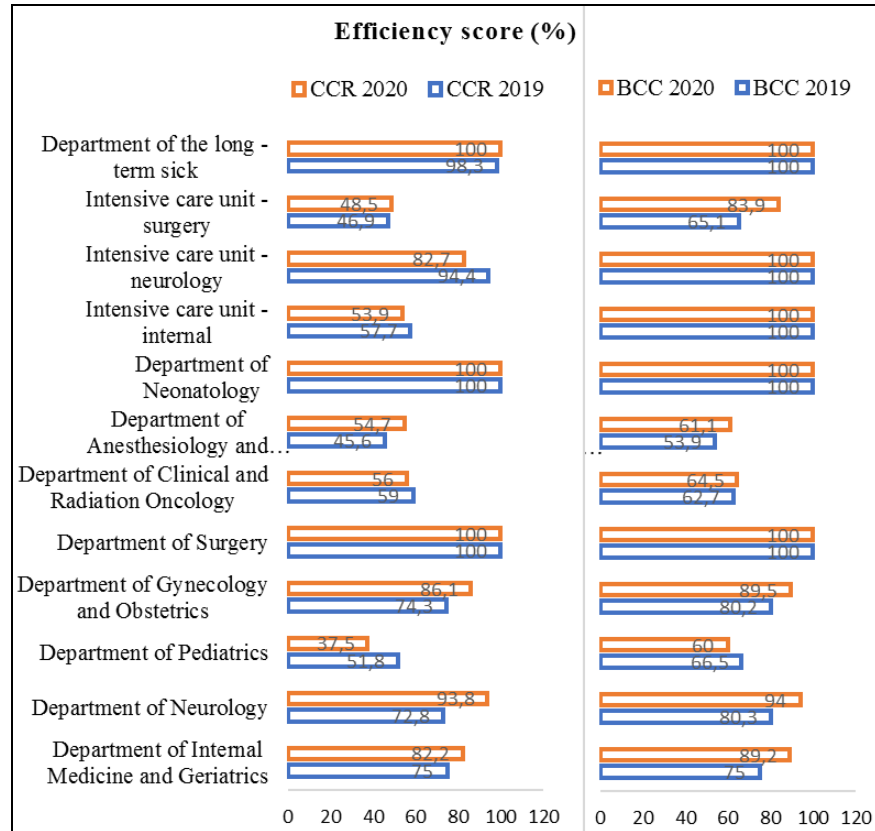


Figure 1. Comparison of efficient scores

Source: author's own research

It can be seen from Table 2 and Figure 1 that the Department of Neonatology and Department of Surgery reported the best efficiency scores in 2019 in both models. According to the BCC model, efficiency of 100% was also reached by the Department of the long-term sick and Intensive care unit – neurology and internal. According to both models, three departments, namely the Department of Surgery, Department of Neonatology, and Department of the long-term sick had reached the efficiency of 100% in 2020. The efficiency of the Department of the long-term sick rose by 1.7% in CCR model. The highest efficiency increase was found to be in the Department of Neurology (CCR model: 21%; BCC model: 13.7%). According to the BCC model, the highest efficiency increase was identified in the Intensive care unit – surgery whereas the increase of 1.6% was identified in CCR model. The highest average efficiency improvement of 17.6% was recorded in the Department of Neurology. The number of doctors and nurses decreased, costs between 2019 and 2020 increased by €104,854, yet the revenue increased by €406,619. This is, however, a simplistic quantitative view, and as aforementioned, it is not always ethical to discuss hospital staff cutbacks from the perspective of health care.

Ten inefficient wards were identified by the CCR model in 2019 and nine wards in 2020. BCC model identified seven inefficient departments in 2019 and 2020 respectively. According to both models, the most inefficient was found to be the Department of Paediatrics. The drop in the efficiency score between 2019 and 2020 was 14.3%; the BCC model indicated a decline of 6.5%. The headcount remained unchanged in both analysed years; input costs increased by €62,184; revenue decreased by €96,848. It is to be attributed to the minimum legally required staffing of the department, despite a declining number of paediatric hospital admissions in the region.

The average efficiency increased between 2019 and 2020 in both models. In the resulting DEAOs reports, input reductions were suggested because input-oriented models were used. The actual situation in 2019 and the suggested input indicator reductions according to BCC model are given below. In addition, the data on the actual situation in 2020 and efficient score changes listed in the table 3 below.

Table 3. Proposed reduction of inputs

DMU	BCC 2019					Situation in 2020			Change in the efficient score
	Doctors		Nurse		Δ costs	doctors	Nurse	Δ costs	
	from	To	from	To					
1	13	10	23	18	-716,006	12	23	420,579	14.2
2	8	4	15	13	-197,290	6	14	104,854	13.7
3	5	2	11	8	-238,632	5	11	62,183	-6.5
4	11	5	16	13	-225,452	11	16	62,344	9.3
5	12	12	20	20	0	14	20	91,102	0
6	4	3	11	7	-317,489	5	11	128,746	1.8
7	8	3	19	11	-499,994	9	18	160,341	7.2
8	1	1	11	11	0	1	11	55,907	0
9	1	1	10	10	-164,870	1	11	47,148	0
10	1	1	5	5	0	2	4	137,662	0
11	2	1	10	5	-175,276	2	9	55,488	18.8
12	2	2	8	8	0	2	8	62,273	0

Source: author's own calculations

The Table 3 shows that the total costs increased for all the wards in 2020. This is linked to the increased costs for personal protective equipment in the context of the Covid-19 pandemic. The costs were compensated by the Ministry of Health. Thus, the reduction in the costs input indicator was not necessary.

Conclusions

DEA is one of the essential methods used in research and economics. It can be employed to evaluate the efficiency of individual producers within a given group. Compared to other methods, DEA is a relatively new non-parametric method. It is one of the methods used to assess the efficiency, performance and productivity of homogeneous production units. Homogeneity of production unit means that the units are engaged in the production of identical or equivalent outputs. In the process of production, they consume identical or equivalent inputs. DEA allows an individual evaluation of the production unit efficiency relative to the whole set of units. In addition to identifying efficient and inefficient units, DEA identifies sources of efficiency as well as reductions or extensions needed to achieve efficiency.

DEA is used to measure and compare efficiency of production units in different areas. Efficiency is measured by comparing inputs and outputs. In the case of health care institutions, DEA evaluates efficiency of input transformation into outputs in health care services. DEA is one of the operational research methods used to

optimize inputs or outputs. Poor quality of health care services often goes hand in hand with inefficient financial management. To put it differently, disproportionate resource increases lead to wasting resources and lower quality of health care services.

In the study, wards in a medium-sized private hospital in Slovakia were assessed. In this case, economic performance is closely watched and evaluated by the hospital shareholder. Quality health care services are, without doubt, the primary mission of the hospital. 12 inpatient wards in 2019 and 2020 were assessed using DEA models. Input indicators were labour costs, number of doctors, and number of nurses. Capital inputs were represented by total costs per department. Costs were made up of several components. In the DEA models used, revenues, i.e. capital output, were evaluated as an output indicator. Two basic DEA models, constant returns to scale and variable returns to scale, were utilised. The purpose of the research was to identify inefficient wards and suggest cost reductions since the models were input-oriented. However, much of the resource reduction is not possible due to legal norms on staffing.

Since this was a pilot study, it was not possible to compare its findings with the outcomes of similar DEA analyses in other hospitals. Therefore, this can be considered to be a new model for assessing the health care efficiency in the wards of other hospitals. To improve the proposed DEA model, more experts, especially hospital managers, should be involved in the discussion as the study is mainly focused on the assessment of financial efficiency.

The hospital management consider the methods used in the study to be an option for continual efficiency assessment of the wards. It is, however, necessary to work with other inputs, such as occupancy rates, adjusting the number of beds to staffing norms in individual wards, diagnose weights (Case Mix Index), etc. Outputs should include, for example, the average length of hospital stay and other measurable factors.

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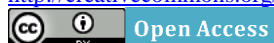
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**FACTORS INFLUENCING THE INTENTION BEHIND MOBILE WALLET ADOPTION:
PERCEPTIONS OF UNIVERSITY STUDENTS**

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Abstract. The desire of students towards adopting the mobile wallet technology can be affected by various factors. The exploration of these factors and the discussion of the future uses of this technology among university students are the targets of this study. The conceptual model employs the unified theory of acceptance and use of technology besides the self-efficacy construct in this research. Primary data was collected online by surveying 389 university students. The model was subsequently validated by employing the structural equation model. From the results obtained, the intention of students in the utilization of mobile wallet technology are largely affected by trust, self-efficacy, facilitating conditions (FC), hedonic motivation (HM), effort expectation (EE), performance expectation (PE), social influence (SI) and price value (PV). This research's findings highlight the most significant factors in determining the intention behind mobile wallet technology utilization. The developed model is an appropriate research model to explore mobile wallet technology among students. This model focuses on students from private universities, which may limit its universality. The results of this analysis can benefit multiple institutions that use mobile wallet technology as a part of their services, such as banks, financial organizations and mobile payment system suppliers. Factors influencing customers' intention behind adopting the latest technology-related services in developing countries are not sufficiently reported in the literature. This research paper can be considered the first to examine the intention behind the utilization of mobile wallets in developing countries.

Keywords: Mobile wallet; unified theory of acceptance and use of technology; self-efficacy; customer intention; structural equation modeling

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JEL Classifications: D14, D91

1. Introduction

The technology advancement for mobile networking has accelerated dramatically in developed countries during the last decade. A significant number of companies have invested in telecommunications providers to improve mobility for the masses by offering connections to superior types of communications networks. Millions of people's lives have been affected by mobile phones, which today play a key role in a country's overall social and economic growth. By developing mobile-technology-based market architectures, this phase has provided a multitude of possibilities for the companies involved (Mittal & Kumar, 2018). According to the report "Digital around the world in 2018" by We Are Social, 89% of the population of Jordan were using the Internet and 54% were using mobile phones. Currently, there are four Internet and mobile phone service providers operating in Jordan, a fact evident by the increase in mobile phone usage in the country. Moreover, 15 banks in Jordan have commenced offering mobile banking services. However, the use of cash as the main form of payment still dominates the daily transactions in the country. As a result, the use of mobile wallets has not been widely accepted. This was evident in 2016 when four Mobile Payment Service Providers (MPSPs) started offering mobile payment services, but only 72,000 users subscribed to them. The literature on mobile wallet usage in Jordan is lacking and not many models studying the intention to use such technology exist at the moment. This research paper analyzed the factors that can affect mobile wallets usage by Jordanian university students by utilizing the unified theory of acceptance and use of technology (UTAUT2). The authors conducted a survey in various Jordanian private universities. For structural equation simulation, evaluation of the collected data was undertaken via the partial least squares method. This study used some theoretical and functional concepts for the creation, review and testing of the different research-related hypotheses. Future studies should investigate other relevant factors which can contribute to the behavioral intentions towards mobile wallets as this area of research remains relatively underexplored.

2. Conceptual Background

In general, mobile payment can be defined as using smart devices to pay for different products and services by making use of advanced communication technologies, which include mobile wallets (Zhong, 2015). A mobile wallet is an electronic mobile phone account that acts like a regular wallet in that it stores money (online) and can be used to make financial transactions and purchases. It also allows you to run and access your account history and your payment records. Mobile wallets can have multiple channels that allows a person to make a transaction, for example, consumer-to-online, consumer-to-machine, consumer-to-consumer, and consumer-to-business. This technology can serve as a multifunctional application by supporting numerous service components such as subscriptions, loyalty cards, online shopping accounts and booking records. Mobile wallets also hold sensitive and confidential information in encrypted or password-protected files, such as the PIN codes of a person's credit cards. 83% of Jordanians used mobile phones in 2017. If these people are converted to mobile wallet users, they will be able to pay for their various purchases and services via their mobile phones. As a result, the amount of complex authentication processes and transaction steps required during money transactions will decrease. MEPS (mobile easy payment service) and NFC already exist in the market while mobile wallets are the newest and the easiest technology available for users.

3. Previous Research on Mobile Payment Systems

The potential for mobile wallet use is immense, and it is gaining traction as a payment option throughout the world. As a result, the current study seeks to create a conceptual model to identify the most important elements that influence a user's intention, perceived happiness, and recommendation to use a mobile wallet. According to (Singh et al., 2020), mobile wallets assist practitioners by identifying key variables that influence a user's decision, which in turn influences the user's perceived happiness and endorsement of mobile wallet services. The

breadth of the mobile wallet, whose value has been boosted by the constantly increasing smartphone technology, is a hot issue of debate right now. With the addition of new players to the scene, the reach of mobile wallets grows every day, making them indispensable for satisfying daily demands (George & Sunny, 2021). To develop and retain trust, mobile wallet app providers emphasize reputation in their communication approach. In addition to the moderating role of the provider's profession, verifying the provider's reputation as a factor enhancing the trust and perceived security of the mobile wallet is a factor enhancing the trust and perceived security of the mobile wallet (Garrouch, 2021). Smartphones have become means for digital users to perform money transactions or payments utilizing applications loaded on the smartphone as a result of technical advancements (Raimee et al., 2021). In terms of any technology, the findings by (Xavier & Zakkariya, 2021) show that both positive and negative valence strongly influenced the desire to use mobile wallet indefinitely. As a result, mobile wallets are new and gaining traction as a payment option throughout the world. The groundbreaking development in mobile devices and their uses in the recent years has supported the emergence and spread of new applications that provide mobile payment service such as mobile wallets. The research done on these technologies is still in the budding stages and only very few studies have explored the use of mobile wallets in Jordan. Table 1 summarizes some studies investigating various factors linked to mobile wallets usage intention using multiple hypotheses. Creating a real value for consumers is the main purpose of mobile wallets according to these studies. The unified theory of acceptance and use of technology (UTAUT), diffusion of innovation (DOI), behavioral control theory and the technology acceptance model (TAM) were the primary models used. Researchers had also claimed that the wide acceptance of mobile wallets by individuals is accelerating. However, most of this research focused on this technology's adoption rather than the usage intention. Moreover, most of these studies had been done outside the Arab region and only one of them had explored mobile wallets usage intention in Jordan.

Table 1. A summary of theories used in mobile payment studies

Author(s)	Theories	Content/viewpoint
(Amoroso & Magnier-Watanabe, 2012a)	UTAUT	Developing adoption model for mobile wallets in Japan. Cultural factors play an important role.
(Alalwan et al., 2017)	UTAUT2	Extending UTAUT2 with trust for mobile banking in Jordan.
(Kavandi, 2020)	UTAUT	Understanding the behavioral intentions to use mobile wallet services by examining gender roles, age and adoption experience.
(Gbongli et al., 2019)	Extended TAM	Understanding the factors influencing the use of mobile wallets by users.
(Seetharaman, Nanda Kumar, et al., 2017)	Extended TAM	Understanding the key factors that affect mobile wallet acceptance in Singapore.
(S et al., 2018)	TAM, diffusion of innovation (DOI)	Understanding the intention of using mobile wallets in India.
(Pathirana & Azam, 2017)	Extended TAM	Investigating the elements affecting the consumers' intention while using Malaysian services for mobile payment during the millennial era.
(Limantara et al., 2018)	Extended TAM	Examining the elements affecting mobile payment utilization intention for Indonesians.

Source: Authors

3.1 Unified Theory of Acceptance and Use of Technology Model

For explaining the acceptance of novel technologies by consumers, the comprehensive integrated model known as UTAUT2 is specifically developed. The UTAUT2 was selected for its suitability in designing this research's conceptual model as it can encompass almost all factors that affect Jordanian consumers' intention behind mobile wallet acceptance. These factors, which were suggested as direct determinants of the consumers' intent behind the adoption of mobile banking, are: price value (PV), performance expectancy (PE), social influence (SI), hedonic motivation (HM) and effort expectancy (EE). Apart from those factors, two more factors were found to be crucial

in foreseeing the acceptance of using banking services on the mobile phone, which are behavioral intention (BI) and facilitating conditions (FC). Customer behavior and habits were not taken into consideration in this study. Some authors have used other models for example, Al-Maatouk et al. (2020) and Alamri et al. (2020) used the Technology Acceptance Model (TAM) with the Task Technology Fit (TTF) to test the effect of learning applications acceptance. As well as, other studies used other models, for example (Ullah et al., 2021; Sayaf et al., 2021; Al-Rahmi et al., 2020; Alenazy et al., 2019) used the (TAM) with digital communication and Blockchain Technology Adoption effect of learning applications acceptance. This is due to the fact that a behavior study requires the subjects to have good experience in using such technologies. Most of the students surveyed in this study are considered prospective customer and have not yet used this technology. Moreover, mobile wallets have only recently been launched by Jordanian banks, which makes this technology too new to provide us with enough data to establish any relationship between its use and customers' habits. Thus, the role of customer habits is excluded from this study (Figure 1). The hypotheses of this research have been formulated under the different factors of the UTAUT2 theory based on previous research. These hypotheses are discussed in more details below.

3.2 Performance Expectancy (PE)

PE represents how much someone believes that employing technology can aid in attaining certain benefits. Typically, users tend to be more likely to welcome emerging innovations into their daily lives if they can find them useful. Mobile wallets are considered as appropriate and useful tools for shopping transactions in daily life. Performance expectancy is strongly related to the usage of such technologies (Bertagnolli, 2011), (N. Singh & Sinha, 2020). Besides that, the intention behind new technology utilization is also strongly related to performance expectancy based on the previous works (Singh & Sinha, 2020; Bertagnolli, 2011; Koenig-Lewis et al., 2015). Whether or not a consumer uses mobile wallets is substantially dependent on the expected results. Therefore, the following hypothesis is obtained:

H1: The intent behind the adoption of mobile wallets of Jordanian students will be positively influenced by performance expectancy.

3.3 Effort Expectancy (EE)

Effort expectancy represents a person's perspective on the effortlessness of utilizing technology. The intention behind technology utilization is significantly influenced by the effortlessness in using the technology (Venkatesh et al., 2016). Its impact on a person's intent to utilize mobile wallets had been validated by some authors across the related area of interest. Previous research had shown that the intent of someone to utilize such technology is significantly affected when it comes to effort expectancy (Tun, 2020). In the current research, the required effort to utilize mobile wallets is explored in order to explain how the decision to utilize mobile wallets is affected by it. Therefore, the following hypothesis is obtained:

H2: The intention of Jordanian students to adopt mobile wallet will be positively influenced by effort expectancy.

3.4 Social Influence (SI)

How much someone's decision in the adoption of a novel technology is affected by the people's feelings and opinions is referred to as social influence. In previous research, social impact had been proven where the intention behind technology usage is directly correlated with social influence. There are four prescriptive factors related to usage intention behavior in the UTAUT model, where one of them is social influence (Amoroso & Magnier-Watanabe, 2012a). Previous research had shown that the intention behind the utilization of such technology is significantly affected by social influence (Wirtz & Göttel, 2016). Therefore, the following hypothesis is obtained:

H3: The intention of Jordanian students to adopt mobile wallet will be positively affected by social influence.

3.5 Facilitating Conditions (FC)

Facilitating conditions depend on a particular area's operational infrastructure. They define to what extent is the belief of a person regarding the existence of a certain organizational and technical infrastructure assisting in the system utilization. Facilitating conditions is a significant factor for predicting mobile wallet usage intention. Mobile wallet usage intention is positively influenced by facilitating conditions (Larasati et al., 2018). Many researchers consider facilitating conditions as a key element to determine similar technologies usage (Amoroso & Magnier-Watanabe, 2012b). Accordingly, the following hypothesis is obtained:

H4: The intention of Jordanian students to adopt mobile wallet will be positively affected by facilitating conditions.

3.6 Hedonic Motivation (HM)

The customer's technology usage intention can be directly linked to hedonic motivation. Hedonic motivation refers to the gratification and joy that technology usage brings (Gogan et al., 2018). Comparing the inclination to adopt mobile services between the Gen X and the millennials, it can be observed that the disposition of an individual for mobile technology usage depends on whether the person belongs to the younger generation or not. It can be noted that behavioral intention is substantially influenced by hedonic motivation (Islam, 2015). This is due to the fact that the younger generation's intrinsic motivations, like joy and curiosity, have a stronger effect on their behaviors. Hence, the following hypothesis is obtained:

H5: The intention of the Jordanian students to adopt mobile wallets will be positively influenced by hedonic motivation.

3.7 Price Value (PV)

The exchange of cost to a perceived benefit is the price value. When the gain is greater than the cost, customers will adopt a particular technology. It was established that positive price value for mobile payment services lead to higher adoption of these services by customers. (N. Singh & Sinha, 2020) concluded that when the technological gains outweigh the cost, the impact of the price has a beneficial influence on the purpose of utilizing technology. A research on mobile networks in China showed that perceived price values substantially affected the desire of users to use services (Deng et al., 2013)(Chawla & Joshi, 2020). Thus, we hypothesize:

H6: The intention of Jordanian students to adopt mobile wallets will be positively affected by the price value.

3.8 Self-Efficacy (SE)

According to Bandura (2006), self-efficacy refers to people's capabilities to organize and perform their daily tasks independently. Self-efficacy is believed to be a key aspect in the pre-intentional stage of action before deciding to use a particular technology. With regard to health information technology, the usage intention is directly and positively affected by self-efficacy (Kavandi, 2020). Self-efficacy has been taken into account in studies on mobile data services, online shopping and money transfer (Gbongli et al., 2019); therefore, self-efficacy positively affects customers willingness to adopt and use a technology like mobile wallets. To date, not many studies take into consideration the intention behind the adoption of mobile wallets by university students in developing countries. As a result, the subsequent hypothesis is obtained:

H7: Jordanian students' behavioral intention to utilize mobile wallets will be positively influenced by self-efficacy.

3.9 Trust (TR)

Trust is another important factor that was found in the literature to have an effect on the adoption of mobile wallets. A customer needs to trust mobile banking in order to choose to utilize such service. Trust is considered a critical factor while evaluating the mobile banking usage intention of the customer. Existing research found that trust has an impact on the utilization of mobile financial services (Amoroso & Magnier-Watanabe, 2012b; Nidhi Singh et al., 2020)(Chawla & Joshi, 2020), and therefore affects the customers' intention to utilize mobile wallets. Based on that, we hypothesize that:

H8: Jordanian students' behavioral intention to adopt mobile wallets will be positively influenced by trust.

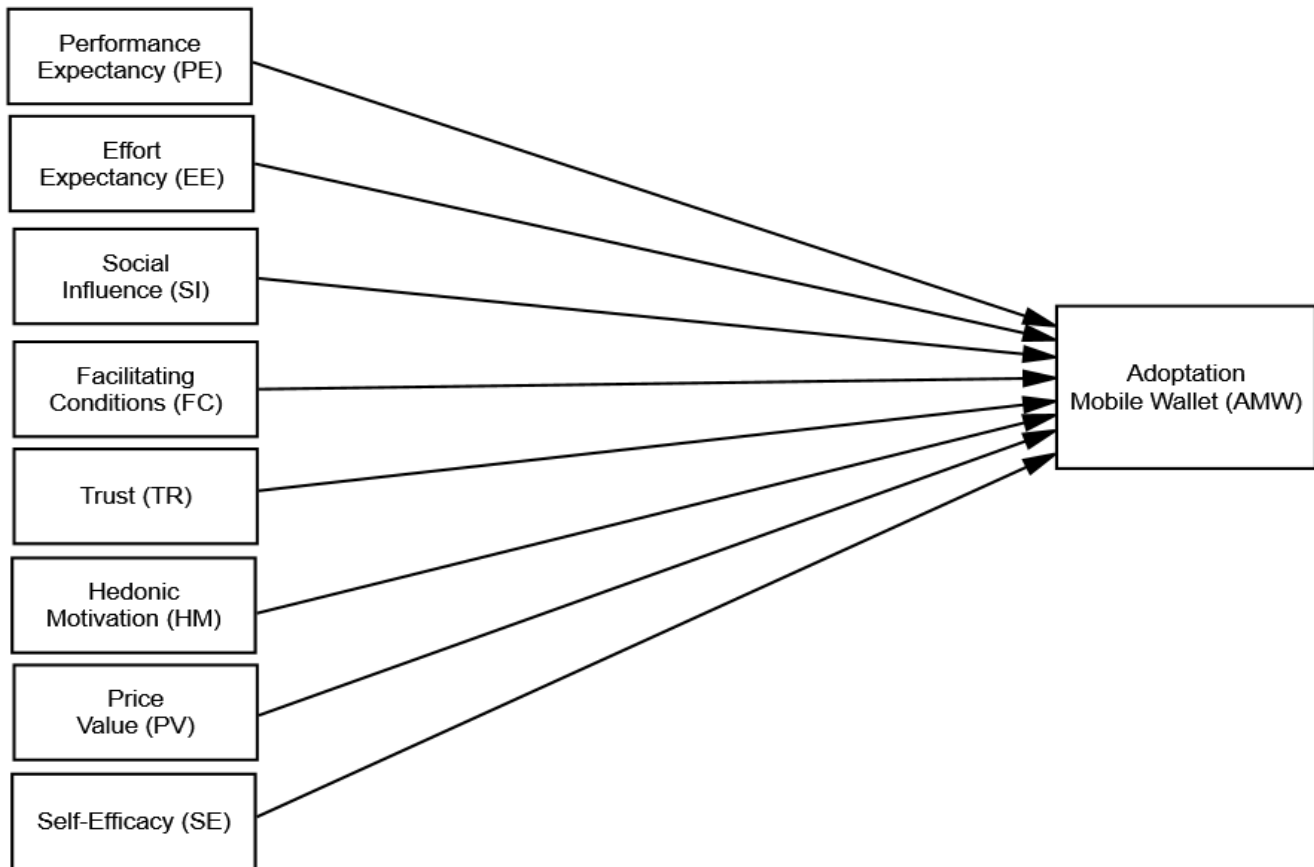


Figure 1. Research Model

Source: Authors

4. Research Methodology

By using a structured questionnaire containing multiple items, this research's survey was designed. A scale ranging from 1 to 5 was used for each survey item, whereby strongly agree was assigned to score 1 while strongly disagree was assigned to score 5. Moreover, questions regarding the demographic characteristics of each respondent and questions about their use of mobile wallets were also incorporated into this same survey. Validation of this survey was carried out by two assistant professors who were management specialists and items were adjusted according to the feedback from the assistant professors. Following the amendment of the survey, a sample of 398 students was identified and the survey was conducted in Jordan in April 2019. Data were collected online from students in three private universities in Jordan. In total, 398 questionnaires were collected.

4.1 Measurement and Survey Instrument

A Likert scale with five points was utilized in the questionnaire for this survey, with questions which were close-ended. There were two parts in this questionnaire. The first one included demographic characteristics: gender, age, education level and university. There were 48 questions related to factors of self-efficacy, UTAUT2 and background information. The measurement of students' intention behind mobile wallet utilization was the aim of these questions. Assessment of every construct was done by utilizing validation methods from existing works, where the process of content validity was considered for further validation and refining. Eight factors were considered for measuring the constructs, where seven of them were based on the work by (Venkatesh et al., 2016) and one of them was based on the work by (Bandura, 2010). With reference to the literature on IS and existing studies, adaptation and articulation of the scale were carried out. The model was assessed via SmartPLS, including structural models assessment (Henseler et al., 2016). Regarding the latent variables' relationship with the related observed variables, measurement assessment entailed the relationship's reliability and validity examination. The different constructs' relationships were the focus of the structural model's evaluation (Hair et al., 2018). For this research, an approach based on the PLS-SEM was considered. For the Structural Equation Modeling (SEM) based on variance, the Partial Least Squares (PLS) was utilized in the SmartPLS (Hair et al., 2018). IBM SPSS Statistics 19.0 and Smart PLS 3.3.3 were utilized for data analysis due to the following reasons: 1) the concept of the PLS-SEM is not based on data with normal distribution, 2) the implementation of bootstrap resampling via random selection of observations, 3) the standard errors' derivation, which is enabled through the estimated parameter. Furthermore, this research's goals are aligned with the PLS (Partial Least Squares) analysis' aim, including the prediction of the role of the factors with regard to mobile wallet technology usage intention.

5. Results and Analysis

The demographic profile of those who participated in the research is displayed in Table 2. In terms of gender distribution, 53 percent were female participants and 47 percent were male. Table 2 depicts the detailed statistics of the respondents' profile and technology used. The Cronbach α reliability coefficient value for every construct (price value, hedonic motivation, PE, EE, SI, FC, SE, trust and mobile wallet adoption) was 0.902. An acceptable discriminant validity (DV) can be achieved if: (1) every construct's average extracted variance (AVE) is not less than 0.50, (2) the factors' index is more or equal to 0.80 (Hair et al., 2018), (3) and the inter-construct correlations (IC) related to the factors are less than the value of the AVE's square root corresponding to every construct (Hair et al., 2018). Furthermore, the lowest acceptable value for Factor Loading (FL) with Crematory Factor Analysis (CFA) is 0.70. Similarly, the Cronbach's α (CA) must be no less than 0.70 (Hair et al., 2018). Further, 0.70 should be the ideal value of the durability of composite (CR) considered.

Table 2. Respondents Demographic Profile

Gender		%
Male	190	47%
Female	212	53%
Education		
Bachelor	395	99%
Master	3	1%
Age		
18-13	350	88%
24-30	44	11%
31-35	4	1%
36-45	0	0%

Source: Authors

5.1 Measurement Model and Instrumentation

Using SmartPLS 2.0, the PLS-SEM was implemented in the initial phase to validate the model. Confirmation of this model's reliability was carried out in two steps, before hypotheses testing was done.

5.2 Measurements' Construct Validity

The parameter that represents to what extent does a test measures the components that need to be measured is the construct validity. The three main evidence validation types are criterion validity, content validity and construct validity (Hair et al., 2018). The factors were shown to have high item cross-loading and loading through factor analysis (Table 3).

Table 3. Cross-Loading

Factors	Items	AMW	EE	FC	HM	PE	PV	SE	SI	TR
Adoptation Mobile Wallet	AMW1	0.832571	0.406384	0.428621	0.507182	0.473396	0.450422	0.529188	0.422681	0.466594
	AMW2	0.870291	0.423431	0.269690	0.417262	0.477829	0.381813	0.415374	0.404943	0.322921
	AMW3	0.826170	0.522780	0.357688	0.530033	0.497686	0.562029	0.394712	0.599885	0.352439
Effort Expectancy	EE1	0.347625	0.824031	0.394635	0.392431	0.430598	0.378909	0.467302	0.213368	0.273997
	EE2	0.420564	0.858651	0.311393	0.455111	0.532605	0.471280	0.475993	0.417831	0.293318
	EE3	0.490394	0.834796	0.252298	0.391867	0.484323	0.466301	0.431901	0.382499	0.198012
	EE4	0.489741	0.780545	0.492773	0.555290	0.554318	0.534914	0.623984	0.350097	0.544060
Facilitating Conditions	FC1	0.307035	0.356154	0.745084	0.431961	0.242617	0.502537	0.514452	0.297416	0.432422
	FC2	0.301401	0.291087	0.811533	0.426179	0.267221	0.384821	0.296176	0.121226	0.356583
	FC3	0.356719	0.359957	0.746933	0.385702	0.399288	0.307330	0.284938	0.272668	0.361790
Hedonic Motivation	HM1	0.479189	0.475910	0.437906	0.896148	0.499031	0.589577	0.514636	0.481473	0.431685
	HM2	0.580556	0.600492	0.524188	0.944556	0.612047	0.595313	0.546889	0.502202	0.570930
	HM3	0.531672	0.427300	0.513598	0.908596	0.536251	0.625985	0.575778	0.565438	0.538657
Performance Expectancy	PE1	0.503172	0.575771	0.297379	0.511215	0.839497	0.404492	0.360437	0.564525	0.310283
	PE2	0.474931	0.431285	0.411340	0.437824	0.850430	0.342944	0.286893	0.480370	0.303447
	PE3	0.459994	0.560125	0.254903	0.508092	0.808186	0.450263	0.387231	0.541746	0.278967
	PE4	0.402870	0.390264	0.332580	0.481338	0.706878	0.514709	0.537653	0.446048	0.457096
Price Value	PV1	0.405242	0.344124	0.186423	0.441101	0.431949	0.701444	0.460019	0.494241	0.305080
	PV2	0.508134	0.506695	0.515582	0.554549	0.416794	0.926652	0.548794	0.415247	0.433319
	PV3	0.482568	0.558147	0.544114	0.638570	0.473633	0.856816	0.560375	0.449693	0.536985
Self- Efficacy	SE1	0.357823	0.548763	0.327191	0.416263	0.274206	0.525602	0.772371	0.301310	0.437724
	SE2	0.473951	0.428561	0.425976	0.507030	0.406201	0.434966	0.820979	0.343409	0.429227
	SE3	0.338982	0.414620	0.287632	0.403698	0.394212	0.477273	0.642207	0.397439	0.319600
Social impact	SI1	0.471134	0.354101	0.207633	0.463055	0.505046	0.482854	0.438213	0.903937	0.270486
	SI2	0.597267	0.425359	0.257595	0.564635	0.606040	0.515662	0.438013	0.931195	0.319422
	SI3	0.450384	0.342983	0.359971	0.467618	0.584238	0.434428	0.346354	0.838879	0.381447
Trust	TR1	0.307255	0.249041	0.405927	0.406911	0.292862	0.336803	0.419873	0.320311	0.839717
	TR2	0.275127	0.347503	0.435658	0.458545	0.305410	0.429143	0.419560	0.253672	0.851630
	TR3	0.514201	0.418868	0.454361	0.563274	0.431421	0.530410	0.512724	0.344215	0.905649

Source: Authors

5.3 Measurement Model's Convergent Validity

The lowest score for composite reliability was 0.791439 and the highest score was 0.940384. Since the threshold level is 0.70, the scores obtained are acceptable, thus every construct can be taken into consideration. In addition, the values corresponding to the Cronbach α were between 0.607702 and 0.904961, which met the requirement of being above 0.60. Besides that, the range of the values of AVE were between 0.560998 and 0.795982, which

exceeded the lowest value required, 0.50. On the other hand, the necessary value of 0.50 was exceeded by the critical element loadings (Hair et al., 2018). Table 4 highlights the measurement model's CFA results.

Table 4. Convergent Validity

Factors	Items	Factors Loading	AVE	Composite Reliability	Cronbach α
Adaptation Mobile Wallet	AMW1	0.832571	0.711046	0.880645	0.797722
	AMW2	0.870291			
	AMW3	0.826170			
Effort Expectancy	EE1	0.824031	0.680611	0.894890	0.844208
	EE2	0.858651			
	EE3	0.834796			
	EE4	0.780545			
Facilitating Conditions	FC1	0.745084	0.590548	0.812026	0.654022
	FC2	0.811533			
	FC3	0.746933			
Hedonic Motivation	HM1	0.896148	0.840272	0.940384	0.904961
	HM2	0.944556			
	HM3	0.908596			
Performance Expectancy	PE1	0.839497	0.645207	0.878611	0.814912
	PE2	0.850430			
	PE3	0.808186			
	PE4	0.706878			
Price Value	PV1	0.701444	0.694947	0.870921	0.773093
	PV2	0.926652			
	PV3	0.856816			
Self-Efficacy	SE1	0.772371	0.560998	0.791439	0.607702
	SE2	0.820979			
	SE3	0.642207			
Social Influence	SI1	0.903937	0.795982	0.921151	0.871804
	SI2	0.931195			
	SI3	0.838879			
Trust	TR1	0.839717	0.750199	0.899997	0.842981
	TR2	0.851630			
	TR3	0.905649			

Source: Authors

5.4 Discriminant Validity of the Measurement Model

Discriminant validity represents to what degree is one latent variable different from the others. It refers to the case where the observed variables linked to a latent variable have a higher variance compared to the: a) different constructs under the conceptual framework; or b) error in measurement or any comparable external unmeasured effects. Every indicator and construct's validity are considered as unreliable for any case that is different from the aforementioned case (Hair et al., 2018), see Table 5.

5.5 Structural Model Analysis

From Table 5, it can be observed that the factors that were considered were all statistically significant. Consequently, every hypothesis considered were accepted. Therefore, we can conclude that mobile wallet usage intention was affected by the important factors of PE ($\beta=0.127948$, $t=2.608857$), EE ($\beta=0.144183$, $t=2.413334$), SI ($\beta=0.240565$, $t=4.916715$), FC ($\beta=0.050628$, $t=1.204036$), hedonic motivation ($\beta=0.108791$, $t=1.767918$), price value ($\beta=0.093208$, $t=1.861954$), SE ($\beta=0.080590$, $t=1.550957$) and trust ($\beta=0.078155$, $t=1.892641$) (see Figure 1 and Figure 2).

Table 5. Hypotheses testing

H	Independent	Relationship	Dependent	Path Coefficient	Standard .E	T. Value	Result
1	PE	→	AMW	0.127948	0.049044	2.608857	Accepted
2	EE	→	AMW	0.144183	0.059744	2.413334	Accepted
3	SI	→	AMW	0.240565	0.048928	4.916715	Accepted
4	FC	→	AMW	0.050628	0.042049	1.204036	Accepted
5	HM	→	AMW	0.108791	0.061536	1.767918	Accepted
6	PV	→	AMW	0.093208	0.050059	1.861954	Accepted
7	SE	→	AMW	0.080590	0.051962	1.550957	Accepted
8	TR	→	AMW	0.078155	0.041294	1.892641	Accepted

Source: Authors

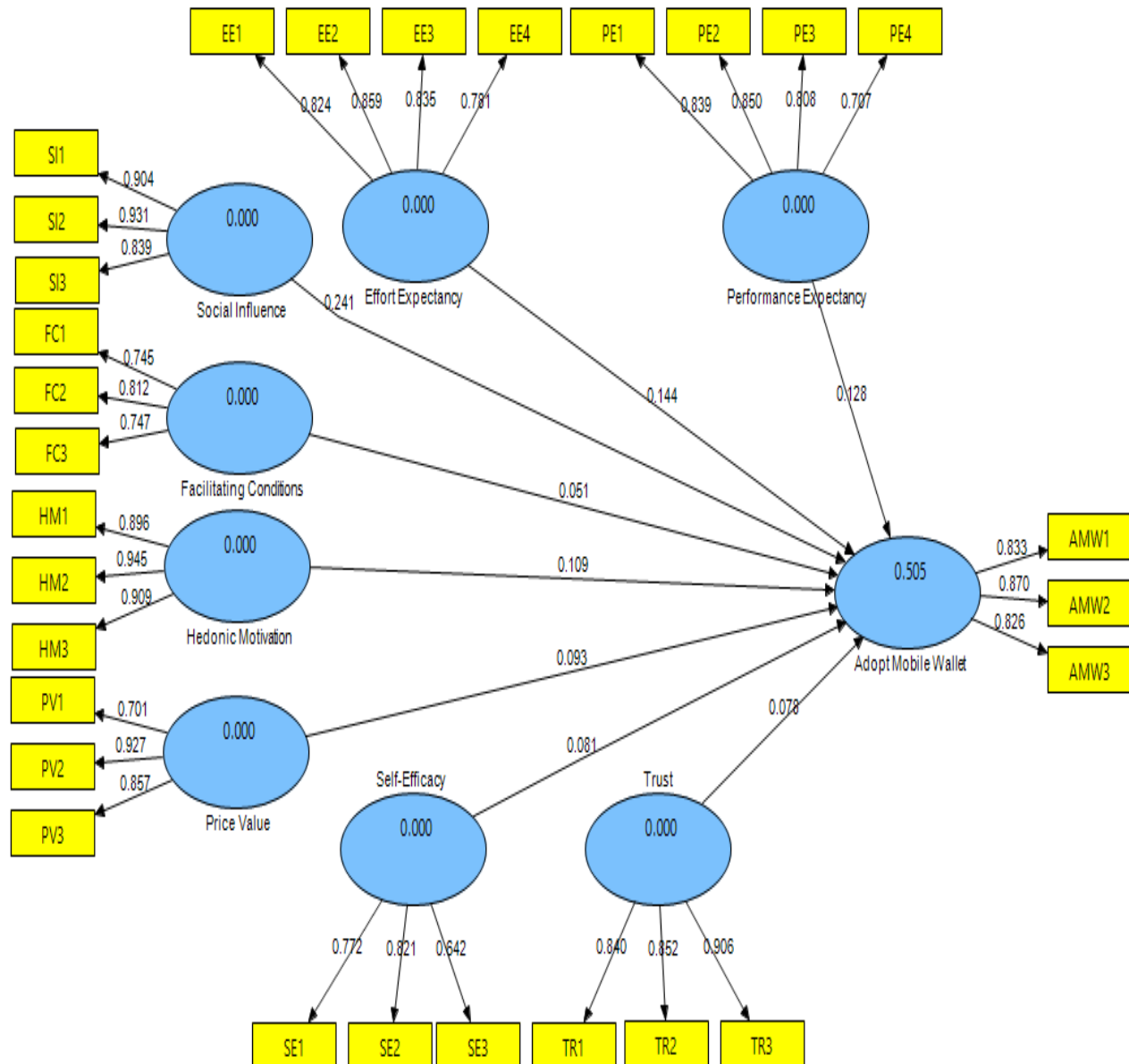


Figure 2. Path Coefficients Results

Source: Authors

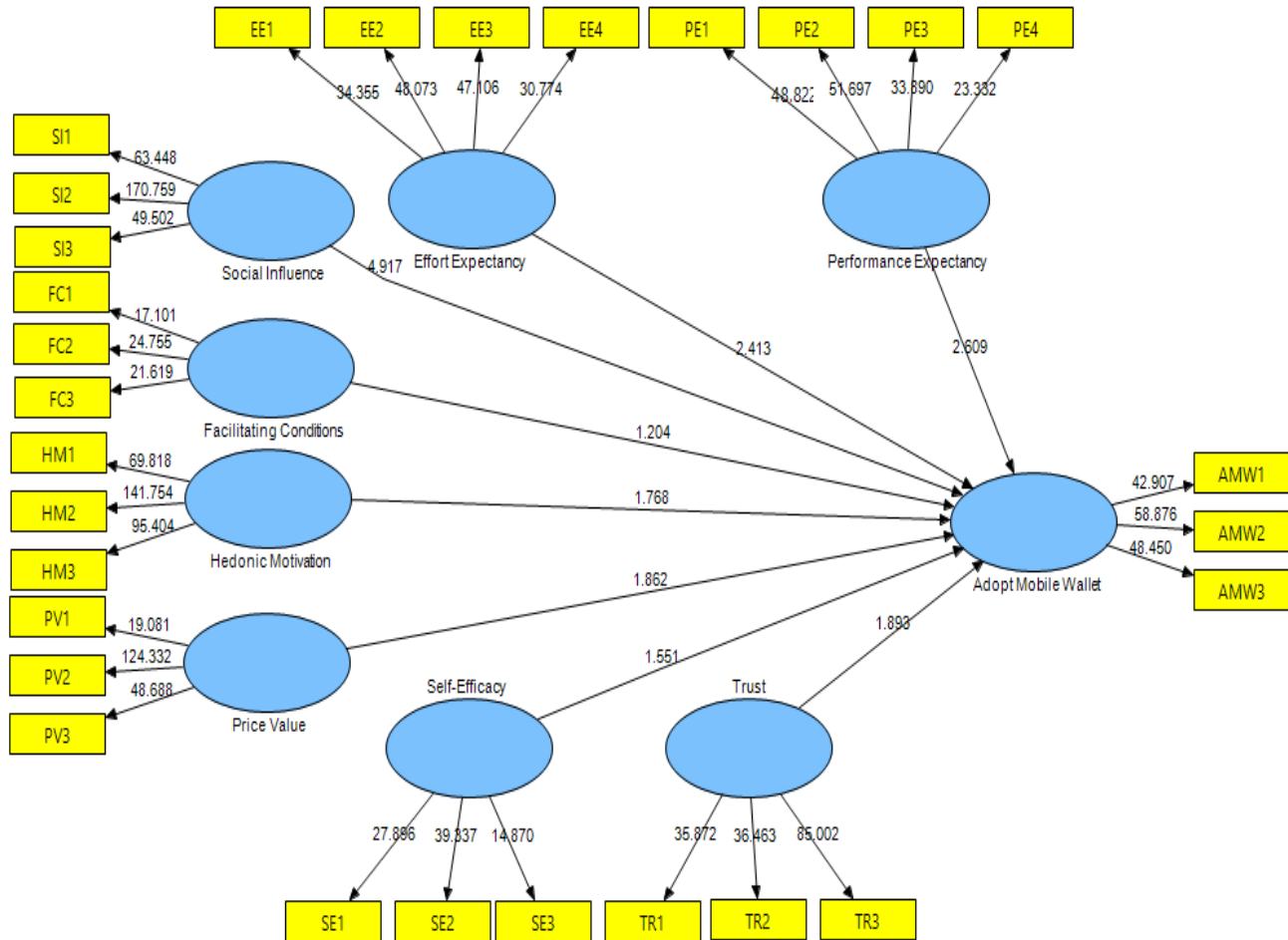


Figure 3. Path Coefficients T Values

Source: Authors

6. Discussion And Implications

By collecting and analysing useful data, the intention behind adopting mobile wallet technology is shown to be affected by self-efficacy in this research. With regard to H1, it is believed that mobile wallets usage intention is affected by performance expectancy as evident through empirical evidence. This result is corroborated by an earlier work (Suyoto et al., 2016). In addition, effort expectancy, H2, is believed to affect mobile wallets utilization intention, thus the result obtained is similar to an existing study (Larasati et al., 2018). On the other hand, for social influence, H3, the obtained result has similarities with the findings in an existing research (Mittal & Kumar, 2018; Seetharaman, Kumar, et al., 2017). H4 affirms that facilitating conditions can encourage people to utilize mobile wallet. Additionally, mobile wallet utilization intention is also positively influenced by hedonic motivation, H5. A similar observation to this was reported in an existing work (Mittal & Kumar, 2018; Seetharaman, Kumar, et al., 2017). The result for H6 indicates that price value affects mobile wallet usage intention, where a prior study made the same observation (Suyoto et al., 2016). Finally, the participants believe that both trust (H8) and self-efficacy (H7) can positively influence mobile wallet usage intention. These findings are corroborated by earlier studies (Tun, 2020; Mittal & Kumar, 2018; N. Singh & Sinha, 2020). This research explores further than the proposal in UTAUT2 by (Alalwan et al., 2017), by considering novel factors (self-efficacy, trust) and suggesting novel causal links among the behavioral intention's main antecedences (self-

efficacy→Behavioral intention, trust→ Behavioral intention). Implications, both practical and theoretical, of this research's results are discussed as follows.

6.1 Theoretical contributions

In general, the existing literature related to mobile wallet technology acceptance has been enriched through this study. Mobile wallets' usage in Jordan has not been sufficiently studied yet, thus this research is one of the first study to explore this area. Applying advanced statistical analysis like (SEM) in this type of research is another contribution of this paper. Moreover, our study extends the application of the UTAUT2 theory by using it to study a new technology, i.e., mobile wallets in a developing country (Jordan). Our research includes a new construct, i.e. self-efficacy in UTAUT2, which goes beyond what was explored in prior studies. Real-life applications of this research can be significant as customers' motivation to utilize mobile wallets can be improved using the outcomes of this research.

6.2 Implications to practice

This study has identified that all the different factors significantly contribute to the intention of using mobile wallet among Jordanians. Banks and financial institutions can use this study as a foundation for their marketing strategies to target customers and motivate them to use this technology.

6.3 Conclusion and Future work

Mobile wallet technology is still an uncharted field which makes it a fertile area to study, especially when it comes to understanding the various difficulties associated with implementing such technology in developing countries. Considering the small number of Jordanians using mobile wallets, it is necessary for the vital factors that influence the intentions of Jordanian customers to use this technology to be analyzed and examined. For the conceptual model's proposal, the UTAUT2 theory was utilized as it is capable of capturing the most critical elements linked with Jordanian customers' mobile wallets adoption. The study addressed the elements, which influence mobile wallet usage intention. The model developed to link the attitude and belief of students to the utilization of mobile wallet represents the most significant contribution of this research. The theory was extended by including self-efficacy and trust as external factors because they were cited to be amongst the crucial predictors of the intention of individuals to adopt mobile wallet technology (Amoroso & Magnier-Watanabe, 2012a; Office et al., 2017; Suyoto et al., 2016). Although this research is a pioneer in the field of mobile wallet usage and acceptance in the Arab world, it still has a few limitations. Firstly, the research's sample was chosen based on convenience and was limited to the students of private Jordanian universities in Amman. This could affect the generality of the results. Therefore, it is advisable that future studies consider different demographics and areas in Jordan. Regardless of that, the conceptual model of this study can be reapplied and retested to investigate customers' intention to use different technologies, such as airline self-check-in service, mobile payment, online shopping and e-learning, of various industries, i.e., education, health, tourism, government, etc. Moreover, as this is a cross-sectional and longitudinal study, it may provide more insight into this topic and the degree to which the impact of the suggested factors can be stabilized or modified over time.

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DIGITAL GOVERNMENT PLATFORMS: ISSUES AND ACTIONS IN EUROPE DURING PANDEMIC TIME

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Abstract. The aim of the present research is to measure and assess the rise and consolidation of the digital government platforms effectiveness in the period 2016-2020 within European Union. A breakdown between countries based on their GDP expenditure share in ICT (Information and Communication Technology) is developed, in order to identify the spending propensity of the members EU 28 in the digital economy. Furthermore, with the support of the Digital Effectiveness Performance Index (DEPI). Starting from the Government Effectiveness Index (GEI), according to the five DESI dimensions, aims at identifying the sources of digital platforms effectiveness for each country. The cross national comparative study shows that in order to reduce the gap within the EU Member States, it is strategic to develop an ambitious government actions to support the remote working in terms of opportunities, challenges, drivers, processes, and consequences of the single performances, in digital dimensions, of European countries.

Keywords: Digital Effectiveness Performance Index (DEPI); effectiveness; digital platforms; cross national comparative study; European policy

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JEL Classifications: L2, L26

1. Introduction

The COVID-19 outbreak (Donthu et al., 2020) has upset the worldwide. The effects of the covid-19 crisis on working life (Waizenegger et al., 2020) are profound and complex. The changes in our work and social life have been rapid and full of pitfalls. The rise in unemployment and remote work has increased throughout the world. The economic and social (Keogh-Brown et al., 2010) psychological impact (Capone et al., 2020) of the pandemic has yet to be determined, but it will be significant (Marino et al., 2021). In this framework, public remote work (Skyrme, 1994; Staples et al., 1999; Scandura et al, 1997; Spreitzer et al., 2017) and digital platforms (Baiyere et al 2020; Mariani et al., 2020), impressing a smart rise in terms of both opportunities (Barsness, et al., 2005;

Carillo et al, 2020) and challenges. In order to understand possible future outcomes, it is interesting to note that digital government and market effectiveness represent key elements of the European Union's (EU) development strategy. In fact, different targets have been established in order to develop this strategy.

2. Theoretical background

The European Commission (2016 - 2020) has reported that a Digital Single Market with effectiveness and efficiency characteristics could contribute €415 billion per year to EU economy and allow for the creation of hundreds of thousands of new jobs. The report highlights the disparities between European countries capabilities should be considered when realizing and developing policies in the long term. Furthermore, taking European countries capacities within a set of dimensions, it could be strategic to assess the digital platforms effectiveness. As discussed by European Parliament in December 2015, reducing the digital divide may raise Gross Domestic Product (GDP) by 1-1.5%, and in the next ten years, 90% of jobs will require relevant digital skills. Moreover, the digital divide has been substantially reduced over the last decade in Europe, but the reduction of the gap remains a strategic goal to economic development of EU countries. This is in line with the results obtained by World Bank Report (2016). Furthermore, it is interesting to note that digital divide has been declined also as geographic area (Chipeva et al., 2018) and gender (Brännström, 2012). Different authors tackled the issue of investigating the digital platforms in different contexts. A benchmarking and measurement of digital government platforms has been developed by Cattaneo et al. (2007), a survey on Italian Digital government platforms by Assinform and Confindustria (2017), as well as the issue of digital divided both in the rural areas by Kos-Łabędowicz (2017), Matuzeviciute and in developed countries, i.e. Germany (Schleife, 2010). Furthermore, Jardas et al., (2012) proposed a case study of Croatian local e-government, Butkus et al., (2017) analyzed, at international level, the relationship between the technological innovation and the unemployment, J. Wallis et al., (2018) developed a study on e-government effectiveness. For example, Kos-Łabędowicz et al. (2017) analyzed the digital divide and the factors influencing the lack of digital convergence with particular emphasis on rural areas of the European Union, where the main highlighted limit was the aging of the population and the progressive depopulation of the countryside. Moreover, Assinform and Confindustria (2017) examined the impact that the implementation of digital government may have on business, operational and service models in the different sectors of the Italian market. Instead, Wallis et al., (2018) analyzed the relationships between government effectiveness and digital government development, particularly with reference to the e-Government development (Marino et al., 2020). The study analyses such relationship utilizing five levels trust model in public context (Castaldo et al., 2010; Song et al., 2020). A model of public trust in which the importance of communication, task design and incentives for cooperation even in the presence of geographical distance, is strategic in this pandemic time (Metiu, 2006). Digital government platforms should be considered as a strategic driver for the government actions in order to improve their effectiveness. Kauffmann et al. (1999, 2010), starting from 1996, developed the methodology of the Worldwide Governance Indicators based on six composite indicators which include the Government Effectiveness Index (GEI). In this line the same authors (Kauffmann et al., 2007) highlight the strategic importance of governance indicators measure linked to digital platforms. The strategic relationship between government platforms effectiveness and digital government is reinforced by OECD (2019). OECD encourages governments to adopt strategic approaches to use technologies in order to promote more open, participatory and innovative governments. To support this aim in terms of digital government effectiveness in the European context, it is necessary to understand how the countries are organized and creating and developing more specific and effective digital platforms policies. The digital platforms are a complex matrix in which different dimensions are strictly related each other. A classification of digital platforms should consider the following dimensions: Connectivity (Olson 1983; Olson et al., 2000), Human Capital (Marino et al., 2021; Rocco, 1998), Use of Internet Service, (Lau et al., 2020; Hodgson et al., 2020). Integration of Digital Technology, (Venkatesh et al., 2000; Majchrzak et al., 2000; Nambisan et al., 2017), Digital Public Services (Cairncross, 1997; Davis et al., 1989; Davis, 1989; Allen et al., 2015). In order to measure and assess the digital platforms effectiveness, each of these dimensions is weighted and splitted in sub dimensions. The digital platforms performance combines more than 30

indicators as indicated in Table 1. The European Commission addressed this issue by measuring the digital government platforms performance of the EU Member States through the brainchild of Digital Economy and Society Index (DESI). DESI is a composite index that summarizes relevant indicators on Europe's digital performance. It aims to help EU countries identify areas requiring priority investments and actions in order to create a truly Digital Single Market (European Commission 2017). Each dimension includes a particular aspect that contributes to the definition of a framework of the EU Member States digital platforms performance. Despite these set of indicators, DESI does not show a clear measure of digital government platforms effectiveness. This matter attracted the interest of many researchers, who tried to assess digital government platforms effectiveness. Asgarkhani (2005), has developed a study on effectiveness of e-Service in local Government, Bicking et al., (2006), proposed a scenario for e government in 2020, Arendsen, et al., (2014), analyzed the relationship between e-government and administrative burden. Bracken (2015), studied the topic of digital infrastructure through a government as platform and Janowski (2015), proposed a study on the evolution of Digital Government. Furthermore, digital transformation is changing citizens' expectations of governments, particularly in pandemic time, those linked to the ability to provide high-value, real-time digital services. Digital transformation means changing their operational methods to improve public service delivery. This process is not yet systemic (Xu et al., 2011), but should be realized short-term (Mergel et al., 2019). Following this approach, a preliminary study aimed at developing a systemic vision could be supported with semantic-based Decision Support System based on BPMN (Business Process Model Notation) that helps some of the core actors in adoption of some solutions (Pérez et al., 2004; Arpaci, 2017) in digital transformation processes (Di Martino et al., 2019). In Europe there are many bottlenecks related to digital platforms and its systemic process. In particular, Asgarkhani (2005) with a case study examined the value and the effectiveness of key aspects of digital government platforms within the public sector with a focus on four specific facets of effectiveness. Furthermore, Arendsen, et. al. (2014) analysing the scenario in Netherlands, elaborated an assessment of the business to government system. The study highlights the organizational characteristics as strategic tools to reduce the administrative burden and develop effective government policies. Janowski (2015) presents a four-stage Digital Government Evolution Model that considers pressures on government and how digital innovation is applied to address such pressures. The study analysed the high impact of Digital Government on its external environment when technological, organizational, socioeconomic (Fenner et al., 2010) and sectorial knowledge are used to ensure planning, and implementation of effective measures. On the hand, the reviewed literature shows how the digital government platforms is a driver to develop government effectiveness and how important it is to measure this effectiveness in a new digital context. Moreover, when analysing a geographic area, as the Europe, the heterogeneity of the considered countries becomes a very relevant element in function of an existing wide variability in terms of economic structure and conditions. These elements may be responsible for the gaps in terms of government platform effectiveness performances within the 28 EU Member States. A deeper analysis can be developed in order to comprehend in detail, which are the sources of the effectiveness. As shown in the elaboration of DESI (EU 2017), digital performance and competitiveness can be decomposed based on DESI dimension in order to identify measures that can be considered enhancers of platforms government effectiveness. On the other hand, in literature there is a lack of studies focusing on the effectiveness analysis of the digital government platforms and governance effectiveness at the same time, so as to allow an eventual comparison and discussion. In light of this, the present paper aims at bridging this gap introducing the Digital Effectiveness Performance Index.

In particular, digital platform government effectiveness is taken into consideration separately in the 28EU Member States for the period 2016-2020. The effectiveness analysis is based on the five DESI dimensions in order to elaborate the Digital Effectiveness Performance Index (DEPI). Moreover, a breakdown in terms of groups effectiveness for each DESI dimensions is proposed so as to establish the contribution of such dimensions to the effectiveness level of each analysed country. It is supposed that the present study will allow to support the comprehension, more in detail, on the level of the effectiveness in the field of digital platforms performance and governance in the 28 EU Member States. Furthermore, this analysis can help the quantitative identification of the contributions behind the achieved trend of platforms effectiveness and identify the countries, as best practices, to

increase the effectiveness. It is forecasted that the present analysis will be of interest for policy makers and government planners, who can acquire information for the development of government policies in long term plans. In the next sections an articulated discussion on the methodology will be developed, furthermore a deep analysis on the trend of the government effectiveness according to the digital platforms' performances in EU28 in the period 2016-2020 will be presented. Moreover, section 4 highlights the obtained results and the related discussions. Finally, section 5 shows the conclusion of the paper.

3. Research objective and methodology

Starting from Government Effectiveness Index (GEI) methodology, one of the six dimensions of Worldwide Governance Indicators (WGI) elaborated by Kauffmann et al., it has been developed DEPI. GEI defines the effectiveness of policy actions related to the public services. Through the analysis of several variables, the GEI contributes to the construction of the WGI. It can be considered as a synthetic benchmark of government effectiveness. The Digital Effectiveness Performance Index (DEPI), starting from the assumption of the GEI, captures the effectiveness performance of digital government strategies. It includes, as variables to analyse, the five DESI dimensions providing strategic information. DEPI derives from the theories of GEI and the digital transformation (Kehal, et al., 2003). DESI has developed an analysis linked to the relationship between two variables and their distributions share, particularly related to its five dimensions, but it does not allow to capture the effectiveness of each dimension. DEPI was formalized using the min-max method starting from the normalization of DESI 2016. The values of share and probability distributions are involved between 0 and 1. DEPI consists on a linear projection of each indicator onto a scale between 0 and 1 (indicators with positive trend 0 min value; 1 max value). Min-Max method allows to normalize indicators in order to have an identical range [0, 1] by subtracting the minimum value and dividing by the range of the indicator values. Consequently, from the analytical point of view, the values do not diverge from each other and, therefore, the DEPI can be extended to other research fields.

Equation Min Max Method:

$$I_{qc}^t = \frac{x_{qc}^t - \min_c(x_q^{t_0})}{\max_c(x_q^{t_0}) - \min_c(x_q^{t_0})}$$

The digital platforms are a complex matrix in which different dimensions have a strictly relation each other. A classification of digital platforms should consider the following dimensions. A different weight, according to their characteristics, was given to each of the five dimensions.

Table 1. Dimensions and their sub-dimensions our elaboration on DESI

<i>Dimension weights</i>	<i>Sub Dimension weights</i>
1 Connectivity 25%	1.1 Fixed Broadband 8,5%
	1.2 Mobile Broadband 5,5%
	1.3 Speed 8,5%
	1.4 Affordability 2,5%
2 Human Capital 25%	2.1 Basic Skills and Usage 12,5 %
	2.2 Advanced Skills 12,5 %
3 Use of Internet Services 15%	3.1 Content 5%
	3.2 Communication 5 %
	3.3 Transactions 5%
4 Integration of Digital Technology 20%	4.1 Business Digitization 12%
	4.2 E-commerce 8%
5 Digital Public Services 15%	5.1 E-Government 13,5 %
	5.2 E-Health 1,5%

The repartition of specific weights follows these criteria:

25% Connectivity and Human Capital. This weight, which represents the highest, has been assigned (European Commission, DESI 2018 Digital Economy and Society Index Methodological note) because it shows the countries' investments in IT (Connectivity) and Digital Economy (Human Capital).

20% Integration of Digital Technology. This dimension captures the use of ICT by businesses.

15% Use of Internet Services and Digital Public Services. These are the last two enabling dimensions where the first captures the use of internet by citizens and the second displays the digitization of public services.

DESI methodology does not give a clear measure of digital government platform effectiveness because it is an investment measure and does not capture how the investments improve the digital government platform effectiveness. Starting from this assumption, DEPI can be calculated in the following way:

$$1. \quad y(w,s) = \alpha(s) + \beta(s)(g(w) + \varepsilon(w,s))$$

List of Abbreviations

w Country, $w = 1, 2, \dots, W$

s Sub Dimension of DESI, $s = 1, 2, \dots, S$

y (w,s) observed score on indicator s for country w

g(w) Unobserved performance. g(w) is assumed to be in the form of a normally distributed random variable with mean 0 and standard deviation 1.

$\varepsilon(w,s)$ Disturbance term also mentioned to as error term. It reports the perception and measurement error and variation of sample. Furthermore, it displays the imperfect relationship between the particular concept measured by indicator s and the corresponding broader aspect of effectiveness.

$\alpha(s)$, $\beta(s)$ Coefficients are useful to map, together with the disturbance term $\varepsilon(w,s)$, unobserved governance into the observed data.

$\sigma_{\varepsilon}^2(s)$ Variance of the disturbance terms of indicator s common to all countries s

Digital service effectiveness is also structured by unobserved components. In order to assess these unobserved components, the effectiveness is measured by algebraically summing the scores we have obtained on each dimension y(w;s). Starting from this assumption, it is possible estimate the unknown performance g(w) but it is suitable to set jointly the error term with g(w) into brackets.

The model includes the following assumption:

1) The random terms (disturbance terms) $\varepsilon(w,s)$, are not correlated with each other, i.e. perception errors are not correlated across dimensions and countries. In order to identify the model parameters is essential to consider that the mean of $\varepsilon(w,s)$ is zero for all w,s.

2) The disturbance term has the same variance, $\sigma_{\varepsilon}^2(w)$, among countries within a set indicator but may have a different variance among dimensions.

3) Unobserved governance and observed indicators are linearly related.

4) $\varepsilon(w,s)$ are statistically independent of g(w) for all w and s.

5) Both g(w) and $\varepsilon(w,s)$ have a joint normal distribution.

Starting with Min Max method, MLE estimates of $\alpha(s)$, $\beta(s)$ and $\sigma_{\varepsilon}(s)$ are achieved and this model is founded on the next Likelihood function:

$$2. \quad L [w; \alpha, \beta, \sigma_{\varepsilon}^2(1), \dots, \sigma_{\varepsilon}^2(S)] = \prod_{w=1}^W (2 \cdot \pi)^{-\frac{w}{2}} |\Omega|^{-\frac{1}{2}} \exp[y(w) - \alpha] \exp[y(w) - \alpha]' \Omega^{-1} [y(w) - \alpha]$$

S = Score of dimensions

W = number of countries

y(w) = the Sx1 vector of the y(w,s)'s for country w

y = the WSx1 vector of the y(w,s)'s for all countries $\alpha = Sx1$ vector of the $\alpha(s)$'s

$\beta = Sx1$ vector of the $\beta(s)$'s

$$\Omega = \beta \beta' + \text{diag} \{ \sigma_{\varepsilon}^2(s) \cdot \beta(s)^2 \}$$

The formula 3 (weights p) expresses a relationship in which each indicator in the aggregation procedure is inversely proportional to its error variance, i.e. the greater the variance of the error term the smaller the weight.

$$3. p(s) = \frac{\sigma_{\varepsilon}(s)^{-2}}{1 + \sum_{s=1}^{S(w)} \sigma_{\varepsilon}(s)^{-2}}$$

Considering Kaufmann et al., DEPI by equation 3 measures the performance basing itself on a weighted average of the rescaled observed scores. These rescaled scores are obtained when $\alpha(s)$ is subtracted from each observed score $y(w,s)$ and the result is then divided by $\beta(s)$. In this way it is possible rewriting equation 1 and assuming a mathematical expectation. As this is of a calculation of expected values we can hypothesize that the expected value of the disturbance term, $\varepsilon(w,s)$, is by assumption 0. The assumptions of equation 4 (mean) and 5 (standard deviation) imply that the conditional distribution of unobserved governance $g(w)$ is normal.

$$4. E[g(w)|y(w), \alpha, \beta] = \sum_{s=1}^{S(w)} p(s) \cdot \frac{y(w,s) - \alpha(s)}{\beta(s)}$$

$$5. sd[g(w)|y(w), \sigma_{\varepsilon}^2(1), \dots, \sigma_{\varepsilon}^2(S)] = \left[\sum_{s=1}^{S(w)} \sigma_{\varepsilon}^2(S)^{-2} \right]^{-1/2}$$

The equation 5 wanes in the number of specific indicators in which a particular country appears and raises in the variance of the $\varepsilon(w,s)$ on each of these indicators. In so doing, each indicator is re scaled in order that higher outcomes are equivalent to better outcomes. An additional re scaling is reached by first subtracting the minimum possible score and then dividing by the difference between the minimum and maximum possible score. The estimates of the $\alpha(s)$, $\beta(s)$ and $\sigma_{\varepsilon}^2(s)$, are achieved using MLE (Eq. 2). The low level of $\sigma_{\varepsilon}^2(s)$ means that indicators will show similar results with the other indicators. If the indicators are uncorrelated with the other indicators will have larger error variances. This correlation of scores underlies of the concept of effectiveness and not directly correlated to the perception errors. In the weight calculation, the indicators that highlight a highly correlation will express a larger weight than other indicators, because the results of equation 3 are inversely proportional to their imputed error variance. Equation 4 can now be estimated for each country so that an estimation of the level of performance $g(w)$ is obtained. Finally, equation 5 provide the calculation of the standard error of these estimates. The estimates of effectiveness for each country are re scaled by subtracting the mean across countries and dividing by the standard deviation across countries. The scores are in the range between -2.5 and 2.5. The standard error (Equation 5) is re calculated.

4. Data analysis

The analysis is built up in relation with data over the period 2016-2020 recovered from Eurostat (Eurostat, 2020), which reports official statistics for EU. The first elaboration by European Commission of DESI for all the countries in EU28 is available from 2016 onward. The years before 2016 offered a reference framework with only partial data and thus not reliable for a complete analysis. However, this range is rather meaningful because many changes happened to the EU digital structure due to a set of concomitant trends. Namely speed and significant growth of IT, radical changes in digital government (de Reuver, et al., 2017), relationship between countries and economic growth (Gustova, 2017; Posvyanskaya, 2018) and the full implementation of the EU Digital government (OECD, 2014; The Digital Assembly, 2018). In the present study, firstly, the 28 EU member states are ranked on the basis of the ratio between annual GDP and ICT investments and are grouped with quartiles methodology based on DEPI scores. Table 2 reports the considered countries and the corresponding results (GDP/ICT) during the period of the analysis. This division helps to understand the possible absence of

expenditure propension in ICT investments of the countries. Moreover, the first column of Table 2 reports a breakdown of the countries based on geographic criteria. It can be observed that geographic areas show countries with a similar structure and investments conditions. It can be observed that Table 2 shows the expenditure share of GDP in ICT, and the data highlight a progressive decrease of investment share. Malta shows the highest decrease with a negative variation with a value equal to – 1,5%. The average share of investment, for the period 2016 -2020 and for all countries, is equal to 3,81%. Considering this average value, 13 countries, out of total of 28, are above the average and 15 are under such value. Analysing the 13 countries (above the average value), it can be observed that the positive deviation from this value swings in a range with a minimum value equal to 0,13%, displayed by Luxembourg, and a maximum value equal to 1,5% of the UK. Examining the other 15 countries (under the average value), the negative deviation from it swings between -0,07 and – 1,22. The data highlight reflexions to do both about geographical groups and regarding the deviation from the average value of the ICT investments that will be object of subsequent analysis.

Table 2. Breakdown European Countries 2016– 2020 our elaboration from Eurostat data

Breakdown European Countries 2016 - 2020																	
Member States	Groups	2016	GDP2016	ICT/GDP2016	2017	GDP2017	ICT/GDP2017	2018	GDP2018	ICT/GDP2018	2019	GDP2019	ICT/GDP2019	2020	GDP2020	ICT/GDP2020	Average 16-20
Austria (AT)	G1	11.126	329.296	3,38%	11.630	339.896	3,42%	11.610	350.875	3,31%	11.630	369.899	3,14%	11.638	388.923	2,99%	3,25%
Belgium (BE)	G1	13.539	400.643	3,38%	14.016	409.407	3,42%	14.106	421.607	3,35%	14.045	439.052	3,20%	14.072	456.497	3,08%	3,29%
Bulgaria (BG)	G4	2.136	42.751	5,00%	2.155	44.162	4,88%	2.152	45.708	4,71%	2.219	51.663	4,29%	2.272	57.618	3,94%	4,56%
Croatia (HR)	G4	1.886	43.020	4,38%	2.003	43.897	4,56%	2.018	44.775	4,51%	2.028	48.990	4,14%	2.059	53.205	3,87%	4,29%
Cyprus (CY)	G3	702	17.394	4,04%	734	17.421	4,21%	744	17.543	4,24%	753	19.571	3,85%	766	21.599	3,55%	3,98%
Czech Republic (CZ)	G4	6.765	154.739	4,37%	7.522	166.964	4,50%	7.612	172.190	4,42%	7.700	191.722	4,02%	7.773	211.254	3,68%	4,20%
Denmark (DK)	G2	13.326	260.582	5,11%	13.658	266.179	5,13%	13.625	271.795	5,01%	13.612	292.808	4,65%	13.647	313.821	4,35%	4,85%
Estonia (EE)	G4	728	19.963	3,65%	767	20.461	3,75%	781	20.991	3,72%	804	23.615	3,41%	820	26.239	3,13%	3,53%
Finland (FI)	G2	10.296	205.268	5,02%	10.730	209.149	5,13%	10.724	212.265	5,05%	10.705	223.892	4,78%	10.760	235.519	4,57%	4,91%
France (FR)	G3	88.090	2.132.449	4,13%	89.103	2.181.064	4,09%	89.538	2.225.994	4,02%	89.083	2.291.705	3,89%	89.281	2.357.416	3,79%	3,98%
Germany (DE)	G1	112.771	2.915.650	3,87%	118.174	3.032.820	3,90%	119.682	3.123.501	3,83%	119.878	3.386.000	3,54%	120.262	3.648.499	3,30%	3,69%
Greece (EL)	G3	4.784	177.559	2,69%	4.698	176.023	2,67%	4.603	175.178	2,63%	4.534	180.218	2,52%	4.517	185.258	2,44%	2,59%
Hungary (HU)	G4	4.430	104.239	4,25%	4.937	108.748	4,54%	4.998	112.924	4,43%	5.059	124.050	4,08%	5.146	135.176	3,81%	4,22%
Ireland (IE)	G2	6.319	189.046	3,34%	6.853	255.815	2,68%	6.959	276.434	2,52%	6.864	294.110	2,33%	6.863	311.786	2,20%	2,61%
Italy (IT)	G3	52.287	1.611.884	3,24%	53.285	1.636.372	3,26%	53.451	1.663.863	3,21%	53.706	1.724.955	3,11%	53.948	1.786.047	3,02%	3,17%
Latvia (LV)	G4	713	23.581	3,02%	773	24.378	3,17%	798	25.146	3,18%	809	27.033	2,99%	819	28.920	2,83%	3,04%
Lithuania (LT)	G4	1.058	36.444	2,90%	1.142	37.124	3,08%	1.187	38.519	3,08%	1.198	42.191	2,84%	1.215	45.863	2,65%	2,91%
Luxembourg (LU)	G1	2.048	48.898	4,19%	2.112	52.113	4,05%	2.118	54.510	3,89%	2.108	55.299	3,81%	2.105	56.088	3,75%	3,94%
Malta (MT)	G3	351	8.106	4,33%	372	8.806	4,22%	375	9.334	4,02%	375	11.295	3,32%	375	13.256	2,83%	3,74%
Netherlands (NL)	G1	31.287	662.770	4,72%	33.249	676.531	4,91%	33.515	691.009	4,85%	33.548	772.694	4,34%	33.697	854.379	3,94%	4,55%
Poland (PL)	G4	14.304	410.845	3,48%	15.573	427.737	3,64%	15.790	445.189	3,55%	15.968	467.167	3,42%	16.086	489.145	3,29%	3,48%
Portugal (PT)	G3	7.475	173.446	4,31%	7.522	179.369	4,19%	7.493	183.620	4,08%	7.428	194.614	3,82%	7.408	205.608	3,60%	4,00%
Romania (RO)	G4	4.475	150.230	2,98%	4.901	160.353	3,06%	5.101	171.207	2,98%	5.184	187.517	2,76%	5.231	203.827	2,57%	2,87%
Slovakia (SK)	G4	2.798	75.561	3,70%	2.977	78.071	3,81%	2.977	80.717	3,69%	3.012	84.851	3,55%	3.028	88.985	3,40%	3,63%
Slovenia (SLO)	G4	1.435	37.303	3,85%	1.511	38.543	3,92%	1.517	39.017	3,89%	1.512	43.000	3,52%	1.515	46.983	3,22%	3,68%
Spain (ES)	G3	40.285	1.041.160	3,87%	41.324	1.081.190	3,82%	41.343	1.116.437	3,70%	40.969	1.206.878	3,39%	40.558	1.297.319	3,13%	3,58%
Sweden (SE)	G2	21.632	430.642	5,02%	22.437	444.617	5,05%	22.521	466.404	4,83%	22.508	475.224	4,74%	22.662	484.044	4,68%	4,86%
United Kingdom (UK)	G2	128.313	2.254.297	5,69%	145.685	2.575.719	5,66%	148.009	2.619.506	5,65%	147.074	2.930.192	5,02%	146.601	3.240.878	4,52%	5,31%

Starting from the application of DEPI methodology, Figure 1 reports Connectivity scenario. This scenario is a prerequisite for the functioning of digital platforms. The connectivity dimension takes into account both fixed and mobile broadband by considering supply and demand. Under fixed broadband, it assesses the availability as well as the take-up of basic, fast (digital natives) and ultrafast broadband. The availability of 5G and the adoption of mobile broadband are considered on mobile broadband. Digital Connectivity must be considered as a social right and network (Wellman et al.,1996), in the EU state members. A comparative assessment of Connectivity dimension displays, as reported in Fig.1, the Nordic countries (Finland and Denmark) as the strongest performers of effectiveness measured by DEPI. While the lowest scores were registered by Greece and Croatia.

Table 3 reports the breakdown of EU 28 countries in quartiles. The first quartile (Q1) presents the lowest level of platform effectiveness, whereas belonging to the fourth quartile (Q4) show the highest platform effectiveness level based on DEPI scores on Connectivity Dimension.

Table 3. Decomposition in quartiles scores in Connectivity

COUNTRIES	2016	2017	2018	2019	2020
Austria	Q2	Q2	Q2	Q2	Q1
Belgium	Q4	Q4	Q4	Q4	Q4
Bulgaria	Q1	Q1	Q1	Q1	Q1
Croatia	Q1	Q1	Q1	Q1	Q1
Cyprus	Q2	Q2	Q2	Q2	Q2
Czech Republic	Q2	Q1	Q2	Q2	Q2
Denmark	Q4	Q4	Q4	Q4	Q4
Estonia	Q3	Q4	Q4	Q4	Q4
Finland	Q4	Q4	Q4	Q4	Q4
France	Q1	Q2	Q2	Q1	Q1
Germany	Q3	Q3	Q2	Q3	Q3
Greece	Q1	Q1	Q1	Q1	Q1
Hungary	Q2	Q2	Q2	Q2	Q2
Ireland	Q3	Q3	Q3	Q3	Q3
Italy	Q1	Q2	Q1	Q1	Q2
Latvia	Q3	Q3	Q3	Q3	Q3
Lithuania	Q3	Q3	Q3	Q3	Q3
Luxemburg	Q3	Q4	Q3	Q3	Q3
Malta	Q4	Q3	Q4	Q4	Q4
Netherlands	Q4	Q4	Q4	Q4	Q4
Poland	Q1	Q1	Q1	Q1	Q1
Portugal	Q3	Q2	Q2	Q2	Q3
Romania	Q1	Q1	Q1	Q1	Q1
Slovakia	Q2	Q1	Q1	Q2	Q2
Slovenia	Q2	Q2	Q3	Q2	Q2
Spain	Q2	Q3	Q3	Q3	Q2
Sweden	Q4	Q4	Q4	Q4	Q4
United Kingdom	Q4	Q3	Q3	Q3	Q3

Source: Marino, Pariso on Eurostat Dataset

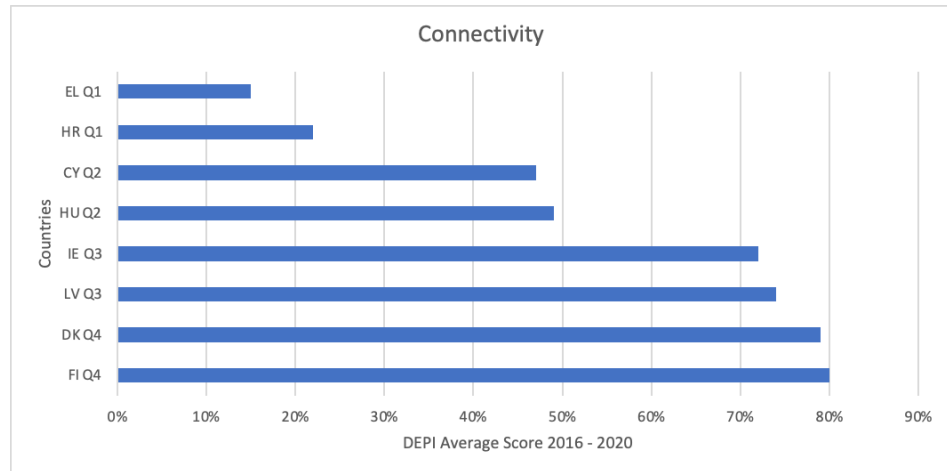


Fig. 1 DEPI Average scores 2016-2020 Connectivity

Source: Marino, Pariso on Eurostat Dataset

Figure 2 shows the Human Capital dimension score of DEPI.

Strategic importance, in this case, is given by digital skills. Remote work should be supported by investments in both traditional and innovative educational sector.

Digital skills, i.e. the ability to use digital platforms for work, leisure and communication competently and safely. It is composed by two sub dimensions, namely “basic skills and usage” and “advanced skills and development”.

Basic skills and usage sub dimension involve indicators on platform use by individuals and digital skills (basic). The other sub dimension includes indicators on ICT specialist employment and graduates in STEM – (Marino et al., 2019).

Science, Technology Engineering and Mathematics disciplines (advanced). Finland and Sweden are the top performers; instead, Romania and Bulgaria rank in the lowest overall on Human Capital dimension. Table 4 reports the breakdown of EU 28 countries in quartiles.

The first quartile (Q1) presents the lowest level of platform effectiveness, whereas the fourth quartile (Q4) shows the highest platform effectiveness level based on the DEPI scores on Human Capital Dimension.

Table 4. Decomposition in quartiles scores in Human Capital

COUNTRIES	2016	2017	2018	2019	2020
Austria	Q3	Q3	Q3	Q3	Q3
Belgium	Q4	Q3	Q3	Q3	Q3
Bulgaria	Q1	Q1	Q1	Q1	Q1
Croatia	Q1	Q2	Q1	Q1	Q2
Cyprus	Q2	Q2	Q2	Q2	Q2
Czech Republic	Q2	Q2	Q2	Q2	Q2
Denmark	Q3	Q3	Q3	Q3	Q3
Estonia	Q3	Q4	Q4	Q4	Q4
Finland	Q4	Q4	Q4	Q4	Q4
France	Q3	Q3	Q3	Q3	Q3
Germany	Q3	Q4	Q4	Q4	Q4
Greece	Q1	Q1	Q1	Q1	Q1
Hungary	Q2	Q1	Q2	Q2	Q2
Ireland	Q4	Q4	Q4	Q4	Q4
Italy	Q1	Q1	Q1	Q1	Q1
Latvia	Q1	Q2	Q2	Q1	Q1
Lithuania	Q3	Q3	Q3	Q3	Q3
Luxemburg	Q4	Q4	Q4	Q4	Q4
Malta	Q2	Q2	Q2	Q2	Q1
Netherlands	Q4	Q4	Q4	Q4	Q4
Poland	Q1	Q1	Q1	Q1	Q1
Portugal	Q3	Q2	Q2	Q2	Q3
Romania	Q1	Q1	Q1	Q1	Q1
Slovakia	Q2	Q1	Q1	Q2	Q2
Slovenia	Q2	Q3	Q3	Q2	Q2
Spain	Q2	Q2	Q2	Q2	Q2
Sweden	Q4	Q4	Q4	Q4	Q4
United Kingdom	Q4	Q3	Q3	Q3	Q3

Source: Marino, Pariso on Eurostat Dataset

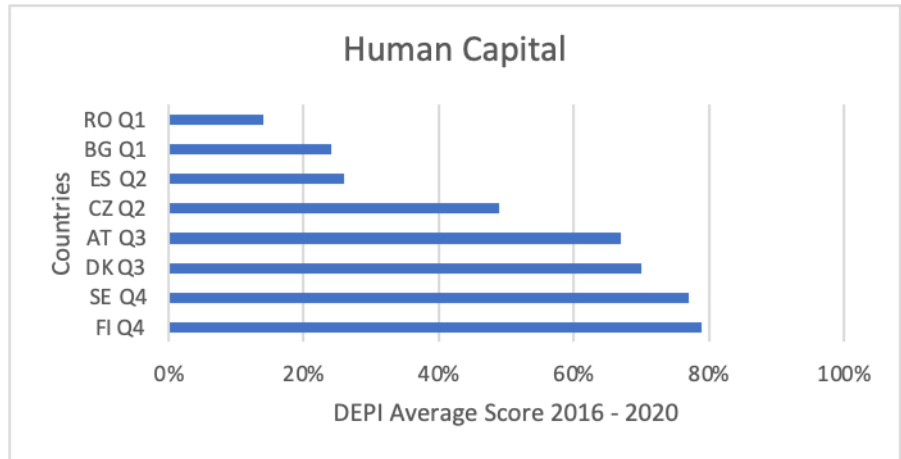


Fig. 2. DEPI Average scores 2016-2020 Human Capital

Source: Marino, Pariso on Eurostat Dataset

Figure 3 displays the Use of Internet services dimension, which is made up of three sub dimensions: Citizens' use of Content, Communication and Online Transactions.

This dimension is related to digital services platforms and its services delivery, i.e., to protect personal data (Barth et al., 2017) and privacy (Acquisti et al., 2005; Acquisti et al., 2015; Awad et al., 2006). The first sub-dimensions measure the extent to which a country's platform users get online content. Furthermore, the second measures the extent to which the same users communicate and interact online via their broadband connections.

Online Transactions, instead, measures the propensity of Internet users to perform transactions online. The best performers on DEPI scores are Sweden and Denmark and the worst are again Romania (see fig. 2) and Italy. Table 5 reports the breakdown of the 28 EU countries in quartiles.

The first quartile (Q1) presents the lowest level of platform effectiveness, whereas the fourth quartile (Q4) shows the highest platform effectiveness level based on DEPI scores on Use of Internet services dimension. Figure n.4 reports Integration of Digital Technologies dimension based on the DEPI scores.

This dimension highlights the difficulty of integration between the platforms and the software that manage the information exchange relationships and the transactions between the business and government processes. It has two sub dimensions, Business digitization and e-commerce both measured by use of digital technologies.

The Business digitization sub-dimension shows the level of adoption of digital technologies by a country's businesses. The e Commerce sub-dimension measures the use of the online sales channel by a country's small and medium enterprises. Finland and once again Sweden (see fig. 2) are at the top positions of European ranking and on once again Romania (see fig. 3) and Poland occupy the last positions.

Table 5. Decomposition in quartiles scores in Use of Internet Services

COUNTRIES	2016	2017	2018	2019	2020
Austria	Q2	Q2	Q2	Q2	Q2
Belgium	Q4	Q3	Q3	Q3	Q3
Bulgaria	Q1	Q1	Q1	Q1	Q1
Croatia	Q2	Q3	Q3	Q2	Q3
Cyprus	Q3	Q3	Q3	Q3	Q2
Czech Republic	Q2	Q2	Q2	Q2	Q2
Denmark	Q4	Q4	Q4	Q4	Q4
Estonia	Q3	Q4	Q4	Q4	Q4
Finland	Q4	Q4	Q4	Q4	Q4
France	Q2	Q2	Q2	Q2	Q1
Germany	Q3	Q4	Q4	Q4	Q4
Greece	Q1	Q1	Q1	Q1	Q1
Hungary	Q2	Q1	Q2	Q2	Q2
Ireland	Q1	Q2	Q2	Q1	Q1
Italy	Q1	Q1	Q1	Q1	Q1
Latvia	Q3	Q3	Q3	Q3	Q3
Lithuania	Q3	Q3	Q3	Q3	Q3
Luxemburg	Q4	Q4	Q4	Q4	Q4
Malta	Q3	Q3	Q3	Q3	Q3
Netherlands	Q4	Q4	Q4	Q4	Q4
Poland	Q1	Q1	Q1	Q1	Q1
Portugal	Q3	Q2	Q2	Q2	Q3
Romania	Q1	Q1	Q1	Q1	Q1
Slovakia	Q2	Q1	Q1	Q2	Q2
Slovenia	Q1	Q3	Q1	Q1	Q2
Spain	Q2	Q2	Q2	Q2	Q2
Sweden	Q4	Q4	Q4	Q4	Q4
United Kingdom	Q4	Q3	Q3	Q3	Q3

Source: Marino, Pariso on Eurostat Dataset

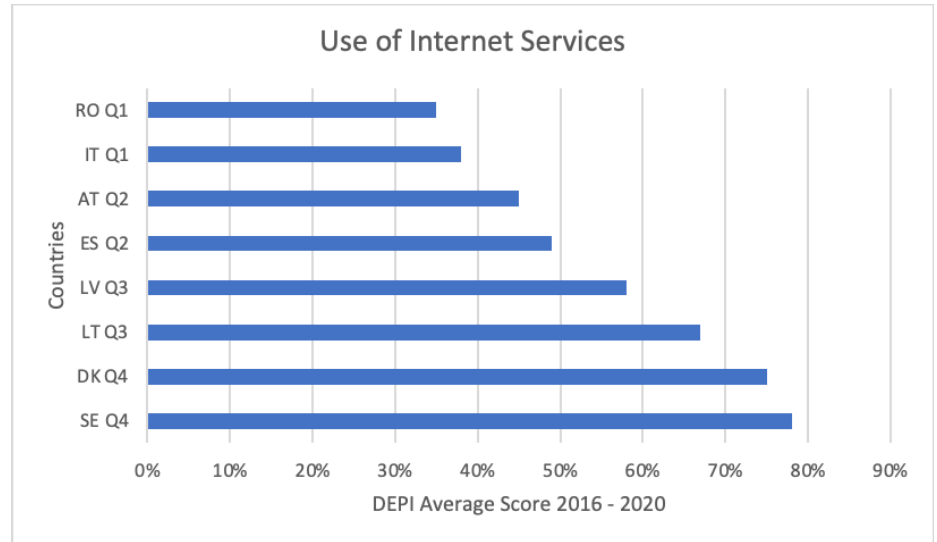


Fig. 3. DEPI Average scores 2016-2020 Use of Internet Servicesa

Source: Marino, Pariso on Eurostat Dataset

Table 6 reports the breakdown of 28 EU countries in quartiles. The first quartile (Q1) presents the lowest level of platform effectiveness, whereas the fourth quartile (Q4) shows the highest platform effectiveness level based on the DEPI scores on Digital Technologies dimension.

Table 6. Decomposition in quartiles scores in Integration of Digital Technology

COUNTRIES	2016	2017	2018	2019	2020
Austria	Q3	Q2	Q2	Q2	Q3
Belgium	Q4	Q4	Q4	Q4	Q4
Bulgaria	Q1	Q1	Q1	Q1	Q1
Croatia	Q2	Q3	Q3	Q2	Q3
Cyprus	Q3	Q3	Q3	Q3	Q2
Czech Republic	Q1	Q2	Q2	Q2	Q2
Denmark	Q4	Q4	Q4	Q4	Q4
Estonia	Q2	Q2	Q2	Q2	Q2
Finland	Q4	Q4	Q4	Q4	Q4
France	Q2	Q2	Q2	Q2	Q2
Germany	Q3	Q3	Q3	Q3	Q3
Greece	Q1	Q1	Q1	Q1	Q1
Hungary	Q1	Q1	Q1	Q1	Q1
Ireland	Q4	Q4	Q4	Q4	Q4
Italy	Q2	Q1	Q2	Q2	Q2
Latvia	Q1	Q3	Q1	Q1	Q2
Lithuania	Q3	Q3	Q3	Q3	Q3
Luxemburg	Q2	Q2	Q2	Q1	Q1
Malta	Q2	Q2	Q2	Q2	Q2
Netherlands	Q4	Q4	Q4	Q4	Q4
Poland	Q1	Q1	Q1	Q1	Q1
Portugal	Q3	Q3	Q3	Q3	Q3
Romania	Q1	Q1	Q1	Q1	Q1
Slovakia	Q2	Q1	Q1	Q2	Q1
Slovenia	Q3	Q3	Q3	Q3	Q3
Spain	Q3	Q4	Q4	Q4	Q4
Sweden	Q4	Q4	Q4	Q4	Q4
United Kingdom	Q4	Q3	Q3	Q3	Q3

Source: Marino, Pariso on Eurostat Dataset

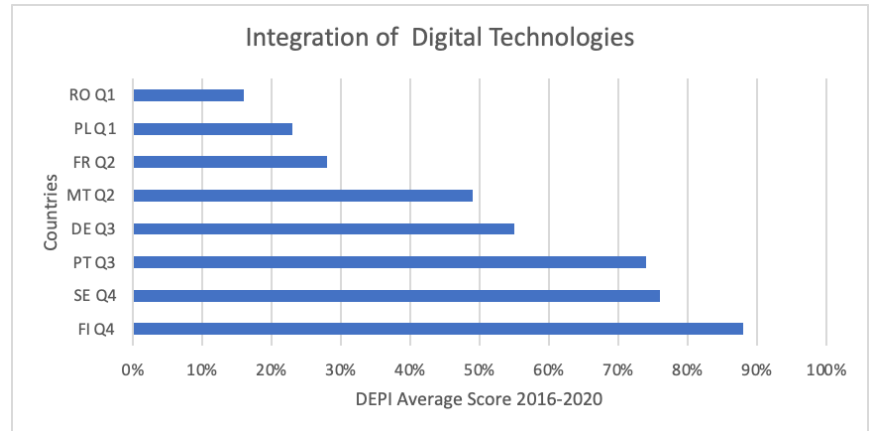


Fig. 4. DEPI Average scores 2016-2020 Integration of Digital Technology

Source: Marino, Pariso on Eurostat Dataset

Figure 5 shows the effectiveness of digital public services dimension by DEPI. The digital public services dimension consists of two sub dimensions: the e Government and e Health. E - government platforms measures the extent of interaction, through digital services delivery, between the public administration and its stakeholders. In line with the previous sub dimension, e Health assesses the percentage of people who used health and care

services provided online. The DEPI score European ranking shows on the top once again Finland (see figs. 2 and 4) and the United Kingdom and at the bottom, once again, Greece (see fig.1) and Hungary. Table 7 reports the breakdown of the 28 EU countries in quartiles. The first quartile (Q1) presents the lowest level of platform effectiveness, whereas the fourth quartile (Q4) shows the highest platform effectiveness level based on the DEPI scores on digital public services dimension.

Table 7. Decomposition in quartiles scores in Digital public services

COUNTRIES	2016	2017	2018	2019	2020
Austria	Q4	Q4	Q4	Q4	Q4
Belgium	Q2	Q2	Q2	Q2	Q2
Bulgaria	Q1	Q1	Q2	Q2	Q1
Croatia	Q2	Q2	Q1	Q1	Q2
Cyprus	Q3	Q3	Q3	Q2	Q3
Czech Republic	Q1	Q2	Q2	Q1	Q1
Denmark	Q4	Q4	Q4	Q4	Q4
Estonia	Q4	Q4	Q4	Q4	Q4
Finland	Q4	Q4	Q4	Q4	Q4
France	Q3	Q3	Q3	Q3	Q3
Germany	Q1	Q3	Q1	Q1	Q2
Greece	Q1	Q1	Q1	Q1	Q1
Hungary	Q1	Q1	Q1	Q1	Q1
Ireland	Q3	Q3	Q3	Q3	Q3
Italy	Q2	Q1	Q2	Q2	Q2
Latvia	Q3	Q3	Q3	Q3	Q3
Lithuania	Q3	Q3	Q3	Q3	Q3
Luxemburg	Q2	Q2	Q2	Q2	Q2
Malta	Q3	Q3	Q3	Q3	Q3
Netherlands	Q4	Q4	Q4	Q4	Q4
Poland	Q1	Q1	Q1	Q1	Q1
Portugal	Q3	Q3	Q3	Q3	Q3
Romania	Q1	Q1	Q1	Q1	Q1
Slovakia	Q2	Q1	Q1	Q2	Q1
Slovenia	Q2	Q2	Q2	Q2	Q2
Spain	Q2	Q2	Q2	Q2	Q2
Sweden	Q4	Q4	Q4	Q4	Q4
United Kingdom	Q4	Q4	Q4	Q4	Q4

Source: Marino, Pariso on Eurostat Dataset

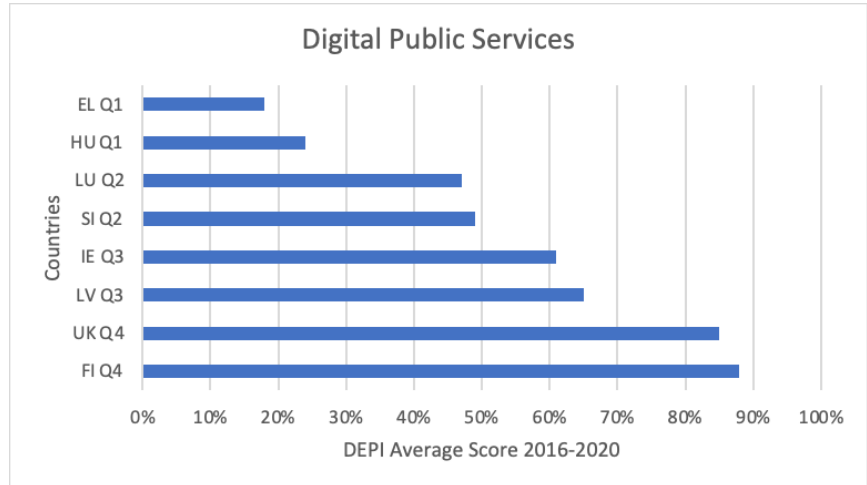


Fig. 5 DEPI Average scores 2016-2020 Digital public services

Source: Marino, Pariso on Eurostat Dataset

The present data analysis confirms the peculiar situation of the 28 EU countries during the period 2016-2020 and highlights the heterogeneous conditions among the countries. Furthermore, each country displays a specific trend related to expenditure propension of the ratio of ICT/GDP and results of DEPI application in the five different DESI dimensions. At this stage some leader countries emerged by data analysis and also country profiles with deep weaknesses are shown. For these reasons, the development of a more sophisticated investigation appears appropriate.

4. Results

From the analysis by geographic area of the 28 EU countries, the following profiles related to ICT/GDP investment emerge. In the G4 Area (Table n.2 - Eastern Europe), except Bulgaria, Croatia and Czech Republic which show an investment share above the average value, the other 7 countries invest a lower than average amount. In these countries, a consolidation of digital platforms is needed in terms of opportunities and challenges to improve remote working (Daniels et al., 2001) and offer change processes to companies and in particular to the public sector. Particularly, for two of them, Romania and Lithuania, compared to the average value (3,81%), the negative deviation ranges between -0,9 (RO) and - 1 (LT). Southern Europe (G3 group) offers a framework in which, out of total of 7 countries, three of these are slightly above the average value and the other four are below it. Greece, in this group, shows a negative deviation compared to the average value for a percentage equal to - 1,3%. In the central Europe (G1 group) Netherlands and Luxembourg are slightly above the average value and the lowest score is achieved by Austria with a negative deviation compared to the average value for a percentage equal to - 1,6%. Northern Europe (G2 group) ranks four, of its five countries, in the first five position, out of total of the 28 EU Member States, in which Ireland, instead, shows a negative deviation compared to the average value for a percentage equal to - 1,2%. Data analysis shows that the countries (Finland, Sweden and Denmark) with the highest share of ICT/GDP ratio investments in 2014 (year of DESI introduction) preserve their leadership until 2018 also in a general framework in which there is an overall decrease of the ICT/GDP ratio investments for the period 2014-2018. Starting with these first results, in the next sub sections a detailed discussion of DEPI dimension results will be provided. Figure 1 reports the trend of DEPI for Connectivity dimension and the sub dimensions taken into account, namely Fixed Broadband, Mobile Broadband, Speed, Affordability. Connectivity is a pre requisite to support digital platforms and its opportunity. Connectivity is a competitive investment in terms of both, development and consolidate the information and communication technology. This dimension highlight Finland is the best performer and Greece the worst. A representation among DEPI, related to Finland and Greece's connectivity sub dimensions performances, calculated by using the level values of the sub dimensions and considering their weighted parameters, is depicted respectively in Fig. 1(a) and Fig. 1(b). It can be observed that the values of these scores are different, but some common patterns can be identified. In particular, DEPI calculated on level values and weighted on the four sub dimensions of Connectivity has a similar trend related to the homogeneous European areas. Finland displays a DEPI average score for the considered period (2014-2018) equal to 1,98, and for the same period, Greece shows a total average score equal to 0,23. On the one hand, Finland achieves its best score in this dimension in the 2018 with a DEPI equal to 2,20. On the other hand also Greece obtains the best DEPI performance in Connectivity dimension with a score equal to 0,68. Related to the connectivity sub dimensions, the strategic gap is the "affordability", in fact in Finland DEPI scored 2,01 but in Greece 0,19. This means that Greece should activate appropriate policies in order to enhance affordability in different sectors. Analyzing the results of Table n.3 it can be detected that Finland is always in Q4 and Greece always occupy Q1 position.

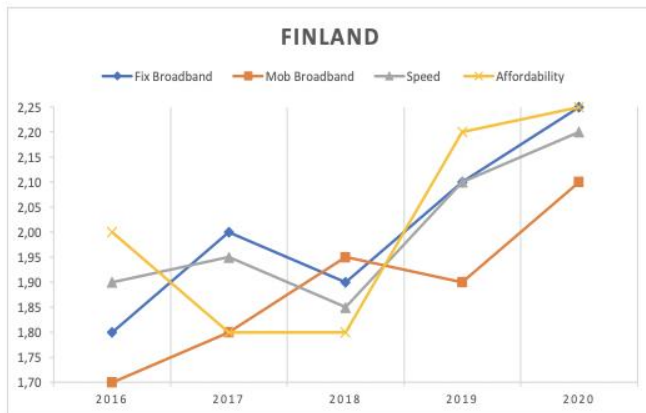


Fig. 1a Connectivity Finland

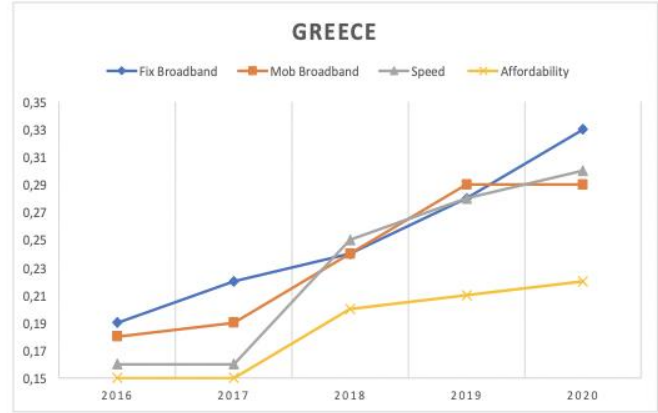


Fig. 1b Connectivity Greece

Similar considerations can be drawn when the index is referred to the Human Capital dimension. DEPI scores have different values but show a very similar trend in the Connectivity dimension. Finland (Fig. 2.a) confirms a leading position also in Human Capital with a DEPI average score for the considered period (2016-2020) equal to 1,98, and the worst performer, belonging to the Eastern European countries, is Romania (fig. 2.b) with a score equal to 0,24. Therefore, also in this case it can be said that the Human Capital dimension distribution, Basic skills and usage and Advanced skills highlight significant differences between the two countries. In the considered period, Finland displays DEPI average scores for each sub dimension equal to 1,99 (Basic) and 1,93 (Advanced). On the opposite side, the scores are 0,27 (Basic) and 0,22 (Advanced) for Romania.



Fig. 2a Human Capital Finland

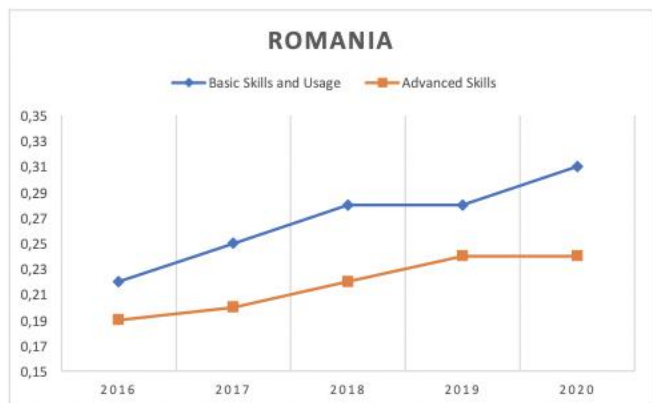


Fig. 2b Human Capital Romania

The DEPI scores calculated on the basis of the Use of Internet Services dimension follow the previous trends whereas the first two positions as held by the northern European group by contrast, there are two countries belonging to the eastern and southern European group, as shown also in Connectivity dimension. In this case the last positions are occupied by Italy and Romania, the first two, instead, by Sweden and Denmark. Those based on the GDP have different values, but the same trends. Sweden's DEPI average score (Fig. 3.a) in this dimension, for the considered period (2016-2020), is equal to 2,04, and Romania's (Fig. 3b) 0,15. Related to the Use of Internet Services sub dimension, the strategic gap is the "transaction", in which Sweden achieves a DEPI average score, for the 5 years, equal to 2,09 and Romania equal to 0,15. It could be mean that in these two countries deep differences in terms of culture in the use of digital technologies for daily transaction by citizens are present, and in this way the first step should be to act towards a reduction of digital divide. This is in line with the general framework in this dimension displays Sweden and Denmark achieve scores linked to Q4, and Italy and Romania always occupy Q1 positions. Furthermore, in relation to the Use of Internet Services sub dimensions, Sweden has

the best average scores in “Content” (2,03) and “Transaction” (2,09), instead Romania reaches its best score in “Communication” (0,23).

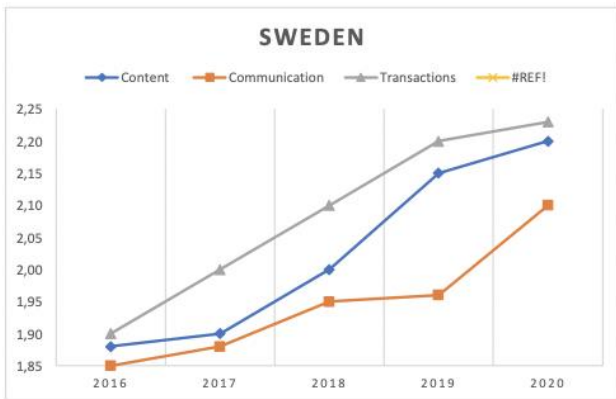


Fig. 3a Use of Internet Services Sweden

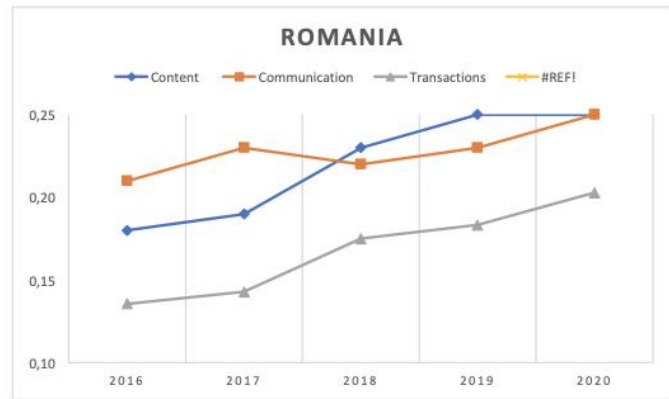


Fig. 3b Use of Internet Services Romania

Figure 4.(a) reports the DEPI score index calculated on the basis of Integration of Digital Technologies dimension for Finland that maintains, also in this dimension, a leadership with a DEPI average score, for the 5 analyzed years, equal to 2,16. Romania (Fig. 4.b) shows once again a low profile of performance with an average score equal to 0,30. The trend is confirmed by the positions occupied by these two countries in the table n. 6 in which Finland is for the five years in Q4 and whereas Romania always places itself in Q1. Analyzing the two sub dimensions of the Integration of Digital Technologies, it can be observed that both countries have the best score in E-commerce sub dimension (Finland 2,20; Romania 0,32).



Fig. 4a Integration of Digital Technologies Finland

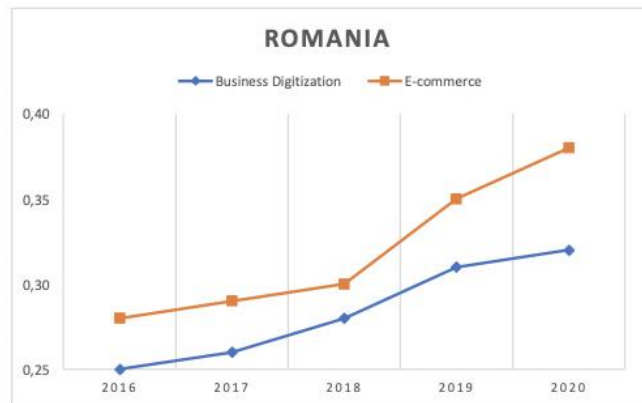


Fig. 4b Integration of Digital Technologies Romania

Figure 5 represents the trend of DEPI for Digital Public Services dimension and its two subdimensions, namely E-government and E-Health. As seen for the Connectivity dimension, Finland is the best performer and Greece the worst. A representation among DEPI, related to Finland and Greece’s Digital Public service sub dimension performances, calculated by using the level values of the sub dimensions and considering their weighting parameters, is depicted respectively in Fig. 5(a) and Fig. 5(b). Finland obtained a DEPI average score for the analyzed period (2016-2020) of 1,91, and Greece shows a total average score equal to 0,31. Both countries realize their best average scores in the E-government sub dimension even if the difference between the two is significant, in fact Finland’s score is 1,97 and Greece’s score is 0,35. This difference, equal to 1,59, is also present in E Health sub dimension. Table n.7 shows that Finland is always in Q4 and Greece always in Q1 position. At this level of results, a first polarization emerges in relation to the DEPI scores, in fact the first two countries belong to the Northern area (G2 group) and show a leadership in all dimensions, as shown in the graphs. The last two countries belong to the Eastern (G4 group) area and display many weaknesses. Furthermore, similar conclusions

can be drawn from the analysis of Tables from 3-7 and it can be observed that Finland is always in Q4, and Greece and Romania are for the entire period in Q1.

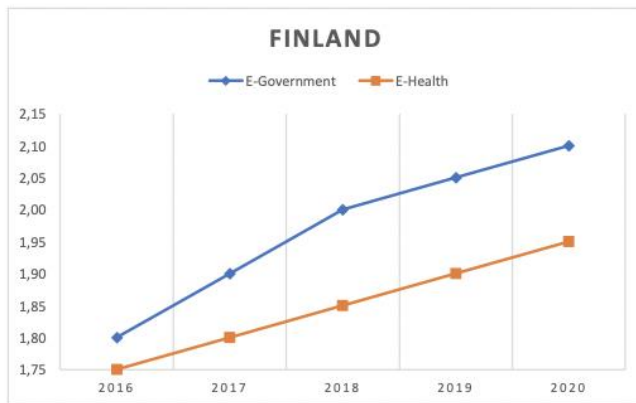


Fig. 5a Digital Public Services Finland

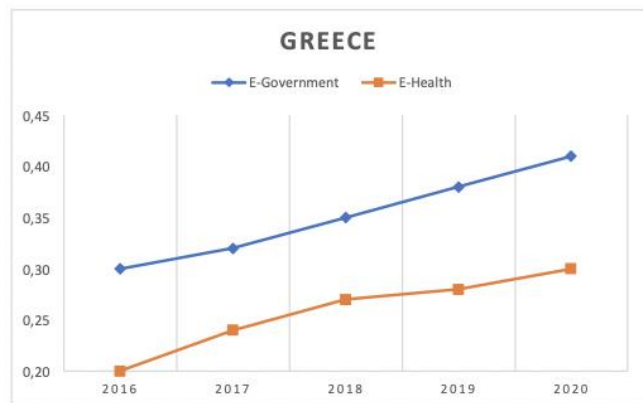


Fig. 5b Digital Public Services Greece

5. Discussion

By analysing the results above reported, representative countries profiles emerge in order to develop a deeply discussion. The comparisons, cross-countries allow to reveal consistent patterns and practical value. Finland, as reported in the previous graphs, shows an effectiveness leadership. Finland has been able to transform challenges into opportunities, consolidating public digital platforms, promoting remote work. The digital public platforms is managing and driving change in this pandemic phase. This leadership has been built with both planning and government actions, in fact Finland developed a Government program with goals of productivity in public services and the private sector by utilizing the digitalization as driver and reducing the red tape. Furthermore, Finland set itself the objective of delivering public services primarily in digital way. In fact, Finland displays a high level of the ICT/GDP ratio within the 28 EU Members State (see Table n.2). Furthermore, the implementation of this program started with an open letter by the government requesting proposals on how to contribute to digitalization. In twelve months, the government has received from public administration, businesses, NGOs and citizens more than 260 proposals and through the appointment of a working group some of these proposals have received funding (i.e. Income register and Virtual hospital - E-Health). This country's leadership profile is sustained, developed together with other northern European countries. It is interesting to note that this shared approach to the creation of public digital platforms, is a model that also other northern European Member States are devoting attention to consolidate and guide the relationship with citizens and stakeholders in this pandemic phase. In particular, Northern countries cooperate on their e-government effectiveness strategy and implementation. Northern European Member States are leading the digital platforms processes and highlight some good practices, such as the one described above. In fact, Denmark, Finland, Norway and Sweden share their national e-government actions and together promote both big data and open data (Ferraris et al., 2020) platforms. The big data (Wamba et al., 2015) represent a strategic step in the creation of a digital platforms service linked to consolidation of the community area. It can be observed, based on this, that the DEPI average scores show as leaders, for each dimension, these countries (G2 group). In particular, for the Connectivity dimension, the first two positions are Finland and Denmark (Fig. 1) and in the considered period, these countries always occupy Q3 or Q4 position (see Table 3). This trend is confirmed also in the other dimensions, Human Capital displays as leaders Finland and Sweden (Fig. 2) with always Q4 or Q3 position (see Table 4), Use of Internet Services shows Sweden and Denmark as the best performer (Fig. 3) and once again with a positioning for both in Q4 (see Table 5). Similarly, Integration of Digital Technology shows Finland and Sweden in the first two positions (Fig. 4) and table n. 6 always displays both countries in Q4 position. Finally, in Digital Public Services, the best performers are Finland and UK (Fig. 5) and in Table 7 it is possible to verify that both countries are always in Q4 position. On the opposite side, the most representative countries' profiles are given by Greece (G3 group) and Romania

(G4 group), belonging respectively to the Southern and Eastern European areas. The worst performances breakdown by DEPI average score assigns to Greece the last position in Connectivity and Digital Public Services and Romania the other three dimensions. Greece, as reported in the previous graphs shows, a low level of government platforms effectiveness compared to the average of the 28 EU Member States. In line with these performances Table n.2 shows, for the entire period, the lowest ICT/GDP ratio. In particular, it can be observed that this low profile is also related to weak government actions that do not emphasize the digitalization and specific planning tools for the government. Particularly, Greece has shown deficiencies in advanced digital infrastructures and interconnection of the State. In fact, Fig. 1.b highlights Greece as one of the European countries with the lowest DEPI scores in Affordability, one of the Connectivity sub dimensions. Furthermore, it could be strategic to interconnect the registers in the entire country, because it is an important element to the development of government platforms effectiveness. Moreover, Greece shows other important limits related to the modernization of the State and Public Administration and in the reconnection of the citizens with State and Public Administration. In fact, these are two strategic objectives of the Country to improve Digital Public Services. Actually, show a very below level of performance the average compared to the other Member States. These low performances are shared with other southern countries, in fact also in Italy, in the considered period the average of ICT/GDP ratio shows a significant difference with the European average share. Moreover, as to Connectivity (Table 3), together with Greece, also France, Italy and Cyprus always occupy positions between quartiles 1 and 2. Analyzing Human Capital (table 4), it can be observed that these low performances (Q1 and Q2 position) are shared by Greece, Cyprus and Italy. In the Use of Internet Services, Greece, Italy, France, and Spain are again in Q1 and Q2 positions (Table 5). This trend is confirmed in Integration of Digital Technology that shows Greece, Italy and France positioning in quartiles 1 and 2 (Table 6). Finally, in Digital Public Services once again Greece and Italy always occupy Q1 and Q2 positions (Table 7). On the basis of this, it can be concluded that in Southern European countries Greece and Italy show a lot of shared weaknesses.

Starting with the description of Greece's profile it can be assumed the Romania's performance in terms of government platforms effectiveness is very similar, in fact, also this country shows the lowest average in the ICT/GDP ratio and achieves below average effectiveness performances in each dimension. In particular, Romania occupies the last position in the DEPI average scores in relation to Human Capital, Use of Internet Services and Integration of Digital Technology dimensions. These scores are in line with the national framework. Despite many attempts to develop effectiveness government strategies, such as the creation of the National Interoperability Framework (NIF), Romania was not able to create, enforce and support policies aimed at minimising the costs and maximising the efficiency of the public administration, and at the same time to ensure a better service delivery to citizens and businesses. The Country, in fact, is not yet able to promote a public administration that uses shared ICT, reusable assets and a standardised approach to implement government platforms effectiveness. In line with the trend reported for Finland and Greece, also the performances showed by Romania are a common element with some other eastern countries. In fact, on one hand also Lithuania, Poland, Latvia, Slovakia and Slovenia, in the analyzed period, invest an average share of the ICT/GDP ratio that is below the European average share. On the other hand, also the DEPI average scores in the five dimensions express many similarities. In particular, in Connectivity dimension (Table 3), Poland, Croatia, and Bulgaria show, together with Romania, performances that rank in the first quartile and other three countries (Slovakia, Hungary and Czech Republic) are positioned in Q2. Analyzing Human Capital dimension (table 4), it can be observed that these low performances (Q1 and Q2 position) are shared also by Poland, Croatia, Bulgaria, Slovakia, Hungary, Latvia and Czech Republic. In line with these performances, also in Use of Internet Services, Integration of Digital Technology, and Digital Public Services, Bulgaria, Czech Republic, Hungary, and Slovakia performances are in line with that of Romania and positioned in quartiles 1 and 2 (Table 5, 6, 7). The reported three country profiles that reflect the trend of three different European group areas, it can be observed that the G2 area represents a country profile with a high propensity in ICT investments. This propensity is linked to actions capable of creating government effectiveness as shown by their DEPI average scores, to an inclination of taking advantage of digital government platforms, and to an ability of acquiring top positions in the long run. Despite these top positions,

there is a country, namely Ireland, that shows in considered period and in all dimensions, significant differences in the DEPI average scores. On the contrary, G3 and G4 areas show a countries' profiles with common regional capability deficiencies in relation with possible outcome of government platforms effectiveness. Particularly, these lacks are linked to connectivity, use of internet services and digital public services. Moreover, there is no integrated strategy between central and local public administration. The lack of these strategies also affects the educational system, particularly with relevance to digital skills training in central and local public administration. DEPI, as an assessment tool for digital government platforms effectiveness, shows that the countries in each geographic area show similar features and the imbalance within the rank is due to the differences existing among the geographic areas. The research limitations, especially in the field of choosing methodology are linked to the necessity to capture how the investments, improve the digital government platform effectiveness in relation to DESI dimensions.

Conclusions

The present paper presented a detailed analysis on the digital government platforms effectiveness of diverse country typologies within Europe. DEPI was elaborated in order to have a synthetic measure of the platform's effectiveness. It is built up by considering its five dimensions. This permitted to investigate in detail the sources of platforms effectiveness in the 28 EU Member States, grouped in quartiles according to the level of DEPI scores. Thus, is an investigation on the relationship between effectiveness and single countries within geographical groups with respect to the digital government platforms development was developed. The analysis demonstrated a stable trend in the platforms' effectiveness, independently of the weighting dimension considered, e.g. Connectivity, Human Capital or Digital Public Services. The situation changes when the countries' profiles are investigated in relation to ICT/GDP ratio, in which a general decreasing trend is observed. This means that the countries investments share in ICT does not have similar distributions but rather a common decreasing investment trend. Analysing DEPI within the same areas the last countries' profiles do not reach different positions in the analysed period, i.e. Ireland (G2 group) holds the last position, and the same consideration is also true for Greece (G3 group), that belongs to a weak European area. Therefore, it is necessary to study thus more in depth, and in the long term, because the weak countries' profiles within different European areas maintain such positions at least in the considered period. This issue is of fundamental relevance for the achievement of EU targets in terms of digital government platforms effectiveness. Similarly, it can be said that in the best performer areas, the leader countries remain such in the considered period, which implies that the different economic structure and adequate government actions of the countries play an important role in the implementation and maintenance of digital government platform development. Moreover, it can be observed that in order to support an effective European digital government policy, it is essential to work on improving, in the respect of the concrete restraints, the mix of government actions of the countries with low performances, in order to reduce both the divergences and the inequality with leader countries. In this way it is possible to reduce both gaps and lacks the worst countries and it could be simpler to set gradual European government targets. In practical terms, it is necessary to support the transition of countries belonging to Q1 and Q2 to effective government systems based on digital government platform. In particular, the effectiveness of many of these areas it is unbalanced towards some countries, in which the outflow of resources is constantly below EU28 average share of ICT/GDP ratio. The share of these investments should be consolidated by increasing the amount of effective government actions. Furthermore, digital government platform development also can help to improve a social issue, because it can ensure employment for a relevant amount of people in territories characterized by higher un-employment rates. Therefore, investments of the Europe are strategic particularly in these areas (e.g. firstly Romania and Bulgaria (G4), Greece and Italy (G3), Ireland (G2) in order to support government policies which could create new work opportunities in the digital government industry. Furthermore, the infrastructural gap should be bridged, especially in terms of Connectivity. As well, as is strategic to ensure a stable supply and to reach a stable efficient network, in order to enhance digital skills, and offer employment to the digital generation. At the same time, more investments in Digital Public Services are necessary, especially for E-government but this requires the reduction

of digital divide, which is very wide. In conclusion, it can be said that in order to reduce the gap within the 28 EU Member States, it is necessary to develop ambitious government actions to support the improvement of the single performances, in the digital dimensions, of European countries. This would necessitate a relevant amount of investments of the 28 EU Member States, but would also promote a development of the government platforms effectiveness at European level. The future is not a destiny but a project, digital platform consolidation is an open question, and must be under constant development and reinterpretation.

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THE ROLE OF ACCOUNTING INFORMATION IN DECISION-MAKING AND ECONOMIC PERFORMANCE: THE PORTUGUESE ACCOUNTANTS' PERSPECTIVE*

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Abstract. The rise of the concept of sustainability reveals a pivotal shift in market thinking, thus pushing companies to reevaluate the method in conducting their decision-making processes. The main objective is to investigate the role of accounting information in decision-making from the point of view of Certified Accountants. Specifically, it aims to analyse the relationship between the companies' size, the usefulness of Financial Information (FI) and Management Control Information (MCI), and the company's economic performance. Supporting evidence is provided by analysis of an online questionnaire survey of professionally qualified accountants working in Portugal. We used structural equation modelling in the analysis of causal relationships between different constructs. The results show the size of the companies and their performances are directly related, so it is the larger companies that have the best economic performance. However, to improve the company's performance, it has been proven that the use of FI in decision-making is not sufficient, so the use of MCI is decisive for a good economic performance. This study highlights the importance of producing useful FI and MCI to assist decision-making and contribute to economic sustainability.

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1. Introduction

The rise of the concept of sustainability reveals a pivotal shift in market thinking, thus pushing companies to reevaluate the method in conducting their decision-making processes. In current competitive environment, companies are asked to innovate at any moment, warranty tomorrow's sustainability and make money now. This context challenges the current mindset of decision-makers and threatens the role accounting information plays in decision-making. For Biancone et al. (2019), the need for open innovation management is crucial to improve organizations performance and consequent sustainable business development. Literature suggests that the growing number of innovation activities in companies has stressed the need for research on management accounting and control (Janka et al., 2020). Based on the literature, Le et al. (2020) argue that managers often require more information for decision-making when facing high uncertainty in business environment. Thus, accounting information system is useful for decision-making process in an innovation context (Janka et al., 2020; Sajady et al., 2012).

In fact, accounting is, unquestionably, an important component of business information systems. Generally, the role of accounting in business organizations is perceived to be the provision of information for decision-making (Hayes, 1977). Indeed, early writers such as Beaver et al. (1968) understood predictive ability of accounting as a facilitator of decision making. However, usefulness of accounting information is grounded on the assessment of decision-making as a rational process. This approach assumes management as a planned, intentional, and rational act, and decision-making as a rational process where managers act as maximizing entrepreneurs (Da Silva et al., 2020). It fits with neoclassic theories of the company which state that organizations identify, evaluate, and implement optimal alternatives. Economic actors are self-interested, but conflicts of interest are resolved through a prior contract by which employees agree to pursue the interests of an entrepreneur (Jensen & Meckling, 1992). These assumptions are challenged by Cyert and March (1992, p.8), with the idea of "bounded rationality", i.e., rational actors are significantly constrained by the limitations of information and calculation. As stated by Wooldridge and Cowden (2020, p.1), "although such decision-making was originally conceived as a completely rational, top-management process, contemporary thinking recognizes that strategies from across multiple organizational levels changes within social and political contexts".

Accounting system provides useful information to interested parties for decision-making and therefore information produced by the accounting can determine organization success and sustainability in an innovation context (Janka et al. 2020; Sajady et al. 2012; Haleem et al., 2018; Ibrahim et al., 2020). The same is to say that FI use is a mandatory condition for the organization success and sustainable development (Baugh et al., 2020). In fact, in studies of Hope and Vyas (2011), and Cepêda and Monteiro (2020), FI usefulness and business performance are statistically correlated. Yet, literature suggests existence of numerous factors that vary according to each company characteristics and context (Amoako, 2013) as proven by contingency theory (Cadez & Guilding, 2018).

An example of a factor that can influence decision-making is company's size and complexity itself because, according to structural functionalism, managers of larger and more complex companies have a greater need to make rational decisions to innovate in business and, in this sense, key decisions are necessary for companies' operation (Miller & Wilson, 2006).

The main objective of this study is to investigate accounting information potential in decision-making, from Certified Accountants perspective. Specifically, it aims to analyse relationship between the companies' size, FI usefulness and MCI, and company's economic performance. Methodologically, it follows a quantitative approach. This research covers a gap in literature regarding accountant's perception about contingency factors that influence the role of accounting information in decision-making and the firm's performance.

Next two sections present the literature review, theoretical framework and hypotheses. After that, we explain methodological procedures. Empirical findings and their discussion follow. Finally, research conclusions and implications are presented.

2. Decision-making and the role of accounting information

Open innovation management is important to firms (Biancone et al. 2019). According to Volberda et al. (2013, p.1), "management innovation consists of changing a firm's organizational form, practices and processes in a way that is new to the firm and/or industry, and results in leveraging the firm's technological knowledge base and its performance in terms of innovation, productivity and competitiveness". For Biancone et al. (2019, p.3), "the more firms have innovation capacity, the more effective the performance and value creation will be for them". Managing innovation is not an easy process and it implies making the right decisions.

A decision is a choice between possible options for action. Decision process results in a choice. The term decision can be associated with decision-making process, with decision support instruments or with decision theory. Making decisions is just like talking, people do it all the time, consciously or unconsciously. So, it is not surprising that decision-making subject is shared by many disciplines, from mathematics and statistics to economics and political science, to sociology and psychology. The study of decision is approached in the most diverse areas of knowledge and according to several perspectives.

Firstly, it is important to separate the concept of problem analysis from the concept of decision-making. Usually, first precedes the second (Kepner & Tregoe, 1981). The analysis of the problem supposes the problem identification and the study of its causes. A problem will be more complex the greater its level of novelty, ambiguity, urgency, as well as its amplitude and importance for the organization. Decision-making presumes the prior definition of objectives and the study of alternatives. Alternatives are all global actions that can be performed and evaluated in isolation. The decision maker is the one responsible for choosing among the alternatives identified as viable. Decision criteria are tools that allow the comparison of alternatives with previous objectives.

Decision-making is either a reasoning or emotional process that can be rational or irrational, based on explicit or tacit assumptions. Decisions are likely to be involuntary and after the decision, we spend our time evaluating the costs and benefits of such a decision (Doya & Shadlen, 2012). However, all the process is highly subjective because as stated by Mock et al. (2008, p.127), "the way a decision-maker should assess evidence depends on how the task is framed".

Rationality concept is central to "decision theory" studies, classical decision theories are based on a rationality perspective. These approaches assume Man as a rational being. The concept origin of Homo Economicus goes back to Adam Smith's work, *Wealth of Nations* (1987). In his model, the capitalist investor would act to maximize and therefore would try to pay the lowest wages but at the same time, the worker would endeavour to find a better paying job in such a way that, if these economic agents were free from any regulation, would eventually find a satisfactory balance point for both.

Following rational decision-making argument in business context, seems quite easy to argue accounting information use. Business decisions are made in an unknown and uncertain decision environment (Shagari & Dandago, 2013). In that sense, the more reliable the FI and the MCI, the better the manager's decisions will be, mainly decisions linked to innovation (Janka et al., 2020). Moreover, usefulness is a major premise of accounting (Frendy, 2017).

Under this assumption, we can argue that the entire accounting information system is useful for the decision-making process (Sajady et al., 2012) and manager must select the greatest expected utility alternative (Thuan & Huong, 2019). The usefulness of FI and MCI refers to information capable of making a difference in the decision-making of financial statement users by having confirmatory value, predictive value or both (Frendy, 2017). This is because FI and MCI allow interested parties to use them to predict future benefits in all past analysis and therefore FI and MCI are prepared so that all information produced by accounting can be used by interested parties to better understand and manage the company (Carraher & Auken, 2013).

Both FI and MCI provide useful information for a wide range of users, internal and external (İbicioglu, Kocabiyik & Dalgat, 2010). All FI produced must be reliable, relevant, and accurate to be analysed and processed by users, to be a fundamental pillar in decision-making (Popescu, 2009). FI is composed of all accounting information, however Financial Statements are one of the most relevant sources of information for financial analysis (Monea, 2013). A Financial Statement is powerful because it reports company's financial performance in each period and it summarizes all income and expenses, and reports its results (Monea, 2013, p.143). On the other hand, Cash Flow Statements information, together with the Balance Sheet, also has enormous relevance for decision-making and for all external and internal users, as they summarize the company's financial position presenting assets, liabilities and equity for a given period (Sharma & Jones, 1998).

According to Mock et al. (2008), managers should be aware that FI can help them keep the financial situation under control and, consequently, enhance business growth. In a similar perspective, Salehi et al. (2010, p.188) argue that FI "plays an important role in the management process of a company's activity". In the same vein, Soudani (2012, p.50) states that "accounting information systems are considered as important organizational mechanisms that are critical to the effectiveness of management and decision control in organizations".

Owners of micro and small companies generally lack management knowledge and have difficulty interpreting the financial statements, which prevents owners from extracting utility out of FI (Birkinshaw *et al.*, 2008). Likewise, managers have difficulty analysing the reports derived from MCI and therefore do not recognize its usefulness (Auken, 2005). Consequently, this difficulty in analysing and interpreting the FI and MCI can compromise the business survival and innovation (Janka et al. 2020; Çaliyurt, 2011).

The main justification for accounting is to meet the users' need for FI. To create meaning from communicated information, the user should be able to process the information and integrate it in his decisions. Yet, as mentioned by Kober et al. (2010, p.271), "concept of usefulness of information is widely regarded as encompassing several qualitative characteristics". Thus, when preparing it, the accountant should consider all the qualitative characteristics of the Financial Statements according to Regulation (EC) No. 1606/2002, of European Parliament and of Council, of July 19th, published by European Commission in November 2003, namely intelligibility,

relevance, comparability and credibility. To have credibility, any information in financial statement must be completed. Any omission can make the information false, misleading and lacks credibility or becomes irrelevant.

For Le et al. (2020), the MCI is an important role in the firm's strategic management. Information systems have contributed to the quality and usefulness of accounting information. Within management accounting, Enterprise Resource Planning (ERP) systems are having a positive impact on this branch of accounting and on the work of management accountants. An ERP system comprises integrated application modules covering most business functions, which allows access to a large amount of information for decision support as well as for control. Oyewo (2020) examined the outcomes of the interaction between organizational characteristics and the robustness of management accounting practice on corporate sustainability, from the standpoint of the Global Management Accounting Principles and concluded that a robust management accounting practice elevates corporate sustainability, organizational characteristics such as size, organization lifecycle, and presence of specialist skills may determine the extent to which such benefit is realized. Le et al. (2020) studied the relationship between organizational culture, management accounting information, innovation capability, and firm performance in Vietnamese small and medium-sized enterprises (SMEs) and proved that management's cultural orientation combined with management accounting information has a significant positive effect on innovation capability and enhanced firm performance. Ibrahim and Naym (2020) and İbicioglu et al. (2010) analysed the influence of age, size and competitive environment of organization on financial and non-financial use performance indicators. A brief review of literature about the contingency factors affecting the efficacy of accounting information systems and its impact on performance show that firm size is a very explored variable, both as moderating variable (Guenther & Heinicke, 2019) and independent variable (Hoque, 2014).

3. Theoretical framework and hypotheses

Contingency Theory advocates that accounting information system characteristics impact on organization effectiveness depends on Contingent Variables such as external environmental, competitive strategy, technology used, firm size, firm diversification, organizational structure, industry variables, and so on. This approach has been widely explored by accounting researchers. Since seminal works, as those of Hayes (1977) and Otley (1980), and Chapman (1997), more than one hundred papers have been published under the topic of "contingency theory" and accounting in web of science database. Moreover, the decisions of managers are influenced by the different characteristics of the company (Çaliyurt, 2011). The importance of examining companies' contextual factors such as their size and accounting information, has been particularly addressed in the literature (Sharma & Jones, 1998).

İbicioglu et al. (2010) concluded that small companies, when compared to large ones, have less liquidity, have more volatile cash flows, depend on short-term financing and are more likely to experience financial difficulties and constraints. These authors also state that failure rates in small companies are unacceptably high. Many studies have found that decision making in small companies involves several factors that make the process complex, for example, the level of company revenue can affect many decisions to innovate in small businesses (Carraher & Auken, 2013). Another cause of this situation, according to Amoako (2013), may be related to the fact that the managers of microenterprises give less importance to FI in decision-making. In this context, we formulate the first hypothesis:

H1: The size of the company influences the usefulness that manager attributes to FI in decision-making.

An accounting system is one of the most effective tools in management decision-making process, because it allows entire FI collection and organization which will then be the basis to produce MCI, making it a critical management aid in the business operation (Amoako, 2013). According to Horvat and Mojzer (2019), large companies use FI and MCI more often than Micro, Small and Medium-Sized Enterprises (MSME). However, the

usefulness of FI and MCI remains a valuable mechanism for all companies to help them achieve their goals (Phornlaphatrachakorn, 2019).

This paper encompasses the orthodox perspective of accounting information systems as a frame that meets two main functions: (a) to support decision-making and (b) to support management control (Zimmerman, 2011). Thus, just like the size of the company can be influenced by the utility that manager attributes to FI when making decisions (İbicioğlu et al. 2010; Salehi et al. 2010), the utility that manager attributes to MCI may also depend on company context characteristics, namely its size (Cadez et al. 2008; Horvat et al. 2019). That is why Cadez and Guilding's (2018) study proved that there is no strategic accounting and management system universally appropriate, because it will always depend on the specific company characteristics. Thus, company size has been a factor considered in many studies because according to the contingency theory, the efficiency of the structure or procedures of an organization depends on the specific circumstances of that organization (Cadez & Guilding, 2018). Thus, our second hypothesis is:

H2: The size of the company influences the usefulness that manager attributes to MCI in decision-making.

Accounting system is one of most effective tools in management decision-making process, because it prepares the whole FI considering all its qualitative characteristics (Auken, 2005). Hence, through FI it is possible to prepare reports for management, i.e., FI is the basis to produce MCI, which makes it a critical aid for management and consequently for good decision-making (Amoako, 2013).

Based on the basic theory of accounting information system, Shen and Han (2020, p.820) demonstrate that accounting information optimization depends on the ability to "truly use the auxiliary accounting function and integrate its functions into the management accounting of the enterprise to play its due role". Similarly, Taipaleenmäkia and Ikäheimob (Ri Taipaleenmäki & Ikäheimo, 2013, p.323) describe the convergence of management accounting and financial accounting as a contemporary phenomenon "in which both intentional integrating and aligning actions of human actors and changes in contingencies are shifting management accounting and financial accounting towards one another, forming newly observable connections between them, through which they affect and interact with each other". In line with this perspective, we formulate third hypothesis:

H3: The usefulness that the manager assigns to the FI is directly related to the usefulness that manager assigns to MCI in decision-making.

Literature suggests that there is "a multidimensional conceptualization of organizational performance related predominantly to stakeholders, heterogeneous product, market circumstances and time" (Richard et al., 2009, p.718). According to Richard et al. (2009), measuring business performance is essential for managers to assess companies position in relation to their rivals and how companies evolve and behave over time. Thus, it is quite acceptable that "there is a growing body of research that seeks to examine whether decision makers are proficient in assessing assumptions and whether performance can be improved" (Mock et al. 2008, p.124). The company's performance, "is a kind of effectiveness indicator" (Richard et al., 2009, p.722) and has always motivated and guided the company's actions (Folan & Browne, 2005).

Upadhaya et al. (2014) investigated the role of performance measurement systems in organizational effectiveness and suggest that non-financial measures and feedback are tightly intertwined with organizational effectiveness. According to Ruf et al. (2001) use measures of financial performance as return on equity, return on sales and sales growth. Several authors measure company performance through profitability, growth, and market share (Richard et al., 2009; Dhanaraj & Beamish, 2003), and adopt a dynamic guideline to measure performance by asking the respondent about the evolution of results in the last 3 years (Sousa, Martínez-López & Coelho, 2008).

Previous empirical studies, supported by statistical data, have analysed relationship between company performance and FI usefulness (Hope et al. 2011; Cepêda et al. 2020; Soudani, 2012). In this context, we formulate the following hypothesis:

H4: The utility that manager attributes to FI influences economic company performance.

Mail et al. (2006), Biancone et al. (2019) and Janka et al. (2020) discuss the importance of studying change management accounting practice that could lead to improve organizational innovation and performance. Mail et al. (2006) demonstrated that management accounting, as a managerial tool in creating organizational control, has a positive effect on organizational, financial, and operational performance. Traditionally, MCI's jurisdiction has played a role in providing information to assist managers in decision-making (Kaplan & Norton, 1996). Given its usefulness for decision-making, MCI may have an influence on organizational performance (Cadez & Guilding, 2018). For instance, Pavlatos and Kostakis (2018) explored top management team impact characteristics and historical financial performance on strategic management accounting and concluded that one of the most important factors that influence the level of usage of SMA techniques is lagging historical enterprises performance.

The impact of management accounting and control in performance has been explored in main dimension, namely sustainability (Narayanan & Boyce, 2019), supply chain integration (Nartey et al., 2020) effective organizational learning under high levels of advanced manufacturing technology (Choe, 2004) and culture. Le et al. (2020, p.1) study “reveal that management’s value orientation towards innovation has a positive direct effect on the use of management accounting, which in turn leads to higher firm performance”. In this context, we formulate following hypothesis:

H5: The usefulness that manager attributes to MCI influences the company's performance in decision-making.

According to Lee (2009), a key line of research in management and accounting is to identify factors that explain financial performance like profitability, the absolute size of a firm being considered a key determinant. In its study, the authors observed that “along with market share, absolute firm size plays a dominant role in explaining variations in profitability” (Lee, 2009, p.200). Indeed, several investigations have found a high degree of association between organizations size and performance. Normally, researchers hypothesize positive relationship between size and performance because “the larger company's assets, the higher investor’s belief to invest” (Mahendri & Irwandi, 2007, p.240). This kind of studies tend to “emphasize the importance of scale economies and other efficiencies in larger firms” (Lee, 2009, p.189), such as negotiation power, greater resources, and market opportunities. There are also a few studies that investigate organizational performance determinants, such as company’s context characteristics (Mail et al., 2006; Lee & Choi, 2003). Other authors, such as Shen and Han (2020, p.809) demonstrate that “reorganizing accounting business processes can greatly improve accounting information decision making usefulness, thereby enhancing enterprises competitiveness”.

Previous studies suggest that context factors such as company size can have a significant weight on its performance (Cadez et al., 2008; Mock et al., 2008; Guilding, 1999). In this context, we formulate following hypothesis:

H6: Company size influences company performance.

Hypotheses defined above support operational model that we propose for this research. Operational model is shown in Figure 1.

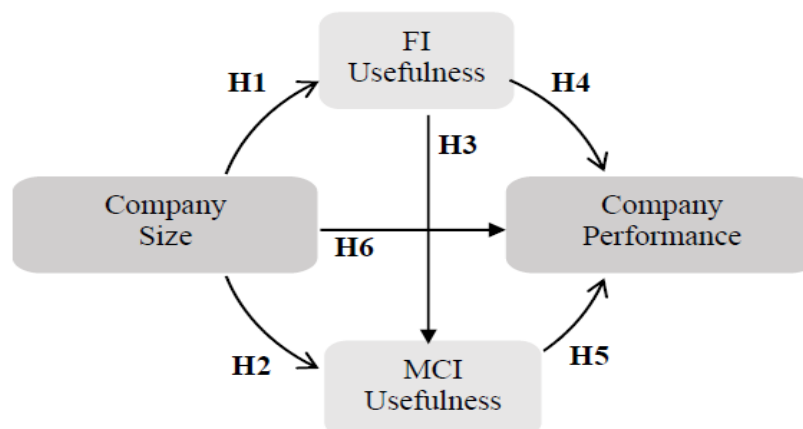


Figure 1. Conceptual model

4. Conceptual model and methodological procedures

This study has contingency theory as its theoretical lens, accepting that there is no universally appropriate accounting and management system (Cadez & Guilding, 2018). It investigates the perception of accountants about contingency factors influencing accounting information role in decision-making. Specifically, we capture certified accountants perspective about the usefulness that manager attributes to FI and MCI in decision-making and its relationship with company's context characteristics (its size) and its impact on performance.

To achieve proposed objective, this study is based on a quantitative approach, which involves application of an online survey to certified accountants (available on the certified accountant's website). This survey was directed to certified accountants because they are the ones who prepare and produce companies' FI and can evaluate FI and MCI usefulness, depending on the type of information that is normally produced and what is actually requested by the manager. Given the large number of Certified Accountants (about 72,000), authors opted for a non-probabilistic statistic.

A survey-based study was carried out to test proposed model. Questionnaire was pre-tested with two higher education professors in accounting, and five accounting professionals, to detect problems related to wording of instruction/questions and clarity. Questionnaire's final version included a question about firm (size), FI and management control usefulness in decision-making and company's performance.

To measure company variables, several questions were asked in the questionnaire. Regarding companies' size, accountants were asked to indicate one of the following options: (1) micro entity, (2) small entity, (3) medium entity or (4) large entity (as defined by the EU). The variable FI usefulness was measured based on the importance attributed to financial statements and FI disclosed in other reports. In assessing the MCI usefulness variable, we considered the importance attributed to management accounting tools (annual budget and forecast maps and management control maps). We measured company performance using Murphy et al.'s (1996) measurement scale (6 items). The items of each dimension were evaluated on a Likert scale of 5 points.

The survey was carried out with Portuguese's certified accountants enrolled in the Order of Certified Accountants (OCC) from May 2017 to August 2018. We emphasize that the professional, to perform the function of certified accountant, must be compulsorily enrolled in the OCC. The link to access the online survey was made available on the OCC website.

During data collection, a total of 285 questionnaires were received, 250 of which were usable because 35 respondents do not currently practice.

In data analysis, we used SPSS statistical software (version 19) and AMOS SPSS (version 24). In the preliminary data analysis, all the procedures, as of data "cleaning" (treatment of missing data and analyses of outliers, central tendency and normality and sample size) will be performed in the SPSS software. This analysis aims to prepare data and assess whether they meet necessary requirements to be subjected to Structural Equation Model (SEM). SEM, performed in AMOS SPSS, is a multivariate technique and involves two steps: (1) evaluation of the measurement model and (2) structural model. In parameters estimating, we use the maximum likelihood method. The maximum likelihood estimation method was used to evaluate measurement model (Marôco, 2010). This method, when using covariance matrices, calculates more reliable estimates. According to Marôco (2010), this method is robust enough for samples that do not follow a normal distribution of data.

In research model evaluation, in addition to model adjustment evaluation, measures were also considered to verify the unidimensionality, reliability and validity of the constructions.

5. Results

Findings show that the sample is mostly composed of men (56.8%), by individuals over 50 years old (65.6%), higher education (80.8%), experience for more than 10 years (81.6%), and currently assume accounting in more than one company (65.6%). Accountants', in their replies, took into consideration the company and managers that, by the nature and wealth of information allowed them, with more knowledge, to respond this inquiry.

Regarding managers under analysis, 80% are male, 57.6% have higher education, 56% work in micro-entities, 27.2% in small entities, 14.4% in medium-sized companies and 2.4% in large companies, and 88.8% managers are business enterprise owners. Most companies belong to the services sector (57.6%), with 25.6% of commercial sector and 16.8% of industry. About three-quarters of companies have started their business more than 10 (years) ago and more than half of the companies have been in the market for more than 20 years.

In this study, in order to prepare the data and assess whether they meet the requirements to be submitted to a SEM analysis, we proceeded to a preliminary analysis of the data. Then we performed evaluation of the SEM. Analysis using the structural equation model involves two steps, the measurement model and the structural model assessment.

In analysis, we find moderate main assumptions violations of normality. However, maximum likelihood estimation method is considered robust against normality assumptions violations (Marôco, 2010)

The measurement model, the unidimensionality of constructs, as well as reliability and validity (convergent and discriminate) were analysed.

Table 1 provides measurement model evaluation results. In first-order models, all items correspond statistically with their factor, demonstrating the unidimensionality of the factor. All loads of observed variables have values, which proves the existence of convergent validity of the constructs (≥ 0.70) (Garver & Mentzer, 1999). All latent variables have values greater than 0.60, which proves the reliability of the scales (Bagozzi & Yi, 1988). Finally, the value of the extracted average variance (> 0.50) shows discriminant validity of the constructs (Fornell & Larcker, 1981).

Table 1. Measurement model results

<i>Construct and items</i>	<i>Standardised loading</i>
FI usefulness (CR=0.93; AVE= 0.70)	
Balance sheet	0.72*
Income statement	0.70*
Cash flow statement	0.80*
Statement of changes in equity	0.77*
Notes	0.72*
Other FI	0.81*
MCI usefulness (CR=0.93; AVE=0.94)	
Annual budget and forecast maps	0.81*
Management control maps	0.94*
Company performance (FC=0.98; MVE=0.84)	
Turnover has increased over the last 3 years.	0.84*
The company has expanded its activity in the last 3 years.	0.78*
The company has been very profitable in the last 3 years.	0.93*
The company has increased its market share in the last 3 years.	0.95*
The company size has increased in the last 3 years.	0.92*
The number of employees has increased in the last 3 years.	0.71*
Notes: CR = composite reliability; AVE = average variance extracted. (*) All loadings are statistically significant at p<0.001.	

Results show a good fit of the model (χ^2 (94) =122.5; $p<0.05$, GFI=0.943, CFI=0.962, RMSEA=0.05). Table 2 presents the standardised coefficients, the value of t and the significance level for each relationship postulated in the model, as well as the coefficient of determination for each construct. Table 3 presents the standardised coefficients, the value of t and the significance level for each relationship postulated in the model, as well as the coefficient of determination for each construct and Table 3 depicts the standardised indirect effects of the theoretical model.

Table 2. Testing results hypotheses

Parameters	Standardised coefficients	t value	R2	Hypotheses	Results
Company's size – FI usefulness	0.15	2.61(*)	0.02	H1	Supported
Company's size – MCI usefulness	0.11	2.88 (*)	0.60	H2	Supported
FI usefulness – MCI usefulness	0.87	15.54 (*)		H3	Supported
FI usefulness – company's performance	-0.79	-3.03(*)	0.35	H4	Supported
MCI usefulness – company's performance	0.97	3.65(*)		H5	Supported
Company's size – company's performance	0.27	4.36(*)		H6	Supported

Note: (*) Sig. value at $p<0.01$.

Table 3. Standardised indirect effects of the theoretical model

	Company's size	FI usefulness
MCI usefulness	0.13	0.00
Company's performance	0.12	0.84

Note: All coefficients are statistically significant at $p < 0.01$.

In this study we found that, statistically, manager of larger companies, attributes greater utility to FI and MCI ($\beta = 0.15$, $p < 0.01$; $\beta = 0.11$, $p < 0.01$, respectively), which leads to support of H1 and H2. Regarding the relationship between FI usefulness and MCI usefulness, results indicate that manager who attributes high importance to FI also attributes to MCI ($\beta = 0.87$, $p < 0.01$), so H3 is supported. It is also possible to conclude that manager who attributes more usefulness to FI is not manager of companies with the best performance ($\beta = -0.79$, $p < 0.01$). Based on the results, H4 is supported, however, the relationship signal was not expected. Although the impact of FI usefulness is negative on company's performance, the MCI usefulness is an important variable that mediates this relationship [$\beta = 0.84$ (0.87×0.97), $p < 0.01$]. On the other hand, managers who give more importance to MCI in decision-making are managers of a company with high performance ($\beta = 0.97$, $p < 0.01$), supporting H5. These results allow us to conclude that attributing importance to the FI alone is not enough to achieve superior performance and organizational innovation. MCI proves to be paramount in the decision-making process. Additionally, in this study, as expected, larger companies have better performance ($\beta = 0.27$, $p < 0.01$), which allows to support the last investigation hypothesis (H6). In sum, all hypotheses were supported, and model explains 60% and 35% of MCI usefulness and company's performance variations, respectively.

Discussion and Conclusion

In innovation management, the decision maker is encouraged to environment research, gather information, and form and evaluate educated assumptions in order to make accurate judgements and decisions (Janka et al., 2020; Sajady et al., 2012). Thus, for good management it is necessary to use information produced by financial accounting and management accounting. The objective of this study is to analyse relationship between utility that manager attributes to accounting information (FI and MCI) in decision-making and size of the company, as well as analyse its impact on economic performance.

In this study, we developed and evaluated a theoretical model using SEM technique. Based on 250 certified accountants' perspective, results show that the company's size has direct influence on the usefulness of the FI and MCI, as well as on companies' performance. FI usefulness determines the MCI usefulness. However, to improve company performance, it has been proven that the use of FI in decision-making is not sufficient, so MCI use is decisive for good economic performance. Previous studies also found that the larger the company, the greater the business performance (Mock et al., 2008) because they can have negotiation power, greater resources, market opportunities and benefit of scale economies and other efficiencies (Lee, 2009; Lee & Choi, 2003). As in this study, other authors also suggest that the managers of large companies recognize greater usefulness to FI and MCI (Cepêda et al. 2020; Amoako, 2013; Cadez et al., 2008; Phornlaphatrachakorn, 2019) which leads to conclusion that accounting information is valuable to all companies as it can help them to take decisions and achieve their goals and superior performance (Cepêda et al. 2020; Phornlaphatrachakorn, 2019) and consequently contributes to business sustainable development. In this study we draw important conclusions: (1) usefulness of the information prepared by management accounting is strongly dependent on the size of the company and the usefulness that the

manager attributes to FI in decision-making, which suggests that the information prepared by the management accounting system depends on the specific characteristics of the firm (Cadez & Guilding, 2018) and the manager; (2) use of the IF decision-making alone does not contribute positively to the companies' performance but, together with MCI, they are determinants of Portuguese companies success.

Based on contingency theory assumption, in this study, we conclude the companies' performance depends on the specific factors, namely size and innovative decisions-making based on accounting information system (Janka et al., 2020; Sajady et al., 2012; Cadez et al., 2008).

This paper is original and contributes to literature, as we present evidence, with the assumptions on contingency theory, on the relationship between company's size, usefulness of FI and MCI, and business performance from the point of view of Certified Accountants. This research is also relevant for accounting and management professionals as it provides a better understanding of the type of information that managers value in decision-making, which may determine the survival and sustainable growth of Portuguese firms.

This study, like all, has some limitations, namely in terms of survey sample size, since we use a convenience sample which limits results generalization. This research involves the accountants' perspective and not managers. We chose to apply the survey to certified accountants to fill a gap in the literature, that is, the absence of studies that analyse the importance that manager recognizes to the information that is produced by the accounting professional.

Organizations move in ecosystems of significant uncertainty. They never know what comes next, what will be the next step of their competitors or what innovation they are planning to launch in the market and on what time scale. Most Portuguese companies operate within the very competitive environment of EU. Digital transformation of society and organizations has been one of the biggest priorities of the EU over the last two decades. However, the constraints imposed by COVID'19 pandemic accelerated the digital transformation in a way never seen before. Companies had to reinvent themselves, managers face great challenges in the field of open innovation. Thus, even though this study remains current and relevant, in future research, we encourage the introduction of information technology and accounting 4.0 as drivers the role of accounting information in decision-making and company performance.

We also suggest: (1) applying this study directly to managers, in order to compare the results obtained and applying this study in different countries with a bigger sample of large companies, given that 99.9% of Portugal companies are MSME; (2) including other independent variables, such as the quality of the internal control system and accounting information system importance and another dependent variable, namely success in decision-making; and (3) performing the same research in different geographical areas in Europe as Italy, Germany, and other continents, to validate or modify our results and start a fruitful discussion under this topic

The model developed within study framework provides a management's orientation approach in terms of using accounting information to determine decision-making quality and the business performance for business sustainability in an environment that is increasingly associated with innovation.

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THE ENTREPRENEURIAL POTENTIAL OF LATVIAN STUDENTS: THE ROLE OF THE UNIVERSITY ENVIRONMENT*

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Abstract. An important prerequisite for the economic growth and improving the quality of life of the population is the growth of entrepreneurial activity. A special place here is occupied by student youth, who, during their studies, partially already receive the necessary knowledge, skills and experience in the field of entrepreneurship. However, there are certain factors in the academic environment hindering the growth of the entrepreneurial potential of students. The object of the study is a set of theoretical, methodological and practical issues aimed at further shaping of the entrepreneurial potential of students and its enhancement in terms of the academic environment having a significant role of in this process. The objective of the study is to examine theoretical foundations of the concept of entrepreneurial potential, to explore foreign experience in researching the entrepreneurial potential of students, to investigate the role of the university environment of higher education institutions in Latvia in the formation and enhancement of the entrepreneurial potential of students. In order to study the motivation and readiness of students to engage in entrepreneurship and the degree of their interest and need for business education for the commercialization of business ideas, a sociological questionnaire was elaborated and a sociological survey (2020) of students of Latvian universities was conducted. 402 students of different faculties were interviewed: social sciences, humanities, information technology, music and art, mathematics. The authors use various methods including the axiomatic one, analysis and synthesis, monographic method, sociological survey, statistical analysis of quantitative data from a questionnaire survey. As a result of the work done, the parameters of the real and potential engagement of Latvian students in entrepreneurial activity, the main obstacles to expanding the scale of student entrepreneurial activities were determined, the activities implemented in the academic environment and stimulating interest in entrepreneurship and real engagement of students in this activity were proposed. Our analysis of the entrepreneurial potential of Latvian students is extremely important in the study and development of entrepreneurship both nationwide and at the level of individual higher education institutions. The results obtained make it possible to assess the situation and take measures towards creating a more favourable learning environment for the development and implementation of students' entrepreneurial intentions.

Keywords: potential; entrepreneurial potential; university environment; factors activating entrepreneurial activity

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1. Introduction

At the present stage of social development, entrepreneurship positions itself as an effective form of reaching human potential. For the past two decades, researchers have been paying close attention to the potential of humans. At the same time, in scientific literature there is no unambiguous system of interpretation and understanding of regularities that would facilitate describing and analysing human potential. In order to transform the economics and obtain the highest possible level of employment, Europe needs a large number of entrepreneurs, including a high potential for entrepreneurial activity of the population, especially among the youth.

The aim of the research undertaken is to consider the theoretical fundamentals of the concept of entrepreneurial potential, to study foreign experience in researching the entrepreneurial potential of students, to investigate the role of the university environment of higher education institutions in Latvia in the formation and promotion of the entrepreneurial potential of students.

The **methods** used by the authors include axiomatic analysis and synthesis, monographic, sociological survey, statistical analysis of quantitative data from a questionnaire survey.

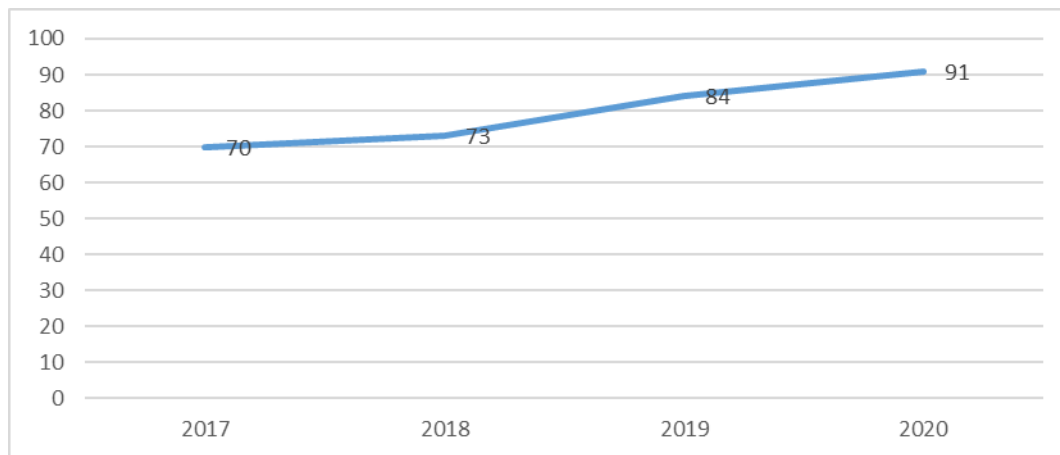


Figure 1. The number of publications related to the issues of entrepreneurial potential of students published in scientific journals indexed in the scientometric database SCOPUS in the period from 2017 to 2020

Source: elaborated by the authors based on SCOPUS database

In the period from 2017 to 2020 the number of publications related to the issues of student entrepreneurial potential published in scientific journals indexed in the scientometric database SCOPUS increased from 70 to 91 (Figure 1). The most active in the matter of our interest were researchers from the United Kingdom (55 publications), Spain (50) and Germany (27). Unfortunately, Latvia showed zero result in the distribution of scientific activity dwelling upon the topical research on the entrepreneurial potential of students.

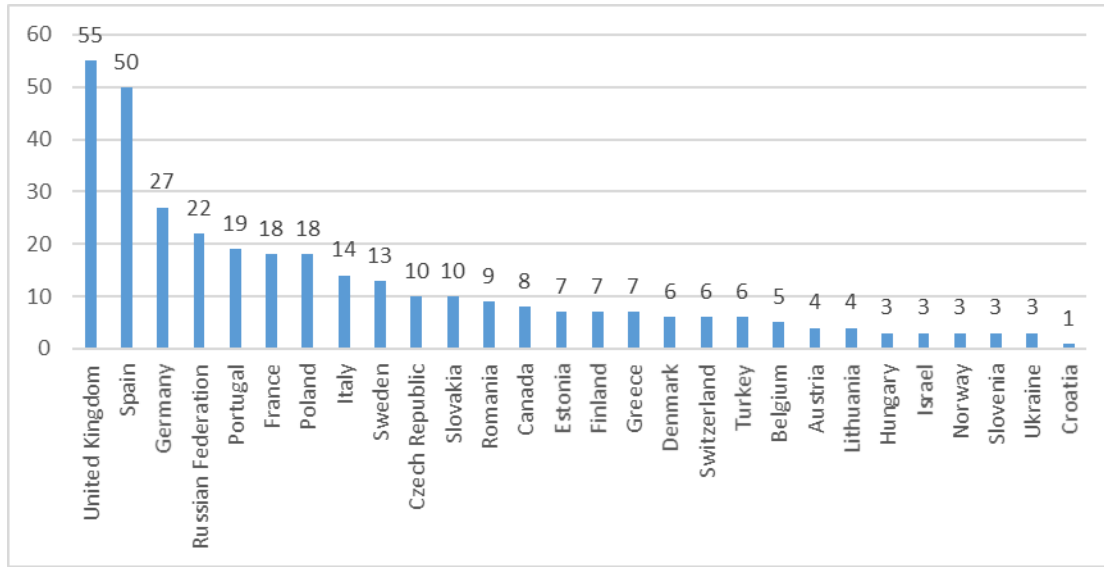


Figure 2. Scientific activity related to the topical research on the entrepreneurial potential of students in the EU countries

Source: elaborated by the authors based on SCOPUS database (SCOPUS 2021)

The issue of the entrepreneurial potential of students has been studied by many foreign authors, such as Krpálek P., Krellová K. (Krpálek et al. 2020), Mukesh, H.V., Rao, A.S., Rajasekharan Pillai, K. (Mukesh et al. 2018), García-Rodríguez, F.J., Ruiz-Rosa, C.-I., Gil-Soto, E., Gutiérrez-Taño, D. (García et al. 2016). The authors believe that entrepreneurship education enhances students' entrepreneurial potential by encouraging them to pursue entrepreneurial careers. Higher education institutions promote knowledge dissemination and the provision of educated workforce in the industry (Athayde 2009), (Pietrovski et al. 2019). The differences between students-adapters and students-innovators have been also investigated. The results of the study showed that young innovators are more likely to have key characteristics that are important for entrepreneurship, as well as intellectual and organisational skills, motivational factors and social capabilities, self-confidence and constitutional factors (Subotic 2018), (Rijati et al. 2019). (see Figure 2).

Our analysis of publications on the subject of student entrepreneurial potential revealed the fact that the work most frequently cited by researchers in this field is "Tracking student entrepreneurial potential: personal attributes and the propensity for business start-ups after graduation in a Portuguese university" by Portuguese scientists Gerry, C., Marques, C.S., Nogueira, F. (Gerry et al. 2008). The aim of this article is twofold: firstly, to assess the extent to which students of the Portuguese University of Trás-os-Montes and Alto Douro (UTAD) located in the country's less developed region may want to establish their own companies upon graduation; and secondly, to assess the personal qualities and abilities of students that may influence such intentions.

The statistical procedures selected for the processing of the data collected from a sample of 640 UTAD students were as follows: (1) a preliminary study of general characteristics of university students and their attitudes to their future employment preferences; and (2) the use of multivariate statistical methods in order to better understand students' attitudes towards their journey from university education to the labour market - with particular attention to the possibility of starting their own enterprise. It was found that gender, attitude to risk, factors related to the choice of profession and desired job, as well as the level of academic preparedness, significantly affect the interest of students and their motivation to start their own business. Such a broad and well-reasoned analysis of the beginning of the entrepreneurial path of students sets a high bar for subsequent researchers of this increasingly topical issue for virtually any country, including Latvia.

In 2021, a study was carried out by the Latvian register of enterprises “Lursoft”, which analysed the age of people who decided to register their first company last year, as well as how the average age of entrepreneurs who founded their first company has changed compared to ten years ago. (Delfi 2021).

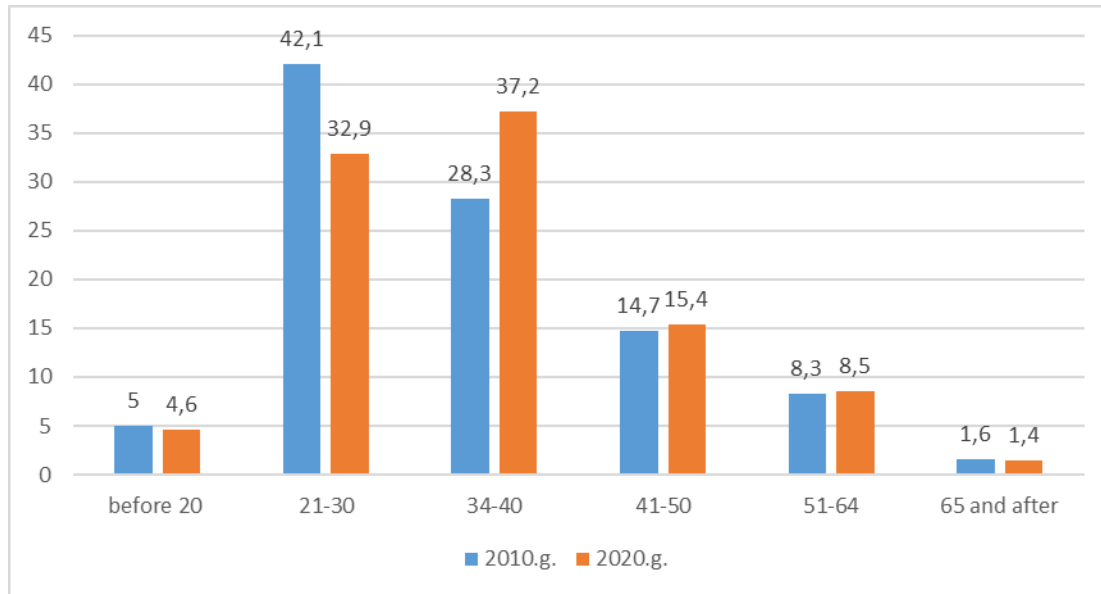


Figure 3. Share of entrepreneurs who registered their first enterprise, by age group, %

Source: elaborated by the authors based on (Delfi 2021).

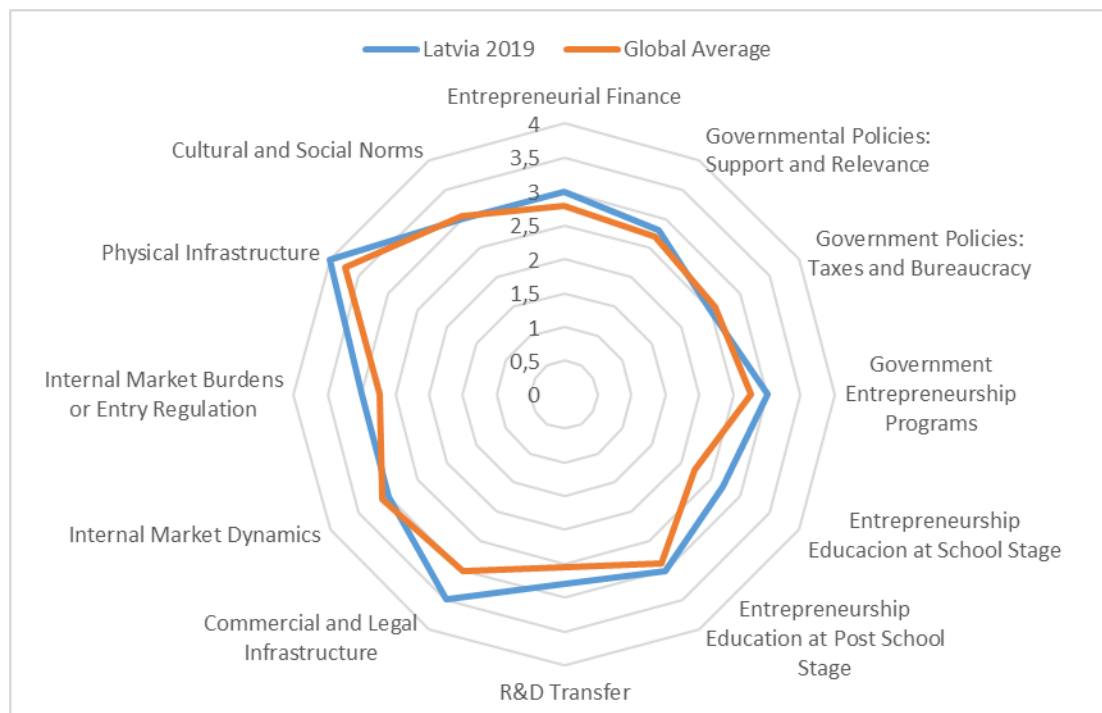
The analysis of the data of the Latvian register of enterprises “Lursoft” on all owners of companies registered in Latvia makes it clear that their average age has increased over the past 10 years. In 2010, it was 46.1 years old, and at the end of 2020 it reached 49.2 years. Figure 3 shows that over the past 10 years, the share of young people under the age of 30 (which includes the overwhelming majority of students) among those who founded their own enterprise has significantly decreased - from 47.1% to 37.5%. However, “Lursoft” researchers do not analyse the reasons that hinder reaching the entrepreneurial potential of young people.

Noteworthy are the data of the international research Global Entrepreneurship Monitor (GEM), where expert assessments of the National Entrepreneurship Context Index (NECI) are given among the important indicators of the entrepreneurial activity of the population. To provide an overview of how favourable the business environment is in different countries, national GEM experts annually define the NECI consisting of 12 indicators. Of course, the NECI data are based on the subjective opinions of experts about the conditions of entrepreneurship within a certain economics and at a certain point of time. Therefore, any cross-country analysis should be done with caution. Entrepreneurship, deeply rooted in cultural traditions and norms, can persist despite difficult conditions, and, conversely, can lag behind despite relatively favourable conditions. However, these indicators provide an effective tool for the comparative analysis and are used to spot the strengths and weaknesses of the national entrepreneurial context by comparing it with other countries.

Such comparative analysis provides for giving recommendations on possible directions for enhancing support and stimulating a thriving entrepreneurial activity. Hence, in 2019, the UK ranked 21st out of 54 countries with a total score of 4.83. A score below 5 out of 10 (neutral) indicates that the experts believe that the conditions for entrepreneurship need to be improved. The overall UK entrepreneurial environment index is slightly lower than

the NECI scores of the benchmark countries, Germany (5.04) and the United States (5.31), and much lower than the NECI scores of the leading countries, including Switzerland (6.05) and the Netherlands (6.04).

Interestingly, in 2019, Latvian national experts assessed the situation for the development of entrepreneurship in Latvia even higher than in the UK (4.91 and 4.83, respectively) and very close to the situation in Sweden (4.92). According to the results of the GEM survey, the number of people involved in the establishment and management of new companies in Latvia in 2019 amounted to 15.43% of the adult working-age population of the country aged 18 to 64, which is 6.1% higher than the average in Europe and Central Asia (Bosma et al. 2020).



Expert Ratings: 1 = highly insufficient, 5 = highly sufficient

Figure 4. Entrepreneurial Framework Conditions in Latvia and Global, 2019

Source: elaborated by the authors based on (GEM 2019)

As may be seen from the data in Figure 4, the entrepreneurial environment in Latvia according to estimates of certain NECI indicators appears to be quite favourable - 9 out of 12 indicators have a higher rating compared to the global one. The most prominent are the commercial and legal infrastructure (by 0.41 scores) and entrepreneurship education in schools (by 0.40 scores). However, entrepreneurship education at universities and other post-secondary educational institutions is rated relatively low, while the global indicators exceed the Latvian ones by 0.10 scores, which make 2.79 scores. This situation with entrepreneurship education in higher education strengthens the topicality of our research and requires a thorough study of both the attitude of students to the possibilities of their educational institutions to the reveal of their entrepreneurial potential, and the real concern of universities in the formation of entrepreneurial activity in their students.

The term “potential” is used by researchers of the Centre for Social Research of Daugavpils University in a set of concepts reflecting the socio-economic activity of an individual (resource, capital, capitalization of resources). Thus, the resource approach was used by our sociologists and economists in the study of labour migration

(Menshikov et al. 2013), social stratification (Menshikov 2016), multidimensional poverty (Voronov et al. 2020). Measuring the capitalization of resources makes it possible to determine the obstacles to acquiring the aggregate capital by the respondents, to find the dominant strategies of their behaviour in the labour market, depending on the specificity of available resources and the ability to capitalize them.

What is that specific and original that the term “potential” gives researchers of socio-economic issues? Is there anything new one can comprehend when using this particular term? The term “potential” characterizes its owner under any socio-economic and other living conditions, while the resource approach narrows the analysis of the situation to the conditions of acquisition and functioning of resources in a market economy. Therefore, the term “potential” is widely used in comparative international studies.

Potential is primarily the ability to perform a certain activity. Ability, on the other hand, is a feature of a subject or object associated with an action. The concept of ability is closely related to the concept of possibility or identical to it. Thus, the concept “potential” refers to the sphere of the possible. Human aggregate capital is an important, but not the only form of manifestation of human potential in the system of market relations. A quantitative assessment of human potential testifies to the quality of social life and the existing economic conditions for reaching the human potential in labour and other types of human activity.

When using the concept “potential”, it is important to keep in mind its systemic nature. In particular, it is the United Nations (UN) that systematically determines the Human Development Index for most countries of the world, when the national Gross Domestic Product (GDP) per capita, level of education and life expectancy are taken into account.

The concept “human potential” has a pronounced interdisciplinary focus. Hence the difficulties of unambiguous understanding of it. The sociological approach to the analysis of human potential is distinguished by an expansive interpretation of this phenomenon, and economists limit the field of their research to the analysis of the possibilities and abilities of an economic entity to ensure the goals of economic growth and socio-economic development. The focus of attention of sociologists is the differentiation of human potential of different social groups and reasons for these differences, the possibility of accumulation and reaching of potential by their representatives. Whereas economists are primarily interested in the return on investment in human potential, sociologists are concerned with the correlation of human potential and quality of life, social inequalities and characteristics of human potential, the role of carriers of various types of human potential in society, the role of the cultural environment in the acquisition and use of human potential, etc. At the same time, a system of sociological indicators of entrepreneurial potential is analysed, including the attitude of the population to entrepreneurship, an assessment of conditions of the entrepreneurial environment, and the orientation of the population towards entrepreneurial activity, as well as self-assessment of personal competence and the ability to take entrepreneurial risks.

What is the focus of the attention of psychologists in the study of human potential? The role of psychological characteristics of certain social groups and individuals in the dominant of certain carriers of elements of human potential. Thus, among the tasks of the psychological study of the phenomena of entrepreneurship, one of the central ones is the study of human abilities, internal reserves of mental and business activity, without which the implementation of entrepreneurial activity is impossible. Entrepreneurship is a complex area of professional activity that requires not only special education, but also special abilities, motivation, personal qualities, and in a special combination and expression.

The entrepreneurial potential of an individual has been studied by economists in the context of entrepreneurship, understood as an activity to create economic innovations, a form of implementing a role function, a final product

of economic creativity, etc., starting from the 18th century. R. Cantillon (Cantillon 2015) and his followers J. Thünen, G. Mangoldt and F. Knight (Knight 2003) identified the ability to take risks as one of the elements of entrepreneurial potential; J. Schumpeter (Schumpeter 1982) considered innovation, creativity as the leading ability of an entrepreneur; L. Mises, F. Hayek, I. Kirzner (Kirzner 2010) focused on such individual psychological characteristics of an entrepreneur as managerial abilities, independence in choice and decision-making, and the ability to respond to changes in the economic and social situation.

In recent decades, scientists from different branches of social science have paid much attention to entrepreneurship as the most significant factor in the dynamic development of the economics. With this in mind, it is important to understand what entrepreneurship and its potential are. Entrepreneurship is any attempt to establish a new enterprise or a new business, such as self-employment, starting a new entrepreneurial structure or expanding an existing business undertaken by an individual, a group of individuals or an existing business structure.

The degree of development of entrepreneurship depends on the formation and implementation of entrepreneurial potential. Entrepreneurial potential is a kind of labour potential; however, it has specific features determined by both the nature of a certain type of entrepreneurial activity and the specific features of a particular economic system.

Entrepreneurial potential is a highly complex phenomenon based on both genetic and social factors (congenital and acquired ones). In the scientific literature, in the reports on scientific research, quite a number of its certain elements may be encountered. In our opinion, the following should be attributed to the individual characteristics of a potential entrepreneur:

- Entrepreneurial opportunities - confidence that there are favourable conditions for starting a business in the place of residence of an individual.
- Entrepreneurial abilities - confidence that a potential entrepreneur has the necessary knowledge and skills to start a business.
- Entrepreneurial intentions – orientation toward the entrepreneurial activity of an employable person who is a latent entrepreneur and plans to open a business within the next few years.
- Mobility is a characteristic of an individual's lifestyle that demonstrates a high level of activity in both real and virtual space.

It is noteworthy that until recently researchers have not paid attention to mobility, which is the most important component of entrepreneurial potential in the context of globalization and the rapid onset of the digital economy. Important changes in the modern labour market, where lifestyles, work and employment are mobilized, cannot be ignored. Traditionally, labour mobility was understood as a career change, a change of work location, or labour migration. Today, mobilisation in labour includes any method of movement in the economic space (more and more often in the virtual space), which brings about saving of working time and the expansion of partnerships. Researchers are paying increasingly more attention to new groups of professionals whose work is impossible without high mobility and the presence of a significant amount of network capital (Menshikov et al. 2017). For an entrepreneur, a new understanding and dimension of mobility has become an essential prerequisite for success.

The experience of international studies on student entrepreneurial potential

The student community of many countries is the subject of studies where the degree of readiness of the educated part of society for entrepreneurial activity, possible measures of public institutions to expand it, are determined. The Global University Entrepreneurial Spirit Students Survey (GUESSS) has been conducted every two years since 2003 (Shirokova et al. 2019). The main goal of the study is to explore to what extent modern students are ready for a career of an entrepreneur, what their intentions for their future career are, whether entrepreneurial

sentiments are strong among students, what the university offers for the enhancement of students' entrepreneurial spirit. Students of any specialty can take part in the survey. The data collection takes place through an online questionnaire developed by the global GUESSS team. Latvia's neighbours participated in 2018 survey: Russia – with 2800 respondents, Lithuania - 1059, Estonia - 1303. Unfortunately, Latvia has not taken part in GUESSS projects yet. (Sieger 2021).

Noteworthy is the theoretical model of GUESSS research - the theory of planned behaviour. Based on the materials from numerous countries, the authors of the research study the influence of three groups of factors on behaviour and career choice: attitudes towards behaviour, subjective norms, and perceived control over behaviour. The characteristics of an individual and the environment of one's life activity are taken into account: personal motives, university environment, family, socio-cultural context. As a result, the dominants and structure of students' intentions in relation to career choice become clear.

It is important to know and consider that according to GUESSS, in 54 countries, only 9% of students see the beginning of their careers as entrepreneurs, 79% - as payroll employees. That is why, within the framework of the study, special attention was paid to those factors that can explain the formation of students' career intentions. The university environment is one of the key elements in the formation of an entrepreneurial ecosystem. However, the data from 54 countries show that the degree of inclusion of the entrepreneurial component in the curriculum is very low: about 45% of students did not have any entrepreneurship courses at all. In addition, the role of the learning environment and related courses in the development of entrepreneurship among students was assessed by the latter at a rather low level, especially among students of natural sciences.

The presence of parents - entrepreneurs in the family is often seen as a factor contributing to the development of their children as future entrepreneurs. Indeed, it has been found that the percentage of students who intend to become entrepreneurs is higher if their parents are entrepreneurs. In an international sample of entrepreneurial families, 39% of students see themselves as founders of their own business, while in non-entrepreneurial families, the percentage of those willing falls to 32%.

There is experience in studying the entrepreneurial potential of students at the national level. In Malaysia, there was a deep study carried out on the introduction of entrepreneurial education in educational institutions of different levels, its sufficiency and specificity at each level of the country's education system (Usova 2021). Some of the research questions were as follows. What are the potential, attitudes and aspirations of enterprising high school students? Is there a difference in the ideas of students' entrepreneurial potential in different educational institutions? Is there a difference in entrepreneurial potential among the entire mass of students and students attending special electives? Is there a difference in the potentials, attitudes and nature of student entrepreneurship? Are there differences in students' attitudes towards entrepreneurship, depending on whether there is compulsory entrepreneurship training or this training is optional? Is there a difference in the nature of entrepreneurship among students of different nationalities?

In the study "Introducing Entrepreneurship Education in Malaysia: Impact on Students' Entrepreneurship Aspiration" (1330 respondents), the entrepreneurial potential refers to such characteristics as willingness to start business, entrepreneurial knowledge and entrepreneurial skills. A total of 1080 (81%) students believe they lack the potential to become entrepreneurs. They feel that for now there are many other concerns - they have to complete their studies before they can pursue an entrepreneurial career. The survey data also showed that only 502 (38%) respondents feel that they have enough knowledge about entrepreneurship. A total of 59% of respondents theoretically choose entrepreneurship as a career, but 41% of respondents did not even hypothetically choose entrepreneurship as a career for their future. Of those who want to choose an entrepreneurial career, a total of 438 (33% of all respondents) believe they will take action when they graduate. Malaysian researchers

emphasize in their conclusions that it is necessary to start teaching entrepreneurship already at school, that students of different educational institutions should be taught entrepreneurship.

Comparative studies of the entrepreneurial potential of students in two countries having similar characteristics of higher education are also of great interest. For example, a study on the topic “Integration of Engineering Education and Business Education in Technical Universities of Ukraine and Belarus as a Factor National Economic Development” (Kutuev et al. 2018).

Based on the analysis of the data of a sociological study carried out within the framework of the BRFFR-SFFRU international research project on the topic “Integration of Engineering Education and Business Education in Technical Universities of Ukraine and Belarus as a Factor National Economic Development”, a high level of motivation and readiness to engage in industrial entrepreneurship was revealed among engineering students of National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” (Kyiv) and the Belarusian National Technical University (Minsk). The study by P. V. Kutuev, G. A. Korzhov, I. V. Pigolenko, A. L. Yakubin, A. A. Melnichenko, E. A. Akimov, A. N. Ishchenko, S. V. Kostyukevich, I.A. Andros and O. Kobyak (Kutuev et al. 2018) substantiates that the students of technical specialties of the former Soviet Union countries may be the social basis for the transition to the market innovative economy, provided that engineering education and business education are integrated at technical universities in order to train an engineer-entrepreneur (such integration already exists in Western countries). It is argued (taking into account the relevant international experience) that there is a high need for training an engineer-entrepreneur in former Soviet countries, since this social figure is key in the commercialization of technical creativity - a global trend launched in Western countries during the development of industrial capitalism.

The theoretical and methodological basis of this study was the concept of an innovation economics by Joseph Schumpeter. In order to study the motivation and readiness of engineering students to engage in industrial entrepreneurship and the degree of their interest and need for business education for the commercialization of engineering ideas, a sociological questionnaire was developed and a sociological survey (2018) was conducted among students of engineering specialties of National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” (Kyiv) and the Belarusian National Technical University (Minsk). The survey showed that the engineering students of NTUU “Igor Sikorsky Kyiv Polytechnic Institute” (Kyiv) and BNTU (Minsk) have a high degree of motivation and readiness, a high interest in business education. The researchers concluded that the common for both groups (Igor Sikorsky Kyiv Polytechnic Institute and BNTU) is the idea of an entrepreneur (businessman) as a person with knowledge of foreign languages, analytical (research) skills, the ability to negotiate, skills of independent work and leadership skills.

It is obvious that students - businessmen have brought some clarity into the idea on what knowledge and skills are important to acquire when teaching entrepreneurship. The analysis of sociological data allowed the researchers to draw the following conclusions: (1) a real (and not idealized) businessman is not only an independent leader, an analyst who knows how to negotiate in a foreign language, but rather a person concerned about protecting his intellectual creation (engineering technology), interested in theoretical scientific disciplines (since new technologies for business can be born here), the one who wants to know how to build and manage a team, interested in practical knowledge about the production technology and, of course, interested in learning foreign languages (since it is necessary to work on global markets); being enterprise is considered an attractive personality trait by the overwhelming majority of the surveyed students; (2) in their environment, about 3 out of 4 people want to do business; (3) about a quarter have unequivocally and confidently stated that they want to study entrepreneurship at their university; (4) despite the high motivation of engineering students to engage in industrial entrepreneurship, the lack of financial capital can be a limiting factor in starting their own business; (5) the high interest of a quarter of the surveyed students to study entrepreneurship at their university should be supported not only by university teachers, but also by business practitioners.

Specificity of the entrepreneurial potential of Latvian students and the ways of its enhancement (experience and problems)

Our own experience in sociological research has guided us to use the revealed theoretical, methodological and practical findings in a sociological survey of students of Latvian universities in the study of the issue of students' entrepreneurial potential. *The objective of the study* is to investigate the role of the university environment of higher education institutions of Latvia in the formation and activation of the entrepreneurial potential of students. *The tasks of the study*: (1) to find out the scope of engagement of Latvian students in entrepreneurship and the share of proto-entrepreneurs (those dreaming to start their own business); (2) to identify the main obstacles to the engagement of students in entrepreneurship, which exist both in Latvia as a whole, and especially in the university environment; (3) to evaluate some of the catalysts for student engagement in entrepreneurial activities, which are university initiatives to increase the entrepreneurial potential of its students. *Hypothesis* - for the students of Latvia, a significant factor contributing to the enhancement of their engagement in entrepreneurial activities is the university initiatives in this direction, especially targeted programmes to support business development. Along with this, knowledge in the field of economic theory and entrepreneurship, which is not yet sufficiently available to students of non-economic specialties, is of the greatest importance.

In academic year 2019/2020, 79.4 thousand students were receiving higher education in Latvia (CSB 2020).

The sample size determination was carried out according to formula 1.1. (Orlovska 2007):

$$n = \frac{t^2 * S^2 * N}{t^2 * S^2 + \Delta x^2 * N} , \quad (1.1.)$$

where:

N - population size,

t - probability coefficient = 1,96, where the reliability of the results will make 95%,

S² - sample variance = 0.25, since part of the studied trait in the population size is unknown

Δ - margin of sampling error = 0.05.

In accordance with formula 1.1, the sample included 383 students.

In February 2020, the researchers of the Department of Economics and the Centre for Social Research of Daugavpils University surveyed 402 students in 16 higher education institutions (including all 6 Latvian universities). The sociological questionnaire included questions that made it possible to identify the parameters of students' attitude to entrepreneurship, their real engagement in entrepreneurial activity, as well as factors both promoting and hindering the accumulation of entrepreneurial potential already in their student years. In general, Latvian students declare a rather positive attitude towards entrepreneurship, when: (1) they already have their own business - 5.8%, (2) have dreams of starting their own business at a certain point - 65.2%, (3) now and hardly ever there will be such desires - 29.0%

More restrained answers were given to the question "To what extent are you ready to establish your own enterprise / start your own business?" where the dominant (among 40% of the respondents) was the answer "both agree and disagree". 34% of the surveyed students are definitely not ready to start their own enterprise yet, and 26% already have their own business, or are almost ready to start it.

When answering the open-ended question of the questionnaire “What, in your opinion, are the most significant obstacles to starting your own business?”, our respondents indicated the following circumstances: their own lack of confidence in success and threats - 51%, lack of start-up capital - 48%, high competition - 42%. As can be seen from these answers, the students see the insufficient degree of their own entrepreneurial potential and start-up financial resources as primary obstacles to their entrepreneurial activity, along with rather high competition in the desired areas of student entrepreneurship. Attention is drawn to the fact that students do not consider the tax system and bureaucracy to be significant obstacles to starting their own business (they have not faced this circumstance yet, which is usually noted by those who already have entrepreneurial experience), as well as the lack of knowledge.

In the course of its own research in Latvia, SEB bank found out that over a half of the country’s residents would like to be their own bosses and almost as many have at least one or even several unrealized business ideas. In addition, almost a third of people who dream of starting a business have been cherishing their ideas for three years already. Most likely, among the residents who want to be their own bosses (including becoming a self-employed person), there are quite a lot of those who can really successfully become such. Why are they still inactive? (SEB 2017).

Seven reasons that keep the residents of Latvia from becoming entrepreneurs, which our students should be not only aware of, but also acquire the relevant knowledge and skills to solve them while still in the university environment: lack of start-up capital, tax system and bureaucracy, fear of failure, lack of knowledge, fear of instability and irregular income, lack of confidence that the idea is worthwhile, doubts about their abilities.

In more detail, the students’ answers about the role of driving factors encouraging students to start their own business are given in Table 1 in descending order of their importance.

Table 1. Driving factors encouraging students to start their own business

Driving factors encouraging students to start their own business	The arithmetic mean of the factor, where 1-completely disagree, 5 - completely agree	Agree with the statement, including completely (%)
Starting a business is risky	4,26	83
Support programmes contribute to business development in Latvia	3,48	44
At the university, I was told in sufficient detail about the types of business and their differences (the sole trader, the limited liability company, the join-stock company, self-employed).	3,32	44
Having started your own business (becoming an entrepreneur), you can earn much more than working as a payroll employee in Latvia.	3,30	38
I am aware of all the taxes that I am paying now	3,27	45
At the university, I was quite well explained that, having received any profession, I can start my own business.	3,10	43
At the university, I was told in sufficient detail about the types of taxes in Latvia.	2,99	38
At the university, I was explained where and how theoretical knowledge can be applied in practice.	2,89	25
I have enough knowledge to start my own business	2,68	29
I am aware of all the taxes that I will have to pay if I start my own business	2,65	27

Source: elaborated by the authors

Among the 10 factors that take place in the university environment and influence starting a business, Latvian students most often indicated the risk, probable losses and threats in the implementation of such an intention (83% agree with this statement). As can be seen from the students' answers, they unquestionably attribute risk to an obstacle to starting their own business, when higher education does not form a broader and positively coloured view of the phenomenon of risk. Apparently, neither in academic matters, nor in research work, meetings with successful entrepreneurs, our students receive knowledge and beliefs about the positive role of risk, about such functions of risk as protective, analytical, innovative, and regulatory ones (Ekonomika 2021).

When starting any new business, it is necessary to assess not only risks, but also chances. Lectures, conversations and discussions with students should be dedicated to both risks and chances - both forms of enhancing the results of decisions and actions taken in an uncertain and unpredictable future. In this case, risks are unfavourable events for an individual, while chances are favourable ones. At the same time, it is important to show young people that in order to make rationally substantiated decisions, it is necessary to predict and evaluate both risks and chances, since when setting goals and making decisions, one expects first of all to achieve success, that is, chances, rather than failure, that is risks.

The sociological survey has shown that students in Latvia give a rather high assessment of university initiatives to develop students' entrepreneurial potential. 44% of the surveyed students agreed with the statement that the implemented entrepreneurship support programmes contribute to the development of business in Latvia (see Table 1). They mention the information on the types of business and their differences (44% agree), taxation of individuals (45%), the relationship between the profession received and business (43%), the tax system in Latvia (38%), the relationship between theoretical knowledge gained and its practical application (25%), enterprise taxes (27%) as important. It is also important to note that 38% of the surveyed students agree that starting their own business, they will be able to earn much more than working as a payroll employee in Latvia, but only 29% of the respondents admit that they have enough knowledge to start their own business.

The correlation analysis of the factors activating the entrepreneurial potential of students in the university environment and the degree of their readiness to found their own enterprise again testifies to the importance of knowledge that correlates with a certain entrepreneurial environment ($r=0,524^{**}$), the transfer of confidence that mastering any profession you can establish your own enterprise ($r=0,331^{**}$), as well as the importance of demonstrating to students the transformation of theoretical knowledge into practical results in mastering any profession ($r=0.355^{*}$) (see Table 2). It has been empirically established that knowledge in the field of economic theory and entrepreneurship plays a special role in increasing the entrepreneurial potential of students. So, to the question of the questionnaire "To what extent are you ready to establish your own enterprise / start your own business?" 30% of students of economic faculties and specialties answered positively, while only 23% of students of other specialties did so.

Table 2. Correlation coefficients between the driving factors of enhancing entrepreneurial potential in the university environment and the degree of students' readiness to start their own enterprise

Factors enhancing the entrepreneurial potential in the university environment	Degree of readiness to start one's own enterprise
Starting an enterprise is risky	,071
Support programmes help start entrepreneurship in Latvia	,087
I have enough knowledge to start my own enterprise	,524**
I have enough knowledge about the types of entrepreneurship and their differences	,022
I know well enough about the types of taxes in Latvia	,020
I am quite well informed about the fact that by mastering any profession I can start my own company.	,331**
I was explained where and how theoretical knowledge can be used in practice	,355*
I am aware of all the taxes I am paying now	,029
I am aware of all the taxes that I will have to pay if I start my own business	,232
Having started your own business (becoming an entrepreneur), you can earn significantly more than working as a payroll employee	,278**

Notes: ** Correlation is statistically significant at 0.01 level (2-sided), * correlation is statistically significant at 0.05 level (2-sided)

Source: elaborated by the authors

Among the driving factors encouraging students to start their own business, the second place on the ranking scale was taken by business development support programmes in Latvia (see Table 2). 44% of our respondents noted the importance of this support, only 13% of the students surveyed disagreed with this, who were mostly not informed about the existence of such programmes, about the types of assistance and support they provide.

The most popular support programmes mentioned by the students were the programmes of the Investment and Development Agency of Latvia (LIAA), primarily business incubators and investment incentive programmes, as well as assistance programmes for start-up entrepreneurs implemented by the financial institution Altum. Some students also mentioned local (municipal) support programmes. Among the types of support that can be obtained within the programmes, students noted the following: assistance in starting a business (both material and non-material), possible financing - in part or in full, risk assessment and management, office or industrial premises and equipment necessary for the business, meetings with experienced entrepreneurs - assistance in the export of competitive products or services, preparation of the necessary documents, filling in declarations and assistance of an accountant (Altum 2021; Vidzemes EC 2021; NaudaBiznesam 2021; BA School 2021; Connect.. 2021; Turiba.. 2021; Ideju.. 2021; ALTUM 2020; Rigas.. 2021; LR..2021; University.. 2021; LIAA 2021; RTU.. 2021; Swedbank 2020; The role .. 2019).

More recently, the Latvian Chamber of Commerce and Industry (LCCI) has created and launched the project "Entrepreneur of Tomorrow" for university students, in which members of the LCCI - entrepreneurs and professionals from various industries began to deliver lectures to students of Latvian universities, thereby providing practical knowledge about entrepreneurship, promoting interest of young people in entrepreneurship and preparing them for doing business both in the Latvian and international markets (LV 2021).

Conclusions

In conclusion, it should be noted that Latvia currently maintains a favourable environment for the development of entrepreneurship among young people, which is characterized by a gradual recovery of economic growth despite the losses caused by the coronavirus pandemic. Hence, distance learning expands opportunities for economic mobility in the virtual space.

For example, during the Global Entrepreneurship Week from 16 to 20 November 2020, the Business Experience Days took place in Latvia for the third time (Swedbank 2020). This initiative contributed to the exchange of experience among entrepreneurs and organisations for a more successful development of entrepreneurial activity in Latvia. Swedbank, together with the business partners of the Latvian Chamber of Commerce and Industry and ALTUM, provided the participants with an exchange of experience through visiting each other virtually and using platforms of digital tools. In addition, during this week, a number of online discussions were organised with experts and entrepreneurs on how to better adapt to new circumstances, how to cooperate and talk remotely, how, despite the situation in the world, to grow and develop, conquering international markets.

The novelty of the research results is that for the first time the parameters of real and potential participation of Latvian students in entrepreneurial activity have been set, the main obstacles to expanding the scale of student entrepreneurial activities have been identified, the activities have been proposed that can be implemented in the academic environment and stimulate the interest toward entrepreneurship and real engagement of students in this activity.

Our analysis of the entrepreneurial potential of Latvian students is extremely important in the study and development of entrepreneurship both nationwide and at the level of individual higher education institutions. The results obtained make it possible to assess the situation and take measures towards creating a more favourable learning environment for the development and implementation of students' entrepreneurial intentions. The materials, results and conclusions of the article may be used by research organisations, government bodies, higher education institutions, student organisations.

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SOCIAL MEDIA IN THE CONTEXT OF TECHNOLOGY ACCEPTANCE MODEL*

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Abstract. Based on the analysis of previous research in the field of technological acceptance models, the aim of this study is to clarify the significance of individual social media factors in connection with the use of electronic banking in the light of unified theory of acceptance and use of technology. The aim of the article is to describe a model that identifies the influence of social media use factors on the use of electronic banking. The purpose of this model is to explain how these factors influence user behavior in the context of using electronic banking. To obtain primary data sources, we used the exploratory method through a questionnaire survey, which was attended by 948 respondents who are Internet users and users of banking services in an electronic environment. We verified the adequacy of the composition of the research sample with Cronbach alpha. We solved the verification of hypotheses through confirmatory factor analysis and modeling of structural equations. The results, using the WLSMV estimation method, found a negative significant impact (negative linear dependence) of the social media factor on the expected efforts, which are further related to the use of electronic banking.

Keywords: Technology acceptance; social media; online banking adoption

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1. Introduction

New technologies and the big expansion of social media websites have transformed interaction in the online space, and many online retailers and industries have provided new opportunities to reach their audiences, including the field of Internet banking (Małkowska et al. 2021).

The coverage of social networks worldwide is still growing. The global digital population is 4.66 billion active Internet users in January 2021, of which 4.2 billion are active social media users, which represents about 90% (Johnson, 2021). For comparison, in 2012, 63.1% of Internet users also used social networking services. The worldwide increase in the use of smartphones and other mobile devices, such as tablets, opened up the possibilities of social networks with extended functions. Most social networks are also available as mobile applications, while some networks are optimized for Internet browsers. Facebook is currently the market leader in terms of size and reach. This social network has been shaping the social media market since its launch and has faced various discussions on user privacy (American Marketing Association, 2014).

According to a 2008 Forrester study, up to 75% of Internet users got to interact with social media through social networks, reading blogs, or writing reviews on e-commerce websites. Significant growth in social media usage should not be ascribed only to young users, as also members of the so-called Generation X, now 35 to 44 years old users are avid users of social media. It is therefore important to note that social media is a revolutionary trend that companies operating in the online environment should pay attention to (Bernardelli et al. 2021; Ahmed et al. 2020). Despite these facts, few companies are active in the online world – the world in which consumers can talk about companies but companies have little to no control over what is being said / written about them (Almeida et al., 2019; Kaplan and Haenlein, 2010).

Communication between banks and consumers is therefore now taking place at various levels in the digital space (Korzeb & Niedziółka, 2020). The main products of banks include internet banking, and with this research we want to examine the area of relations between users of social networks and banks, specifically by examining the degree of acceptance of banking technology through a stimulating factor of social media.

2. Theoretical background

The idea of publishing online content belongs to the era of the so-called Web 1.0. Blogs, wikis and social web projects can be found in Web 2.0. Although Web 2.0. is not connected with any specific technical update of the World Wide Web as such, it is a set of basic functionalities that differentiate it from Web 1.0. If Web 2.0. is being characterized by ideological and technological basis, User Generated Content (UGC) can be understood as a summary of all the ways in which people use social media. The term, which gained widespread popularity in 2005, is commonly used to describe the various forms of media content that are publicly available and created by end users (Kaplan and Haenlein, 2010). According to the Organization for Economic Co-operation and Development (OECD, 2007), a UGC must meet three basic requirements in order to be considered as such: it must be published or made available on a publicly accessible website or social network accessible to a selected group of people, it must demonstrate certain creative efforts and need to be developed outside of professional practices and procedures.

Based on their analysis, Kaplan and Heinlein (2010) define social media as a group of Internet applications, which are based on ideological and technological foundations of Web 2.0., and which enable the creation and exchange of user-generated content (User Generated Content). In addition to this general definition, the authors mention the existence of different types of social media, which need to be further distinguished, but there is no systematic way in which different social media can be categorized (e.g. Čepel, 2019). If we want to try to create a system of social

media classification, it is necessary to rely on a set of theories in the field of media research (social existence, media richness) and social processes (self-presentation).

Social media includes a wide range of online, the so-called word-of-mouth forums, including blogs, company-sponsored discussion forums and chat rooms (Worimegbe et al., 2020), C2C email, product and service customer review portals and discussion forums, other online discussion forums, sites featuring digital content for image, film, photo or music content, and social networks, social media are numerous and diverse (Mangold and Faulds, 2009).

Table 1 Example of social media categorization

Type of social media	Example
Social networks	Facebook, MySpace
Creative content sharing sites	Video: Youtube Photos: Flickr Music: Jamendo Intellectual property: Creative Commons
User-sponsored blogs	cnet.com
Company-sponsored websites / campaigns	Dove's campaign "Real beauty" click2quit.com
Social networks based on invitations	ASmallWorld.net
Professional social networks	LinkedIn
Collaborative websites	Wikipedia
Virtual worlds	Second Life
Commercial communities	eBay, Amazon, iStockphoto
Other	Podcasts Educational content sites (iTunes U, MIT OpenCourseWare) Open-Source Software communities (Wordpress)

Source: Mangold, Faulds (2009)

In the traditional communication paradigm, elements of the promotional mix are coordinated to develop Integrated Marketing Communication (IMC) while the content, frequency, timing and medium of communication are given by the organization in cooperation with its paid agents (advertising agencies, marketing research firms, PR consultants). The flow of information beyond the paradigm is generally limited to face-to-face and word-of-mouth communication between individual consumers, who have minimal impact on market dynamics due to their limitations (Mayzlin, 2006). Despite the age of social media, the management of the content, timing and frequency of information dissemination is not fully in the hands of managers (Streimikiene & Ahmed, 2021). In the new paradigm, information about products and services may also come from the market itself (Ferencakova et al., 2020). This information is based on the experience of individual consumers and is distributed through the traditional components of the promotional mix (Gorączkowska, 2020). In the scheme of the new communication paradigm, marketing managers should recognize the power and critical nature of discussions conducted by consumers on social media (Žufan et al., 2020). The impact of consumer interactions on social media on the development and implementation of IMC strategies is illustrated in the following points as summarized by Mangold and Faulds (2009): The Internet has become a mass media tool for communicating with consumers (Rashtchy et al., 2007). Consumers are moving away from traditional sources of advertising such as radio, television, magazines and newspapers. Consumers demand more control over the content they receive and their media consumption. They also require immediate access to information at their own convenience (Khan et al.,

2019; Rashtchy et al., 2007; Vollmer and Precourt, 2008). Consumers more often turn to different types of social media to carry out their purchasing decision (Lempert, 2006; Vollmer and Precourt, 2008). Social media are perceived as a more credible source of information about products and services, as corporate-sponsored communication through traditional elements of the promotional mix (Foux, 2006).

Advance in online technologies and related applications allow consumers to interact in diverse ways with businesses and institutions. More and more organizations are investing heavily in online customer-centric solutions and technologies in an effort to increase their share of the online market (Kwon et al., 2002; Moss et al., 2006). In recent years, the Internet has grown steadily and offers a number of web applications that provide organizations with a new way to reach and retain consumers by offering new services and products (Tan and Teo, 2000). In the interest of both parties (organizations and consumers), it is very important to monitor and analyze real perceptions and the main reasons for consumers' willingness to adapt these technologies to use these applications (Lee, 2009; Liao and Cheung, 2002). Internet banking has proven to be one of the most profitable e-commerce platforms (Lee, 2009). Most research on the adoption and continued use of technology is based on the Technology Acceptance Model (TAM) (Davis, 1989). The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) is based on and expands TAM in an effort to integrate the eight most widely used models of technological acceptance research into one practical model. UTAUT therefore includes a framework for current studies of the adoption of Internet banking. In this study, we use the fundamentals of this concept to analyze the relationships between its factors and social media. Expected performance is the degree to which the use of technology helps the consumer to perform certain activities. The expected effort is the simplicity with which consumers use technology.

2. Metodology and hypothesis development

The aim of the paper is to determine the significance of the influence of social media on performance expectancy and effort expectancy factors in the context of the UTAUT model and the use of online banking technology. To better understand the use of online banking, we have extended the UTAUT model by including a new construct: social media. We are of the opinion that the adoption and use of social media in the context of online banking can expand the UTAUT model in the field of information systems acceptance. That is why we have drawn up the following hypotheses:

H1. Social media has a positive impact on effort expectancy.

H2. Social media has a positive impact on performance expectancy.

We have solved the research problem and verified the hypotheses by several levels of solution. To obtain primary data sources, we used the exploratory method through a questionnaire survey, which was attended by 454 respondents who are Internet users and users of banking services in an electronic environment. The relatively high level of education and slight male dominance in terms of gender of respondents in the survey sample reflects the profile of online consumers across different countries in the European Union (Al-Qeisi et al., 2014). The questionnaire consisted of closed questions using Lickert's seven-point scale of answers. We verified the adequacy of the composition of the research sample with Cronbach alpha. We solved the verification of hypotheses through confirmatory factor analysis and modeling of structural equations.

In the original construction of the model of technological acceptance, on which our research is based, we incorporated a factor which in the current circumstances of social media boom can significantly influence the use of online banking. This factor is social media (abbreviation SM). Social media can be characterized as media through which banking institutions communicate with their customers, market their products, policies, provide customer support and promote their products and services. For better understanding of respondents, we

supplemented the individual attributes of the social media factors with additional information in parentheses. The questions we used in the survey were as follows (SM 1-4):

SM 1: Using social media of my bank increases the likelihood of successful completion of banking tasks that are important to me (for example Facebook, Twitter, Google + and the like)

SM 2: Using social media of my bank helps me accomplish my banking tasks faster (for example Facebook, Twitter, Google + and the like);

SM 3: I have found that social media is useful in my communication with the bank (e.g. direct communication, following news, etc. through Facebook, Twitter, Google + and the like);

SM 4: Using social media makes my life easier (e.g. Facebook, Twitter, Google + and the like - in connection with the tasks you perform in your online banking).

In relation to online banking, respondents perceive social media mainly as neutral, as in each of the four questions the answer expressing a neutral attitude prevailed, mostly in the question concerning the help of social media when performing online banking tasks (37%). The most positive answers were recorded for the question SM 4 - a total of 45.82% of positive answers. The most negative answers were recorded in question SM 3, which deals with the usefulness of the respondent's communication with the bank via social media.

Table 2 Summary of results for the social media factor

Factor	1	2	3	4	5	6	7
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	N	N	N	N	N	N	N
SM 1	8.81	6.17	7.27	37.00	16.30	13.44	11.01
	40	28	33	168	74	61	50
SM 2	11.23	9.91	9.25	33.26	15.20	12.33	8.81
	51	45	42	151	69	56	40
SM 3	15.86	9.91	12.78	31.50	12.56	9.03	8.37
	72	45	58	143	57	41	38
SM 4	12.56	9.03	8.59	24.01	15.64	13.44	16.74
	57	41	39	109	71	61	76

Legend: 1 – Totally disagree; 3 – Neutral view; 7 – Totally agree

Source: own elaboration

3. Results

To compare the results of factor analysis, we chose an estimation method for calculating values and coefficients - WLSMV, which can be defined as follows - it does not assume normally distributed variables and is presented as the best choice for modeling categorical or sequential data (Brown and Venkatesh, 2005). In our case, we use scaled answers for individual factors as this type of estimation method seems to be a better option here.

In the educational, social, and behavioral sciences, sequential observations of categorical variables are most often operationalized by latent constructs in structural regression models. Testing of ordinal variables as if they were continuous variables, the accuracy and precision of parametric model estimates, standard errors, and goodness-of-fit tests may be compromised, thus leading to misinterpreted statistical conclusions. Robust estimates such as WLSMV (weighted least squares) method, have been addressed in the literature in recent decades and are considered more applicable than the current Maximum Likelihood (ML) theory when ordinal variables are being analyzed (Cheng-Hsien, 2014).

Table 3 Overview of SEM results using the WLSMV method

χ^2 (chi square)	df (degrees of freedom)	CFI (comparative fit index)	RMSEA (Root Mean Square Error of Approximation)
899.229	447	0.972	0.047

Source: own elaboration

Table 4 SEM for SM factor - Overview of the results of latent variables

	Estimate	Std. Error	Z-value	Std. lv	Std. all	KMOS
TSM – social media						
SM 1	1			1.286	0.780	0,779
SM 2	1.049	0.056	18.774	1.348	0.786	0,749
SM 3	1.013	0.069	14.676	1.302	0.735	0,819
SM 4	1.005	0.081	12.358	1.292	0.671	0,849

Source: own elaboration

With social media, there is a question concerning the use of social media to perform online tasks, or the usefulness of social media in communication with the bank. The highest values were recorded in the first three questions, i.e. the questions which deal with the performance of banking tasks. The lowest significance, which is not very striking given the circumstances, was recorded in the question exploring whether social media make life easier when it comes to performing banking tasks. When verifying the reliability of the sample, the Cronbach Alpha indicator reached a value of 0.886.

Structural model and hypothesis testing

After a detailed analysis of partial results, taking into account both analyzes and methods of calculation of factor analysis, we proceeded to the evaluation of our research hypotheses and focused on the regression relationships between individual variables. Detailed statistical values of the model can be found in the individual tables, which show the coefficients of calculations for both methods used to calculate the factor analysis.

Table 5 SEM when estimating WLSMV - Overview of the results of the structural regression model

	Estimate	Std. Error	Z-value	p (> z)	Std.lv	Std.all
TEE						
TSM	- 1.511	0.425	- 3.557	0.000	- 1.559	- 1.559
TPE						
TSM	- 0.432	1.060	- 0.408	0.684	- 0.492	- 0.492

Source: own elaboration

For the purposes of this study, when evaluating research hypotheses, we did not explicitly define null hypotheses, which represent a well-known relationship to the formulated alternative hypothesis and expresses the differences. In each of the hypotheses, we observe the effect of the independent variable on the dependent variable. As part of the evaluation of hypotheses, the table marks estimation methods, while the coefficients always correspond to the

stated method. Due to the nature of the research, the structural model is developed uniformly based on the WLSMV estimation method.

Table 6 Overview of statistical evaluation of the research hypotheses

	Path	Coefficient	S.E.	t (Z)	p	Result	Estimator
H1	TSM>TEE	-1.511	0.425	-3.557	***	Accept	WLSMV
H2	TSM>TPE	-0.042	0.035	-1.193		Reject	WLSMV

Source: own elaboration

H1. Social media has a significant impact on the effort expectancy.

In the context of the hypothesis, we focused on the social media factor and its impact on the effort expectancy. The research results show a negative, statistically significant result. We obtained the values using the WLSMV estimation methods.

H2. Social media has a positive impact on performance expectancy.

Another hypothesis deals with the social media and their impact on the performance expectancy in connection with carrying tasks in online banking. The results point to negative and statistically insignificant coefficients. Thus, we refute the hypothesis. We obtained the values using the WLSMV estimation methods.

Conclusion and discussion

In this case, based on the evaluation of research hypotheses, using the WLSMV estimation method, we found a negative significant impact (negative linear dependence) of the social media factor on the effort expectancy. This relationship can be interpreted as a situation where individual users use social media to communicate with their bank (perform banking tasks) and subsequently has to exert more performance effort to fulfill the task. By adding the social media factor to the model we arrived at interesting findings, namely the existence of its indirect significant impact on the efforts expectancy and the possibility of further research in this area.

Banking institutions, as well as other companies and individuals, gain many benefits from well-designed websites, effective communication on social networks, and also by exploiting the potential of mobile marketing. Our research has the ambition to meaningfully transform the results into practice and, in the form of recommendations, apply findings concerning the behavioral intent for the use of information systems. The process of deeper implementation of social media into the marketing communication of banks may ultimately result in a simpler adoption of new technology, the adoption of procedures and a higher acceptance of the use of technology. With a unified theory of acceptance and use of technology as a theoretical foundation, this work adapts new constructs and definitions from the model in the context of the adaptation of online banking technology.

Future research into the use of Internet banking technology, also based on our results, can be directed to the field of social media, as this factor, in understanding the UTAUT model, has proven to be an attribute of potential importance and we assume that its significance will be in the coming years. user perspective, user experience and ease of use of technology are increasing.

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ENTERPRISE COMPETITIVE POSITIONING BASED ON KNOWLEDGE RESOURCES IDENTIFICATION

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Abstract. Competitive advantages of modern companies are determined by a set of resources that discover the uniqueness of the company in the market and find out its competitive position. The authors conceptualized the process of determining the company's competitive position based on the identification of knowledge resources. Competitive positioning is understood as the process of forming, maintaining and strengthening the company's competitive position based on the audit of key knowledge resources (their types, location, carriers and directions of movement), which form key areas of the company's competence and create sustainable competitive advantages. The sequence of the enterprise competitive positioning on new resources of knowledge which reveals stages of competitive position definition is offered. The tools and methods of estimating knowledge resources in the competitive positioning of the company are formed. The matrices of the company's competitive position are constructed, which determine the competitive advantages and competitive weaknesses of the company. Criteria for interpreting the results of the company competitive positioning based on knowledge resources are proposed. They identify main company's competitive advantages and weaknesses. In the article resources of knowledge that form company's competitive advantages and weaknesses are defined. Competitive advantage matrices are built. Criteria for the results of company's competitive positioning on new knowledge resources interpreting are suggested.

Keywords: competitive advantages; competitive positioning; identification; measurement; knowledge resources

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JEL Classifications: M21, M31

Additional disciplines: mathematics, management

1. Introduction

Main trends in the modern business environment are characterized by volatility, complexity, unpredictability and chaos, or to put it in another way, Volatility, Uncertainty, Complexity and Ambiguity (VUCA). Changes, which are intensified by revolutionary technological transformations are associated with a gradual transition to a new, sixth technological order, post-industrial society and digitalization of the economy, which radically change the conditions and opportunities for companies competition. Modern scientific view of ensuring the competitive advantage of enterprises and their competitive positioning proves that the classic schools of strategic management, effective in the late twentieth century, are ineffective in the XXI century, because unpredictable and unpredictable changes in the business environment often make strategic management processes irrelevant. strategic positioning, strategic planning. The development of strategic management schools followed the changes that took place in the environment, which concerned both the productive forces of society and, consequently, the factors of competitive advantage, and the very essence of competitive relations. Modern approaches to ensuring the companies competitive advantage are based on the concepts of resource and competence approaches to company management (Hamel & Prahalad, 1994; Teece, 2007; Coyne et al., 2007; Tidd, 2016, etc.), which postulate the fact that stable, unique and difficult to simulate competitive advantages are determined by a unique set of intangible success factors for each company, such as key capabilities and competencies (Teece, 2007; Hamel & Prahalad, 1994; Coyne et al. 2007; Tidd, 2016, etc.). The high level of information and telecommunication technologies development has caused acceleration of introduction processes and distribution, copying by competitors of new science-intensive technologies and scientific developments. In these conditions, the competitiveness of a modern company, its role as an "intellectual leader" in the industry is determined by the availability of internal resources of knowledge, which together create a stable and long-term competitive advantage (Leonard-Barton, 1988). Thus, today in the scientific community there is a consensus on the internal organizational origins of the company's competitive advantages based on the use of intangible assets, among which the most important are knowledge, intellectual property and capabilities (Teece, 2007).

Obviously, the solution of the problems of forming the company's competitive advantages and company's competitive positioning on the basis of knowledge resources is in the plane of knowledge management. The most difficult task of competitive positioning is the audit of knowledge resources that are potentially able to form the competitive advantages of the company and determine its competitive position. Thus, the aim of the study is to conceptualize the company's competitive positioning based on the knowledge resources identification and the creation of competitive positioning tools. Realization of the set article purpose demands the decision of the following tasks, which are solved in article:

- conceptualization of the competitive positioning process on the basis of knowledge resources;
- formation of a competitive positioning procedure based on knowledge resources;
- improvement of methods of the company's knowledge resources identification and their application in the competitive positioning process and formation of competitive advantages;
- determination of the company's competitive position based on the identification of knowledge resources.

2. Methodology

To solve the tasks set in the study, general scientific and special research methods were used: analysis and synthesis, competence approach (in the conceptualization of the research subject); knowledge audit and expert survey (to identify the company's knowledge resources); scoring, scaling, rating, assessment of knowledge at the level of codification and diffusion (to assess knowledge resources); matrix method and method of comparison (to form a company's competitive position).

The methodology for identifying and measuring the company's knowledge resources is quite complex. Some authors consider the measurement of knowledge resources at the level of individual companies (Tidd, 2016) and at the level of their own practical experience (Henderson & Cockburn, 1995) in an attempt to link intra-firm and industry analysis (Leonard-Barton, 1988). However, measuring internal knowledge resources through industry efficiency is not always appropriate, as knowledge resources are internal sources of competitive advantage as a unique set of knowledge, capabilities and business attributes for each company.

Measurement of the company's knowledge resources, capabilities and competencies can be carried out on the basis of various methods, in particular, on the basis of assessing the impact of intangible assets on company performance (Henderson & Cockburn, 1995), which is also difficult to measure the contribution of intangible assets specific type.

A significant contribution to the methodology of measuring knowledge resources, capabilities and competencies was made by Ukrainian scientists V. Verba, O. Grebeshkova: "Problems of identification of enterprise competencies" (Verba & Grebeshkova, 2004) and "Diagnostics of enterprise competencies" (Verba & Grebeshkova 2007), who proposed to form the company's competitive advantages based on compliance with the internal balance of different hierarchical levels competencies (Verba, Grebeshkova 2007), as well as O. Malyarchuk and A. Nalyvayko et al. (Malyarchuk, 2013; Nalyvayko et al., 2017), who offers measurement of companies knowledge resources based on SPACE-analysis, evaluation of enterprise resources on the criteria of value, uniqueness, mobility and organization (VRIO-analysis technique, supplemented by an integrated indicator of the strategic status of enterprise resources – Sr), which allows to form a company's strategic position based on the availability of resources that are of strategic importance to the company (Malyarchuk, 2013). This approach makes a significant contribution to the practice of strategic and competitive positioning of the company based on the resource approach, forming a practical tool for their identification and diagnosis (Nalyvayko et al., 2017).

In forming the methodology for identifying knowledge resources in the company's competitive positioning, we applied the concept of the social learning cycle and the M. Boisot approach (Boisot, 1995) on the processes of codification and diffusion of knowledge in the social learning cycle. It is formed in two directions: codification (the level to which information can be compressed and expressed explicitly) and diffusion (the degree of information dissemination between a number of agents) (Boisot, 1995). Evaluation of knowledge sources on the scale of codification and diffusion allowed to identify those knowledge that are crucial for the formation of sustainable competitive advantages.

The concept of the company competitive positioning based on the identification of company's knowledge resources predicts determining the whole set of knowledge resources, business processes and business attributes that can be transformed into competitive advantages (Vartanova, 2020; Vartanova et al., 2020; Vartanova & Kolomytseva, 2019; Vartanova & Salita, 2013; Vartanova & Rekiyanov, 2015; Vartanova & Rekiyanov, 2016; Acharya et al., 2020; Jeannerat & Kebir, 2020; Bolade, 2021), the definition of their location, media and methods of analysis. Conceptualization of the company's competitive positioning on the basis of knowledge and competencies made it possible to form a sequence of competitive positioning of knowledge resources identification.

3. Main part

The implementation of the competence approach in the company's competitive positioning allows to solve a number of specific scientific and applied problems. In particular, the consideration of knowledge resources as a source of the company's competitive advantages and the formation of competence key areas on their basis allows to identify strategic knowledge resources that underlie the company's competitive success, to determine the company's competitive position, key areas of competence and its competitive benefits (Vartanova, 2020; Rekiyanov, 2011; Rekiyanov, 2008; Buzko & Rekiyanov, 2007), Kolomytseva & Pepchuk, 2017; Kolomytseva,

2016). This understanding of the applied tasks of the company's competitive positioning on the basis of competency approach allowed to clarify the terminological meaning of this concept as a process of forming, maintaining and strengthening the company's competitive position based on audit of key knowledge resources (their types, localization, media and directions), definite key areas of the company's competence and create sustainable competitive advantages. In this context, the basis for the company's competitive positioning are the company's knowledge management processes, which allow to create incentives to improve the company's ability to innovate, combine knowledge sources with their needs, create conditions for effective knowledge exchange and assess their contextual effectiveness. The sequence of company's competitive positioning based on the identification of knowledge resources is given in Fig. 1.

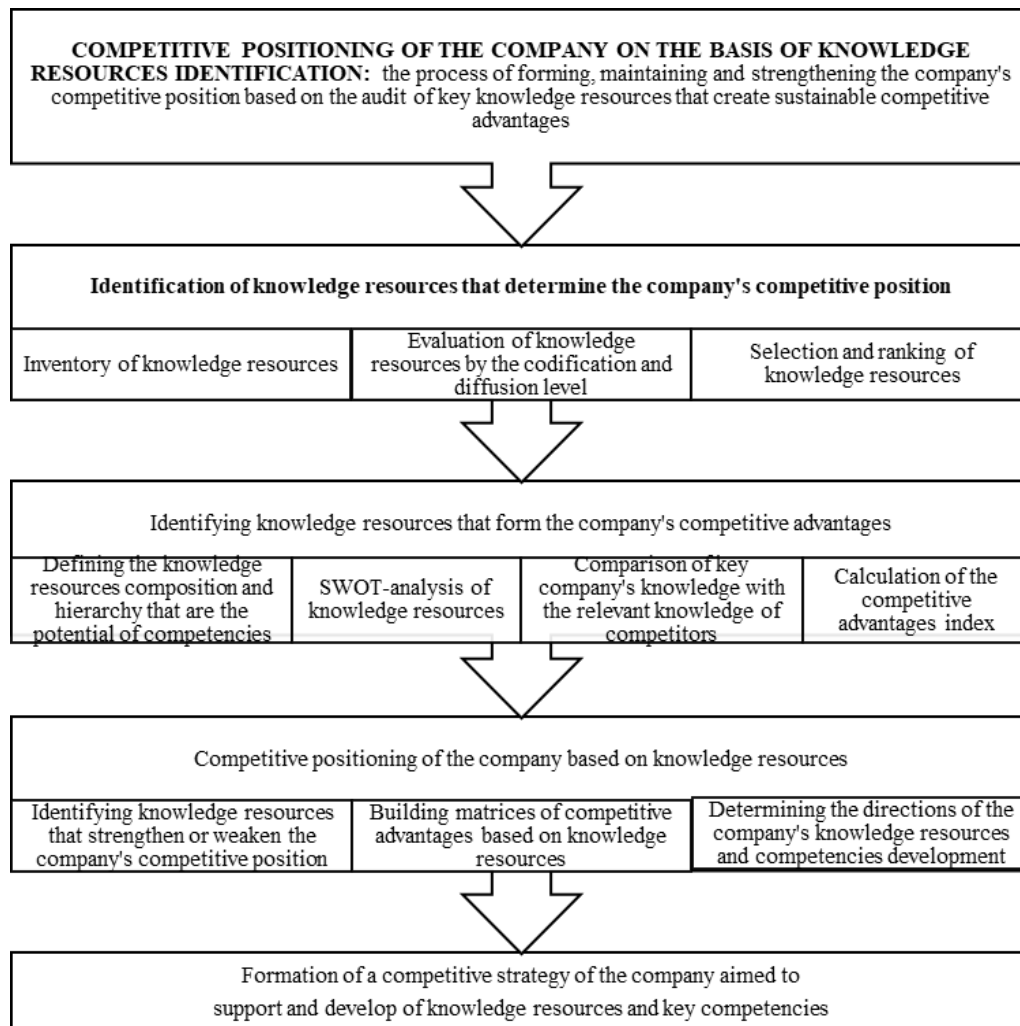


Figure 1. Conceptualization of the company's competitive positioning on the basis of knowledge resources identification

Source: own research

The criteria for selecting knowledge resources that can be used to build a competitive position of the enterprise is their uniqueness (Moore, 2006; Otenko & Preobrazhenska, 2012). We offer to evaluate the uniqueness of knowledge according to the criteria of knowledge codification and diffusion. Codification is the degree to which

information can be compressed and expressed explicitly (plain text is more codified than images, and numerical information is more so than utterances). Diffusion of knowledge is the degree of information dissemination between a number of agents who are employees of the enterprise. Therefore, we have applied the approach to evaluation and scale of knowledge codification and diffusion for machine-building companies, which is proposed by Joe Tidd in the book "From strategic management to strategic competence: measuring technological, Market and Organization Innovation" (Tidd, 2016).

Table 1. Scales of codification and diffusion of the company's knowledge

Knowledge codification	Value	Knowledge diffusion	Value
<i>Codified knowledge</i>		Common knowledge:	
Can be fully represented by information technologies	6	Known to all companies in all industries	6
Can be partially represented by information technologies	5	Known to many companies in all industries	5
Can be systematically described	4	Known to many companies in many areas	4
Can be clearly described	3	Known to many companies in several areas	3
Can be shown and described orally	2	Known to small number of companies in several areas	2
Can be demonstrated	1	Known to small number of companies in one area	1
Are in the minds of employees	0	Known to only one company in an industry	0
<i>Uncodified knowledge</i>		Uncommon knowledge	

Source: Tidd (2016)

Results

Approbation of the company's competitive positioning formed methodology on the basis of resources identification is carried out according to the machine-building enterprise of the Cherkassy area – "Smilyansky electromechanical plant" LLC. The company manufactures components and parts for electric motors and generators, provides repair services. The purpose of the study is the competitive positioning of the machine-building enterprise of Cherkasy region on the basis of knowledge resources identification. As a result of the strategic session and the survey of the company's employees, 56 knowledge resources were identified, which were named by the respondents.

Thereafter, the initially defined list of 56 knowledge resources of the researched company is not final, because we are interested only in those knowledge that are able to create a competitive advantage of the company over competitors, and therefore are quite unique. We propose to evaluate knowledge sources according to the criteria of codification (degree of codification of knowledge; unique knowledge is uncodified) and diffusion (degree of knowledge prevalence; unique knowledge and technologies are not diffuse) of knowledge, using the proposed scales of codification and diffusion. Thus, the sources of knowledge that are able to form the company's competitive advantages and its competitive position in terms of codification and diffusion are rated from 0 to 3; it is knowledge that is codified by no more than: "Can be clearly described" and differentiated by no more than: "Known to many companies in several industries". The results of the knowledge resources assessment of "Smilyansky Electromechanical Plant" LLC (Cherkasy region) according to the level of codification and diffusion are presented in Fig. 2.

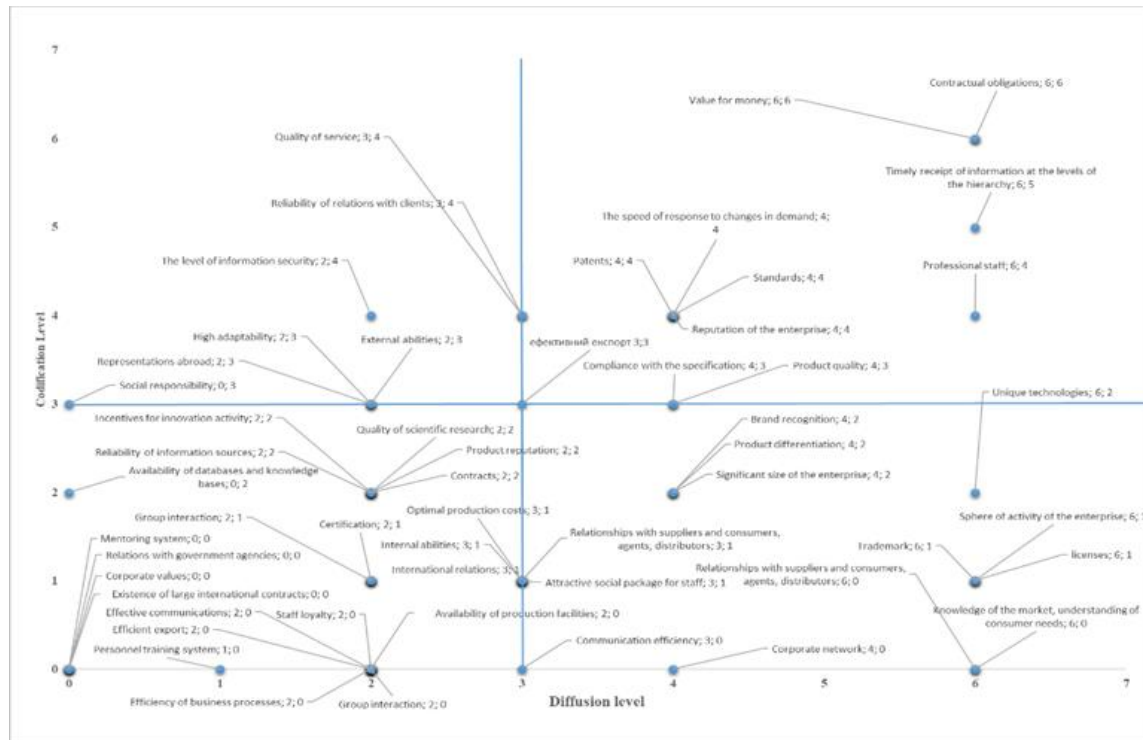


Figure 2. The results of the knowledge resources assessment of “Smilyansky Electromechanical Plant” LLC (Cherkasy region) by the codification and diffusion level

Source: own research

So, as can be seen from the data of Fig. 2, we are interested in knowledge resources, which according to the results of the codification and diffusion level assessment were in the lower left quadrant of the matrix. This quadrant contains knowledge resources that are relatively unique and uncommon in a competitive environment, and, accordingly, are sources of enterprise competence and its competitive advantages. Thus, 15 knowledge resources of the enterprise were selected, their rating was determined and evaluated according to the criterion of the enterprise key competence (on a five-point scale) (Table 2).

According to the research concept, the most significant resources of enterprise knowledge (are quite unique, uncommon and to the greatest extent meet the criteria of competence, have a high rating (Otenko & Poltava, 2005; Widet & Holliford, 2003; Peppard, 2010) are located in the lower right quadrant of the matrix. Such knowledge includes: availability of databases and knowledge bases, certification, product quality, market knowledge, understanding of consumer needs, availability of significant international contracts, availability of production facilities, financial capabilities, turnover of the enterprise. According to the results of the study, none of the pre-selected knowledge resources received a low score (in this case, we get a list of knowledge resources that either need to be developed (especially if they have a high rating) (see Table 3).

Table 2. Assessment of knowledge resources on the basis of competence

Knowledge resources	Rating	Assessment of knowledge resources on the basis of competence				Aggr egate
2. Availability of production facilities	1	5	3	3	5	16
1. Financial opportunities, turnover of the enterprise	2	3	3	3	2	11
14. Certification	3	4	5	5	4	18
33. Availability of databases and knowledge bases	4	4	5	5	4	18
24. Product quality	5	4	4	5	3	18
47. Market knowledge, understanding of consumer needs	6	4	5	4	3	16
55. Existence of significant international contracts	7	3	4	5	4	16
48. Relationships with suppliers and consumers, agents, distributors	8	4	4	5	4	17
11. Contracts	9	4	4	5	4	17
21. Product reputation	10	4	5	4	4	17
23. Representations abroad	11	3	4	5	4	16
54. Export efficiency	12	3	2	4	3	12
44. Attractive social package for staff	13	4	2	4	3	13
56. Relations with government agencies	14	3	4	3	3	13
7. Trade mark	15	5	4	5	4	18

Source: own research

Table 3. The results of the knowledge resources assessment of “Smilyansky Electromechanical Plant” LLC (Cherkasy region) by the level of codification and diffusion

Knowledge resources	Rating	Assessment of knowledge resources on the basis of competence				Aggr egate
2. Availability of production facilities	1	5	3	3	5	16
1. Financial opportunities, turnover of the enterprise	2	3	3	3	2	11
14. Certification	3	4	5	5	4	18
33. Availability of databases and knowledge bases	4	4	5	5	4	18
24. Product quality	5	4	4	5	3	18
47. Market knowledge, understanding of consumer needs	6	4	5	4	3	16
55. Existence of significant international contracts	7	3	4	5	4	16
48. Relationships with suppliers and consumers, agents, distributors	8	4	4	5	4	17
11. Contracts	9	4	4	5	4	17
21. Product reputation	10	4	5	4	4	17
23. Representations abroad	11	3	4	5	4	16
54. Export efficiency	12	3	2	4	3	12
44. Attractive social package for staff	13	4	2	4	3	13
56. Relations with government agencies	14	3	4	3	3	13
7. Trade mark	15	5	4	5	4	18

Source: own research

The author's approach to the enterprise competitive positioning based on the identification of knowledge resources involves not only the assessment of knowledge resources that affect the enterprise competitiveness, but also a comparative assessment of knowledge resources with relevant factors of competitors. This makes it possible to establish the competitive advantages of the enterprise, determined on the basis of knowledge and competencies. The main competitor of "Smilyansky Electromechanical Plant" LLC (Cherkasy region) is State Enterprise "Electrovazhmash" (Kharkiv). To assess the competitive advantages based on knowledge resources, we propose to use the Competitive Advantage Index (CAI), which is the ratio of the estimated level of knowledge resource of the studied enterprise to the corresponding assessment of the competitor's knowledge resource. If the value of CAI exceeds one, the company has an advantage in the corresponding resource and vice versa. Comparative assessment of knowledge resources of "Smilyansky Electromechanical Plant" LLC ("SEP" LLC) and SE "Electrovazhmash" is given in table 4.

Table 4. Comparative assessment of knowledge resources of "Smilyansky Electromechanical Plant" LLC and "Electrovazhmash" SE

Knowledge resources	Rating	Assessment of knowledge sources		CAI
		"SEP" LLC	SE "Electrovazhmash"	
2. Availability of production facilities	1	16	16	1,0
1. Financial opportunities, turnover of the enterprise	2	11	16	0,7
14. Certification	3	18	18	1,0
33. Availability of databases and knowledge bases	4	18	20	0,9
24. Product quality	5	18	12	1,5
47. Market knowledge, understanding of consumer needs	6	16	17	0,94
55. Existence of significant international contracts	7	16	14	1,14
48. Relationships with suppliers and consumers, agents, distributors	8	17	17	1,0
11. Contracts	9	17	17	1,0
21. Product reputation	10	17	13	1,30
23. Representations abroad	11	16	8	2,0
54. Export efficiency	12	12	12	1,0
44. Attractive social package for staff	13	13	13	1,0
56. Relations with government agencies	14	13	15	0,87
7. Trademark	15	18	13	1,38

Source: own research

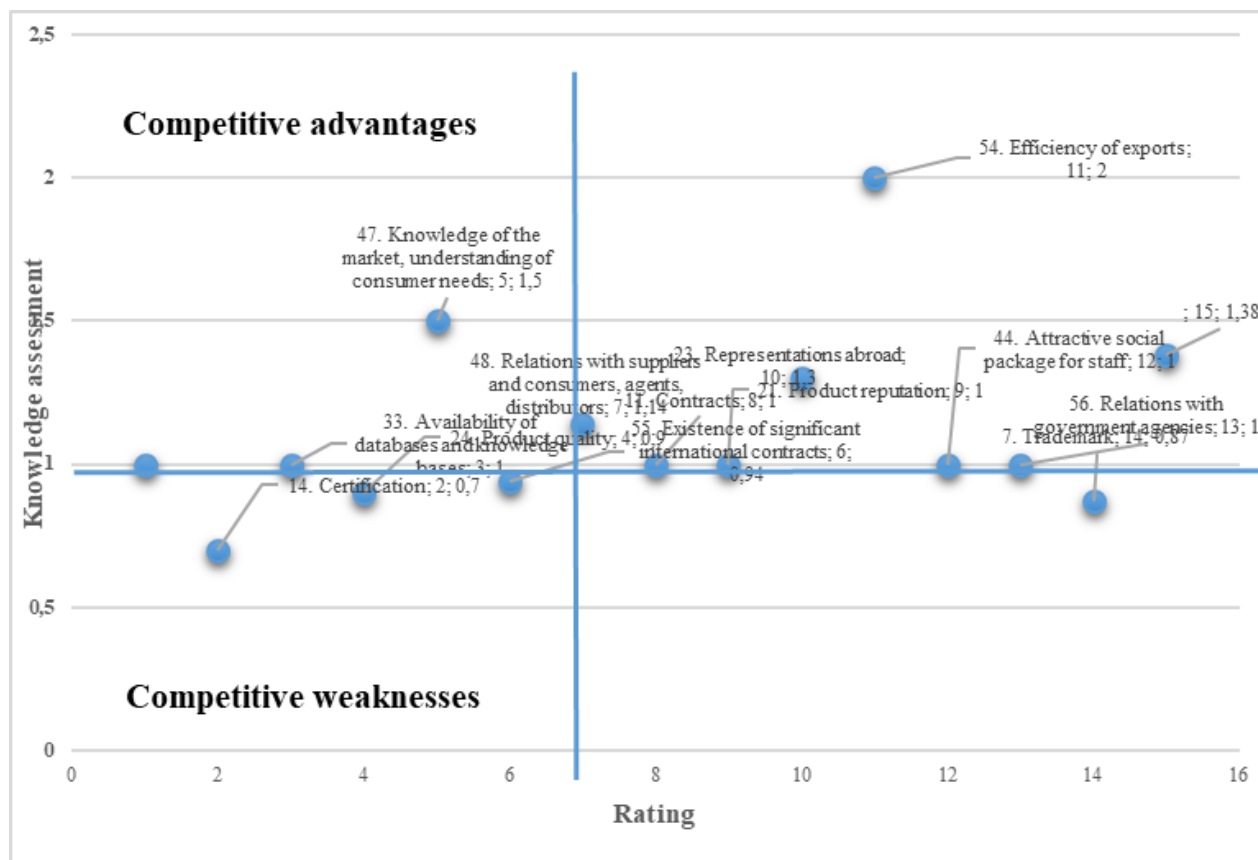


Figure 3. Competitive position of "Smilyansky Electromechanical Plant" LLC (Cherkasy region) based on knowledge resources
Source: own research

According to the results of the enterprise knowledge resources identification and their evaluation in comparison with the direct competitor on the index of competitive advantages (CAI) The competitive position of "Smilyansky electromechanical plant" LLC on the basis of knowledge resources is defined. In the matrix shown in Fig. 3. competitive advantages are in the upper right quadrant, which houses the resources of knowledge that are highly valued and recognized as important for the competitiveness of the enterprise (rating - from 1 to 7). The competitive advantages of the company include: the presence of significant international contracts, product quality, availability of production facilities and certification.

Competitive weaknesses are placed in the lower right quadrant of the matrix (high rating and low score): financial opportunities and turnover, availability of databases and knowledge bases. These are the resources of knowledge that are of great importance to the company and are valued below competitors.

The obtained results of competitive positioning make it possible to classify the types of the company's competitive position according to the level of assessment of knowledge resources:

- strong position - not less than 50% of the company's knowledge resources can be assessed as strengths, not more than 20% of knowledge resources are assessed as weak relative to competitors;
- middle position - not less than 25-30% of the company's knowledge resources can be assessed as strengths, not more than 25% of knowledge resources are assessed as weak relative to competitors;
- weak position - less than 20% of the company's knowledge resources can be assessed as strengths, more than 25% of competencies are assessed as relatively weak.

The competitive position of the researched enterprise can be classified as strong / medium (conditionally 73.3% of knowledge resources are evaluated as strengths, no more than 20% of knowledge resources are evaluated as weak relative to competitors).

Conclusions

The performed scientific research allows us to formulate the following conclusions.

Scientific novelty lies in the following research results:

- a principled approach to competitive positioning of the enterprise on the basis of competency and resource approaches is formed, it allows to consider the sources of the enterprise competitive advantages as a set of knowledge resources (competencies), determine their competitive position and establish areas of support and development of competitive position;
- an approach to understanding the competitive positioning of the enterprise is proposed, according to which the enterprise competitive position is presented as a set of knowledge resources that are evaluated and are stronger than competitors. This understanding of the applied tasks of the enterprise competitive positioning allowed to clarify the terminological meaning of this concept as a process of forming, maintaining and strengthening the competitive position of the enterprise based on the audit of key knowledge resources that form key areas of competence and create sustainable competitive advantages;
- a sequence of the enterprise competitive positioning on the basis of inventory and analysis of knowledge resources is formed, which reveals the stages of determining the enterprise competitive position and creates a theoretical basis for further research.

The practical value is inherent in the following research results:

- tools and methods for assessing knowledge resources in the competitive enterprise positioning are formed, in particular, the authors proposed the index of competitive advantages (CAI) usage to assess the knowledge resources that form the competitive advantages of the enterprise compared to its main competitors;
- matrices of the enterprise competitive position which define competitive advantages and competitive weaknesses of the enterprise are constructed. The resources of knowledge which form competitive advantages and competitive weaknesses of the enterprise are defined. Matrices of competitive advantages reflect the assessment of knowledge resources of the enterprise and their assessment in comparison with the main competitor;
- criteria for interpreting the results of the enterprise competitive positioning on the basis of identified knowledge resources was proposed, according to it the competitive position of the studied enterprise can be classified as strong / medium (73.3% of knowledge resources are assessed as strengths, no more than 20% of knowledge resources are assessed as weak).

The main limitations of the study are that the identification of knowledge resources and competencies of the enterprise in practice is a significant difficulty: "Core competence is clearly an important concept, and some companies seem to be able to make it work. But for most, it is like a mirage: something that from a distance appears to offer hope in a hostile environment, but that turns to sand when approached. Why do competencies seem so elusive? One reason may be that there is no clear basis for identifying them, nor any established way of gauging progress towards them" (Coyne et al. 2007). Thus, the methodology of identification and measurement of knowledge resources and key competencies of the enterprise is still in its infancy, which determines the relevance of further research in this area.

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WEBSITE QUALITY FACTOR AS A MULTIDIMENSIONAL CONSTRUCT AND ITS IMPACT ON THE USE OF E-BANKING*

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Abstract. The aim of this paper is to determine the significance of the impact of website quality on the expected performance and the actual use of e-banking. The aim of this paper is to create a model that identifies the impact of website quality on the use of electronic banking. With Unified Theory of Acceptance and Use of Technology (UTAUT) and use of technology as a theoretical basis, this paper identifies specific features of websites and their impact on the use of internet banking by tourists in destinations. In general, the results of our research show that the perceived quality of the website is a multi-dimensional concept. The quality of the website has an indirect impact on the behavior of the user, which is expressed by the frequency of using internet banking. This indirect effect is mediated by the expected performance factor.

Keywords: e-banking usage; website quality factors; consumer behavior; UTAUT; website usage

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1. Introduction

Continuous advances in online technologies and related applications enable consumers to interact with businesses and institutions in several ways. More and more organizations are investing heavily in electronic customer - centric solutions and technologies to increase their online market share (Małkowska, Urbaniec & Kosała, 2021). As Vila and Kuster (2011) observe in their study, companies spend a significant amount of this effort on improving the visual and design of their websites and on enhancing the quality of their customers' interactive experiences. Further research in this area usually focuses on exploring the relationship between website design and consumer behavior (Kwon, Kim & Lee 2002; Moss, Gunn & Heller 2006).

2. Starting points for technology acceptance models – theoretical background

In recent years, the internet has been steadily expanding and now offers a number of web-based applications that provide organizations with a new way of reaching and retaining consumers by offering new services and products (Tan, Teo 2000). In the interests of both parties (organizations and consumers), it is very important to monitor and analyze the real perception and the main reasons for consumers' willingness to adapt to these technologies (Lee 2009; Streimikiene & Ahmed, 2021; Gorączkowska, 2020).

Despite the significant importance of website design, previous research does not provide consistent information about which website attributes affect user perception. Thongpapanl and Ashraf (2011) report in their publications that studies report conflicting results related to the amount of information that websites should contain to reduce consumer risk perception and enable informed purchasing decisions. Gounaris, Koritos & Vassilikopolou (2010), like previous authors, emphasize the importance of the atmosphere in the process of conducting online transactions. Further research in this area (Venkatesh, Morris & Davis, 2003; Andrews, Bianchi 2013, Cortinas, Chocarro & Villanueva, 2010, Toufaily, Ricard & Perrine, 2013; Al Qeisi, Dennis, Alamanos, Jayawardhena 2014) examines the way individual elements website and the quality of interaction experience affect consumer behavior in connection with the Unification Theory of Acceptance and Use of Technology - UTAUT).

Consumers in the context of banking services have a choice of different channels of transaction execution, such as: personal computer, mobile phone, tablet, or face-to-face banking. However, most users tend to use more than one channel, which may depend on the type of transaction, e.g. face-to-face channel for banking with high transaction engagement (loans) and use of online channels for low transaction engagement (account status) (Cortiñas, Chocarro & Villanueva, 2010). Banks operate in a competitive environment and, to differentiate their online activities, they tend to emphasize different characteristics of website design, their utilitarian (product-related information, navigation) or hedonic (aesthetics) aspects, to facilitate the transaction experience for consumers (Korzeb & Niedziółka, 2020; Ahmed, Romeika, Kauliene, Streimikis & Dapkus, 2020) and meet the needs of different consumer segments (Floh, Zauner, Koller & Rush, 2014).

Internet banking has proven to be one of the most profitable e-commerce platforms (Lee 2009). Most banking institutions have implemented Internet banking systems in an effort to reduce costs while increasing the level of service to customers (Xue, Hitt & Chen, 2011). Despite the many potential benefits that electronic banking offers to consumers, its adaptation has been limited, and in many cases has not met expectations (Bernardelli, Korzeb & Niedziółka, 2021).

While previous research focuses on factors that influence end-user adoption of information technology, there is limited empirical evidence that would capture the positive (success factors) and negative (resistance factors) that drive consumers in adapting Internet banking (Lee 2009). Following the premise that Internet banking services are perceived as risky in relation to traditional banking services (Cunningham, Gerlach, Harper & Young, 2005),

a study by Martins, Oliveira & Popovič (2014) provides an assessment of the perceived risk factor. Based on perceived risk theory, the study combines specific aspects of perceived risk (Featherman & Pavlou, 2003), namely performance, finance, time, psychological aspects, social aspects, privacy and overall risk - with a Unified Theory of Acceptance and Use of Technology (UTAUT) for designing an integrated model to explain the consumer intent for adapting and using internet banking. Research by these authors links existing and empirically proven theoretical models with the perceived risk factor (which is an important construct) for testing adaptation of Internet banking. The study helps banking institutions understand the determinants that affect users and develop the right formal measures to attract consumers to use the services. In addition, it is in the interest of both parties to redirect their communication from bank branches to online channels, pursuing higher productivity and cost reduction.

Websites and internet technologies are now well established and reliable elements of marketing communication, however, it is important to know what factors affect the success of a website. Previous research focused on identifying company-controlled design factors of websites that could increase online sales and result in customer satisfaction, confidence and reduce perceived risk. SME managers should be able to develop websites that Internet users visit, although not all visits will lead to purchases and conversions (Vila & Kuster 2011).

The study by Vilu & Kuster (2011) is based on the foundations of information systems theory, marketing and psychology in an integrated theoretical framework of online consumer behavior. Their goal was to create a tool capable of measuring various desired effects of a well-designed website in terms of satisfaction, online trust, perceived risk and intent to purchase. The tool was designed to provide a one-dimensional measurement of well-designed websites. The advantage of this model is the common measure of different items for the same size or construct.

3. Model and hypothesis development

The aim of this paper is to determine the significance of the impact of website quality on the expected performance and the actual use of e-banking. The aim of this paper is to create a model that identifies the impact of website quality on the use of electronic banking. This model is intended to explain how the elements that we present as factors of website quality affect user behavior in the context of using electronic banking. With UTAUT and use of technology as a theoretical basis, this paper identifies specific features of websites and their impact on the use of internet banking.

The UTAUT model defines facilitation conditions as a construct that reflects the perception of a person's control over their behavior (Venkatesh, Brown, Maruping & Bala, 2008). Al-Queisi et al. (2014) support the view that the quality of website design is related to the importance of facilitating terms. The research deals with the relationships between web elements and their impact on user intentions (Bauer, Hammerschmidt & Falk, 2005). Dennis, Merrilees, Jayawardhena & Wright (2009) demonstrate that website attributes affect online behavior. Aladwani & Palvia (2002) explored key characteristics of website quality from the user perspective. The current research adopts their definitions of perceived website quality as a user rating of individual sections of the website that meet the needs of visitors and reflect the overall quality of the website. Aladwani (2006) proposed a model that examines the impact of the four sub-dimensions of a website on consumer attitudes and purchasing intentions. The first component is the technical dimension, which covers the characteristics of the website, such as security, ease of navigation, search options, website availability, link validity, personalization, website load time, interactivity and easy access. The second component is total content, which includes characteristics such as content usefulness, completeness, clarity, consistency and accuracy. The third component is specific content that carries features such as contact information, general information about the institution, details of products and services, consumer policy and customer support. The last component is the overall look that includes features

such as attractiveness, organization, correct font, color and media usage. We therefore formulate the following hypotheses:

- H1. Website quality has a significant impact on expected performance.
- H2. Website quality has a significant impact on the use of internet banking.

4. Materials and Methods

For research purposes, we focus on EU-based banking institutions and the tools they provide in an online environment that facilitate work with their products and electronic banking itself. Based on the stated main objective and sub-objectives, we identified the following research problems. Is there a statistically significant link between website quality (Aladwani, 2006) and expected performance? Is there a statistically significant link between the quality of the website (Aladwani, 2006) and the use of internet banking?

The primary data for the study was collected through a questionnaire survey. The respondents were users of internet banking and, in terms of demographic characteristics, copied a sample of common internet banking users across EU countries (Yousafzai & Yani-de-Soriano 2012; Al-Qeisi, Dennis, Alamanos & Jayawardhena, 2014). A pilot survey was carried out on a sample of 41 respondents, university colleagues to verify the clarity of questionnaire items. By means of the test-retest method and repeated use of the research tool, we verified the reliability of the research file. The survey sample consists of 279 (61.45%) men and 175 (38.55%) women, the majority of the respondents reported a higher level of education (bachelor's degree or higher) and 158 (34.80%) respondents were in the age from 19 to 29 years. In the research we used Confirmatory Factor Analysis, multiple linear regression analysis - for the purpose of interpreting associations between quantitative variables and Structural Equation Modeling.

5. Results

The questionnaire items regarding the performance expectancy factor were addressed through items aimed at perceived usefulness, easy completion of tasks, efficiency and improvement of the quality of performance of banking tasks via online banking. Together, the other four groups of items form separate factors, which we will later combine into a single whole, and through it we will express one coherent factor, which we will call the quality of the website. The first partial factor of this whole is the Technical Quality (TQ), which expresses and describes the technical aspects and characteristics of the website such as security, ease of navigation, search tools, website availability, link validity, personalization or customization, interactivity and ease of access (Aladwani, 2006). The items we used in the questionnaire were as follows (TQ 1-7). My bank's internet banking:

- TQ 1: Looks safe for financial transactions;
- TQ 2: Is easy to navigate;
- TQ 3: Has an adequate search system;
- TQ 4: Has functional links;
- TQ 5: Has many interactive features;
- TQ 6: Is easy to access;
- TQ 7: Loads quickly.

The results indicate positive evaluations of individual statements, with respondents most unambiguous in the answers related to easy accessibility (45.59%) and fast loading of internet banking websites (40.09%). It is interesting to observe the respondents' neutral attitudes regarding the number of interactive elements on the website (25.11%), which can be explained by the fact that respondents may perceive these elements of interactivity more subjectively (see table 1 and .

Table 1. An overview of results for the technical quality of the website

Factor	1	2	3	4	5	6	7
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	N	N	N	N	N	N	N
TQ 1	2.42	2.64	4.85	10.57	15.64	28.19	35.68
	11	12	22	48	71	128	162
TQ 2	1.98	3.30	3.74	7.27	21.81	30.40	31.50
	9	15	17	33	99	138	143
TQ 3	1.54	3.52	4.41	13.66	22.69	28.85	25.33
	7	16	20	62	103	131	115
TQ 4	1.54	1.98	5.29	15.42	17.62	25.99	32.16
	7	9	24	70	80	118	146
TQ 5	1.32	4.19	6.83	25.11	21.59	21.15	19.16
	6	19	31	117	98	96	87
TQ 6	1.54	2.42	3.08	3.08	16.08	28.19	45.59
	7	11	14	14	73	128	207
TQ 7	2.64	1.76	7.71	4.63	15.42	27.75	40.09
	12	8	35	21	70	126	182

Legend: 1 – Totally disagree; 3 – Neutral stance; 7 – Totally agree

Source: own elaboration

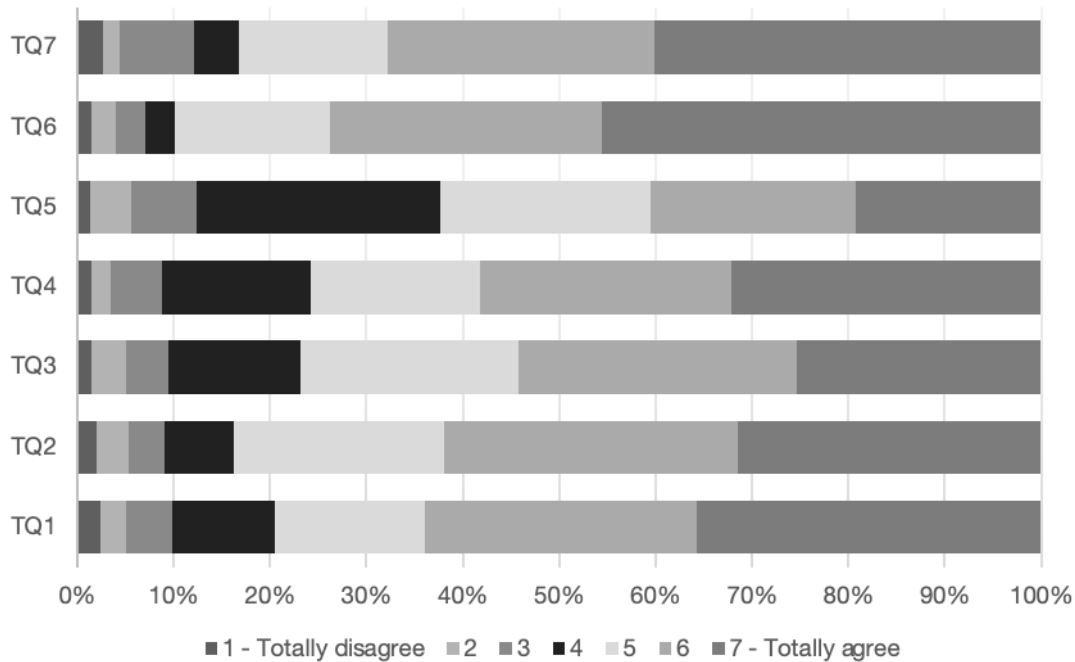


Figure 1. An overview of results for the technical quality of the website

Source: own elaboration

GQ - General Content Quality reflects the characteristics of a banking institution's website, such as its usefulness, completeness, clarity, timeliness, consistency and accuracy (Aladwani 2006). The items we used in the survey were as follows (GQ 1-6). For the completeness and understanding of the respondent, we have added additional

information in parentheses to the individual attributes of the overall quality of the banking website content. My bank's online banking content is:

- **GQ 1:** Helpful (site content is helpful);
- **GQ 2:** Complete (I can find all important information on the site);
- **GQ 3:** Clear (page content is understandable to me);
- **GQ 4:** Current (I can find up-to-date information on the page);
- **GQ 5:** Descriptive (I can find what I am looking for on the page);
- **GQ 6:** Accurate (this page shows correct and truthful information).

The results of the items concerning the overall quality factor of the internet banking website content are positive. Most respondents (42.73%) responded positively to the item regarding the up-to-date nature of the website content (GQ 4). Positive responses were also recorded to other items and positive answers exceeded 80% in all cases. Therefore, we can state that the overall quality of the website content of banks is perceived positively by the respondents and that users find useful, complete, clear, up-to-date, concise and accurate content on the website (see table 2 and figure 2).

Table 2. An overview of results for the technical quality of the website

Factor	1	2	3	4	5	6	7
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	N	N	N	N	N	N	N
GQ 1	1.53	2.42	3.96	5.95	24.45	26.87	34.80
	7	11	18	27	111	122	158
GQ 2	1.32	3.08	5.95	8.59	21.59	29.52	29.96
	6	14	27	39	98	134	136
GQ 3	1.76	1.98	6.17	7.05	18.94	32.60	31.72
	8	9	28	31	86	148	144
GQ 4	1.98	0.88	6.17	7.93	13.88	28.19	42.73
	9	4	20	36	63	128	194
GQ 5	1.98	2.20	4.63	6.61	22.91	31.06	30.62
	9	10	21	30	104	141	139
GQ 6	1.10	2.20	4.85	9.69	14.98	28.63	38.55
	5	10	22	44	68	130	175

Legend: 1 – Totally disagree; 3 – Neutral stance; 7 – Totally agree

Source: own elaboration

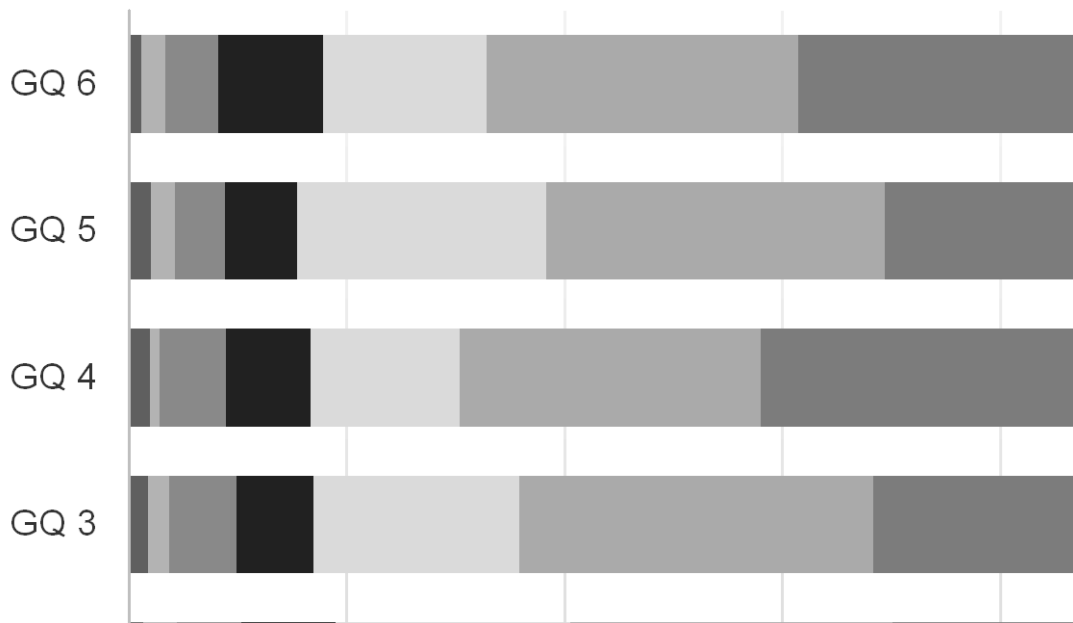


Figure 2. An overview of results for total content quality factor

Another factor is the quality of special content (SQ - Special Content Quality), which means specific content on a website, such as contact information, general bank information, detailed information about the bank's products and services, and customer support information (Aladwani, 2006). The items we used in the survey were as follows (SQ 1-5). In the internet banking website of my bank I can find:

- **SQ 1:** Corresponding contact information;
- **SQ 2:** General bank information;
- **SQ 3:** Details of the Bank's products and services;
- **SQ 4:** Customer policy information;
- **SQ 5:** Information in relation to customer services.

As the results shown in the above table indicate, a higher proportion of neutral answers can be observed in items concerning customer policy information (31.50%) and customer service information (24.67%). The answers are positive, with a majority of respondents expressing one of the different degrees of agreement with the statements, with most respondents responding positively to items regarding contact (44.71%) and general (44.27%) information (table 3).

Table 3. An overview of results for the technical quality of the website

Factor	1	2	3	4	5	6	7
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	N	N	N	N	N	N	N
SQ 1	1.10	2.20	3.08	12.56	15.20	21.15	44.71
	5	10	14	57	69	96	203
SQ 2	0.66	2.42	3.74	10.79	15.86	22.25	44.27
	3	11	17	49	72	101	201
SQ 3	0.88	3.74	4.19	12.11	15.64	26.43	37.00
	4	17	19	55	71	120	168
SQ 4	1.54	4.63	3.52	31.50	19.82	18.50	20.48
	7	21	16	143	90	84	93
SQ 5	0.88	4.19	3.30	24.67	18.94	22.91	25.11
	4	19	15	112	86	104	114

Legend: 1 – Totally disagree; 3 – Neutral stance; 7 – Totally agree

Source: own elaboration

The last factor that is connected with the website quality is the AQ - Appearance Quality. This factor describes the appearance quality attributes of a website, such as attractiveness, orderly manner of content display, proper use of web fonts, colors and multimedia (Aladwani, 2006). The items we used in the survey were as follows (AQ 1-5). My bank's internet banking:

- **AQ 1:** Looks attractive;
- **AQ 2:** Looks organized;
- **AQ 3:** Easy to read;
- **AQ 4:** Use appropriate colors;
- **AQ 5:** Uses appropriate multimedia content.

Respondents responded most positively to the suitability of used colors (43.61%) and the ease of reading the website (37.22%). The respondents evaluated most negatively the attractiveness of the appearance of the website (12.99% in total) and expressed a neutral opinion on the question of the suitability of using multimedia content (15.64%) (see table 4).

Table 4. An overview of results for the technical quality of the website

Factor	1	2	3	4	5	6	7
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	N	N	N	N	N	N	N
AQ 1	1.32	2.86	8.81	8.15	26.87	22.25	29.74
	6	13	40	37	122	101	135
AQ 2	1.32	1.10	6.83	4.63	23.13	28.85	34.14
	6	5	31	21	105	131	155
AQ 3	1.10	2.42	5.51	4.63	19.38	29.74	37.22
	5	11	25	21	88	135	169
AQ 4	1.32	2.42	4.19	6.17	15.64	26.65	43.61
	6	11	19	28	71	121	198
AQ 5	1.54	2.86	3.74	15.64	18.06	25.11	33.04
	7	13	17	71	82	114	150

Legend: 1 – Totally disagree; 3 – Neutral stance; 7 – Totally agree

Source: own elaboration

The last item of the questionnaire survey dealt with the frequency of using electronic banking in its various forms by the respondent. The range of responses corresponds to the methodology of previous research in this field (Al-Queisi et al. 2014). We asked respondents how often they use internet banking. As can be seen from the results,

most respondents use electronic banking at a frequency of once a week (28.19%) and once a month (23.35%). On the other hand, respondents least frequently use electronic banking at intervals of six months (2.86%), once a year (3.30%), and 10 respondents (2.20%) do not use electronic banking at all. We have included these respondents in the results of our research even though they are not currently using electronic banking but have used it at least once in the past.

Validation of website quality factor

The first part of the analysis focuses on the validation of the website quality, which consists of four sub-factors, resulting in the web design quality factor as a higher-level structure. Before incorporating the perceived website quality factor into a multidimensional construct, this paper addressed and tested the four sub-dimensions of website quality through direct links to user behavior by a one-stage analysis model methodology. Therefore, we decided to address the website quality factor as a multidimensional construct. In the first step, we tested the Web Quality Factor (WQ) through confirmatory factor analysis using four factors: technical quality, overall content quality, quality of special content, website quality (Al-Qeisi et al. 2014). Confirmatory Factor Analysis (using R Studio software) was performed several times, with the original model reaching the values that can be seen in the tables 5, 6 and 7 below.

Table 5. Overview of CFA results for the WQ factor

χ^2 (chi square)	df (degrees of freedom)	CFI (comparative fit index)	RMSEA (Root Mean Square Error of Approximation)
838,595	224	0,937	0,078

Source: own elaboration

Table 6. CFA for WQ factor - Overview of latent variable results

	Estimate	Std. Error	Z-value
TQ (Technical quality)			
TQ1	1		
TQ2	1.136	0.061	18.578
TQ3	1.126	0.061	18.477
TQ4	1.031	0.062	16.635
TQ5	0.944	0.063	15.039
TQ6	1.074	0.057	18.710
TQ7	1.072	0.065	16.368
GQ (General content quality)			
GQ1	1		
GQ2	1.073	0.044	24.151
GQ3	1.082	0.043	25.039
GQ4	1.049	0.043	24.401
GQ5	1.060	0.043	24.604
GQ6	1.040	0.044	23.708
SQ (Special content quality)			
SQ1	1		
SQ2	1.024	0.053	19.378
SQ3	1.114	0.055	20.319
SQ4	1.081	0.056	19.302
SQ5	1.106	0.055	20.268
AQ (Appearance Quality)			
AQ1	1		
AQ2	1.029	0.044	23.246
AQ3	1.002	0.046	21.802
AQ4	0.956	0.048	19.913
AQ5	1.006	0.050	20.074

Source: own elaboration

Table 7. CFA for factor WQ - Overview of results of covariance and variance values (variance)

	Estimate	Std. Error	Z-value	Variances	Std. Error
TTQ				1,185	0,134
TGQ	1.102	0.100	11.049		
TSQ	0.888	0.089	9.926		
TAQ	1.004	0.097	10.312		
TGQ				1.320	0.120
TSQ	0.977	0.091	10.791		
TAQ	1.097	0.098	11.214		
TSQ				1.222	0.124
TAQ	1.008	0.095	10.604	1.386	0.136

Source: own elaboration

In the next step, we proceeded to apply the refined criteria according to O’Hair (2006) and Byrne (2001), the standardized regression weights (weighting factors) should reach values preferably from 0.7 up. In addition, we looked at the results of the individual variability reliability test and excluded the variables with the lowest values from the KMOS test from the model. Thus, we achieved an optimized model with the parameter values that can be seen in the table 8.

Table 8. Overview of CFA results for WQ after first modification

χ^2 (chi square)	df (degrees of freedom)	CFI (comparative fit index)	RMSEA (Root Mean Square Error of Approximation)
629.989	183	0.947	0.073

Source: own elaboration

The next step was to optimize the model based on the variation values of each variable. We removed variables with lower than average values from the model, and we did this process more than once to optimize the model, resulting in a model with the values shown in the table 9.

Table 9. Overview of CFA results for the WQ factor after the second modification

χ^2 (chi square)	df (degrees of freedom)	CFI (comparative fit index)	RMSEA (Root Mean Square Error of Approximation)
150.151	48	0.971	0.068

Source: own elaboration

In the last step, because of the low covariance values for the variables of the total content quality factor, we decided to remove this factor from the web quality construct. The result is the model with the values shown in the tables 10 and 11 below.

Table 10. Overview of CFA results for the WQ factor after the third modification

χ^2 (chi square)	df (degrees of freedom)	CFI (comparative fit index)	RMSEA (Root Mean Square Error of Approximation)
73.98	24	0.978	0.068

Source: own elaboration

Table 11. CFA for factor WQ - Overview of results of covariance and variance values (variance)

	Estimate	Std. Error	Z-value	Variances	Std. Error
TTQ				1.155	0.142
TSQ	0.959	0.098	9.781		
TAQ	1.011	0.102	9.869		
TSQ				1.222	0.128
TAQ	1.014	0.098	10.333	1.330	0.138

Source: own elaboration

The results suggest that the website quality factor can be understood as a multidimensional construct, consisting of factors of technical quality, quality of special content, and quality of website design. The resulting, optimized model represents a website quality factor. The next step in our analysis will be the implementation of this model into the UTAUT structure of the technology acceptance model followed by the factor relationship testing.

Incorporating the construct into the UTAUT research model

We incorporated the CFA model from the previous part of the research into the SEM calculations, using the technical quality, the quality of the special content, and the quality of the website. All values of these factors point to comparable numbers, the highest values are seen in technical quality. In the first evaluation column we find the value labeled *Std.lv*, which represents the standardized latent variables. In the next column we find the values of *Std.all*, which represent both standardized latent and observed variables. These values are often referred to as a complete standardized solution. The tables provide an overview of factor values and reliability expressed through Cronbach alpha and Kaiser-Meyer-Olkin statistics (KMOS). The basic model after calculation reaches the values shown in the table 12.

Table 12. SEM for WQ - Overview of results of latent variables

	Estimate	Std. Error	Z-value	Std. lv	Std. all
WQ – website quality					
TQ	1			0.920	0.920
SQ	0.987	0.078	12.645	0.880	0.880
AQ	1.047	0.082	12.763	0.895	0.895

Source: own elaboration

The expected performance factor recorded the highest figures on issues related to the speed and efficiency of banking tasks. Items regarding the impact of electronic banking on improving the quality of banking services and improving the respondent's performance in performing his / her banking tasks were the lowest (table 13).

Table 13. SEM for PE - Overview of results of latent variables

	Estimate	Std. Error	Z-value	Std. lv	Std. all	KMOS
TPE –Expected performance						
PE 1	1			1.247	0.867	0.89
PE 2	1.029	0.036	28.385	1.283	0.924	0.81
PE 3	0.961	0.035	27.849	1.199	0.915	0.84
PE 4	0.754	0.043	17.337	0.940	0.694	0.91
PE 5	0.809	0.045	17.934	1.009	0.710	0.92

Source: own elaboration

Structural model and hypothesis testing

After a detailed analysis of partial results, within the methods of calculation of the factor analysis, we proceeded to evaluate our research hypotheses and to observe the regression relationships between the individual variables. Detailed statistical values of the model can be found in the individual tables, which show the calculation coefficients for both methods of factor analysis calculation. The factor quality of website has a positive and statistically significant impact on the expected performance of internet banking. For the purposes of this research, we did not explicitly define null hypotheses in evaluating research hypotheses, which represent a generally known relationship to the formulated alternative hypothesis that expresses the existence of a difference. In each hypothesis we observed the influence of the independent variable on the dependent variable. With regard to the evaluation of the hypotheses, estimation methods are indicated in the table, with coefficients always corresponding to the given method. Given the nature of the research, the structural model is drawn up uniformly using the ML estimation method (see tables 14 and 15).

Table 14. SEM in ML estimation - Overview of structural regression model results

	Estimate	Std. Error	Z-value	p (> z)	Std.lv	Std.all
FREQ						
TWQ	-0.072	0.089	-0.804	0.421	-0.070	-0.037
TPE						
TWQ	0.109	0.051	2.136	0.033	0.088	0.088

Source: own elaboration

Table 15. Overview of statistical evaluation of research hypotheses

	Path	Coefficient	S.E.	t (Z)	p	Result	Estimator
H1	TWQ>FREQ	-0.072	0.089	-0,804		Accept	ML
H2	TWQ>TPE	0.109	0.051	2.136	**	Support	ML

Source: own elaboration

H1. Website quality has a significant impact on the use of online banking.

The hypothesis addresses the significance of the impact of the quality of the website on the actual use of the internet banking by the respondent. We found that the factors in question have statistically insignificant influence on each other. Thus, we reject the hypothesis. Values were achieved based on ML estimation methods.

H2. Website quality has a significant impact on expected performance.

The second hypothesis addressed the impact of the website quality factor on the expected performance in relation to e-banking in terms of users. The result of the investigation is a positive and statistically significant effect at $p < 0.01$ and a coefficient of 0.120. Thus, we support the hypothesis. Values were achieved based on ML estimation methods.

Discussion

Testing and validating the perception of the quality of the website as a multi-dimensional construct based on the confirmatory factor analysis produced specifics that represent the quality of each of the four dimensions. In modifying the model, we chose to use three items for each dimension to achieve better analytical output, and in the next step we excluded the overall web content quality construct from the model, thus achieving the good model indicated. The quality of the website has proven to be best represented as a multi-dimensional structure more than a uni-dimensional construct, as shown by previous research in this area (Dickinger & Stangl, 2013). Elements of the website quality that respondents have identified as very important include the security of financial transactions, a number of interactive features, and load speed (technical quality). For the quality aspects of the website's special content, these were the corresponding contact information, detailed information on the bank's products and services, and information regarding customer policy. Among the most important aspects of the website's design, respondents identified the attractiveness of the design, the suitability of colors and the use of appropriate multimedia content.

The multidimensional website quality factor in our research replaces the original attenuating circumstances in the research by Venkatesh, Morris, Davis & Davis (2003) and its UTAUT models. The results of our research show the indirect effect of perceived quality of website design on the use of internet banking through the expected performance factor. These results support the results of another research in this area, where the effect of the web design quality construct on the use of internet banking indicated a significant impact of this factor through the expected performance factor (Al-Qeisi, 2014). Based on the results of our research, we can point to the issue of

the mobile banking factor, which may reduce the direct significant impact of the web design quality factor on the use of electronic banking.

Conclusion

In general, the results of our research show that the perceived quality of the website is a multi-dimensional concept. The quality of the website has an indirect impact on the behavior of the user, which is expressed by the frequency of using internet banking. This indirect effect is mediated by the expected performance factor.

Banking institutions, as well as other companies and individuals, gain many benefits from well-designed websites, effective communication on social networks, and also by exploiting the potential of mobile marketing. The presented work shows the current state of knowledge in the field of research into the use and acceptance of technology, applying this issue to the model of the use of electronic banking technology.

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ENTREPRENEURSHIP DEVELOPMENT MANAGEMENT IN THE CONTEXT OF ECONOMIC SECURITY

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Abstract. The article investigates theoretical and methodological approaches and practical aspects of functioning and management of socio-economic systems in modern economic conditions, develops an economic and mathematical model of economic security of business entities in conditions of risk and uncertainty, substantiates the development of Ukrainian entrepreneurship in the context of European integration challenges. The main objectives of this study are: to identify factors influencing the management of business development and the formation of economic security; study of the essence of economic security based on systematization of threats on various classification signs and definition of characteristic signs of its achievement for the realization of the further scientific developments in this direction. The problem of ensuring the development of entrepreneurship in the context of a sufficient level of economic security and the formation of favorable conditions for innovative development of enterprises today requires an adequate and timely solution and is extremely relevant. The author's definition of economic security of the enterprise is formulated, which means such a level of development of its capacities and potential that allows achieving a state of protection from internal and external economic threats in conditions of instability of the national economy. The main functional components of economic security at the level of management of a modern enterprise are highlighted. Attention is paid to the main problems of business development management in the context of economic security. The factors of development influencing economic security in the conditions of competition are formed.

Keywords: globalization; economy; development; threats; security; economic security; challenges; business management

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JEL Classification: C51, F63, L26

1. Introduction

In today's dynamic market conditions, the formation and development of business entities, which should become a formative chain of innovation and development of the state, business, and scientific community, as well as the development and implementation of effective mechanisms to manage the development of business entities, are especially relevant. The global nature of economic and social development, along with providing ample opportunities, strengthens the requirements for product competitiveness and the ability to adapt to external and

internal transformational challenges of the socio-economic environment. Accordingly, an integrated study of the problems of business development management is becoming extremely important not only in terms of increasing competitiveness and in terms of strengthening market positions but also in the direction of developing strategic priorities and development imperatives. Today, most businesses with unique technologies and significant material and technical bases have not only ceased to be competitive in today's economy but have also lost the accumulated intellectual and innovative potential due to the lack of effective management systems and methods. This article is devoted to the study of conceptual foundations and solving problems of ensuring effective management of business development in the context of economic security and the challenges of the XXI century. The article investigates theoretical and methodological approaches and practical aspects of functioning and management of socio-economic systems in modern economic conditions, develops an economic and mathematical model of economic security of business entities in conditions of risk and uncertainty, substantiates the development of Ukrainian entrepreneurship in the context of European integration challenges.

2. Literature review

Shkolnyk, Ladyka, Orlov, Aldiwani & Kozmenko (2021) argue that the optimal and balanced formation of state budget expenditures can be the basis for determining and ensuring an effective development strategy. Honningdal Grytten & Hunnes (2021) demonstrated the importance of combining the protection of the environment and resources from oil production in Norway's open economy. The implementation of the Norwegian oil policy focuses on environmental safety and sound rent management.

Dankiewicz, Balawejder, Tomczyk & Trynchuk (2021) argue that the outbreak of the COVID-19 pandemic is reassessing and changing the way we do business. The vast majority of companies had to learn to act in a new, much more complex reality. Restrictions imposed by individual governments, also related to limited business opportunities, have put some businesses in a very difficult situation; the financial situation of enterprises operating in various sectors of the economy is gradually deteriorating. Kireyeva, Nurbatsin, Yessentay, Bagayeva & Turdalina (2021) argue that the stable operation of enterprises guarantees an increase in the welfare of the population and an improvement in the quality of life. Scientists have concluded that topics such as the potential of enterprises and factors of innovative development, especially in developing countries, are not widely studied.

Daugherty, Jithendranathan & Vang (2021) in their studies studied the strategies of asset allocation that will maximize their real profitability. Oharenko, Merzlyak, Tomareva-Patlakhova, Vikhort & Skriabina (2021) write that the financing of innovation-related projects is provided by a small number of banks, and the financing of large-scale programs is provided by the state and local communities. Agostino & Trivieri (2019) first studied the relationship between production efficiency and credit, to form sources of financing to help financially constrained companies manage their resources optimally.

Bulatova, Marena, Chentukov, & Shabelnyk (2020) studied global financial transformations that affect economic security. Their research is aimed at analyzing the impact of the share of bank assets and debt securities on the growth of the share of stock market capitalization. Chugunov & Nasibova (2021) argue that the best way to achieve social well-being is to promote income transparency and set optimal social standards in terms of improving macroeconomic performance. The study was conducted on Eurozone data.

Dankiewicz (2020) in his works studied the risk of bankruptcy as one of the key types of business risk. Based on Polish data, the highest number of bankruptcies was recorded among companies in the manufacturing sector and the lowest among companies engaged in retail sales. Grytten (2020) on the example of Norway studied the impact of GDP on economic development. Khalatur (2013) notes that one of the priorities of Ukraine's economic policy is to stimulate investment activity; which is closely related to the state of forecasting assessment of the development of the investment market. Khalatur (2017) considers the state of agriculture in Ukraine and argues

that the main reserves of agricultural development in Ukraine are government regulation, assessment of the attractiveness of the investment climate, the use of modern mechanisms of economic stimulation of production.

Khalatur, Trokhymets & Karamushka (2020) analyzed the tax systems of the European Union and Ukraine, the impact of certain indicators of the tax system on economic development. The study of Khalatur, Khaminich, Dubovych, Budko & Karamushka (2020) showed that a multilevel system of investment decision-making is necessary to identify and form a positive synergy effect from the combination and interaction of assets and funding sources.

Ortiz-Villajos & Sotoca (2018) examined the relationship between innovation (and their types) and business survival by controlling five features of companies. Ritter & Pedersen (2020) presented a unique tool for assessing the impact of the crisis on the business model. Zinilli (2016) studied competitive funding schemes using dynamic network analysis techniques within a specific Italian funding program. Vasylieva (2019) argues that the initial management of agriculture is a prerequisite for saturating domestic demand for quality food and expands the Ukrainian niche in world agriculture, and appropriate monitoring and comparison will determine options and prospects for improving agricultural management at the level of agricultural enterprises. Velychko, Velychko, & Ramanauskas (2016) investigated strategic directions of harmonization in the development of agricultural enterprises and rural territorial communities.

Therefore, further research is needed in the management of business development in the context of economic security.

Setting objectives. Based on the review of the literature discussed in the previous section, we can formulate the following goals and objectives of the study.

The main purpose of this study is to identify the factors influencing the management of business development and the formation of economic security.

Achieving the goal will help solve the following tasks:

1. Study of the essence of economic security based on systematization of threats on various classification signs and definition of characteristic signs of its achievement for the realization of the further scientific developments in this direction.
2. Research of the importance of economic security in the management of business development.
3. Development of theoretical, methodological provisions and practical recommendations for solving problems and outlining prospects for economic security and business development.

3. Research methodology.

To achieve this goal, the works of domestic and foreign scientists - researchers on the above issues were analyzed and the following research methods were used: a systematic approach, inductive and deductive analysis, logical generalization, economic and mathematical modeling. The design of the research is presented below in Figure 1.

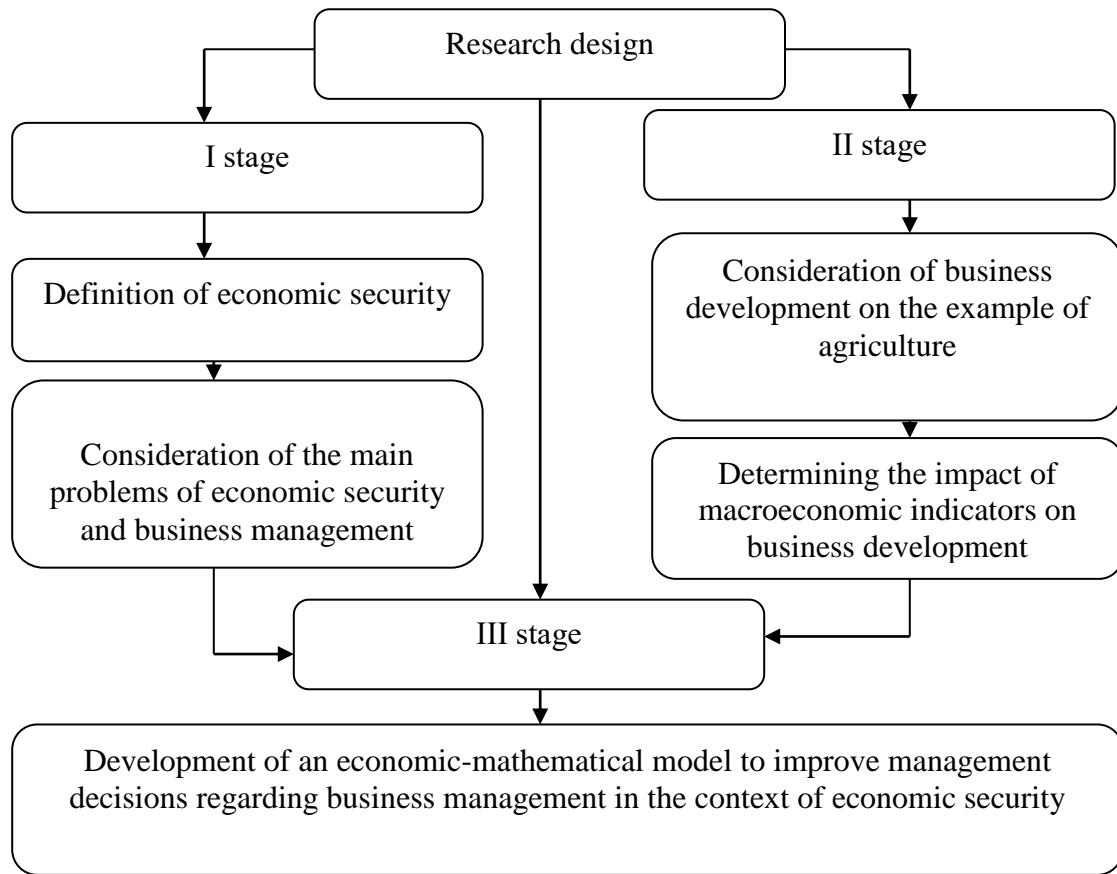


Figure 1. The design of the research

4. Research results

The concept of economic security in modern economic conditions should be considered from a new perspective, as well as any processes or changes that lead to activity and dynamics of development and carry significant both positive factors of development and threats and dangers. At the macro level, economic security is determined primarily by the state's ability to self-development, the source of which in the transition to the information society is innovation. Their introduction into the national economy creates the necessary foundation of technological independence of the country and its sustainable economic development.

The economic security of the enterprise is the state of the most efficient use of corporate resources to prevent threats and ensure the stable operation of the enterprise now and in the future. Summarizing the definition of economic security, we can conclude that the economic security of the enterprise reflects its characteristics such as independence, resilience, security, ability to withstand various threats that interfere with its normal functioning, but, above all, this is the level of development at which the company as a result of a long struggle, certain supportive measures and active actions. Thus, the economic security of the enterprise should be understood as a level of its development that ensures its inaccessibility to internal and external threats and the ability to function properly in a competitive environment.

To understand this concept in more detail, it is customary to distinguish functional components of economic security, namely: financial, intellectual and personnel, technical and technological, political and legal, environmental, information, law enforcement. Each of these components is characterized by its content, functional criteria, and methods of provision that deserve attention. This study will highlight some components of economic security as a driving force for entrepreneurship in the country, which, in turn, leads to a stable place of the enterprise in conditions of constant competition and the presence of internal and external threats.

According to our study, entrepreneurship should be understood as a level of capacity and capacity development that allows achieving a state of protection from internal and external economic threats in conditions of instability of the national economy.

The process of formation and actualization of the economic security of the enterprise depends on the level of management of entrepreneurship in general and enterprises in particular, which increase the degree of realization of society's needs, ensure the development of enterprises and increase their competitiveness. The concept of "entrepreneurship" is broad, but in the formation of economic security are important resources that bring new solutions to problems; significantly improve production processes and the quality of the original product, principles, structure of new objects. Entrepreneurship management is one of the main factors of economic security and competitiveness of the state and the enterprise, which potentially contains the principles of financial success. Accordingly, an adequate level of economic security is impossible without the entrepreneurial component, which ensures the high position of the state and the enterprise, their ability to withstand various dangers. However, full economic security is an ideal, which means the constant need to maintain the already achieved economic results and get new ones, in particular, in the field of entrepreneurship.

So, there were highlighted the main problems of economic security and business management:

- undeveloped legislation on ensuring the development of small business in particular, and entrepreneurship in general;
- significant tax pressure and corruption of government agencies, which forces companies to hide financial resources, which in normal development can be directed to the development of financial and economic activities;
- insufficient financial and credit and investment support for business development;
- limited access to information on the processes of effective business development;
- imperfection and limitations of the system of training, retraining, and advanced training of personnel for the system of economic security.

In modern conditions, the development of entrepreneurship is one of the categories that allow you to assess and analyze a comprehensive product quality, efficiency of production, the processes of the economic system, the state of the country on the world stage as a whole. Today, to ensure the effective competitiveness of enterprises and the state, it is advisable to develop and implement scientific developments, use innovative technologies to improve the overall system of the economy. Thus, it is worth noting that effective business management will succeed in combating competitors and take a certain position in the market. Considering the enterprise as a single integrated system, it should be noted that the creation and implementation of an effective mechanism for managing the enterprise will increase efficiency and achieve the required state of stability.

Thus, in this study, by analyzing and systematizing various theoretical approaches to the concept of "economic security", it was proposed our own generalized definition of the term. Risks of business management in view of economic security of business activity have resulted.

The economic security of a modern enterprise is ensured by a set of conditions, among which the management of entrepreneurship is of paramount importance. An obstacle in its path is the presence of a set of problems that

hinder the normal functioning of entrepreneurship in Ukraine, its innovative steps, and, accordingly, the provision of protection against threats within the organization and by government institutions, competitors, and unscrupulous business partners. Finding a solution to these problems can be the subject of further research. Overcoming them requires a combination of mechanisms of state regulation with the mechanism of self-organization of the modern enterprise, which is a sign of a civilized market and a necessary condition for sustainable economic development.

For more detailed disclosure of the topic in Table 1, the indicators related to the opportunities for the development of entrepreneurship in agriculture in Ukraine and the European Union are analyzed.

Table 1. Indicators of opportunities for the development of entrepreneurship in agriculture in Ukraine and the European Union on average for 2001-2019

Country Name	Agricultural land (% of land area)	Agricultural machinery, tractors per 100 sq. km of arable land	Agricultural raw materials exports (% of merchandise exports)	Agricultural raw materials imports (% of merchandise imports)	Agriculture, forestry, and fishing, value added (% of GDP)
Austria	33,72	2408,32	1,76	2,19	1,31
Belgium	44,89	1140,68	1,32	1,28	0,78
Bulgaria	47,27	118,18	1,55	1,20	5,62
Greece	56,90	967,28	2,20	1,14	3,67
Denmark	64,01	513,12	2,80	2,47	1,31
Estonia	21,45	650,13	5,75	2,56	3,07
Ireland	64,53	1399,88	0,49	0,75	1,13
Spain	55,53	768,66	1,13	1,33	2,74
Italy	47,53	2075,43	0,67	2,45	2,04
Cyprus	14,18	1225,40	1,25	0,84	2,35
Latvia	28,94	540,90	14,65	2,20	3,60
Lithuania	44,96	631,42	3,00	2,17	3,65
Luxembourg	53,57	1109,57	1,56	1,68	0,35
Malta	31,18	1212,78	0,10	0,46	1,35
Netherlands	55,90	1483,65	2,85	1,57	1,80
Germany	48,25	-	0,82	1,49	0,82
Poland	50,08	1166,54	1,24	1,73	2,79
Portugal	40,56	1151,08	2,56	1,84	2,19
Romania	60,73	191,00	2,10	1,40	6,86
Slovak Republic	40,97	158,18	1,22	1,26	2,24
Slovenia	28,41	6146,76	1,68	2,82	2,15
Hungary	61,64	255,59	0,68	1,12	3,78
Finland	7,47	782,27	6,26	2,50	2,36
France	53,10	669,20	0,95	1,34	1,64
Croatia	23,84	38,71	4,19	1,21	3,69
Czech Republic	51,84	278,27	1,48	1,43	2,20
Sweden	7,57	603,98	4,05	1,47	1,56
Ukraine	71,41	112,25	1,51	1,15	9,56

Source: compiled by authors based on World Bank data

Thus, in comparison with Ukraine and the European Union, the following indicators related to agriculture, economic security, and entrepreneurship were analyzed for the selected countries.

The largest value of agricultural land as a percentage of land area among the EU countries on average for 2001-2019 in Ukraine (71.41%), Ireland (64.53%), Denmark (64.01%), Hungary (61.64%)). The lowest value of agricultural land as a percentage of the land area is in Finland (7.47%), Sweden (7.57%), Cyprus (14.18%). Agricultural machinery, number of tractors per 100 square meters. km of arable land is the largest in Slovenia (6146), Austria (2408), Italy (2075). At the same time, the value-added of agriculture as a percentage of GDP in these countries is 2.15%; 1.31%, and 2.04%, respectively. The highest value-added of agriculture as a percentage of GDP is in Ukraine (9.56%), Romania (6.86%), and Bulgaria (5.62%). Exports of agricultural raw materials in% of exports of goods are highest in Latvia (14.65%) and lowest - in Malta (0.10%). The largest value of imports of agricultural raw materials in% of imports of goods in Slovenia (2.82%), and the smallest is also in Malta (0.46%).

Nationwide indicators that promote or hinder the development of entrepreneurship in the country in Ukraine and the European Union on average for 2001-2019 are analyzed in Figures 2 and 3.

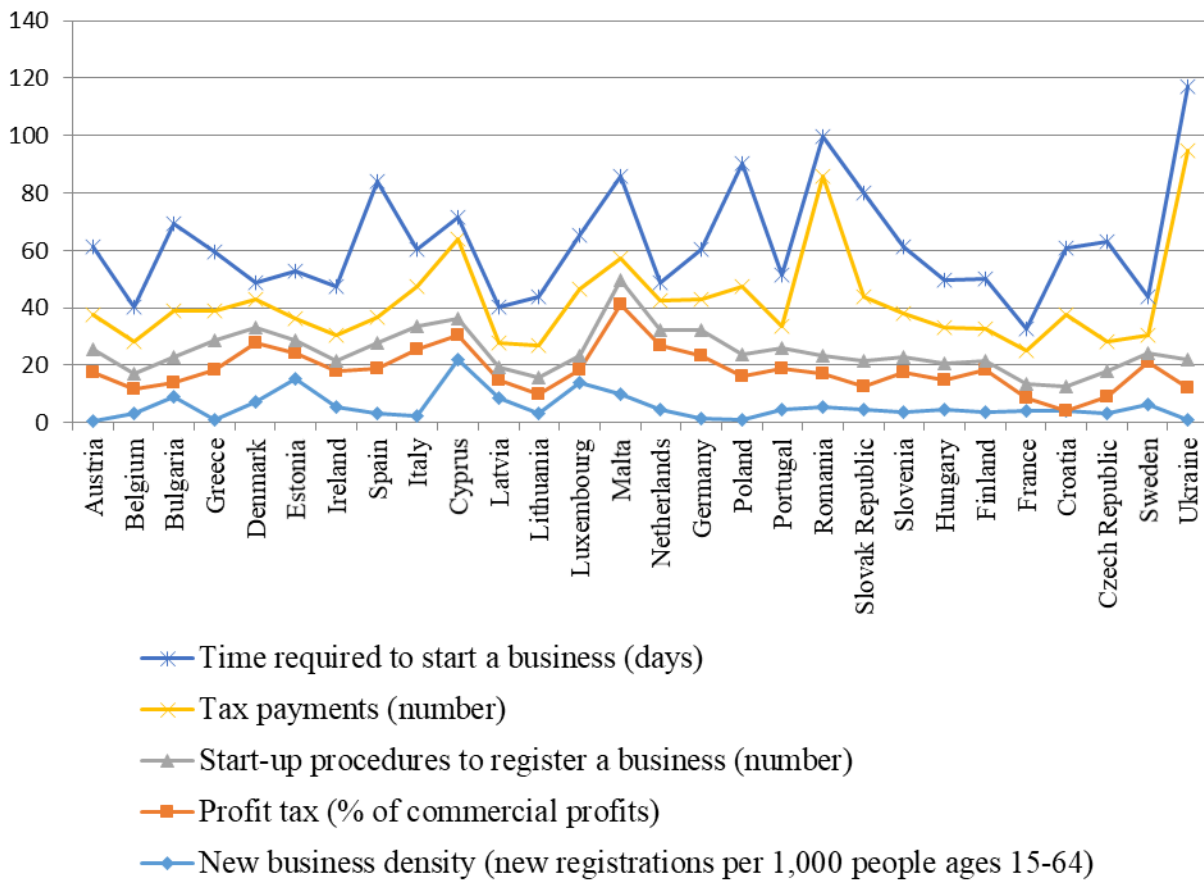


Figure 2. National indicators that promote or hinder the development of entrepreneurship in Ukraine and in the European Union countries on average for 2001-2019

Source: compiled by authors based on World Bank data

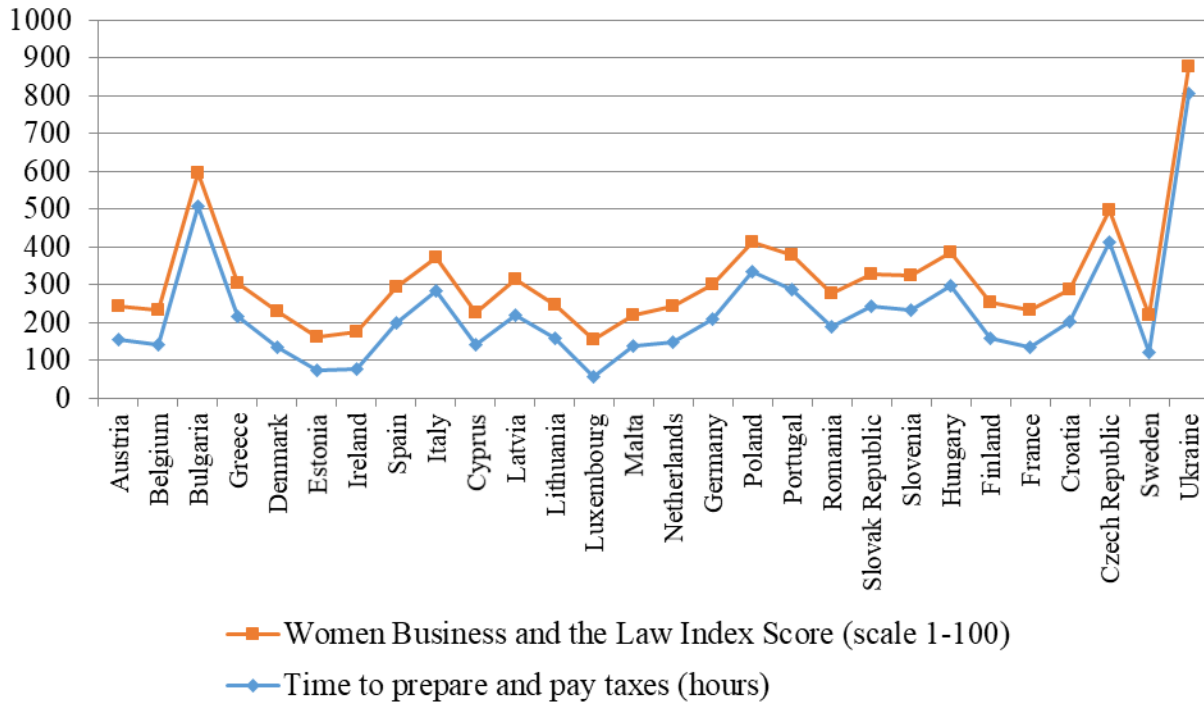


Figure 3. Time to prepare and pay taxes (hours) and Women Business and the Law Index Score in Ukraine and EU countries on average for 2001-2019

Source: compiled by authors based on World Bank data

According to Figure 2, the number of new business registrations per 1,000 people aged 15–64 is highest in Cyprus (21.79), Estonia (15.45), and Luxembourg (14.11); the smallest - in Greece (0.85). Possible factors contributing to this trend are: the number of initial business registration procedures in Cyprus (5.67), Estonia (4.59), Luxembourg (5.00); a number of tax payments Cyprus (27.83), Estonia (7.67), Luxembourg (23.00); as well as the time required to start a business; time to prepare and pay taxes. The Index of Women in Business is interesting, the highest in Spain (96.56) and the lowest in Ukraine (73.91).

One of the main trends in society and the world economy is economic globalization - a phenomenon that has destroyed existing notions of "space and time, the coordinate system according to which we organized reality". In essence, globalization today is a very important challenge to the economic security of any country that is to some extent integrated into the economic space - because it violates economic borders and makes the national economy more open to the negative trends of today. Accordingly, if a country does not have an effective mechanism to counteract the negative impact of processes taking place in a changing and interconnected economic space, it becomes vulnerable to the threats of the globalization world. Thus, the national economy becomes less internally managed and more dependent on such structural centers of globalization as the International Monetary Fund, the World Bank, the International Bank for Reconstruction and Development, the World Trade Organization, and other world financial and economic organizations. Under these conditions, the low level of economic security of the national economy leads to changes in the development of economic processes due to the violation of the stability of development in any center of globalization. Accordingly, the level of GDP, the efficiency of the financial and real sectors of the economy, the purchasing power of the population and the socio-economic well-being of the country as a whole are declining.

In Figure 4 there were analyzed the national indicators of economic security in Ukraine and the European Union on average for 2001-2019.

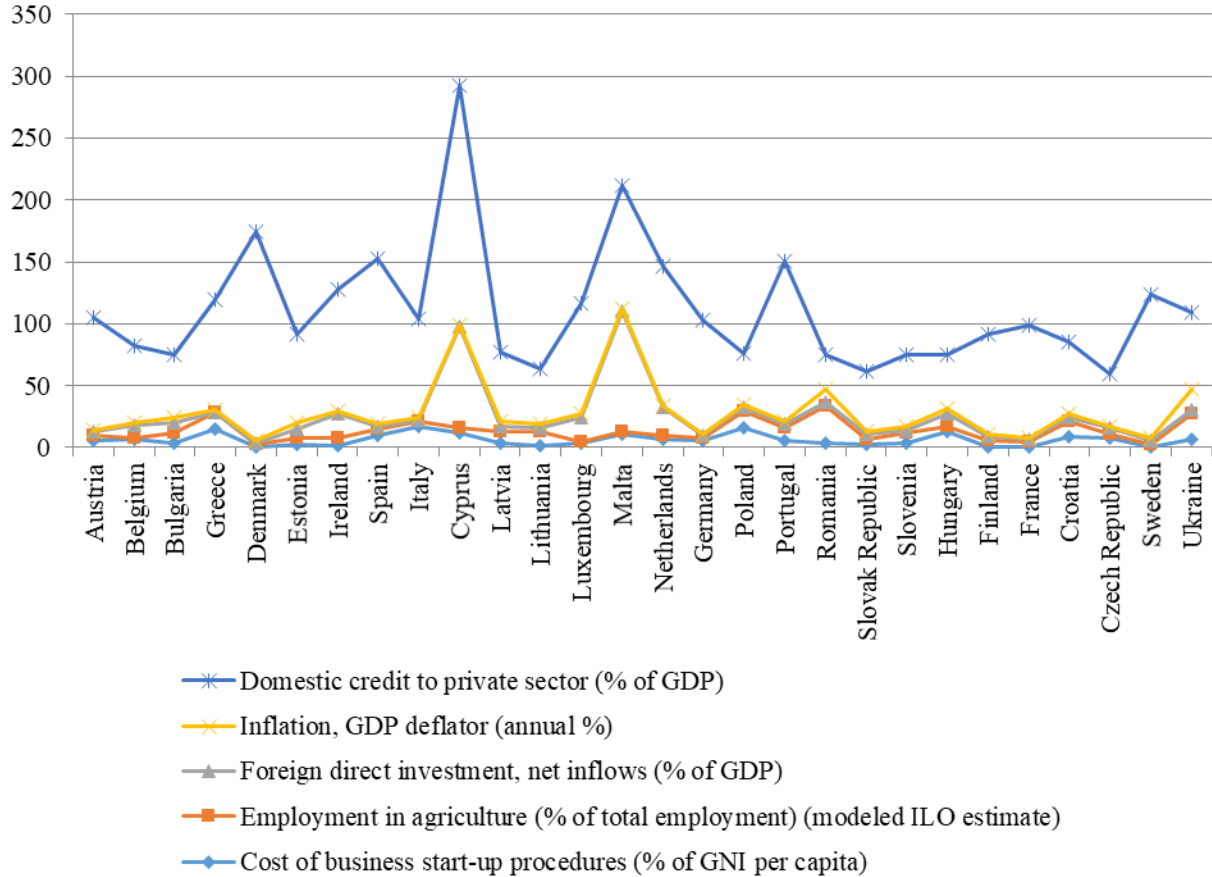


Figure 4. Economic security, national indicators in Ukraine and EU countries on average for 2001-2019

Source: compiled by authors based on World Bank data

According to Fig. 4, the cost of starting a business in% of GNI per capita is highest in Italy (17,26) and lowest in Denmark (0,09). The highest inflation rates in Ukraine are 15,78% and in Romania 10,40%. Thus, because of the above, global economic security can be defined as an integral part of global security of mega economic systems, a prerequisite for which is economic security within the macro-, meso- and microeconomic systems of each of the countries of the global integration world structure.

In Table 2 there were analyzed the indicators of economic security of enterprises in Ukraine and the European Union on average for 2001-2019.

Table 2. Indicators of economic security of enterprises in Ukraine and the European Union on average for 2001-2019

Country Name	Firms expected to give gifts in meetings with tax officials (% of firms)	Firms experiencing losses due to theft and vandalism (% of firms)	Firms that do not report all sales for tax purposes (% of firms)	Firms that spend on R&D (% of firms)	Firms using banks to finance investment (% of firms)	Firms using banks to finance working capital (% of firms)	Ease of doing business index (1=most business-friendly regulations)
Austria	5,7	16,70	35,68	27,14	29,80	37,12	27,00
Belgium	0,20	20,70	27,18	28,90	51,60	54,10	46,00
Bulgaria	20,85	17,33	34,39	6,40	33,99	36,10	61,00
Greece	28,80	19,30	53,19	10,70	17,10	21,50	79,00
Denmark	19,67	25,68	36,76	11,28	25,78	23,45	4,00
Estonia	6,70	27,70	39,07	13,40	31,18	24,30	18,00
Ireland	11,00	22,31	28,78	10,15	37,40	46,10	24,00
Spain	14,30	21,78	18,33	9,45	32,60	35,80	30,00
Italy	4,20	4,10	26,78	5,00	52,50	27,80	58,00
Cyprus	0,00	12,80	30,01	8,00	21,40	42,20	54,00
Latvia	14,42	22,50	37,34	8,55	25,04	27,45	19,00
Lithuania	13,25	18,43	43,61	5,65	26,07	26,70	11,00
Luxembourg	0,00	17,50	32,45	27,00	33,80	30,30	72,00
Malta	0,00	9,30	34,52	16,40	28,90	61,80	88,00
Netherlands	6,78	16,42	36,15	9,12	26,78	32,42	42,00
Germany	14,80	12,56	35,56	10,87	45,00	42,20	22,00
Poland	11,43	15,77	37,88	5,80	36,20	33,52	40,00
Portugal	26,10	5,10	37,25	4,00	20,55	23,75	39,00
Romania	17,38	11,00	34,89	9,20	28,50	33,00	55,00
Slovak Republic	16,24	16,47	36,96	6,95	26,74	29,85	45,00
Slovenia	6,00	16,97	47,79	19,00	36,20	34,60	37,00
Hungary	11,30	12,37	40,67	7,10	31,96	32,43	52,00
Finland	7,89	13,45	37,81	9,15	27,15	32,56	20,00
France	12,45	18,95	36,71	11,45	30,56	36,23	32,00
Croatia	16,36	19,10	39,28	12,75	36,72	42,14	51,00
Czech Republic	14,80	30,43	50,09	21,10	29,00	31,40	41,00
Sweden	0,30	39,80	33,23	29,90	17,90	26,60	10,00
Ukraine	44,16	16,57	31,90	7,60	21,34	19,40	64,00

Source: compiled by authors based on World Bank data

According to Table 2, the largest number of companies expecting to give gifts at meetings with tax officials in Ukraine (44,16% of companies), and the smallest - Cyprus, Luxembourg, Malta (0% of companies). Sweden has the largest number of companies that suffer losses due to theft and vandalism (39,80% of companies), and the smallest in Portugal (5,10% of companies). The largest number of firms that do not report all sales for tax purposes in Greece (53,19% of firms), the smallest - in Italy (26,78% of firms). The largest number of firms that use banks to finance investments is Belgium (51,60% of firms), the smallest - in Greece (17,10% of firms). The largest number of firms that use banks to finance working capital is also in Belgium (54,10% of firms), the smallest - in Ukraine (19,40% of firms). The ease of doing business index is best in Denmark (4, with 1 = the most business-friendly rules) and worst in Malta (88, with 1 = the most business-friendly rules).

The activities of enterprises are carried out in a dynamic competitive environment, complex market conditions, asymmetric information space, and cyclical economic development. The effectiveness of each individual enterprise reflects current trends and processes occurring at the macroeconomic level. At the same time, enterprises as the most productive structural link of the economic mechanism of the state produce a significant

share of goods, provide various services, carry out research and innovation activities, create a competitive potential of the country and so on. Thus, it is safe to say that existing enterprises are a central part of the economic system of any state, which has a direct impact on its stability and socio-economic achievements. In this regard, an important task for the effective functioning of enterprises is to ensure their economic security, which is especially important in an unstable and uncertain business environment.

Thus, it should be noted that the emergence of the category of economic security of the enterprise and the growing relevance of its current research is associated primarily with the existence of a large number of threats that must be taken into account in making management decisions. After all, the efficiency of its business will depend on the ability of the business entity to adapt in time to the impact of these threats. At the same time, the analysis of the results of various scientific studies on the essence of the studied category, allowed us to conclude that there are certain signs of economic security of the enterprise, provided that it can be argued about a certain level of its achievement.

Economic and mathematical methods today are widely used in the analysis of the financial condition of the enterprise and the development of management solutions for its optimization. In the development of management decisions regarding the management of entrepreneurship in the context of economic security, mathematical methods are used to determine the impact of macroeconomic indicators. For the application of economic and mathematical methods, first of all, it is necessary to determine the indicators that affect economic security. The assessment of macroeconomic indicators of the studied European countries shows that there is a tendency to reduce the optimal business conditions in the context of economic security, so it is advisable to identify and analyze the factors that affect economic security. Today, economic and mathematical methods are used to quantify the applied decisions on the organization of management.

When solving specific control problems, the application of mathematical methods involves:

- construction of economic and mathematical models for decision-making tasks in difficult situations or in conditions of uncertainty;
- study of the relationship between the subsequent decisions and the establishment of performance criteria to assess the benefits of a particular option.

The factors included in the description of the model can be divided into two groups:

- 1) constant factors that we cannot influence;
- 2) dependent factors, which within certain limits we can choose at will.

The criterion of efficiency, expressed by some function, is called the target and depends on the factors of both groups. All models of operations research can be classified depending on the nature and properties of operations, features of the application of mathematical methods. It should be noted that, first of all, a large class of optimization models. Such problems arise when trying to optimize the planning and management of complex systems.

To analyze the management of entrepreneurship in the context of economic security, take the indicator Foreign direct investment, net inflows (% of GDP), and the factors influencing it include Cost of business start-up procedures (% of GNI per capita), Inflation, GDP deflator (annual %), Domestic credit to the private sector (% of GDP), Profit tax (% of commercial profits).

The regression equation is compiled - a model according to which measures optimizing the indicator Foreign direct investment, net inflows (% of GDP) will be developed:

$$Y = a + B_1 * X_1 + B_2 * X_2 + B_3 * X_3 + B_4 * X_4 \quad (1.)$$

where Y – Foreign direct investment, net inflows (% of GDP);

a - a free member of the equation;

B₁, B₂, B₃, B₄ – coefficients for variables;

X₁ -Cost of business start-up procedures (% of GNI per capita);

X₂ - Inflation, GDP deflator (annual %);

X₃ - Domestic credit to the private sector (% of GDP);

X₄ - Profit tax (% of commercial profits).

Before applying the function it is necessary to check the expediency of the compiled model:

- check the significance of the regression equation;

- to determine the quality of the compiled model.

The parameters of the regression equation were calculated using the MS Excel program.

The regression equation will take the form:

$$Y = 0,8902 - 0,3054 * X_1 - 0,0294 * X_2 + 0,0567 * X_3 - 0,0871 * X_4 \quad (2.)$$

To check the significance of the regression equation, we find the actual Fisher F-test by the formula:

$$F_{fact} = \frac{S_{fact}}{S_{res}} \quad (3.)$$

where S_{fact} –the actual variance is based on the formula:

$$S_{fact} = \sum (\hat{y} - \bar{y})^2 \quad (4.)$$

S_{res} –the residual dispersion is according to the formula:

$$S_{res} = \sum (y - \hat{y})^2 / n - 2 \quad (5.)$$

So, F_{fact} = 51,285 / 0,650 = 78,9.

Fisher's F-test at a significance level of 0.01 is equal to 16.26 (tabular value). If the condition is met $F_{fact} > F_{0,01}$ the regression equation is considered significant, in this case this condition is fulfilled: 78,9 >= 16,26

Checking the quality of the compiled model is determined using the average error of the approximation. The model is considered to be made qualitatively if the value of the average approximation error is in the range from 5 to 7% inclusive.

The average approximation error is based on the formula:

$$\bar{A} = \frac{|y - \hat{y}|}{y} * 100\% \quad (6.)$$

where \bar{A} - average approximation error;

\hat{y} -the calculated value of the equation.

The calculated value of the average approximation error is equal to 4.5%, rounding to an integer, we obtain 5%. This means that the model is made qualitatively and is suitable for further research.

To determine in which direction to develop activities, we identify the factors that most strongly influence the performance trait. To do this, the following are calculated: coefficients of elasticity; and correlation coefficients.

The coefficient of elasticity is calculated by the formula:

$$E_i = \frac{\epsilon_i * \ddot{x}}{\ddot{y}} \quad (7.)$$

The following data were obtained:

$$E_1 = -0,3;$$

$$E_2 = -0,04;$$

$$E_3 = 0,05;$$

$$E_4 = -0,04.$$

This means that the factors affect the performance trait as follows:

- increase of Cost of business start-up procedures (% of GNI per capita) (factor x1) by 1% entails a decrease of Foreign direct investment, net inflows (% of GDP) by 0.3%;
- growth of Inflation, GDP deflator (annual%) (factor x2) by 1% decreases Foreign direct investment, net inflows (% of GDP) by 0.04%;
- increase of Domestic credit to the private sector (% of GDP) (factor x3) by 1% entails a decrease of Foreign direct investment, net inflows (% of GDP) by 0.5%;
- growth of Profit tax (% of commercial profits) (factor x3) by 1% decreases Foreign direct investment, net inflows (% of GDP) by 0.04%;

Correlation coefficients are calculated using MS Exel for correlation analysis.

The obtained correlation indices are presented in table 3.

Table 3. Correlation coefficients

	Y	X ₁	X ₂	X ₃	X ₄
Y	1				
X ₁	0,1999	1			
X ₂	0,1905	0,0144	1		
X ₃	0,1845	0,0132	0,0123	1	
X ₄	0,1867	0,0156	0,0189	0,0143	1

Source: compiled by authors based on World Bank data

The obtained indicators characterize the connections as follows:

- the factor Cost of business start-up procedures (% of GNI per capita) (correlation coefficient = 0.1999) and only then Inflation, GDP deflator (annual%) (correlation coefficient = 0.1905) have the greatest influence on the performance indicator; Domestic credit to private sector (% of GDP) - (correlation coefficient = 0.1845); Profit tax (% of commercial profits) (correlation coefficient = 0.1867).
- the analyzed factors do not correlate much with each other, so all the factors of the regression equation are significant. All factors of the regression equation will be taken into account when calculating the forecast result (Foreign direct investment, net inflows (% of GDP)).

The regression analysis shows that the Cost of business start-up procedures (% of GNI per capita) has the greatest impact on Foreign direct investment, net inflows (% of GDP).

Conclusions

Summarizing the above, it should be noted that in modern economic conditions, economic security acquires the status of a complex multilevel system, as it requires protection of all its components at different hierarchical levels - from global to individual businesses. Of course, achieving economic security at each level is important and requires constant research at the theoretical, methodological, and methodological levels. However, a necessary condition for achieving global, national, and regional security is to ensure economic security at the enterprise level, the economic essence of which is to provide conditions for its effective functioning and strategic development in the face of threats of various kinds. With this in mind, the achievement of the targets of any enterprise and directly ensure its economic security will depend on the effectiveness of the process of timely identification and minimization of risks to the external and internal environment.

Research limitations: the study was limited to data from the European Union countries and Ukraine for the period 2001-2019.

The scientific novelty of the study is to assess the macroeconomic indicators of the studied European countries, which shows that there is a tendency to reduce the optimal business conditions in the context of economic security, so it is advisable to identify and analyze factors influencing economic security. After developing an economic-mathematical model of the influence of factors on Foreign direct investment, net inflows, it was determined that the factor Cost of business start-up procedures and only then Inflation, GDP deflator has the greatest influence on the performance indicator; Domestic credit to the private sector; Profit tax.

Thus, in view of the above, global economic security can be defined as an integral part of global security of mega economic systems, a prerequisite for which is economic security within the macro-, meso- and microeconomic systems of each of the countries of the global integration world structure.

For the effective solution of strategic tasks of formation and development of the system of guaranteeing economic security of business, adequate to external challenges, the further direction of future researches the creation and analysis of a full-fledged institutional base is determined.

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MOBILITY IN THE CONTEXT OF ENTREPRENEURIAL POTENTIAL OF STUDENTS UNDER THE CONDITIONS OF THE COVID-19 PANDEMIC (LATVIA, GEORGIA)*

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Abstract. *The aim of the study is to assess the role of the university environment of higher education institutions in Latvia in the formation and promotion of the entrepreneurial potential of students under the conditions of the COVID-19 pandemic, paying special attention to the impact of the protracted epidemic crisis on entrepreneurial mobility. In the scientific literature, various systems of mobility are predominantly positively assessed in terms of increasing labour activity, given the increasing availability of distance employment. At the same time, distance employment also has some negative aspects, mainly reflected in the issues of social trust. In our case, the research problem was to elucidate the impact of the crisis in the life of universities, primarily the massive transition to distance learning, on the state of the entrepreneurial potential of students, especially in terms of their entrepreneurial mobility. For this purpose, exploratory research was carried out at the universities of Latvia (Daugavpils University) and Georgia (Ivane Javakhishvili Tbilisi State University and European University). The results of the sociological survey show that the massive transition to distance learning, the expansion the use of information and communication technology by students, is still only to a small extent continued in increasing the entrepreneurial potential, expanding entrepreneurial mobility. Moreover, the crisis situation related to the COVID-19 pandemic even more constrains students to implement their ideas in the field of personal business due to a one-sided attitude to risk as an unequivocally negative factor in the field of entrepreneurship. On the basis of the empirical data obtained, recommendations were made to the administration of universities and the leaders of public associations dealing with the promotion of entrepreneurial activity of students on the basis of more effective ways to increase their entrepreneurial mobility. The methods used by the authors include axiomatic analysis and synthesis, monographic, sociological survey, statistical analysis of quantitative data from a questionnaire survey.*

Keywords: potential; entrepreneurial potential; mobility, students, Latvia, Georgia.

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JEL Classifications: L26, J24, M13, I21

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1. Introduction

The COVID-19 pandemic has significantly exacerbated the entire range of problems of the preservation and sustainable development of mankind, even those that were not previously so urgent and critical. UN Secretary-General Antonio Guterres argues that the COVID-19 crisis is an opportunity to rethink the issue of human mobility (Guterrish 2021). The United Nations Economic Commission for Europe (UNECE) has recently released the Guidelines on Sustainable Urban Mobility and Spatial Planning to help stimulate urban regeneration. “Mobility is a critical issue for the 3.5 billion people who today live in cities around the world for their livelihoods, services and social life”, the UNECE document says. This is especially important in the highly urbanized UNECE region, where over 75% of the population of Europe, 80% of North America and about 50% of Central Asia are concentrated in urban areas” (United 2020). Along with this, the pandemic, with all its grave consequences, is a catalyst for innovative solutions in the field of online education, telecommunication solutions, IT solutions, and makes us look from a different angle at the problems that arise in the event of a job loss or other opportunities. Among the industries most affected by the pandemic and the associated closure of state borders, the most frequently mentioned are tourism, catering, shipping and international trade in general. International educational cooperation and, in particular, academic mobility as a victim of the coronavirus is mentioned much less often in domestic and foreign media and high-level political statements. Empirical studies have recently paid great attention to the role of environmental factors in explaining regional differences in entrepreneurial activity (Linan et al. 2011). So far, there are few scientific and political and economic publications on the impact of the pandemic on student entrepreneurial activity, on its mobility in this area.

2. Mobility in the analysis of entrepreneurial potential (the international aspect of research)

The general interest of researchers in the issue of mobility has increased significantly in recent years. More often than not, the concept of “mobility” is used to describe innovation and novelty both in the world of technology and in the system of social relations. Let us analyse, for example, the reflection of mobility issues in the acknowledged Scopus database.

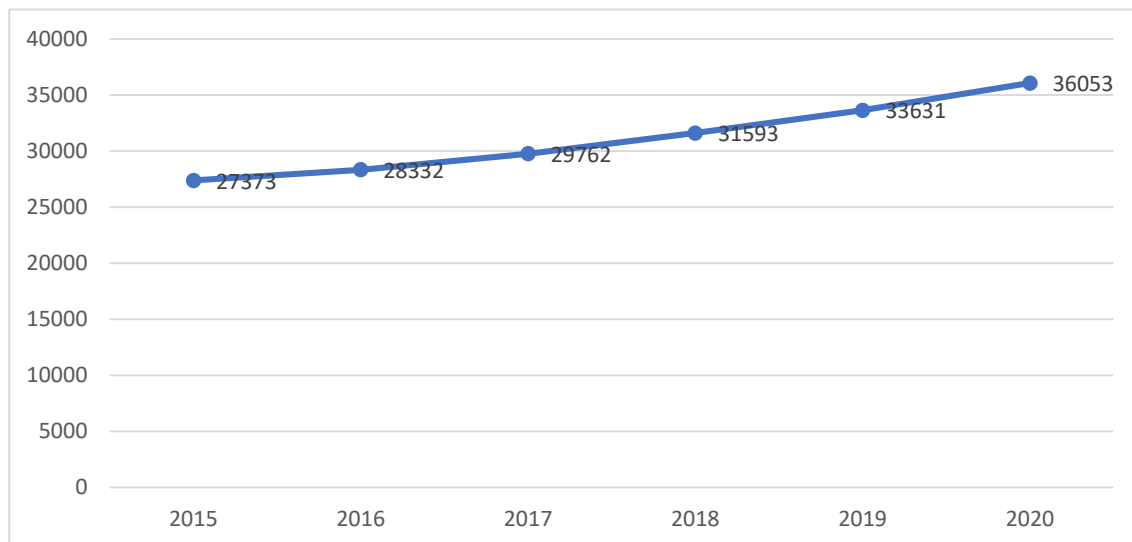


Figure 1. Number of documents per year containing the words “mobility” in the title, abstract or keywords in the Scopus database from 2015 to 2020

Source: elaborated by the authors based on SCOPUS1 database

The results shown in Fig. 1 confirm the high interest of scientists from various branches of science in the topic “mobility”. Publications on the topic “mobility” were indexed especially rapidly in the Scopus database in 2020, when the number of such publications increased compared to 2015 and reached 36,053. Most of the publications are related to the natural sciences and technical sciences, at the same time, 7.7% of the total are represented by social sciences.

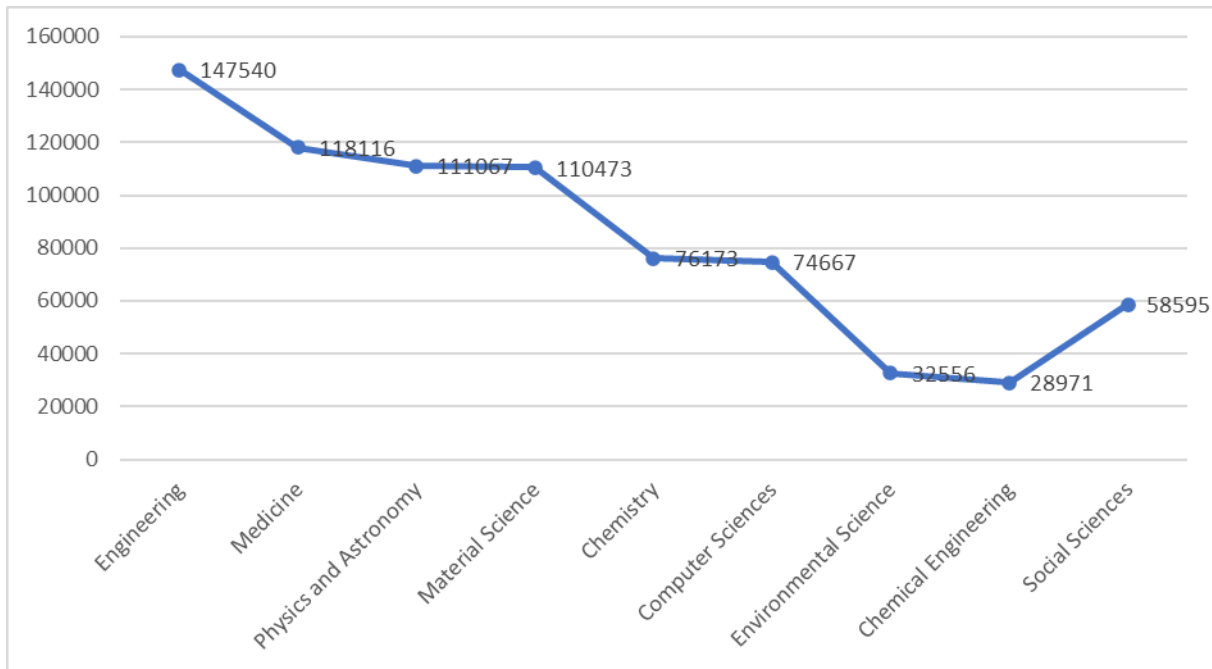


Figure 2. Number of documents by branch of science that contain the words “mobility” in the title, abstract or keywords in the Scopus database from 2015 to 2021

Source: elaborated by the authors based on SCOPUS2 database (SCOPUS 2021)

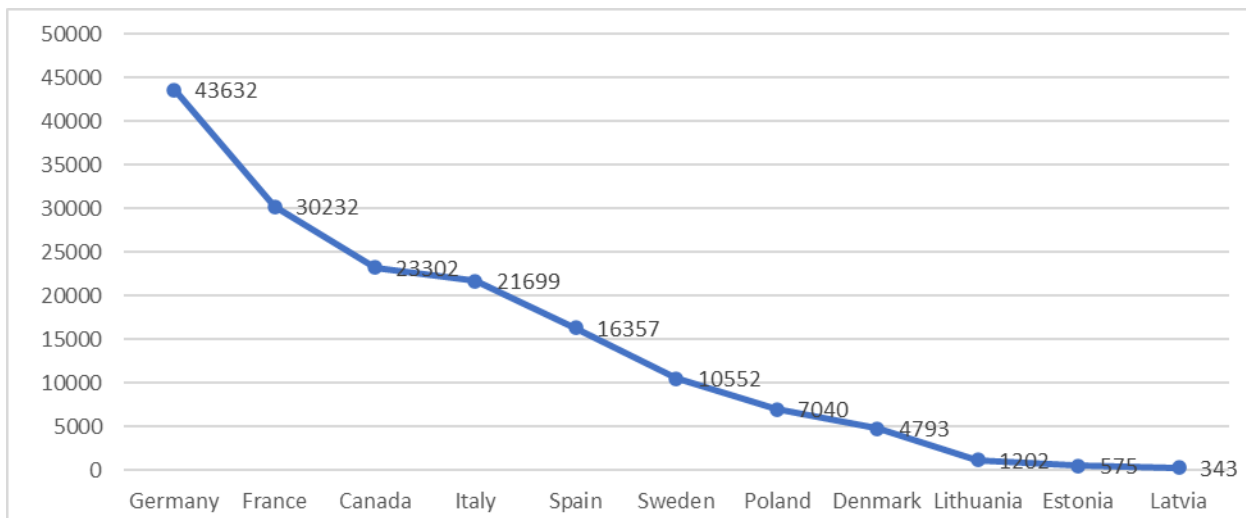


Figure 3. Number of documents by country that contain the words “mobility” in title, abstract or keywords in Scopus database from 2015 to 2021

Source: elaborated by the authors based on SCOPUS3 database (SCOPUS 2021)

The article by Colin McFarlane, Professor of Urban Geography from Durham University (UK), published in 2012, has the largest number of citations (McFarlane 2012). This paper studies co-production of urban entrepreneurship by examining the work of civil society groups on creating models of mobile entrepreneurship in slums. While slums and slum activists have mainly been absent from reports on urban entrepreneurship, they are playing an increasingly important role in creating models of mobile entrepreneurship and in creating and evaluating certain forms of entrepreneurial subjectivity. Focusing on co-production of entrepreneurship requires attention both to the mobile models that constitute relationships between different groups, from states and donors to activists and residents, and to the local contexts and stories that shape and implement entrepreneurship in different ways. In conclusion, the article highlights three values for the study of urban entrepreneurship. Urban entrepreneurship, as the author states, is a far-reaching ideology (methodology) for urban governance, which is characterized by three central elements: competition between cities in order to attract more and more *mobile sources of capital investment*; the powerful influence of market ideologies on the trajectory and content of urban development; and secondary distributional policy that favours growth and wealth accumulation. As we may see, the author widely uses the concept of “mobility” – “mobility of business models”, “mobile sources of capital investment”, “mobility of urban policy”, not paying much attention to either clarifying the essence of the concept itself or the possible content of its various aspects.

The article by Swedish sociologists Bienkowska D., Klofsten M. (Bienkowska & Klofsten 2012) take the second place in terms of the frequency of citing of publications indexed in the Scopus database.

The object of research (postgraduate students) and especially the subject of research (mobility as network capital) allows the authors of this paper to more clearly define the key issues of the proposed topic of their own research. The activities of PhD students aimed at job creation are an important area of study that contributes to deepening our understanding of academic entrepreneurship. The article focuses on the participation of PhD students in network-building activities, defined as mobility and collaboration, as well as their own interest and the estimated degree of support for commercialization from different levels of the university hierarchy. The results of a large-scale survey presented in the article (1126 PhD students at Linköping University, Sweden, 41% of respondents) show that the majority of PhD students cooperate with external organisations, although quite a few (one quarter) spent part of their Doctoral studies outside their home university. PhD students in all faculties are on average interested and in favour of commercialization. However, PhD students of the Faculty of Medical Sciences say they find it difficult to combine research and commercialization. In addition, the interest in the commercialization of research results is relatively low among those PhD students who apply for internships at other universities, which is indicative of experienced incompatibility between research and academic entrepreneurship.

When developing networks, human mobility is an effective mechanism and may even be considered necessary for the initial formation of a network, as it is a precondition for face-to-face meeting and interaction (Urry 2013; Urry 2002). Face-to-face communication is an important way to build trust between people through the investment, effort, money and time that emerge when people come together (Storper & Anthony 2004).

Urry notes that “mobility in general is central to “uniting social networks” and “the connections that emerge from co-presence can generate relationships of trust that enhance both social and economic integration”. Moreover, mobility automatically implies immersion in a different environment, which provides a multifaceted learning experience that cannot be achieved in any other way.

There is an increasing number of scientific articles, where the search results of representatives of various scientific disciplines using the concept of “mobility” are integrated. For example, Swedish entrepreneurship researchers Erik Landmark and Margda Waern point to eight aspects of the relationship between mobility and entrepreneurship: people mobility, knowledge mobility, mobility of ideas, mobility of opportunities, resource

mobility, mobility of social relations/networks or social mobility, mobility of infrastructure and organisational mobility (Lundmark & Waern 2008).

In addition to the important theory of strategic entrepreneurship, some researchers use the undeniably influential theory of resources and the theory of entrepreneurial behaviour in their scientific research. All three theories form the basis for the formulation of entrepreneurial mobility, which provides a better understanding of the activities of enterprises and is a factor helping entrepreneurs to go beyond their usual boundaries.

Researchers on the promotion of entrepreneurial potential propose to use more widely the concept of “entrepreneurial mobility”, which integrates various manifestations of flexibility and adaptation to a rapidly changing business environment. It is noted that entrepreneurial mobility is a multidimensional construct. Which area an entrepreneur will find himself in depends on one’s resources, competences, ability to seize opportunities, entrepreneurial behaviour and strategic entrepreneurship that help to understand the construction of mobile entrepreneurship (Bednarska 2019).

The emergence of entrepreneurial mobility is seen as a career without boundaries, aiming at transcending boundaries in the context of professional development. Thus, Zahra, Wright base their analytical model of entrepreneurial mobility on 4 contexts of possible movements in the business sphere:

1. temporal (enterprise life cycle),
2. institutional (public policy, legal system, norms, values),
3. social (social media) and
4. spatial (geographic space) (Zahra & Wright 2011).

However, the proposed model practically does not emphasize the rapidly growing role of mobility in the virtual space.

The direction of mobile communication technologies and data transmission mobility is becoming an actively developing area in the world of modern information technologies. The development of data transmission technologies leads to the restructuring of the entire information industry and the integration of telecommunications, computer and television networks. The development of wireless mobile communication technologies changes the lifestyle of a person allowing him to be more and more mobile. The combination of these technologies provides mobile access to the resources of the Internet, which will ultimately change its world. Various mobile data services based on mobile Internet access technology provide subscribers with a wide range of online services:

- operations with securities,
- purchasing goods,
- banking operations;
- payments to accounts of various types,
- navigation and search for objects in the city and much more.

The main advantage of the mobile Internet for enterprise employees is freedom of movement with access to the information they need.

3. Mobility of students in Latvia as the most important component of their entrepreneurial potential (theoretical and methodological aspect and some empirical indicators)

Even before the Covid-19 pandemic, one of the authors of this article noted the fundamental changes in the mobile lifestyle in terms of employment in the context of the increasingly huge role of new technologies, which significantly change traditional ideas about mobility. In 2014, the Institute of Social Research of Daugavpils University carried out a research project “Mobility in the Lifestyle of Today’s Youth” (Menshikov 2014). The

data of a sociological survey in Daugavpils (n=355 people) made it possible to assert that for the youth of the city in the conditions of the formation of an e-society, the access to a mobile lifestyle is expanding. It turned out that by the level of mobility our respondents were distributed as follows: low - 57.8%, medium - 32.1% and high - 10.1%. In terms of employment, the largest share of young people with a high level of mobility is among students (14.9%) and employees of private enterprises (14.1%). For comparison: the number among schoolchildren was just 6.3%.

The mobile lifestyle is a relatively little studied phenomenon, although the development of information and communication technologies significantly changes almost all manifestations of our life. Mobility, network capital, social and humanitarian technologies are becoming an increasingly essential prerequisite for successful employment. The purpose of the previously published articles was to analyse the results of a sociological project, where the object of the research was the youth of Latvia and Belarus, in order to determine, in the paradigm of mobility, the general and special perception of the youth of two countries with different economic systems of the problem of a mobile lifestyle in terms of employment (Menshikov et al. 2017a; Menshikov et al. 2017).

The following objectives of the research were among the main ones: to identify the most significant characteristics of the category of “mobile lifestyle” in the perception of young people in two countries with different economic systems (liberal in Latvia, transitional with a high share of state regulation in Belarus), to determine the most essential factors contributing to the implementation of a mobile lifestyle, the establishment of self-assessments of mobility in various types of activities, especially economic ones, the presence of experience of distance employment, the lack of labour skills, including working in the online space. Based on youth self-assessments of their mobility in certain aspects of their lifestyle, we have identified three levels of mobility: low (no more than 2 types of activity, where respondents consider themselves mobile), medium (3-4), high (from 5 to 10 types of activity). Only 7% of respondents both in Latvia and Belarus have a high level of mobility. The data on the share of young people with an average level of mobility (Latvia-28%, Belarus-25%) and a low level of mobility (Latvia-65%, Belarus -68%) show practically no difference.

We again see a coincidence in the three types of activities where young people of Latvia and Belarus are most mobile - communication on the Internet (Latvia - 37.4%, Belarus - 36.2%), recreation, hobbies, entertainment, games (Latvia - 35.5%, Belarus - 43.3%), learning, advanced training (Latvia - 29.9%, Belarus - 24.8%). The youth of our countries is least mobile again in the same types of activities: entrepreneurship, one's own business (Latvia - 9.3%, Belarus - 6.5%), political activity, working in non-profit state organisations (Latvia - 4.7%, Belarus - 2.9%), participation in the activities of religious organisations, churches (Latvia - 10.3%, Belarus - 2.0%).

At the same time, young people still underestimate network capital and computer skills. Only 3.4% of the young people surveyed noted the absence of these skills, while only 27.1% of our respondents in Latvia and 21.2% in Belarus had at least some experience of remote work. And this is despite the fact that only 1% of the young people in our countries surveyed constantly worked on the basis of distance employment. Even when looking for a job, only 17% of those who have some kind of employment have successfully used the Internet.

In recent decades, scientists from different areas of social science have paid much attention to entrepreneurship as the most important factor in the dynamic development of the economy. With this in mind, it is important to understand what entrepreneurship and its potential are (Menshikov & Ruza 2021). Entrepreneurship is any attempt to create a new enterprise or new business, for example self-employment, the establishment of a new entrepreneurial structure or the expansion of an existing business, undertaken by an individual, a group of individuals or an existing business structure.

The degree of entrepreneurship development depends on the formation and implementation of entrepreneurial potential. Entrepreneurial potential is a type of labour potential; however, it has specific features determined by both the nature of a certain type of entrepreneurial activity and the specific features of a particular economic system.

Entrepreneurial potential is a highly complex phenomenon based on both genetic and social factors (congenital and acquired). In the scientific literature, in the reports on scientific research, we may encounter quite a few of its individual elements. In our opinion, the following should be attributed to the individual characteristics of a potential entrepreneur:

- Entrepreneurial opportunities - confidence that there are favourable conditions for starting a business in the place of residence of an individual;
- Entrepreneurial abilities - confidence that a potential entrepreneur possesses the necessary knowledge and skills to start a business;
- Entrepreneurial intentions - focus on the entrepreneurial activity of an able-bodied person who is a latent entrepreneur and plans to open a business within the next few years;
- Mobility - a characteristic of a person's lifestyle that demonstrates a high level of activity in both real and virtual space.

In particular, some researchers of the entrepreneurial potential of young people consider high mobility, flexibility of approaches, and quick response to the development of new markets its greatest strengths (Chernicov et al. 2017).

Awareness and access to various aspects of entrepreneurship can play an important role in shaping beliefs and attitudes towards entrepreneurship. By integrating different predictors of entrepreneurial intentions into one coherent framework, policymakers can better understand the complementarities of various individual and contextual variables that influence entrepreneurial intentions (Urban & Chantson 2019). However, authors of entrepreneurship research do not always focus on the role of mobility in the “coherent structure” of entrepreneurial intentions.

In February 2020, the researchers from the Department of Economics and the Centre of Social Research of Daugavpils University surveyed 402 students in 16 higher education institutions (including all 6 Latvian universities). The sociological questionnaire included questions that made it possible to establish the parameters of students' attitude to entrepreneurship, their real involvement in entrepreneurial activity, as well as factors both promoting and hindering the accumulation of entrepreneurial potential already in their student years. In general, Latvian students declare a rather positive attitude towards entrepreneurship, where: (1) they already have their own business - 5.8%, (2) there are dreams of starting their own business some time - 65.2%, (3) now and hardly ever there will be such desires in the future - 29.0%.

The question “To what extent are you ready to establish your own company/start your own business?” was answered in a more restrained manner with the dominant (among 40% of the respondents) answer “both agree and disagree”. 34% of the surveyed students are definitely not yet ready to start their own business, and 26% already have their own business, or are almost ready to create one. Unfortunately, the issues of mobility in the entrepreneurial potential of Latvian students were only indirectly reflected in the research (primarily in the aspect of incentives and obstacles to entrepreneurial activity).

4. Entrepreneurial mobility of students in Latvia and Georgia under the conditions of the Covid-19 pandemic (some results of a comparative exploratory research)

In March 2021, researchers from Daugavpils University (Latvia) and Tbilisi National University (Georgia), a year after the start of the Covid-19 pandemic, began to study the issue of increasing the entrepreneurial potential of students in the context of a protracted crisis, including their mobility in the implementation of this aspect of labour activity. So far, our joint project is limited to exploratory research. The number of respondents was 122 people at Daugavpils University (hereinafter Latvia) and 145 people at Ivane Javakhishvili Tbilisi State University and European University (Georgia). At the time of the sociological survey, 8.2% of respondents in Latvia and 16.6% in Georgia had their own business, which is largely due to the specifics of the profile of their educational programmes. In Georgia, almost all surveyed students receive education in business, management and economics (98%), in Latvia this number was only 8.1%, while 25.4% of all respondents studied the law and 24.6% - art. Previous researches on entrepreneurial potential emphasize the importance of prior acquaintance with entrepreneurship (Krueger et al. 2000; Rahman & Day 2013; Vanevenhoven & Liguori 2013), social assessment of entrepreneurship (Kibler et al. 2014; Linan et al. 2011), entrepreneurial and social support (Hopp & Stephan 2012; Zanakis et al. 2012; Stephan & Uhlaner 2010).

Table 1. Comparison of data from a sociological survey of students in Latvia and Georgia on the degree of their participation in entrepreneurship, (%)

Answer options	Latvia	Georgia
I have an idea that I would like to commercialize (build my own business and make a profit)	59,8	72,9
I am interested in doing business	58,2	74,6
I consider myself an entrepreneurial person	19,7	28,9
I already run my own business	8,2	16,6

Source: elaborated by the authors

As the data in Table 1 show, among our students there is a fairly large distance from having an idea that they could commercialize to the presence of their own business (especially among Latvian students enrolled in programmes not directly related to business, management, economics).

Apart from usual obstacles, there are now the complexities added by the current pandemic situation. This was indicated by a relatively large share of respondents - 42.6% in Latvia and 55.2% in Georgia indicated the answer option “definitely not” to the question about the possibility of implementing their idea in the current situation of the pandemic. As can be seen from the data in Table 2, the conditions of the pandemic increase the risks of starting a business and managing a company, but the dominant factor is still one’s own attitude to risk, regardless of the external situation.

Table 2. (%) Attitude of Latvian and Georgian students to various aspects of entrepreneurial risk (%)

Answer options	Latvia	Georgia
I can call myself a person willing to take risks	50,0	56,98
I think owning a business is risky	66,0	62,50
I believe that starting a business in the pandemic is very risky	67,0	65,06
I think it's risky to manage your company in the pandemic	62,0	61,14

Source: elaborated by the authors

Still, the dominant fact is that most of the students surveyed give a very low assessment of their own accumulated entrepreneurial potential (to one degree or another, this was indicated by 71.3% of respondents in Latvia and 63.5% in Georgia). The most important gap in the accumulation of entrepreneurial potential here the willingness to take risks (average scores on a scale, where 1 - absolutely agree, 7 - absolutely disagree in Latvia - 4.51, in Georgia - 5.14).

As may be seen from the students' answers, they unambiguously attribute risk to an obstacle to starting their own business, when higher education does not form a broader and positively coloured view of the phenomenon of risk. Apparently, neither in academic affairs, nor in research work, at meetings with successful entrepreneurs, our students receive knowledge and beliefs about the positive role of risk, about such functions of risk as protective, analytical, innovative, regulatory one (Economic 2021). When starting any new business, it is necessary to assess not only risks, but also chances. Lectures, conversations and discussions with students should be devoted to both risks and chances - both forms of actualizing the results of decisions and actions taken in an uncertain and unpredictable future. In this case, risks are the events that are unfavourable for the subject, while chances are favourable ones. At the same time, it is important to show young people that in order to make rationally grounded decisions, it is necessary to predict and evaluate both risks and chances, since when setting goals and making decisions, a person expects first of all to achieve success, that is, chances, rather than failure, that is risks.

Table 3. Distribution of answers to the question: "How did the pandemic affect your business?", (%)

Answer options	Latvia		Georgia	
	entire array/ having their own business		entire array/ having their own business	
Hasn't influenced in any way	59,0	30,0	51,7	13,6
There is less work	8,2	20,0	42,1	86,4
There is more work	4,9	20,0	5,0	0,0
I am thinking about closing my business	2,5	20,0	1,2	0,0
Other	25,4	10,0	0,0	0,0

Source: elaborated by the authors

Young people should be aware that mobility itself is virtually a risk. "At the same time, mobility is associated with risks," a British sociologist John Urry says in his book "Mobilities". The modern mobile world appears to be characterized by new dire threats and restrictions imposed on people, places and natural environments, as well as new opportunities to lead risky mobile lives" (Urry 2012). From a global perspective, the Covid-19 pandemic has significantly increased the uncertainty of the future for the economy and social sphere (Bedianashvili 2021), which gives the factor of mobility an additional special significance.

Table 4. Evaluation of the role of distance learning in the development of entrepreneurial potential among students, %

Answer options	Latvia	Georgia
Yes, it contributes, since the distance learning system allows you to discover the whole spectrum of academic knowledge	7,4	12,4
Rather yes than no, as an effective use of ICTs has increased	23,0	23,4
No, since the opportunity to apply one's knowledge in practice has decreased	46,7	37,9
Rather no than yes, since the technical infrastructure of the educational process is insufficient	20,5	18,6
Other	2,5	7,3

Source: elaborated by the authors

Considering the phenomenon of mobility in the field of entrepreneurial activity, one should take into account that in modern conditions of globalisation, entrepreneurial activity itself largely depends on many factors, including technological, socio-economic, cultural (Bedianashvili 2018). The pandemic clearly revealed these features, which was confirmed in the process of analysing the survey results.

The data in Table 4 demonstrate that distance learning, which has become common under the conditions of the Covid-19 pandemic, was assessed rather positively only by about a third of our students in terms of developing their entrepreneurial potential, especially due to the effective use of information and communication technology (ICT). At the same time, there is also a fairly noticeable group of students (7.4% in Latvia and 12.4% in Georgia), who highly appreciated the opportunity to independently discover a wider range of academic knowledge, which promotes entrepreneurial potential and contributes to the opening of one's own business. However, the dominant of the attitude towards distance learning is rather its negative assessment in terms of the development of entrepreneurial potential - self-isolation and communication in the online format reduce the opportunity to apply one's knowledge in practice (which turned out to be especially important for Latvian students studying in the programmes not directly related to business, management, economics).

The relatively low assessment of distance learning in terms of the formation and implementation of entrepreneurial potential, the expansion of mobility, especially in the online format, does not confirm our hypothesis about the advanced development of the generation born with the "mouse" of the virtual space in comparison with older generations. For example, in Latvia "digital people", "zoomers" make up about 300 thousand representatives of generation Z, born from 1998 to 2013, and to whom the overwhelming majority of our current students can be attributed.

Our research shows that the "digital divide" is not a problem for only older generations, as J. Van Dijk demonstrates in detail in his 2 monographs. The digital divide is one of the elements (and at the same time factors) of social inequality, hence, the general model of social inequality can be represented as follows: - categorical inequalities, including personal ones (age, gender, ethnicity, level of intellectual development, personal features, health status) and positional ones (profession, education, marital status, social status, region of residence), affect the unequal distribution of resources; - unequal distribution of resources affects unequal access to digital technologies; - unequal access to digital technologies also depends on the specifics of these technologies; - a consequence of unequal access to digital technologies is a different level of participation of citizens in public life; - unequal participation in the life of society affects the strengthening of categorical inequalities and causes unequal distribution of resources. Thus, J. Van Dijk concludes that the digital divide is a real social problem of modern society, since it leads to a slowdown in economic growth and innovative

development, increased inequality and exclusion, poses a serious threat to public safety due to the lack of control over those who have limited access and use of digital technologies.

At the end of the 20th century, there emerged works demonstrating that inclusion in social relations, belonging to a network, and the ability to use modern technologies are of fundamental importance for modern societies. J. Van Dijk considers four forms of access: motivation to the use of digital technologies, material access (having access to a device, to the Internet), access to digital skills and access to opportunities for using digital technologies (Dijk 2005). It seems that the combination of these forms of access to digital technologies could have reflected the complex and multidimensional nature of the problem of the digital divide. However, later it became obvious that to adequately describe the state of the digital divide, it is not enough to determine the form of access and its level. It is much more important to understand how this access relates to certain user strategies and practices.

In his new work, J. Van Dijk preserves the theoretical framework. However, his scheme now includes four sequential stages of not only access but also the use of digital media: motivation, physical access, digital skills, and application opportunities. The author considers “access” as the first step, the basis for studying the digital divide. The main attention should be paid to the concept of “usage”. For this reason, the concept of the digital divide of the first level has been continued in the study of the digital divide of the second and third levels. In fact, the sociologist reproduces his own previously proposed concept of access demonstrating the possibilities of its application to studying the subject at all three levels. Unfortunately, J. Van Dijk implements his detailed analysis of the problems of the digital divide only in the paradigm of social stratification, without delving into the theory and reality of a mobile society and mobile lifestyles, existing digital accelerators and obstacles.

Table 5. What area will your company operate in, taking into account the conditions of the pandemic? Choose one most appropriate option, (%)

Answer options	Latvia	Georgia
Information technology and communications	10,7	16,6
Trade (wholesale/retail)	12,3	29,0
Consulting (law, taxes, management, personnel management)	3,3	4,1
Advertising / Marketing / Design	19,7	13,1
Education	11,5	3,4
Tourism	4,1	2,8
Catering	9,8	8,3
Health care	4,9	8,3
Other services (including finance, insurance, etc.)	4,1	4,8
Architecture	0,0	0,7
Construction and industry	4,9	2,8
Other	14,8	6,1
	100,0	100,0

Given the specificity of the difficulties encountered during the Covid-19 pandemic and the current uncertainty in terms of full range of risks, it is not surprising that students are seriously thinking about the possible consequences for their business and what area their company will operate in, given the conditions of the pandemic. Companies are at different stages on their road to recovering from the pandemic, and the consequences of COVID-19 may vary by geographic region and economic sector.

Students are more likely to be interested in entrepreneurship when they think it will lead to the desired results, it will gain the approval of others (Mmakgabo 2014). The decision to start an entrepreneurial activity is to a greater extent determined by the motivation of opportunity, rather than the motivation of necessity (Herrington & Kew 2017; Maque 2017). The data in Table 5 show that students from Latvia in the pandemic would rather plan their business in such areas as advertising/marketing/design (19.7%), trade (wholesale/retail) (12.3%), education (11.5%). Students from Georgia believe that opening their own business with the least consequences of COVID-19 will be in such areas as trade (wholesale/retail) (29.0%), information technology and communications (16.60%), advertising/marketing/design (13.1%). As may be seen from the students' responses, in the context of the protracted COVID-19 pandemic, the most preferable areas of work are those where distance employment is more common.

5. Conclusions, proposals and discussion points

The multifaceted and global crisis caused by the spread of COVID-19 in general negatively affected the entrepreneurial potential of students of universities in Latvia and Georgia, where exploratory research was carried out to determine the impact of distance learning and the circumstances of remote communication with teachers, fellow students, real and potential business partners on the implementation of existing business ideas. In addition to the existing obstacles recorded in the pre-crisis period, the complexity of the current situation of the pandemic is being added. This was indicated in the responses of relatively large shares of respondents in Latvia and Georgia. As follows from the data of the sociological survey, the conditions of the pandemic increase the risks of starting a business and managing a company, but the dominant factor is still one's own attitude to risk, regardless of the external situation. Our hypothesis that distance learning significantly contributes to an increase in student mobility, including in the field of virtual space and remote entrepreneurship, has not been confirmed. The "digital divide" takes place not only regarding the older generations, but also among student youth. Only about one in four of our respondents in Latvia and Georgia said that distance learning increased the efficiency of using information and communication technologies. Universities and non-governmental organisations supporting entrepreneurship are facing the difficult task of helping students to use ICT in business tasks, in increasing entrepreneurial mobility - the most important aspect of entrepreneurial potential. Digitization should become the cornerstone of enhancing student entrepreneurial mobility, thereby supporting the creation and recovery of small and medium-sized enterprises.

The sociological survey at the universities of Latvia and Georgia showed that the overwhelming majority of students want to acquire entrepreneurial competences during their studies, to gain the required minimum of entrepreneurial culture in practice. At the moment, the development of entrepreneurship in the field of creation and use of ICT, medicine, education, as well as training managers in corporate entrepreneurship in order to promote promising national technologies is topical.

We believe that the administration of universities should show a greater interest in teaching entrepreneurship, elaborating and developing educational programmes on entrepreneurship at various levels - from Bachelor's to Doctoral studies, satisfying the growing needs of their students for increasing their entrepreneurial potential and entrepreneurial mobility. It is important to develop such a direction at universities as "start-up as a diploma", as well as to introduce programmes on teaching entrepreneurship as additional education.

We assume that the *House of Europe* programme funded by the European Union and created to support professional and creative exchange between young people in the EU countries, deserves getting support and expansion. The programme focuses on culture and the creative sector, education, medicine, social entrepreneurship, media. For example, a mobility grant is a chance to take part in professional events in the EU countries at the expense of the programme (European 2021).

The novelty of the research findings is that for the first time the impact of the COVID-19 crisis in the life of universities in Latvia and Georgia, primarily of the massive transition to distance learning, on the state of the entrepreneurial potential of students, especially in terms of their entrepreneurial mobility, has been clarified.

The materials, findings and conclusions of the research can be used by research organisations, government bodies, institutions of higher education, student organisations. Our research can encourage entrepreneurial scientists and strategists to realise that the scope of the concept of entrepreneurial mobility is much wider than previously estimated, opening up new interesting opportunities for theoretical and methodological development in this area.

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ADAPTATION OF BIG DATA: AN EMPIRICAL INVESTIGATION FOR SUSTAINABILITY OF EDUCATION

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Abstract. The current study aims at developing a framework to assess big data use for education and encompassing the theoretical background of knowledge sharing and diffusion of innovations in the educational environment. This study hypothesizes that age and cultural diversity, and motivators can influence knowledge sharing, whereas the constructs of relative advantage, trialability, complexity, observability would impact innovations. Thus, innovations influence knowledge sharing and would be positively associated with behavioural intention to use big data and sustainability for education. This study utilized a version of knowledge sharing model and Diffusion of Innovations (DOI) theory as the study framework and implemented quantitative approach for data analysis by collecting 494 responses from university students who were elected using stratified random sampling technique. The data were processed using eleven factors to unveil and understand the predictors of big data use for education sustainability. The study adopts the quantitative approach and employs structure equation modelling (SEM) to data analysis. According to the study's findings, age and cultural diversity and motivators significantly determine knowledge management sharing, while relative advantage, trialability, complexity, and observability have a positive impact on innovations. The adoption of innovations, knowledge sharing, and big data are able to capture 78.9% of sustainability phenomenon on education. Further, the study concludes by reporting findings and implications for research and practitioners.

Keywords: application of Big Data; sustainability; knowledge sharing; behavioural intention to use Big Data

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JEL Classifications: A29, I21, O33

1. Introduction

It is of great importance to know what motivates organizations' team members in order to enhance the sharing of knowledge (Lam and Lambermont-Ford, 2010). In spite of this, it is noticed that such motivations are not properly addressed in previous research and more inclusive results are needed. Nowadays, knowledge and information are becoming the new source of power rather than finance, land, and capital (Ishikawa and Nakagawa, 2013). Therefore, having more studies on big data is very important. Limited success has been reported through the use of big data, and that was seen in the limited outcomes that organizations achieved by

using big data. The investigation of such failure has received little attention from researchers and scholars (Ishikawa and Nakagawa, 2013). In order to address this gap, there is a need for more research investigating the assessment tools of the organizations' willingness to adopt big data. Organizations' capacity of managing big data and knowledge management sharing is a determinant of sustainable competitive advantage and development. Elias and Ghaziri (2007) highlight that knowledge, unlike data or information, cannot be captured and it is also broader and richer. They also refer to it as the abstraction that is located in the minds of people. Researchers and scholars have given the term knowledge management different definitions. Nonaka and Konno (1998) add that knowledge management works to improve and simplify the sharing of knowledge, its distribution, and creation. The concept of knowledge management includes the process of knowledge sharing as one of the most important elements. This process is known as the process of identification that includes the outflow, transmission, and the inflow of knowledge. It refers to the transmission of knowledge among people, groups, and organizations (Gupta and Govindarajan, 2007). Knowledge sharing includes the inflow of facts, suggestions, ideas, and expertise among people (Srivastava et al., 2006). The adoption of any innovation is important for it to be useful. Thus, a high level of adoption is very important for those who are in charge of innovation. Thus, those in charge of innovation pay much attention to the factors that influence its adoption among clients. This adoption of technological innovations has been addressed by many theories. Therefore, this research is aimed to develop a framework that measures the sustainability for education as a consequence of big data acceptance and diffusion of innovations. The high level of innovation underperformance and low adoption of innovations by most of the intended users has become a cause for concern to researchers and practitioners (Tolba and Mourad, 2011), who further attribute this to lack of appropriate use of diffusion of innovation models and problems associated with challenges in evaluating factors that accelerate the rate of diffusion. Ahmer (2013) explains that new innovations should first try to change top management attitude and understanding of the system since they can influence others when they are positively involved in the adoption process because they have control of the resources and can provide a favourable climate in order to implement new technology. The role played by big data nowadays is very important especially since data is the major part of digital evolution. The investigation of the various factors that might influence the adoption of big data is essential in universities, which are still in the early stages in terms of using big data. In general, the understanding of such factors is essential and of great importance to organizations, bearing in mind that more than three-quarters of these organizations are investing or planning to invest in big data (Gartner, 2016). Moreover, these factors have received little attention from researchers, which has been reported in a study that reviewed more than 200 journals (Salleh and Janczewski, 2016; Chen et al., 2016). There is a need for comprehensive frameworks, which explain how they can be used within organizations (Olszak and Mach-Król, 2018). The problem with the current models is that they are limited in focus on technical issues (Kayser et al., 2018). Moreover, frameworks that combine and address the issues of big data adoption in terms of the temporal dimension and the implications of such adoption for organizations' sustainable development are not available yet. Kwon et al. (2015) confirm that the main focus of big data studies is centred mainly around technical factors (such as machine learning or technical algorithms) and improving systems. However, examining the literature indicates that there is a lack in research addressing the core elements that impact big data acceptance or the obstacles confront during adoption. In more details in the theoretical domain, there are few studies have addressed the links between knowledge management sharing, innovations and behavioural intention to employ big data. Therefore, this research is aimed to empirically investigate behavioural intention to use big data for education by including eleven factors, as no study has been found which has exploited these determinants empirically to enhance a successful acceptance of big data by governmental organizations in education.

2. Theoretical Model

Several adoption models have been produced by the research on innovation adoption, especially in two areas, information technology (IT) and information systems (IS). Looking at the available literature in the field of innovation adoption, it can be noticed that two models, in particular, received the highest attention by researchers to investigate the acceptance of a number of technological innovations (Hameed et al., 2012). These models are Davis' (1989) Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI). Hameed et al. (2012) and Puklavec et al. (2014) point out that the majority of IT adoption research has focused on the characteristics of innovation. The adopters' perceptions of innovation characteristics determine their evaluations of these innovations as assumed in both knowledge management sharing and DOI. These adopters tend to adopt those innovations with more advanced characteristics (Rogers, 1983; Davis, 1989). The adoption of innovation is considered to be highly impacted by a number of determinants such as effort-oriented characteristics including perceived ease of use (Davis, 1989), relative advantage (Rogers, 1995) and complexity (Rogers, 1983), and compatibility (Rogers, 1983) (Li et al., 2011). Research model and hypotheses are presented below in Figure 1.

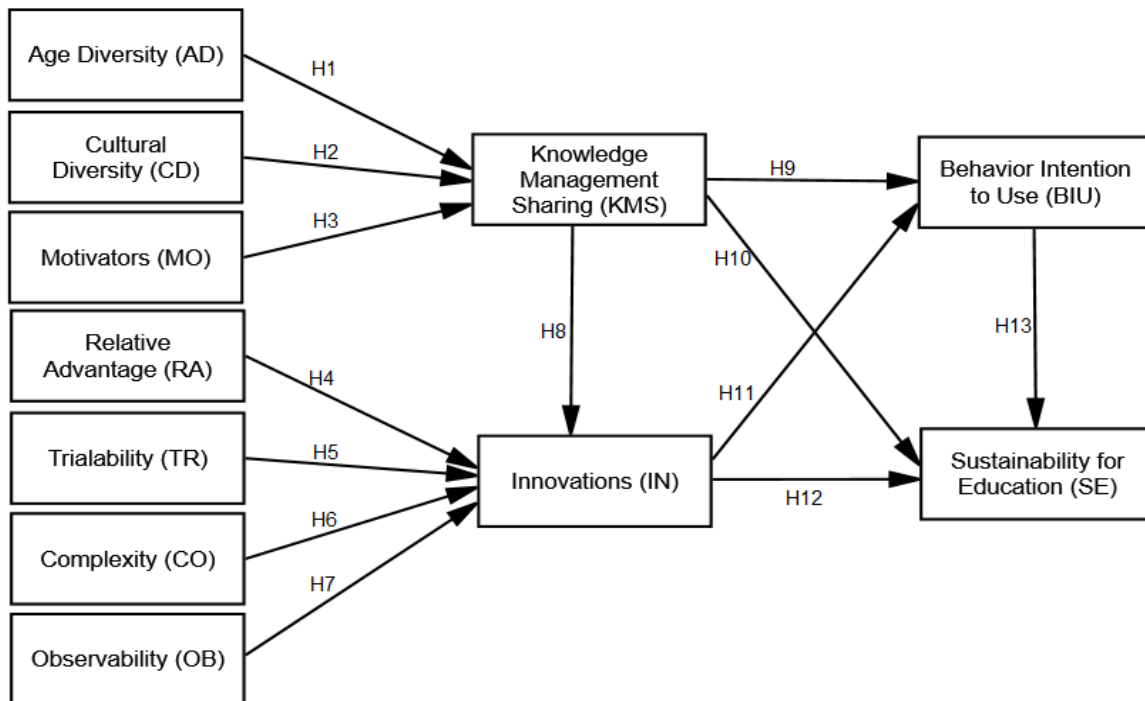


Figure 1. Research Model and Hypotheses

Source: Author

2.1 Research Flowchart and Data Analysis Process

The aim of empirical analysis of the current study is to examine the interrelationships of multiple independent and dependent variables relating to application of big data for sustained education. In Figure 2, we show the flowchart of the regression analysis of this research.

- Independent variables are age and cultural diversity, and motivators influence knowledge management sharing. As well as, relative advantage, trialability, complexity, observability should influence innovations.

- Mediating variables are knowledge management sharing and innovations impact behaviour intention to employ big data and sustainability for education.
- Dependent variables are behaviour intention to employ big data and sustainability for education.

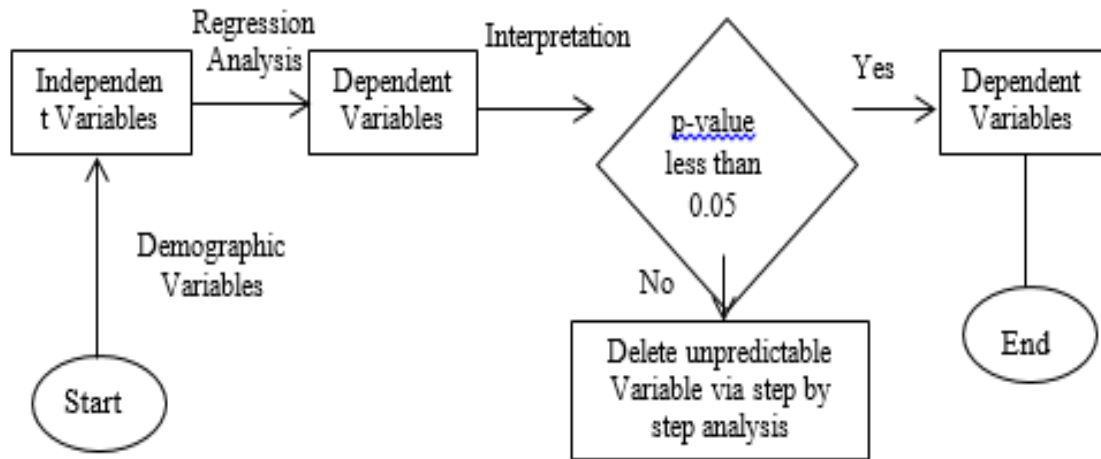


Figure 2. Flowchart of the regression analysis of this research
Source: Author

The model produced in this study used both knowledge management sharing factors and innovation diffusion theory. The model aims at measuring the sustained education through big data, sharing innovation, and knowledge management. The related theories are illustrated in the following sections.

2.2 Knowledge Management Sharing

The processes of acquisition, creation, knowledge sharing, and capturing are closely linked to knowledge management (Cockrell and Stone, 2010). In the field of knowledge sharing, big data text analytics is considered one of the basic terms (Chen et al., 2012; King, 2009). The aim of switching individual knowledge into institution knowledge through transferring and creating knowledge is known as knowledge management. Therefore, knowledge sharing has been defined as the communication of knowledge that can lead to having more understandings and more insights (Sohail and Daud, 2009). The different motivators of knowledge sharing determine the nature of knowledge management (Oye et al., 2011). Based on this, it is important to know the different factors that motivate individuals and organizations to share knowledge in order to improve knowledge sharing (Bartol and Srivastava, 2002; Oye et al., 2011).

Age Diversity: Those countries are witnessing an increasing percentage of people over the age of 60 and that is due to many reasons such as increased prosperity, lower birth rates and the improvement of health systems (Sluiter, 2006). Nelson (2005) adds that western societies are witnessing age prejudices and ageism pointing to the influence of age diversity by bringing forward the stereotyped image the competence of specific age cohorts. Knowing the impact of age diversity is essential for organizations so that they can assess and evaluate the risks. Varying results were revealed as researchers investigated the relation between team outcomes and age diversity (Bunderson and Sutcliffe, 2002). The relation between the team outcomes and age diversity is still vague despite the meta-analysis attempts by researchers (Joshi and Roh, 2009). This is because research included different diversity criteria such as age, ethnicity, and gender and used them to calculate team outcomes (Bell et al., 2011). The social categorization processes were stimulated by age diversity which makes it a difficult task to illustrate task-relevant information and viewpoints (Van Knippenberg et al., 2004). Team members who have diverse

organizational, work, or life experiences form the age diversity teams (Kunze et al., 2011) and that provides problem-solving capabilities and task-relevant perspectives (Kearney et al., 2009). The combination of both perspectives and diverging knowledge is expected to lead to more innovative and creative solutions (Bantel and Jackson, 1989). Moreover, creativity, problem-solving and reflective thinking can be encouraged by the introduction of diverging perspectives as they ignite critical debate regarding the accomplishment of the task (De Dreu, 2006).

Cultural Diversity: is defined as the differences between individuals who come from different cultural backgrounds, beliefs, and worldview which might influence communication (Sheu and Sedlacek, 2004). The impact of culture on knowledge management has been studied, and many findings are available in this regard. Some studies and research papers claimed that the practices of knowledge management are not influenced by culture (Jensen and Szulanski, 2004; Gupta and Govindarajan, 2007). Moreover, other studies, such as Simonin (1999) reported that the ambiguity of knowledge sharing is not affected by cultural differences. In contrast, other studies such as (Voel and Han 2005) reported a significant impact of culture on knowledge management sharing (Voel and Han, 2005). More detailed studies like the one by Finestone and Snyman (2005) found that barriers in knowledge sharing can be created due to cultural diversity. Sackmann and Friesl (2007), who conducted their study on teams, found that cultural differences can influence knowledge sharing behaviour in teams. They found that such cultural differences in terms of nationality, gender and ethnicity can negatively influence the sharing of knowledge. In terms of the type of knowledge management sharing, Thiessen et al. (2007) found that cultural differences have a more negative influence on the transmission of explicit knowledge than on the tacit knowledge management sharing. Other studies reported that knowledge sharing is not influenced by cultural diversity (Horak, 2010).

Motivators: Based on the finding of Fullwood et al. (2013), promotion as an extrinsic motivator was found to be one of the most motivating factors of instructors in England to share knowledge. Also, tendency to learn and help others was found to be one of the main motivators for medical professionals in Kuwait to share knowledge. Those professionals stated that there were no rewards to receive for sharing as reported by (Marouf and Al-Attabi, 2010). These findings provide evidence of the role played by the context of culture or industry in moderating the relationship between rewards and knowledge sharing. Such sharing of knowledge is reported to be influenced by both demotivators and motivators. Age, industry, and culture are all examples of motivators and demotivators to knowledge sharing. Moreover, those motivators and demotivators can be intrinsic and extrinsic (Oye et al., 2011). Age, industry, and culture were reported to have no impact on the knowledge-sharing behaviour within Saudi Arabian companies as reported by Dulayami and Robinson (2015). Rahman (2011) reported that improving performance and effective communication channels were reported as main motivators of knowledge sharing. Knowledge sharing was also reported to be highly influenced by social factors (Boh and Wong, 2015). Among academics in universities, commitment, and enjoyment in helping others were also reported as intrinsic motivators that positively influence knowledge sharing (Tand and Ramayah, 2014).

2.3 Diffusion of Innovations (DOI)

Innovation is a term used to describe the development of a certain idea of an invention to meet certain goals in certain context (Gertner, 2012; Manzi, 2012). The process of innovating takes time when it is adjusted in order to fit into the context. This innovation refers to an enhanced form of the original product, practice, program, or process. When such as innovation gets adopted by individuals or organizations, it becomes the new standard. In the field of learning, enhancing the standard practice by improving the original or introducing a new one is referred to as innovation. The aim of such innovation is usually to obtain better outcomes. The process of innovative practice involves procedures and the combination of programs that finally results in products (Redding et al., 2013).

Relative advantage: Individuals' beliefs regarding the new innovation being better than the original one is known as relative advantage. In other words, this concept refers to the extent to which individuals feel that their learning performance can be enhanced by the sustainability of education. Hung et al. (2016) also define this concept as the perceived idea that this innovation is better than the original standard or idea. The relative advantage that is important to the adopters is mainly determined by the context within which the innovation is adopted and the nature of that innovation. The DOI theory provides that relative advantage of an innovation to influence the adoption technology (Rogers, 1983). Kulviwat et al. (2007) reported a considerable relationship between usefulness and relative advantage indicating that the concepts covered by constructs are very similar. Little attention has been given to the relationships among perceived ease of use, perceived usefulness within knowledge management sharing, relative advantages, and DOI research. The only research is found in this relation revealed that students perceived a higher level of usefulness of the sustainability for education (Hung et al., 2016).

Complexity: The difficulty in understanding innovations and their ease of use by the users is known as complexity. This concept is employed in the current investigation to define the difficulty encountered by individuals that can influence their learning performance. Hung et al. (2016) highlight that this term refers to how difficult it is to understand and use an innovation. Complexity and perceived ease of use were heavily studied and were reported for their influence on IT adoption in the field of DOI and knowledge management sharing (Venkatesh and Bala, 2008; Arts et al., 2011). The degree of how difficult to understand or use a certain innovation determines its complexity and this negatively influences the adoption and the implementation of the innovation (Rogers, 1983). In the adoption of an innovation, complexity is considered a barrier and a hurdle (Tornatzky and Klein, 1990; Grandon and Pearson, 2004). Therefore, an innovation with a high level of perceived complexity is less likely to be adopted.

Trialability: the opportunity given to adopters to experiment with an innovation is known as (Al-Isma'ili et al., 2016). This term refers to the adopters' feelings of whether to try the innovation before adopting it. Innovations that can be tried out first tend to be perceived with less uncertainty by adopters who believe accepting it and those individuals incline to comprehend through this experience. Trialability concerns "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 1983). Moreover, it is noticed that the research on IT adoption within organizations has not paid much attention to the issues of trialability and observability (Puklavec et al., 2014). One of the few studies addressing this issue found that higher levels of usefulness and ease of use of the system are expressed as the levels of trialability are high (Yang, 2007). The hypothesis in the current work assumed that Big Data technologies with a high level of trialability are the ones with low levels of adoption.

Observability: refers to the adopters' observation of the consequences of using a certain innovation by previous users (Boonsiritomachai, 2014). Based on this definition, observability can refer to the level of observing the results of innovations by others. Consequently, friends and neighbors are presumed to ask adopters for feedback. Visibility is considered as an element that stimulates peer discussion of new subjects. The research is conducted in the field of knowledge management sharing where results reveal that there is a substantial impact of the perceived use on the observability by individuals (Huang, 2004; Yang, 2007). Trialability and observability being important characteristics of innovation have been also included in the research in the field of innovation adoption (Ramdani and Kawalek, 2009; Boonsiritomachai, 2014).

Behavioural Intention to Use big data refers to the tendency to employ and continue using certain technology and it includes the determining factors behind the use of this technology (Venkatesh et al., 2012). Moreover, in this research, big data acceptance is considered as an essential component in developing frameworks for innovation usage (Venkatesh et al., 2003; Davis et al., 1989). The roots of these philosophies and models originate from the framework of TRA which determines big data utilization as a function of attitude focusing on certain norms and specific behaviour which were expanded to comprise perceived control and hence TPB (Venkatesh and Bala,

2008). Moreover, user's post-adoption confidence is reflected by the user's post-adoption confidence and the perceived ease of use resulting in better levels of user satisfaction and determination plan (Pelling and White, 2009).

2.4 Sustainability as a Purpose of Education

Environmental educators pay much attention to the concept of sustainability as most advocates in this regard are from environmental studies backgrounds and from facilities management and education (Fien, 2002, p. 244). Sustainability refers to the improvement of the original systems of education based on competitive principles and values and on a predatory view of the world (Gadotti, 2010, p. 203). Sustainable development is just a part of sustainability which is a broader concept. It is defined as the harmony among differences, the dream of living well and the dynamic balance with others. The task of pedagogy of sustainability, known as the pedagogy complementary to Earth Pedagogy, is to create theoretical-practical teaching aids necessary for this education for sustainability (Antunes, 2002). Achieving harmony among human beings and developing the Earth, known as Gaia, is based on sustainability which is an essential element of Cosmo vision. Haan (2007) mentions that education for sustainability emerged as a 'new field of learning and action' which lead to the building of new skills and competencies (UNESCO 2006). Such teaching materials are encouraged to be used in schools and universities. Such places are also required to come up with new activities to fit in their social and economic context. Certain challenges might be posed when approaching sustainability in cultural diversity. Thus, this requires that the different cultural perspectives and aspects be taken into consideration while elaborating the teaching materials (Ferreira et al. 2003). Another thing is that there is limited time allocated for other subjects such as sustainability since graduate and postgraduate courses are heavily loaded with compulsory subjects. However, sustainability should be inserted in such curricula (Crofton, 2000; Springett and Kearins, 2001). In order to reach sustainable development, lifelong learning is considered essential due to the fact that learning these subjects through the different stages of education is essential. Hands-on science experiments, demonstrations and participating in public debates are examples of sustainability concepts inserted in such curricula (Martins et al., 2006). The development of big data in educational contexts has led to new data-driven techniques to assist informed decision making and initiatives to improve educational efficacy (Fischer et al., 2020). Big data is also recognized as a game-changer, capable of changing the way firms function in various organizations for long-term competitive advantage (Muhammad et al., 2020). Big data is used in a variety of sectors; in this paper, we look at how big data is used in education (Khan & Alqahtani, 2020). Universities must continue to play their role as proving grounds for educating the future generation and innovation, based on big data, in improving the education process, and outlines the challenges associated with big data mining, storage, and security in order to respond to the needs of digital transformation (Mkrttchian et al., 2021).

3. Research Methodology

3.1 Developing of The Research instrument

To ensure established content validity, the study adapted scales from previous validated studies. The survey consists mainly of two sections: first one concerns about demographic profile of respondents. The second section is further divided into two main parts: the first part contains 18 scales borrowed from Davis et al. (1989) and Venkatesh and Davis (2000). The other part integrates 24 scales that developed using DOI and reconstructed from the previous research (Davis et al., 1989; Moore and Benbasat, 1991; Karahanna et al., 2002), and 5 scales modified from (Al-Rahmi et al., 2020a; Al-Rahmi et al., 2021a; Alamri et al., 2020a). The instrument-items of the study were examined and assessed by two experts in the field. Preceding to the empirical work, an appropriate permission was received by a government university for gathering data. In order to assess the sustainability for education via through knowledge management sharing and diffusion of innovations, the sampling of this study includes both undergraduate and postgraduate students. The instrument-items of knowledge management sharing

and DOI theory were ranked by using a 5-point Likert item in order of collecting responses relating to assess sustained education through the adoption of big data.

3.2 Sampling and Data Collection

To obtain views about sustainability for education through knowledge management sharing and diffusion of innovations, a self-administered questionnaire was distributed and completed by students. On April 2020, the study distributed 565 questionnaires manually on King Faisal University. About 532 questionnaires were received providing a response rate of 94.2%. Further, a visual examination yielded to have 519 valid-instance for data analysis. The visual examination of the return cases resulted to discarded 13 cases that were not completed. A further analysis was conducted to eliminate nine cases with missing values and five cases with outliers resulting to have 494 valid questionnaires. This filtration is important as suggested by Hair et al. (2012), they indicate that this procedure is essential to conduct since the presence of outliers can lead to imprecise results.

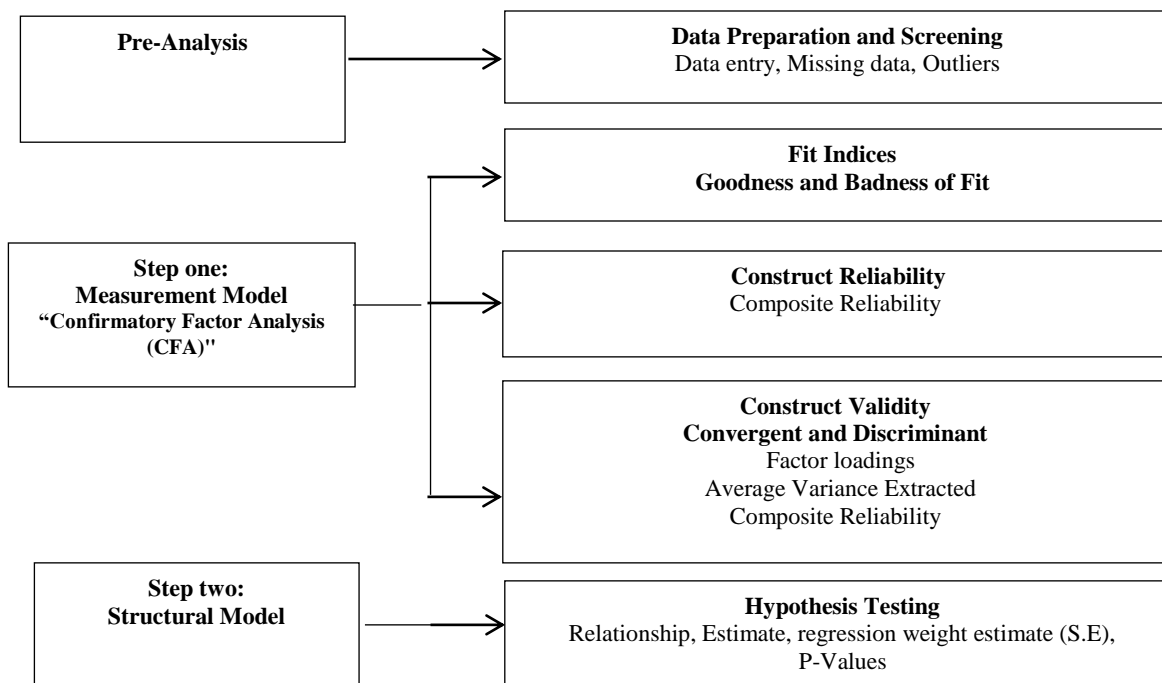


Figure 3. Data Analysis Process

Source: Author

4. Result and Analysis

For preliminary data analysis, the study utilized the common software tool SPSS “the Statistical Package for the Social Sciences”. The details of demographic results showed that males and females represent 235 (47.6%) and 58 (11.7%) of the sampling, respectively. The age profile indicated that majority of the sampling was 30-35 representing about 403 (81.6%). The next cluster of age was 25-29 with 58 cases (11.7%) followed by age above 36 years constituting 33 cases (6.7%). Lastly, the subjects of participants were scattered into three categories social science with 40 cases (8.1%), engineering with 160 cases (32.4%) were from, and science and technology with 294 (59.5%). The next stage considered Structural Equation Modeling (SEM) as the primary statistical analysis technique using AMOS 23 to analyze data and examine the outcomes of hypotheses. According to the suggestions of Hair, Sarstedt, Ringle, and Mena (2012), the study proceeded data analysis using confirmatory factor analysis (CFA) to assess the overall fit of the measurement model and further conducting two methodological procedures: first evaluating the constructs reliability and second constructs validity by calculating both convergent and discriminant validity of measurements. Then study examines the structural model.

4.1 Measurement Model Analysis

The Measurement Model Overall fit: AMOS 23 is the main software tool of analysis employed in the current research. Confirmatory factor analysis (CFA) - structural equation modeling (SEM) are utilized to examine the collected responses. In detail, the measurement model is assessed by a number of techniques such as reliability, convergent validity, discriminant validity, and Uni-dimensionality. In order to evaluate the overall fit of the measurement model of the sustainability for education through big data, knowledge management sharing, and innovation; the study follows the recommendations of Hair et al. (2012) by applying confirmatory factor analysis (CFA). Results indicated that the model succeeded in producing an adequate fit to the data. The key statistics of goodness-of-fit indices comparative fit index (CFI) and Tucker-Lewis coefficient (TLI) pass the suggested cut-off value of .90. Moreover, the other indices such as normed fit index (NFI), incremental fit index (IFI), relative fit index (RFI), and the parsimonious goodness of fit index (PGFI) also generated fits results above in the recommended Figure 3. Last but not least, table 1 also shows that the normed chi-square “chi-square/degree of freedom” was perfect and less than the cut-off value of 3.0. Regarding the badness-fit indices, results illustrated that root mean square error of approximation (RMSEA) and the root mean-square residual (RMR) were also below the required levels .05 and .10 respectively. Figure 4 depicts the measurement model of knowledge management sharing and diffusion of innovations (DOI) theory of the sustainability for education.

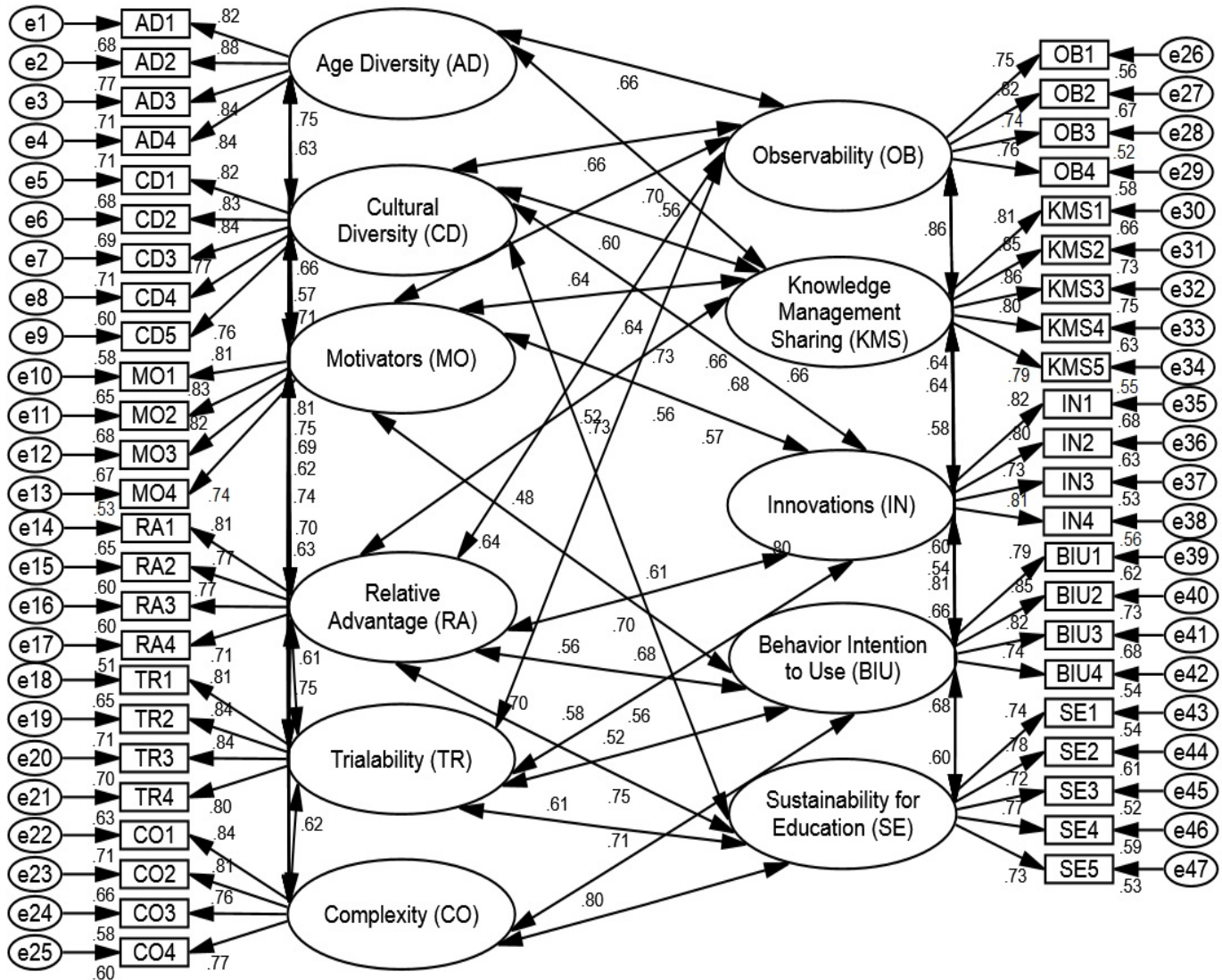


Figure 4. Measurement Model

Source: Author

Table 1. Goodness and Badness of Fit Indices

Measure and suggested cut-off value	Values
Chi-square (χ^2) ≤ 3.5 to 0, $df \geq 0$ and (p value $> .01$)	3090.657, $df=979$
Normed Chi-square (χ^2) ≥ 1.0 & < 5.0	3.157
Root-Mean Residual (RMR) < 10	.037
Normed Fit Index (NFI) ≥ 0.90	.971
Relative Fit Index (RFI) ≥ 0.90	.958
Incremental Fit Index (IFI) ≥ 0.90	.958
Tucker Lewis Index (TLI) ≥ 0.90	.968
Comparative Fit Index (CFI) ≥ 0.90	.969
Root Mean Square Error of Approximation (RMSEA) (< 0.05 for good fit or $.05-.10$ for adequate fit)	.045

Source: Author

4.2 Constructs Reliability

The study employed the common practice in SEM which is composite reliability (CR) to ensure an established inner consistency of constructs. The results illustrated that all the constructs exceeded the recommended limit of CR with values varied from 0.832 to 0.937 as suggested in the literature (Hair et al., 2012). Moreover, the results of Cronbach's Alpha (CA) suppressed the suggested value of .70 exhibiting an accepted level of reliability and varying from 0.832 to 0.918. Table 2 shows the reported results.

4.3 Constructs Validity

As indicated earlier, constructs validity includes two sub-division of assessment, convergent and discriminate validity. To assess convergent validity, we applied three common producers of Hair et al (2012) by computing factor loadings (FL), average variance extracted (AVE) and CR. Table 2 demonstrated that all items exhibited accepted loadings into their proposed factors by exceeding the suggested value of 0.50 and ranging from 0.70 to 0.99 Hair et al (2012). Moreover, AVE indicator demonstrates an accepted convergent validity when it exceeds the cut-off value of 0.50. Findings showed that all items have more variance than errors with values ranging from 0.551 and 0.660. Lastly and as indicated earlier, the computed CR confirmed further the convergent validity whereas all constructs surpassed the cut-off value of 70.

4.4 Discriminant validity

Discriminant validity a common approach is employed to estimate the scope of the variance between a concept and its items with other concepts (Bagozzi and Yi, 1988). A concept deems to be a distinct notion by contrasting the AVE of a particular concept with the square correlations between concepts (Fornell and Larcker, 1981). In addition, correlations of items in any two given constructs should not be above the square root of the average variance that is shared by them in one construct (Hair et al., 2012). In this regard, findings showed that all AVE of each constructs were above the square correlations between as demonstrated in table 3. Consequently, discriminant validity proved to be well established and concluding that convergent validity meets the suggested assessment guidelines (Hair et al., 2012; Fornell and Larcker, 1981).

Table 3. Discriminant Validity Results

Factors	AD	CD	MO	RA	CO	TR	OB	IN	BIU	KMS	SE
AD	.922										
CD	.331	.909									
MO	.420	.436	.918								
RA	.397	.370	.443	.908							
CO	.344	.402	.452	.344	.832						
TR	.448	.321	.362	.436	.399	.897					
OB	.374	.523	.502	.428	.429	.442	.921				
IN	.455	.385	.405	.382	.447	.502	.439	.892			
BIU	.509	.443	.331	.438	.518	.449	.423	.439	.908		
KMS	.429	.396	.439	.341	.411	.539	.389	.500	.359	.901	
SE	.432	.449	.491	.470	.399	.451	.501	.432	.438	.492	.902

Source: Author

Table 2. Confirmatory Factor Analysis Results

Factors	Code	Factor Loading	AVE	CR	CA
Age Diversity	AD1	.823	.552	.881	.888
	AD2	.881			
	AD3	.844			
	AD4	.842			
Cultural Diversity	CD1	.820	.609	.921	.832
	CD2	.833			
	CD3	.841			
	CD4	.773			
	CD5	.764			
Motivators	MO1	.811	.660	.914	.910
	V2	.832			
	MO3	.824			
	MO4	.744			
Relative Advantage	RA1	.813	.594	.889	.899
	RA2	.772			
	RA3	.774			
	RA4	.713			
Complexity	CO1	.842	.583	.906	.909
	CO2	.810			
	CO3	.764			
	CO4	.773			
Trialability	TR1	.811	.555	.899	.900
	TR2	.842			
	TR3	.844			
	TR4	.803			
Observability	OB1	.753	.601	.832	.897
	OB2	.823			
	OB3	.741			
	OB4	.763			
Innovations	IN1	.820	.591	.911	.890
	IN2	.803			
	IN3	.731			
	IN4	.814			
Behavior Intention to Use Big Data	BIU1	.792	.605	.876	.905
	BIU2	.853			
	BIU3	.824			
	BIU4	.744			
Knowledge Management Sharing	KMS1	.813	.551	.937	.862
	KMS2	.853			
	KMS3	.861			
	KMS4	.802			
	KMS5	.792			
Sustainability for Education	SE1	.743	.606	.907	.918
	SE2	.781			
	SE3	.724			
	SE4	.772			
	SE5	.734			

Source: Author

4.5 Structural Model Analysis

In this final stage, structural equation modeling (SEM) is employed as the primary statistical analysis technique using AMOS 23 to evaluate the outcomes of hypotheses. The path modeling analysis was estimated to validate the research model in order to capture the sustainability for education. Based on the findings, the eleven hypotheses were accepted as illustrated in Figures 5 and 6 below. The following Table 3 depicts the results of assessing hypotheses with other measures such as standard errors and values of unstandardized coefficients of this structural model.

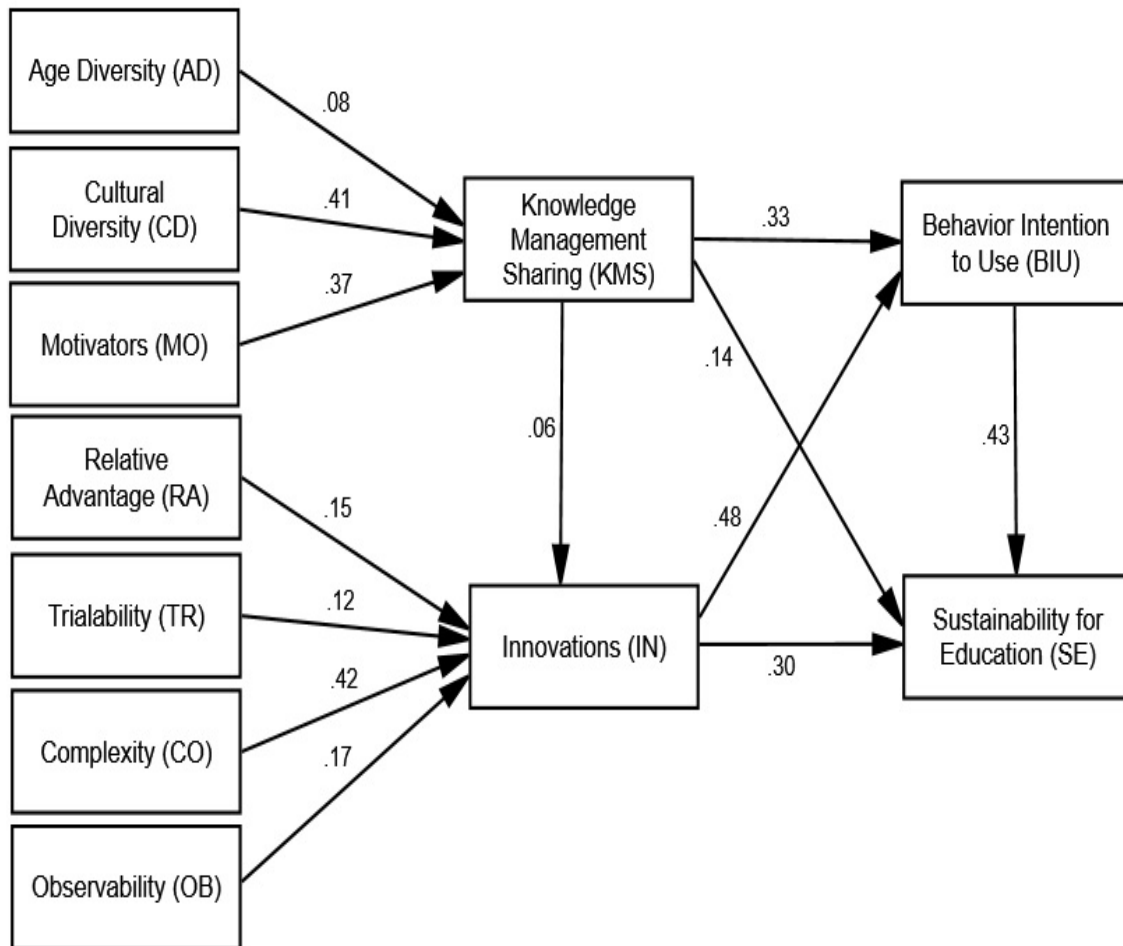


Figure 5. Results of Path Model Estimation

Source: Author

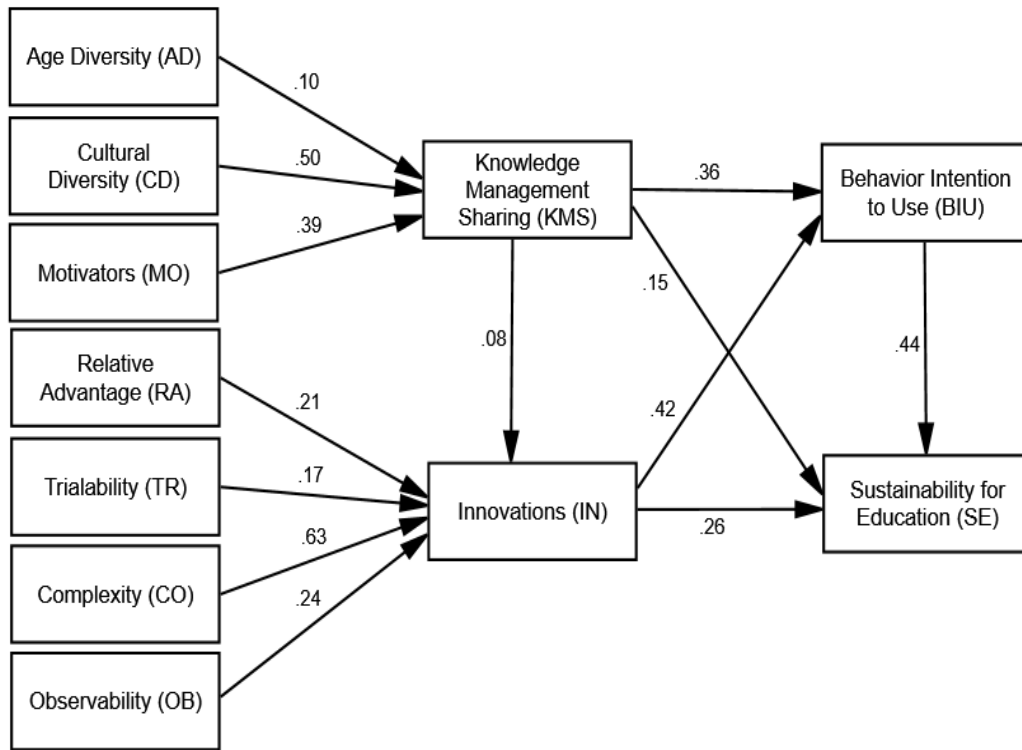


Figure 6. Results for the Hypotheses Checks

Source: Author

Table 3. Results of the Structural Model

H	Independent	Relationship	Dependent	Estimate	S.E	C.R	P	Result
H1	AD	→	KMS	.083	.039	2.115	.034	Supported
H2	CD	→	KMS	.409	.031	13.006	.000	Supported
H3	MO	→	KMS	.368	.044	8.352	.000	Supported
H4	RA	→	IN	.152	.030	5.043	.000	Supported
H5	TR	→	IN	.119	.033	3.650	.000	Supported
H6	CO	→	IN	.417	.024	17.695	.000	Supported
H7	OB	→	IN	.171	.032	5.300	.000	Supported
H8	KMS	→	IN	.061	.025	2.418	.016	Supported
H9	KMS	→	BIU	.328	.031	10.587	.000	Supported
H10	KMS	→	SE	.135	.030	4.571	.000	Supported
H11	IN	→	BIU	.478	.034	14.088	.000	Supported
H12	IN	→	SE	.298	.034	8.720	.000	Supported
H13	BIU	→	SE	.432	.034	12.640	.000	Supported

Source: Author

Regarding the first two hypotheses, the relationships between age and cultural diversity and knowledge management sharing were able to achieve the following results ($\beta=0.083$, $t=2.115$, $p<0.001$) and ($\beta=0.409$, $t=13.006$, $p<0.001$) respectively concluding both hypotheses are positive and supported. The third hypothesis is also positive and supported, as the analysis indicated that the relationship between motivators and knowledge management sharing ($\beta=0.368$, $t=8.352$, $p<0.001$). The following two propositions were also positive and supported; findings showed that both relative advantage and trialability were strong predictors for innovations with ($\beta=0.152$, $t=5.043$, $p<0.001$) and ($\beta=0.119$, $t=3.650$, $p<0.001$) respectively. In the same line, findings illustrated that both factors complexity and observability were strong predictors for innovations and the proposed links were positive with and ($\beta=0.417$, $t=17.695$, $p<0.001$) and ($\beta=0.171$, $t=5.300$, $p<0.001$) respectively. Moreover, findings also revealed that the relationship between knowledge management sharing and innovations is positively approved, the results of this postulation were as follows ($\beta=0.061$, $t=2.418$, $p<0.001$). For the behaviour intention factor, results indicated that predictors knowledge management sharing and innovations had substantial impacts on users' intention to employ big data with ($\beta=0.328$, $t=10.587$, $p<0.001$) and ($\beta=0.478$, $t=14.088$, $p<0.001$) respectively. Lastly, findings showed that the three predictors knowledge management sharing, innovations and intention to use big data had significant influences on sustainability for education obtaining the following results ($\beta=0.135$, $t=4.571$, $p<0.001$), ($\beta=0.298$, $t=8.720$, $p<0.001$) and ($\beta=0.432$, $t=12.640$, $p<0.001$) respectively. The outcomes of these results confirm that all suggested hypotheses are supported and in line with previous research (Salleh and Janczewski, 2016; Nam et al., 2015; Fullwood et al., 2013; Boh and Wong, 2015; Gadotti, 2010; Crofton, 2000; Springett and Kearins, 2001; Ferreira et al., 2003; Martins et al., 2006).

5. Discussion and Implications

The aim of this study was to develop a novel approach towards behavioral intention to employ big data and acceptance of big data by integrating DOI theory with TAM Model to discover the features influencing innovations, knowledge sharing, students' behavioural intentions to use big data, and adoption of big data in higher education organizations. This study was an innovative endeavor in applying innovations, knowledge management sharing and intentions to use big data into a big data acceptance through TAM model and DOI theory. In the light of the aim of this research, the relationships among eleven innovative characteristics were explored with age diversity, cultural diversity and motivators should impact knowledge management sharing and behaviour intention to use big data. Also, relative advantage, trialability, complexity, observability, innovations, adoption of big data for sustainability for education.

Innovation can be understood as generation, adoption, and implementation of new ideas, policy, program, process, product, or service to the adopting organization (Kamasak and Bulutlar, 2010). It can be seen that the higher education institutions can have a wide framework of knowledge sharing and enhancing innovation performance initiatives but not necessarily to the same standard as in other organizations (Aljanabi and Kumar, 2012). The field of big data is witnessing a considerable amount of investment despite the fact that it is still in its primary stages. Such investments aim for new technologies and techniques (Ohlhorst, 2013). It is reported in research as well as in media that organizations around the world are adopting big data. Such adoption, in relation to knowledge management sharing, has advantages and disadvantages. One of the disadvantages is that such adoption can make knowledge management sharing obsolete within organizations. Also, knowledge management can be thrown back to its dark ages where its concentration is mainly based on technology and correlation resulting in failures (Virtanen, 2011). As for the advantages, big data is providing the solution for many issues and problems that were previously available in relation to knowledge management sharing such as giving more priority to technology over the phenomenological and human sociology perspective of knowledge. One of the notable problems in the field of knowledge management sharing is that this concept is highly dis-unified. It is assumed that big data could provide a solution for that by providing a sort of unity. It is noticed that these both concepts and areas have shared lessons and things to be learnt, which opens the door for future research. The

assumption that social interactions could be the generator of innovation and new knowledge is one such lesson from the area of knowledge management sharing (Leonard and Sensiper, 2002).

The findings of Table 3 illustrate that all the proposed hypotheses are supported confirming that the research model is valid. The implications of this study provide insights into the DOI, relative advantage, trialability complexity, and observability, which in turn affect innovations and behaviour intention to employ big data for sustained education. The study also investigates knowledge management sharing constructs to assess age and cultural diversity, motivators and behavioural intention to accept big data, which should impact acceptance and sustainability as a drive of education. The results of this study maintain that both constructs innovations and behaviour intention have impact to use big data for the sustainability of education. Moreover, findings indicate that age and cultural diversity, motivators and behavioural intention to use big data impact adoption of big data. Similarly, the constructs of relative advantage, trialability, complexity, and observability had optimistic importance with innovation. Additionally, innovations construct influences behavioural intention to employ big data and adoption of big data for sustained education. The unique integration of knowledge management sharing factors with DOI theory and behaviour intention to use big data for the sustainability of education make it possible to validate innovations and behaviour intention to use big data for the sustainability of education.

Findings are similar with preceding studies concluding that age and cultural diversity and motivators had significant positive effects on knowledge management sharing, which lead to impact behaviour intention to employ big data (Cockrell and Stone, 2010; Sohail and Daud, 2009; Oye et al., 2011; Salleh and Janczewski, 2016; Nam et al., 2015; Venkatesh et al., 2012), which also leads to impact acceptance and sustainability as a driver of education. On the other hand, students should have positive effects towards innovations when realise relative advantage, trialability and complexity and observability (Al-Isma'ili et al., 2016; Hung et al., 2016; Ramdani and Kawalek, 2009; Kulviwat et al., 2007) which in turns should impact behaviour intention to employ big data, acceptance, and sustainability as a driver of education.

There is a huge amount of valuable structured and untraditional data beyond the transactional ones used by organizations. Such valuable data can be used to extract valuable information (Rajpathak and Narsingpurkar, 2013). Many social tools such as Twitter, Facebook, Google+ accounts and Linked-in are available in the hands of young people who use them in their everyday life. Young people also use different tools of social media or websites for certain purpose such as uploading photographs through the use of Flickr, having sentiment analysis or opinion mining through semantria.com or crowd sourcing through the use of Amazon.com. All of the above-mentioned activities are examples of the use of big data. In a measure of Zeta-bytes, the digital information that accessible on the internet is increasing by a factor of 10 every five years. Such cyber contents can be retrieved from various sources such as blogs, sensors, RFIDs, telephony, cameras, e-commerce social networks, and medical records. Recently, the enhanced sides of web and in particular online social networks in speeding the information traffic and simplicity of interactions permit more space for users to exchange information, participation and collaborative learning (Sayaf et al., 2021; Al-Maatouk et al., 2020; Alamri et al., 2020b; Al-Rahmi et al., 2019a; Al-Rahmi et al., 2020b; Al-Rahmi et al., 2021b). Since the essential contribution of Nonaka in the early 1990s, the notion of innovation has been related strongly to the emerging of recent knowledge (Sáenz et al., 2009). Individuals contribute their own knowledge in order to improve the degree of innovation (Rahab, et al., 2011) owing to the inability of organizations to create knowledge without the contribution of individuals who have an active role in achieving innovation (Ordaz et al., 2011). Kamasak and Bulutlar (2010) echoed this view and indicate that when ideas and notions are disseminated among individuals and groups, usually the present ideas from the first group appear unique and novel to others, and vice versa, leading to innovate new products or services within the organization which makes innovation a knowledge-intensive task (Zhen et al., 2011). Educational institutions should aim at facilitating students' adoption of technology by illustrating the usage of big data and providing instructional supplies. Practitioners in higher education should draw strategies and plans that enable technology in supporting and assisting students to benefit from big data acceptance, which in turn should

ease achieving learning objectives successfully. This study provides results that demonstrated that an enhanced willingness to employ big data for the sustainability of education is associated with higher levels of perception to benefit from using big data.

Furthermore, this study provided three empirical components of confirmations, first, incorporating knowledge management sharing construct with age and cultural diversity and motivators lead to influence intention to employ big data. Next, the effect of innovations via relative advantage, trialability, complexity and observability lead to adopt usage of big data and the sustainability of education. Lastly, the constructs of innovations and knowledge management sharing revealed that to have an impact on behaviour intention to employ big data for the sustainability of education. This theoretical contribution can be considered substantial to previous studies of DOI theory with integrated knowledge management sharing constructs within education setting (Alalwan et al., 2019). According to the findings, the study can conclude three implications for practitioners as follows:

- Educational institutions should be ready to support students and response properly for the potential concerns and issues of knowledge sharing which in turns enhances students learning and provides better skills for researchers.
- Practitioners should design plans and programs aim to prompt learners to have the know-how of using big data for the purpose of education.
- Technology resources should be enriched since such tools are essential components in directing learners' attitude towards using big data, and their willingness to adopt it for the sustainability of education.

In spite of the significant findings this study offers, there are still some limitations. The first concern is the sample size of this study which is linked to the fact that this study was restricted to one University, the results cannot be generalized to other universities, militaries, or school teachers. Another dimension is related to data collection, the current study only used a questionnaire as the main tool of data collection and lost the advantage of using qualitative data collection tools. Qualitative approach should shed the light on the unexpected results and may reveal other dimensions that not covered in this research. Lastly, the current study lacks the absence of addressing the differences between cultures. Thus, future research is recommended to replicate this research and take into consideration these limitations.

6. Conclusion and Future Work

This study revealed that behavioral intention to use big data for the sustainability of education is highly influenced by active knowledge management sharing. Findings further confirmed that innovations can affect behavior intention to employ big data, which is further positively associated with sustainability for education. The unique integration of knowledge management sharing constructs and DOI theory in addressing innovations and behavior willingness to employ big data for the sustainability of education was similarly confirmed by the findings. Accordingly, this research contributes to the knowledge by concluding that innovations and knowledge management sharing impact behavior intention to use big data for the sustainability of education. Therefore, the validated framework of DOI theory and knowledge management sharing constructs should enrich the understanding of the phenomenon. Taking into consideration the paid attention from the students' side to knowledge management sharing on innovations and behaviour intention to employ big data, practitioners in the field should focus in preparing action plans for teachers that contain proposals and instructions in how can big data assists in learning activities. The direction of future research should include other stakeholders such as instructors and educational organizations to unveil the other aspects that not covered in this study. Although findings demonstrate that learners show positive attitudes towards this phenomenon, constraints and facilitators should be included in further studies. Finally, widen the research scope to include other countries should improve the understanding of the outcomes of this study and provide a generalization of the phenomenon.

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A VALUE PROPOSITION MIX FRAMEWORK OF SUCCESSFUL FOREIGN-OWNED SMALL AND MEDIUM ENTERPRISES IN SOUTH AFRICA

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Abstract. The paper presents the value propositions of successful foreign-owned SMEs in South Africa. The focus on successful foreign-owned SMEs provides a stimulus for cross-cultural knowledge diffusion through internationalisation of entrepreneurial efforts by examining the currently under-studied value proposition construct within the SME sector. To achieve this aim, a multi-case empirical investigation, using the grounded theory approach, was conducted with a sample of forty-two successful foreign-owned SMEs in South Africa. The findings revealed that successful foreign-owned SMEs, in addition to commonly known value propositions (i.e product-based value propositions), have unique value propositions (customer interaction and business processes) that enable their businesses to succeed. A value propositions mix (VPM) framework for successful SMEs is presented, therefore, in this paper. The findings of this study are valuable in providing new insights into the VPM of successful foreign-owned SMEs to inform the broader development and sustainability of the SME sector operating within the African continent.

Keywords: value proposition mix; successful foreign-owned SMEs; cross-cultural knowledge diffusion

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1. Introduction

The creation of unique value propositions is a key source of competitive advantage and central for successful business models (Osterwalder, Pigneur, Bernarda & Smith, 2014; Teece, 2010; Vorbach, Müller & Poandl, 2019). Osterwalder et al. (2014) noted that effective value proposition design enables the business to have a better understanding of the value creation patterns, as well as giving the business an opportunity to leverage its internal

capabilities and resources. These factors can be key sources of competitive advantage. As a result, the most important innovation activity of every business should be to strive to identify and create unique value propositions in order to create and retain sustainable competitive advantages. In SMEs, value propositions are vital as a means of identifying opportunities for growth and maintaining the overall sustainability of the business.

The significance of unique value propositions is widely recognized in general literature (for example see Payne & Frow, 2014; Sengupta, Bamel & Singh, 2015) and appreciated by practitioners, yet a clear understanding of value propositions in various business sectors is still lacking. The specific application of the value propositions' concepts in addressing the failure of SMEs, especially in the early business development stages, found limited expression in extant literature. Thus, this paper seeks to provide new insights into the value propositions of successful foreign-owned SMEs as well as to offer the value propositions mix (VPM) framework for SMEs. An understanding of the value propositions of successful foreign-owned SMEs that, despite the additional challenges that they face in the local market, continue to succeed, is central in broadening current knowledge of the said value propositions and increasing the scope of endeavors to address growth challenges among SMEs in South Africa. This paper is an exploratory study and, thus, does not attempt to provide a comparison with native-owned SMEs. The researchers, (referred to as 'we' or 'us' in future) therefore, sought new insights from the proprietors of the above mentioned successful foreign-owned SMEs.

In this paper, successful-foreign-owned SMEs are defined as businesses that are owned by foreign nationals in a host country, employing less than 250 employees; that have been operating for a period of more than three and a half (3.5) years, thus established SMEs were used (Herrington and Kew, 2016). Also, the success of SMEs was determined in terms of business performance using measures such as profitability, growth, market share, return on investment, number of employees and product lines (Radipere & Dhliwayo, 2014).

Successful foreign-owned SMEs bring to the host nation the diversity of culture and knowledge needed for cross-cultural learning and development (Radipere & Dhliwayo, 2014; Tenge, 2013). Compared to their locally owned counterparts, successful foreign-owned SMEs are susceptible to additional challenges to those experienced by native-owned SMEs, yet they continue to succeed (Tenge, 2013). Previous studies, such as those conducted by Ndoro (2016), observed that successful foreign-owned SMEs conduct business differently from native-owned SMEs. For example, in the grounded theory study of foreign-owned SMEs by Chinese nationals, Ndoro (2016) revealed the unique opportunity identification mechanisms employed by these businesses. Similarly, Elo (2016:123) noted that international business, resulting from foreign-owned businesses, facilitates brain-gain and creates connecting flows and competitiveness. At the same time, the economic and social gains achieved by both the home and host countries are considerable (Nkongolo-Bakenda & Chrysostome 2013). These findings espouse the view that successful foreign-owned SMEs are a source of new insights for the development of the broader SME sector. Also, the diversity of business sectors in which successful foreign-owned SMEs operate and the innovation propensity of foreign-owned SMEs (Ostrovsky & Picot, 2020), create an opportunity for the diversity of perspectives to be used to develop a synthesized VPM for SMEs. Against this background, this paper sought to investigate the value propositions of successful foreign-owned SMEs in South Africa with the goal of developing a VPM that could be adopted by SMEs in South Africa and beyond.

Firstly, this paper provides theoretical perspectives on notions of foreign-owned SMEs and the concepts of value propositions to aid our understanding of the concept and its application in SME literature. Secondly, it discusses the methodology applied when gathering the empirical data used in this paper. The findings of the empirical investigations are then presented and discussed, together with an integrative framework of value propositions of SMEs. The article finishes with the presentation of the concluding remarks and the practical implications of the study. The following section delineates the concepts of value propositions.

2. Theoretical Perspectives

This section presents theoretical perspectives on the notions of foreign-owned SMEs and value propositions. This information is important because it characterizes the nature of foreign-owned SMEs, the challenges that they face, and their contributions to economies globally. At the same time, it is important to conceptualize the concepts of a value proposition, as well as highlighting the important literature and theoretical perspectives relating to these concepts. The following subsection discusses the notions of foreign-owned SMEs.

2.1 Foreign-Owned SMEs

Foreign-owned SMEs have been studied in extant literature using name variations such as immigrant-owned SMEs and international new ventures (INVs) (Abrahamsson, Vanyushyn & Boter, 2019; Prashantham, Kumar & Bhattacharyya, 2019). Thus, extant literature provides clarity on the conceptualization of foreign-owned SMEs, regardless of the disparate definitions of SMEs in different contexts. There are country-level variations in terms of criteria for defining SMEs, with many countries using the number of employees and annual turnover as determining factors. Because of differences in currencies, which make comparability among countries difficult, the annual turnover criterion poses challenges when considering universally applied criteria. There, however, seems to be agreement in literature that the number of employees' criterion can be universally applied (Altman, Esentato & Sabato, 2020; Cicea, Popa, Marinescu & Stefan, 2019). Using the number of employees as a criterion for defining SMEs, many countries consider the figure of not more than 250 employees as the requirement for the business to be classified as an SME (Arthur, 2020; Takyi & Naidoo, 2020). Combining the criteria of the number of employees and the country of birth, foreign-owned SMEs in this article are defined as businesses that are owned by foreign nationals in a host country, employing less than 250 employees.

The role of foreign-owned SMEs is widely acknowledged throughout the world (Kerr & Kerr, 2020; Nkongolo-Bakenda & Chrysostome 2013). Kerr and Kerr (2020) in their study of foreign-owned firms in the United States of America (USA), revealed that over 25% of new firms in the USA are foreign-owned. A similar observation was noted in Canada where the innovative potential of foreign-owned SMEs translates into proportionately high numbers of new businesses that are started by foreign nationals (Ostrovsky & Picot, 2020). In South Africa, the majority of foreign nationals are pressed into starting new businesses due to weak opportunities for formal sector employment, discrimination, lack of documentation and similar challenges, resulting in a proportionately large number of foreign-owned SMEs (Charman & Piper, 2012; Radipere & Dhliwayo, 2014). These numbers are even higher when opportunity-based immigrations to start new businesses in South Africa are also taken into consideration. Opportunity-based immigrations occur when foreign nationals move into another country to seek entrepreneurial opportunities. On the African continent, South Africa has long been a favourite destination for prospective foreign entrepreneurs due to its open policies competitive markets, and ease of conducting business (Asongu & Odhiambo, 2019).

Due to their extraneous nature, foreign-owned SMEs are susceptible to additional challenges compared to their native-owned counterparts (Charman & Piper, 2012; Radipere & Dhliwayo, 2014; Radipere & Dhliwayo, 2014; Tengeh, 2013). Charman & Piper (2012) noted that, in addition to commonly known challenges facing SMEs in South Africa, successful foreign-owned SMEs, as previously indicated, are susceptible to discrimination, challenges in obtaining the relevant documentation (e.g. visas and permits), cultural barriers and stereotypes, as well as lack of community acceptance leading to xenophobic attacks. Nkongolo-Bakenda and Chrysostome (2013:7) referred to the challenges facing foreign-owned SMEs the "liability of foreignness" which results from the fact that foreign-owned SMEs incur "...unavoidable costs arising from sources, such as higher coordination costs, the foreign firm's unfamiliarity with the local culture and other aspects of the local market, a lack of information networks or political influence in the host country, or their inability to appeal to nationalistic buyers"). Despite these additional challenges, there are several successful foreign-owned SMEs in South Africa.

A question, therefore, arises as to what makes these SMEs succeed despite the additional challenges that they face. A good starting point for beginning to understand the source of their success would be to investigate the value propositions of these successful SMEs. This fact arises mainly because value propositions have been widely noted as a key source of competitive advantages (Payne & Frow, 2014; Sengupta et al., 2015). The following section, therefore, presents theoretical perspectives on the concept of value propositions.

2.2 The concepts of value propositions

The concept of value propositions can be located within the broader business model literature. Acknowledging that the business model logic consists of interrelated dimensions that reinforce each other, the centrality of the value proposition dimension is undoubted (Amit & Zott, 2012; Osterwalder et al., 2014; Priem, Wenzel, & Koch, 2018; Zott, & Amit, 2013). Priem et al. (2018) emphasized that value propositions and the resultant value creation as the *conditio sine qua non* for value capture is at the heart of any business model research. Similarly, Satar, Dastane, & Ma'arif (2019) in their study of value propositions for e-commerce confirmed the central role that the value proposition in shaping the business's competitive advantages and ultimate success. Thus, understanding, designing, and delivering effective value propositions underlie the holistic business model logic and is indeed a key source of competitive advantage.

The concept of value propositions has been widely explored by many scholars in business models and marketing research literature (for examples see Frow & Payne, 2011; Key et al., 2017; Osterwalder, Pigneur, Bernarda & Smith, 2014; Payne, Frow & Eggert, 2017; Trkman, 2019). The Marketing Research Institute's investigations noted the identification and development of value propositions as a priority research focus area for managers and scholars alike (Payne & Frow, 2014). Similarly, Webster and Lusch (2013) argued that the marketing discipline needs fundamental rethinking and redefining of the essential premises and implicit models that have characterized the marketing discipline for over 50 years, in which the value proposition models are not an exception.

The concepts of the value proposition are anchored on the provision of value to the customers and other stakeholders (Wruk, Oberg, Klutt & Maurer, 2018). It captures the values that a business promises to their target customers (Martin, 2016; Schor, 2017; Wruk et al., 2017). Gilles and Christine (2016) construed value as a multifaceted construct that integrates many aspects within, as well as beyond, the limits of a single business organization. In this regard, Fernandes, Martins, Campese and Rozenfeld (2019) identified the four categories of value, namely functional, emotional, change of life and social impact. The functional category is associated with the practical purposes of a product that reflects its function in the day-to-day lives of the relevant stakeholders. Emotional categories relate to the product's ability to generate positive emotions for stakeholders. Change of life comprises the product's capacity to influence the perspectives on which the stakeholders analyse the world. Social impact refers to the search for a common good, such as improvement of living conditions of people with whom the stakeholders have empathy (Fernandes et al., 2019). Considering all the different types of values, a value proposition, therefore, is a representation of the values that an organization promises its target customers (Martin, 2016; Schor, 2017).

One of the oldest conceptualization of value proposition is found in the seminal paper by Lanning and Michaels (1988) who suggested that a value proposition is a simple statement of both tangible and intangible benefits that the business provides to its customers. Lanning and Michaels's (1988) conceptualization of value proposition was premised on the business's value delivery system in which the business chooses, provides and communicates the value proposition to its customers.

Many definitions of value propositions found in the literature are based on the work of Lanning and Michaels (1988). For example, Johnson, Christensen and Kagermann (2008) describe a value proposition as a statement of

promise that a business formulates and adheres to solve a customers' fundamental dilemma of selecting between alternatives when making a purchase decision.

Despite its wide use in business models, marketing, and other related fields of study, Payne et al. (2017) noted that the concept of value proposition remains poorly understood by many scholars and managers. By extension, the application of the concept is also poorly executed both in literature and in practice (Katz, 2010; Skålén, Gummerus, Koskull & Magnusson, 2014).

While extensive literature exists on the importance of value propositions, the literature on the value propositions of specific groups of firms, such as successful foreign-owned SMEs, is scant. Furthermore, relatively little research (Millspaugh & Kent, 2016; Safar, Sopko, Bednar & Poklemba, 2018; Zaborek & Mazur, 2019) has been published on the application of the value proposition concepts in SME literature, especially in the African context. Yet, the concept of the value proposition is important in delivering, communicating and retaining company value to its customers. In their study, Safar et al (2018) broadly investigated the concept of the SME business model in the fourth industrial revolution in which they emphasized that this specific business model should include novel value propositions, value creation and value capture. However, the study did not offer a specific application context. In another similar study, Zaborek and Mazur (2019) studied the value proposition co-creation with consumers among Polish manufacturing and service SMEs. In this study, Zaborek and Mazur (2019) expressed the central role of value propositions among both manufacturing and service sector SMEs. Consequently, in this study the value proposition is being considered as a central component for business success within the broader business model logic (Osterwalder et al., 2014), and is being applied to the context of successful foreign-owned SMEs. Against this backdrop, this paper sought to investigate the value propositions of successful foreign-owned SMEs. The following section presents the research methodology applied in this study.

3. Methodology

Our methodology is founded on the Grounded Theory approaches of Strauss and Corbin (2008), focusing on the value propositions of successful foreign-owned SMEs in South Africa. With regard to the academic discussion in the preceding sections, Glaser and Strauss (1967) encouraged researchers to remain theoretically sensitive and to make use of existing insights while, at the same time, considering the emerging data. In this regard, a multistage non-linear approach to theoretical review was conducted (Hussein, Kennedy & Oliver, 2017). Thus, the presentation of theoretical perspectives in the preceding sections does not imply that a literature review was conducted prior to conducting empirical investigations. Concurrent data analysis and a review of existing theoretical perspectives were conducted at different stages of the research process, thus, minimizing any possible preconceptions in grounded theory development. In this regard, we adopted an iterative process of concurrent data collection and data analysis following the guidelines provided by Collins and Hussey (2014). The iterative process emphasizes the relationships between data collection, coding, analysis and theoretical development (Collins and Hussey, 2014). The iterative process involved moving back and forth between stages throughout the concurrent data collection and analysis to develop the emergent theory.

The initial sample was selected using a judgemental sampling method in which SMEs who met the criteria of successful foreign-owned SMEs were selected. In this study, successful-foreign-owned SMEs are defined as businesses that are owned by foreign nationals in a host country, employing less than 250 employees, that have been operating for a period of more than three and a half (3.5) years, thus established SMEs were used (Herrington and Kew, 2016). Also, the success of SMEs was determined in terms of business performance using measures such as profitability, growth, market share, return on investment, number of employees and product lines (Radipere and Dhliwayo, 2014). To establish success, we used convenience sampling as an initial sampling approach to identify known and accessible foreign-owned SMEs to establish how long they have been operational and to find out if they consider themselves as successful in their business ventures. Furthermore, the initial

questions also sought to determine the SMEs' number of employees, level of profitability and the variety of their product lines. This use of initial sampling technique was informed by Charmaz (2014: 197) who advised that "initial sampling in grounded theory gets you started, theoretical sampling guides where you go".

Following these criteria, the initial sample of six (6) successful foreign-owned SME owners were interviewed using the initial interview guide which comprises specific but open-ended questions on the value propositions of successful foreign-owned SMEs. As the interviews continued into the subsequent phases, the initial interview guide evolved when new questions were added, while some questions were reviewed, amended or removed to focus on the emergent themes and categories of data. Each interview lasted from between 45 to 60 minutes per session.

Subsequent sampling used a combination of snowball sampling and theoretical sampling techniques. Using snowball sampling, the initial sample provided leads to other successful foreign-owned SMEs known to them. Theoretical sampling involved starting with the initial data set obtained from the original sample to construct tentative ideas about the data and then examining these ideas through further empirical enquiry (Charmaz, 2014). Thus, theoretical sampling involves moving between data collection and data analysis throughout the research. Early data and codes raised unanswered questions. Similarly, early categories were suggestive but not yet definitive. Therefore, further data collection refined them and new insights from which to view data led to fresh conceptual directions. Several rounds of interviews continued until theoretical saturation was achieved. Theoretical saturation relates to the point when emerging concepts have been fully explored and no new theoretical insights are being generated (Charmaz, 2014). During this process, the researcher constantly returned to individual participants, checked the initial assumptions and collected more data until theoretical saturation was reached. According to Straus and Corbin (2008), theoretical saturation is reached when there is no new or relevant data emerging about a category that has been well developed in terms of its properties and dimensions and, lastly, when the relationships among categories are well established and validated. In this study, theoretical saturation was reached after interviewing forty-two (42) successful foreign-owned SMEs.

We used NVIVO 11 for storing, managing, and analyzing data. All audio recorded interviews were transcribed into text format after every interview. With each interview, concurrent data collection and data analysis were conducted until theoretical saturation was reached. The data analysis involved the use of open coding techniques (breaking down, examining, comparing, conceptualization and categorization of data). This process was followed by axial coding techniques procedures in which data was put together in new ways after open coding. Lastly, selective coding procedures of selecting the core categories, systematically relating it to other categories, validating relationships and filling in categories that need further refinement and development (Bryman and Bell, 2014). Throughout the whole process, constant comparisons of emerging categories and concepts were conducted to maintain a close connection between concepts and categories (Straus and Corbin, 2008). NVIVO 11 software enabled the management of large 'chunks' of data, coding and qualitative data analysis.

To ensure trustworthiness (validity and reliability), we used the five criteria of trustworthiness measures proposed by Wallendorf and Belk (1989), namely credibility, transferability, dependability, confirmability and integrity. In particular, we used member checks in several rounds of interviews to also validate previously made assertions and to ensure the overall trustworthiness of our findings. The following section presents the findings of this study.

4. Findings

The findings presented in this paper emerged from the primary questions that sought to identify the value propositions of successful foreign-owned SMEs. Specifically, the questions related to the unique set of benefits offered by the foreign-owned businesses to their customers, as well as to how they offer these benefits.

4.1 Participant background Information

Forty-two (42) successful foreign-owned SMEs were interviewed in multiple rounds of interviews. These participants were from different business types including Retail, Business, Legal Consultancy, Information Technology and Electronics, Construction and Maintenance Services, Cosmetics and Beauty Services and Hospitality Services. Table 1 shows a summary of the participants' background information in terms of country of origin, gender, the average number of years in business and the average number of employees.

Table 1. Participants' Background Information

Country of origin	Number of participants	Number of Males	Number of Females	Average Age in Business	Average Number of employees
Bangladesh	2	2	0	16	35
Ethiopia	2	2	0	9	4
Ghana	3	2	1	9	9
India	2	2	0	13	6
Liberia	1	1	0	10	32
Malawi	2	1	1	5	15
Nigeria	7	5	2	8	6
Pakistan	2	2	0	10	4
Portugal	1	1	0	14	35
Zambia	6	5	1	6	6
Zimbabwe	14	9	5	8	15
Total	42	32	10		
Combined Mean				9	12
Min				5	4
Max				16	35

Participants came from eleven (11) different countries. The largest number of participants were from Zimbabwe (14), followed by Nigeria (7), Zambia (6) and Ghana (3). Bangladesh, Ethiopia, India and Pakistan were represented by 2 participants each while one (1) participant was from Portugal. One participant (the owner) from each SME was interviewed.

Thirty-two (32) of the participants were males and ten (10) were females. Their combined average number of years in business was nine (9) years, with a minimum of 5 years and a maximum of 16 years. The combined average number of employees was twelve (12), with a minimum of four (4) employees and a maximum of thirty-five (35) employees. The National Small Business Act, 106 of 1996 classifies micro enterprises as businesses with less than 5 employees. The majority of businesses used in this study had more than 5 employees (except for a few selected businesses which met other criteria such as the number of years in business and/or annual turnover as reported by participants) thus, this the study was not only concerned with micro enterprises. We acknowledge, however, that the majority of businesses used ranged from very small (10 - 20 employees) to small (less than 50 employees) with a few medium sized (more than 50 employees) hence a low mean number of employees of 12. The following section presents the results of open coding.

4.2 Open Coding

The first step of data analysis used open coding techniques in which relevant terms, phrases, statements and observations were coded. Table 2 shows a list of open codes identified during the open coding process.

Table 2. List of Value Propositions Open Codes

Empathizing with customers	Unique styles	Discounts
Finding something within	Addressing a need in society	Complementary services
Not expensive	Training own staff for good service	Customised services
Good service	Repeat business.	No short cuts
Motivate clients	Quality products	Proper products
Providing access	Not copying others	Building trust
Closer to the people	Unique service	Diversity
Foreign clients	Loyal staff for good service	Connections
Available online	Flexible to customers	Quality of service
Marginalised markets	Home-cooked meals	Timeous delivery
Meaningful contribution	Quality service	Access to goods
Lower prices	Few service providers	Providing the service as and when it is required.
Perfect work	Catering to diverse customers	Going to clients' homes
Well known by customers	Flexible payment terms	Proximity to clients
Be yourself / authenticity	Feeling at home	Being more available
Predominately in townships and rural areas	Affordability	Being there
Something unique	Competitiveness	
Organic food	Going an extra mile	
Trust relationship	Understanding clients' needs	
	Diversity of offerings	

4.3 Axial Coding

Following the open coding processes, axial coding was applied to the data to build categories and their properties. In total, 9 2nd order themes and three aggregate dimensions were developed, as shown in Figure 1. The aggregate dimensions that emerged from our analysis are customer interaction values, product/service values and business process values. These dimensions are discussed in the following subsections.

4.3.1 Customer interaction Values

The customer interaction value relates to the value that is derived from the manner in which the business interacts with its customers. In this category, successful foreign-owned SMEs expressed their accessibility, ability to serve marginalized customer groups, and their appeal to diverse customers as the basis for their customer interaction values. These issues are discussed in the following subsections.

Accessibility

Accessibility was cited by 20 participants as one of the value propositions who indicated that they provided access to goods and services that would otherwise not be available to some sections of the population. Participant 1 remarked that his SME “*assists in making legal and other services available... to almost everyone*”. Similar sentiments were echoed by Participant 15 who conveyed that “*it's [about] giving people access to goods they would otherwise not [be able to] afford*”.

The concept of accessibility was also evident in terms of the location of the majority of the foreign-owned SMEs. Most businesses were located within easy reach of their target customers. This observation was confirmed by Participant 6 who revealed that “*in the catering business you have to make sure that you are located at a place*

where you have access to all the people who are working, and everyone else". There was also an expression of a conscious selection of locations that were suitable for the type of business. Most foreign-owned SMEs were located in townships, downtown market areas and rural areas. Participant 24, who operated a chain of butchery and general merchandise shops, confirmed this observation, stating that *"we are predominately in the locations, in the rural areas, in the homesteads"*. Other facets of accessibility were in terms of provision of delivery services and online business presence.

Also related to the notion of location is the flexibility of the participants' SMEs to offer services according to the needs of customers. The business owners in this study who were involved in general merchandise retail and electronics services, especially those in the rural areas and outskirts, indicated that they operated their businesses outside normal working hours.

In the consulting industry, being available when needed by a client is a common concept, also pointing to flexibility. Participant 20 emphasized this notion when he asserted *"I'm available and I'm letting my clients and networks know that I'm fully available."* Participant 16 expressed similar sentiments: *"I am willing to serve you. I started by making myself available to existing companies."* A closer look at Participant 16's affirmation of willingness to serve customers was a clear indication of answering customers' needs. Participant 9 echoed that the *"customer is like a god, that's my motto"*. Similar assertions were made by 19 other participants.

Serving marginalized customer groups

Also related to the concept of serving diverse customers was that of serving marginalized customer groups. This category was expressed by 4 participants in this study. Here, the successful foreign-owned SME owners indicated that they chose their business locations carefully to ensure that they reached the unserved and marginalized market segment. To illustrate this, Participant 22 indicated they normally served *"marginalized markets in the rural communities"*. Similar sentiments were echoed by Participant 24 who related that *"we are predominately in the locations [townships], in the rural areas, in the homesteads"*. This concept was also found to be related to the notion of accessibility.

Diversity of clients and goods

Other participants mentioned the diversity of clients and goods they served as part of their value proposition. Four (4) participants in this study expressed this view. This notion was further reinforced by the participants in the catering business who indicated that they offered a variety of menus to cater to the diversity of their clients' needs and backgrounds. This approach was seen as beneficial to SMEs because it increased their market base.

4.3.2 Product/Service Values

The product/service values relate to the specific aspects of the product or service from which the customer derives value. Among the successful foreign-owned SMEs interviewed in this study, affordability, quality and uniqueness emerged as among the key product/service values in their businesses. These are discussed in the following subsections.

Affordability

Another component of the value proposition of foreign-owned SMEs relates to the affordability of their goods and services. This factor was reinforced by 28 participants. Participant 13 highlighted that their pricing was structured in such a way that it suited their customers' buying power. Participant 13 advised that *"where the buying power is not that strong, irrespective of the quality, you have to think of a very reasonable mark up so that it can be affordable for your client"*. Similar sentiments were expressed by Participant 17 who advised that *"make sure that you don't go for the kill. Don't try to [put] your price too high"*. Participant 30 also mentioned that *"we are way cheaper than established retailers"*.

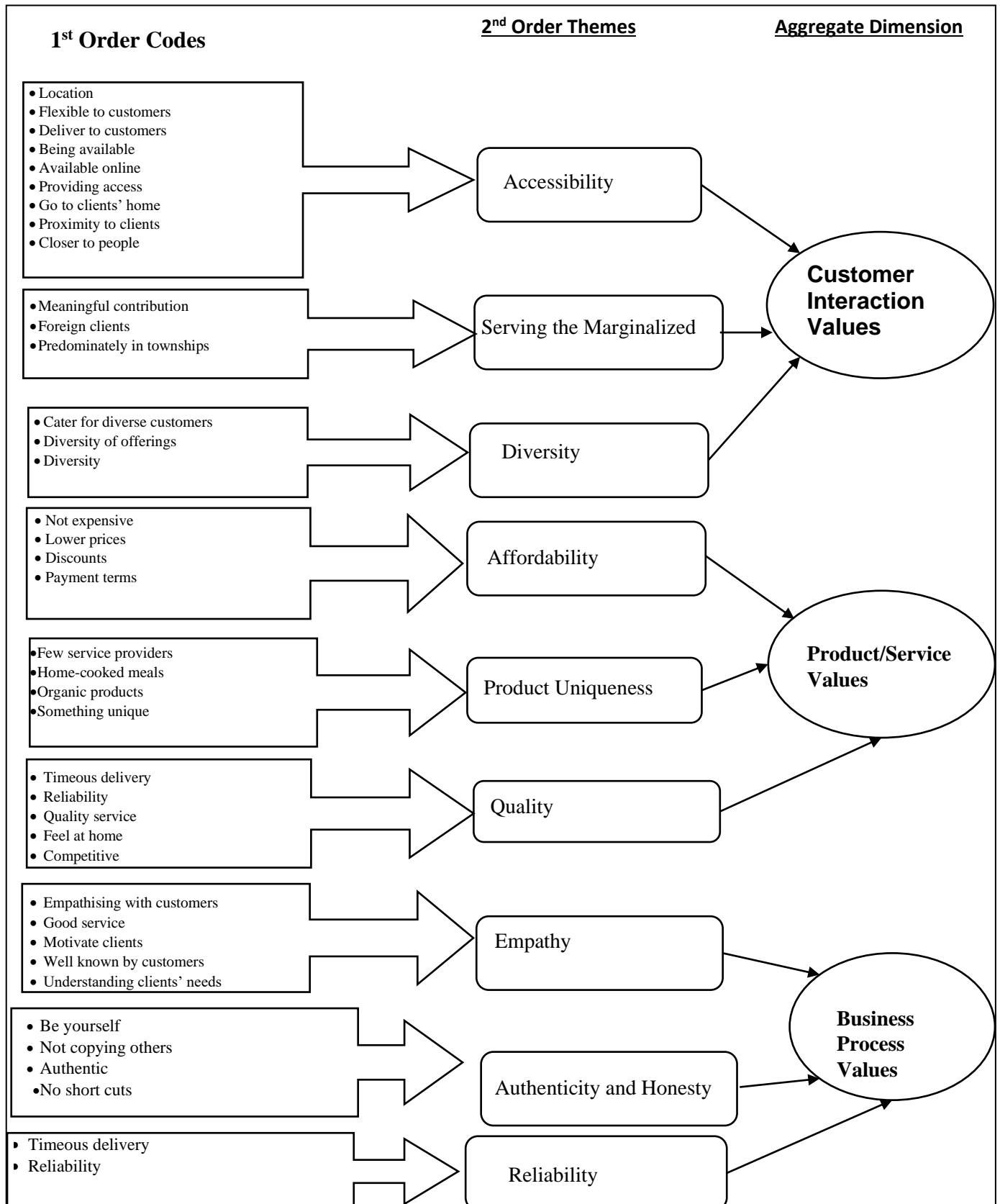


Figure 1. Data Structure, Customer Interaction Values, Product Service Values, and Business Process Values

In addition to the participants' accounts, the researcher's first-hand experiences and comparison of prices for similar products confirmed that the majority of products offered by foreign-owned SMEs were cheaper than those offered by large retailers who were operating in the shopping malls and city centres. Therefore, the affordable prices offered by foreign-owned SMEs appeared to be one of their strong value propositions.

Linked to the concepts of affordability, is the notion of payment terms. This was mentioned by ten (10) of the participants who indicated that one of the unique benefits they offered to their trusted customers was flexible payment terms. Participant 17, when talking about dealing with clients who could not pay their fees upfront, relayed that *"what normally works is a form a credit system"*. Participant 7, an engineering consultant, also indicated this benefit when she explained that:

Unlike other private consultants who need their money upfront, I am flexible to say, you know, I understand this project is for the government, you can pay me something now but when you get paid you can pay me the rest. So usually, it's like 20% upfront just for me to afford to do the job.

Similar assertions were made by other SMEs who operated in general merchandise retail, hair and beauty, and catering.

Quality Products/Services

Another concept that came out strongly was that of quality, which was mentioned in 42 (all) accounts. This consensus means that participants viewed quality in different terms, whereby, one participant could describe it in more than one word or mentioned quality several times in their accounts. Participants indicated that they prioritized offering high-quality goods and services to their customers. Participant 12 summed up this concept, maintaining that *"our values are excellence. So, we want to get someone who is going to do a good job and deliver so that that can create more opportunities"*. This assertion also implies that with high-quality services come more business opportunities, hence the desire to offer high-quality goods and services all the time. All the participants interviewed demonstrated their commitment to high-quality goods and services to their customers.

Another facet of the value proposition of foreign-owned SMEs emerged in the form of the good service that they offer. This concept was evident in 30 accounts of the participants interviewed. Participants expressed that it was through the good service that they offered their clients that they were able to secure repeat purchases. Participant 16 explained that *"delivering good services makes them [customers] come to you all the time"*. The concept of good service also appeared in the form of an 'extra mile' to ensure that the client received a satisfying service. Participant 14 stated: *"If your client says 'polish my shoe', then polish it, it will not kill you, provided that you are getting your money, you are getting your services."* This also confirms the emphasis placed on customer satisfaction.

Offering unique products

The business owners also expressed their value proposition in terms of offering unique products. This concept was found in 29 accounts of the interviewed participants. The uniqueness of the products ranged from home-cooked meals, organic products, unique service or style offerings, imported products and unique medical benefits. Participant 19 relayed that their value proposition was based on *"bringing in a new product, new ways of doing things"*. The same sentiments were echoed by several other participants.

4.3.3 Business Process Values

The business values relate to the value proposition that arises from the day to interactions and processes of the business. In successful foreign-owned SMEs, we found that business process values arise from understanding clients' needs, authenticity in business operations and overall reliability.

Understanding clients

One of the key sources of business process values that emerged from our study related to the concept of understanding clients. This notion emerged in 42 accounts. Participants expressed that by understanding clients' needs, they can deliver customized products or services that satisfy their clients. For example, Participant 14 stated the following: *"I listen to people's needs and work from there."* Similar sentiments were expressed by Participant 16, who mentioned that understanding clients involved understanding their needs and the challenges that they expected the business to address. Participant 19 added that *"we do background research on the customer, so we don't go in blind, because of our unique selling points, we try to say, 'What can we do for you?'"*. These statements confirm a consumer-centric approach to business, in which the actions of the business towards addressing the customer's problem are informed and guided by the customer's specific needs.

Authenticity and Honesty

Authenticity also emerged as another value proposition of foreign-owned SMEs. Although this concept was not explicitly spelled out by most participants, its presence was strongly expressed in 6 accounts. Participant 13 indicated that *"[my] unique way of doing my business is to just be, be myself... as real as possible, so that my clients will have that confidence in me"*. Similar sentiments were expressed by Participant 14 who indicated that *"I want to be as authentic as possible"*. Although other participants did not explicitly express the concept of authenticity, their genuine interest in the subject matter could be seen through their facial expressions and tone of voice. In one of the memos written while waiting to interview Participant 27, the following was noted:

The expressions of this SME owner as he speaks to his clients demonstrate a keen interest in his work and show noticeable originality in his conduct. I overheard him telling the client that he could not fix the customer's broken cell phone and advised his client to go to the manufacturer since the product was still under a warranty. This gesture is a clear indication of authenticity and honesty in business by this specific business owner.

A memo dated 28 September 2018, Gauteng

Participants stressed the importance of honesty and integrity when providing goods and services to clients. Although this concept was expressed in only nine accounts, it was also confirmed through personal observations. The business owners showed a remarkable level of honesty and integrity in their professional conduct. Participant 8 who runs a carwash business, confirmed this when he said:

You know, honesty, that is a very important thing, whenever a customer comes and within their cars, I need to try my level best to check with the guy that they should not pick up anything from the cars.

Similar sentiments were expressed by Participant 16, who owns a training consultancy business, who when asked about how he obtained a government tender narrated his experience with one of the government officers who attempted to solicit a bribe. He concluded his narrative by saying: “...out of integrity, this is not what we do, we don’t offer gifts or anything”. The participants emphasized that with honesty and integrity comes trust, and it is from the trust relationship that they build with their clients that they can create long-term business relationships and benefit from repeat purchases.

Reliability

Participants pointed to their timeous delivery and reliability as another source of their value proposition. This fact was expressed in 14 accounts of the interviewed participants across all business sectors, but the importance of timeous delivery was stated most strongly in the catering business. Participant 11, who ran a catering business, stressed that “we make sure that we are very punctual ... The maximum time we expect our customers to wait is just 10 minutes”. Participant 27, who operated an electronics repair shop, provided the following example: “If you bring your laptop or your phone... I’ll fix it now, I’ll give it to you, and you go with it”. The emphasis on timeous delivery was also confirmed by the researcher’s observations while waiting to interview Participant 11 in her restaurant.

4.4 Selective Coding and Constant Comparative Analysis

The final step in the analysis of data involved the management of concepts and categories based on node hierarchies. In NVIVO, nodes were structured in a branching hierarchical system with categories and subcategories grouped to form node hierarchies, also known as tree nodes (Hutchison, Johnston and Breckon, 2010). This process was conducted to address conceptually related categories that were found scattered in our lists. Moreover, categories that initially seemed distinct but found to be related were combined into one group. We then used coding stripes to analyse the possible relationship between the concepts and categories. An analysis of coding stripes showed relationships between all the value proposition concepts and categories. These coding stripes enabled us to view segments of text as well as the additional nodes that are coded to that particular selection of text. Consequently, coding stripes enabled us to compare categories and concepts. Using the guidelines provided in Hutchison et al. (2010), we, therefore, used coding stripes to provide a visual overview of the possible relationships between concepts.

Figure 2 is an illustration of the analysis of the coding stripes on NVIVO 11.

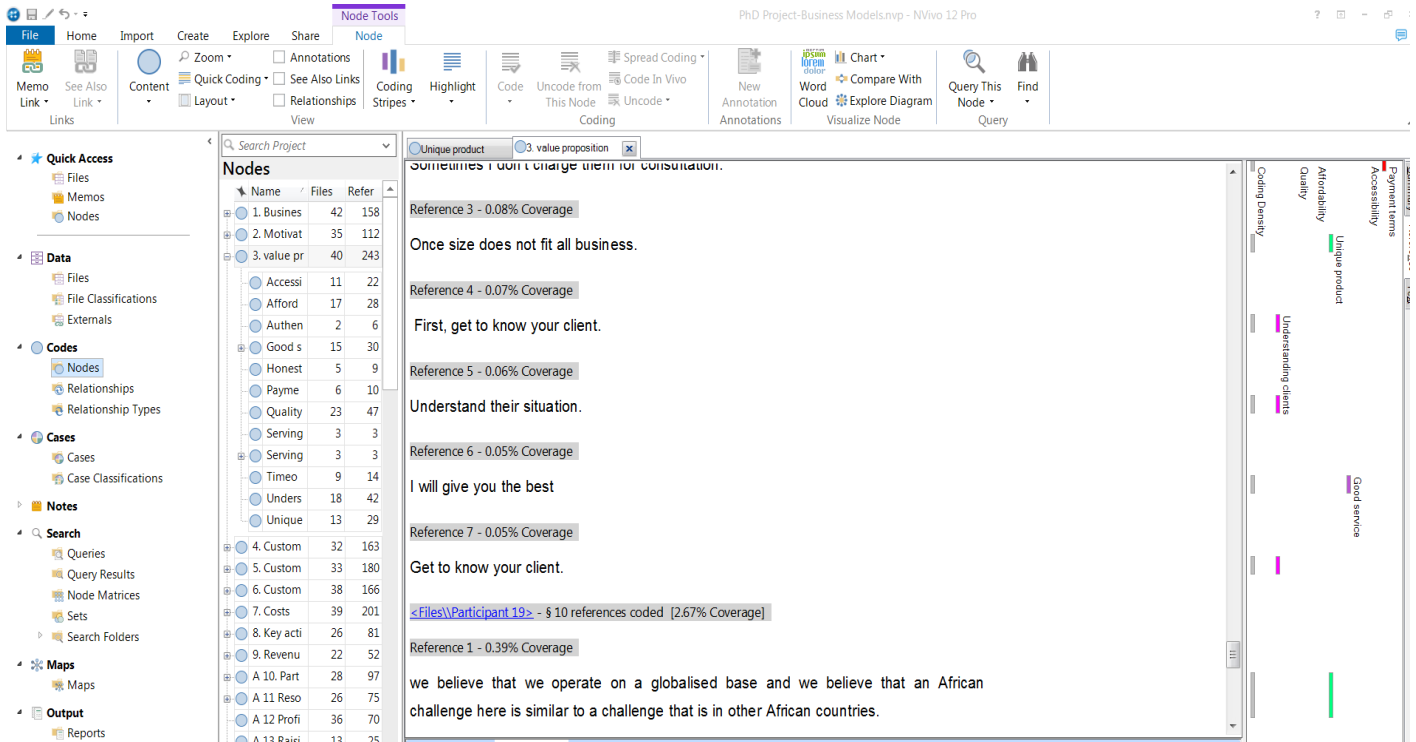


Figure 2. NVIVO12 Screenshot: Results of Node Value Propositions with Coding Stripes

The relationship between all the emergent value propositions is an indication that successful foreign-owned SMEs do not only use a single concept but rather combine various concepts in constructing their value proposition. Thus, the emergent value propositions were found to complement each other. This combination of concepts enables the participating SMEs to appeal to a variety of customer segments and allows the business to operate within a sustainable VPM. Furthermore, an analysis of the coding stripe and constant comparative techniques gave rise to the VPM constructed in this study. By grouping the various dimensions in our analysis, based on the observed relationships using coding stripes, (as illustrated in Figure 2), three value themes were developed, namely, product/service values, customer interaction values, and business process. These values were used as a basis for our VPM framework as shown in Table 3. The VPM framework provides a useful and simplified visualization of the observed relationships, together with operationalized definitions of each theme.

Table 3. A VPM Framework for SMEs

Values	Operational Definition	Dimensions
Product/Service	Values attached to the product or service offering.	Product/Service quality
		Product/Service Uniqueness
		Affordability
		Good service
Customer Interaction	Values attached or related to interactions and contact with customers	Accessibility
		Serving the Marginalised
		Serving Diverse Customers
		Understanding Clients
Business Process	Values attached to business processes.	Authenticity and honesty
		Timeous Delivery
		Payment Terms

The VPM framework provided in Table 3 above identifies the three core values, provides operationalized definitions of each of the core values, as well as identifying the key dimensions of each of the three values. It is important to note that the dimensions presented in the VPM framework are not exhaustive but are a simple illustration of the dimensions observed within the limits of the empirical investigations of this study. It is also important to note that in our investigations and analysis, it was not possible to formulate a universal VPM. Variations among successful foreign-owned SMEs and other businesses, therefore, are unavoidable. To address this, we further developed a typology of value proposition to serve as “a yardstick, an abstraction, and simplification” (Elo, 2016:132,) of successful value proposition combinations based on the line of business.

Table 4 below shows a typology of successful value proposition combinations identified in this study. Although different combinations are notable among different lines of business, there are some common value dimensions across all business lines. In terms of the product/service values, product/service quality, affordability, and good service are found in all lines of businesses investigated in this research study. Commonalities are also notable in customer interaction values in which the dimension of understanding clients is expressed in all lines of businesses. In the business process values, the dimension on payment terms is found in all lines of businesses. This analysis, therefore, provides a yardstick and simplification of successful value proposition combinations, classified according to the line of business. While slight differences among businesses within the same line of business were noted, the differences were not sufficiently significant for them to be presented on a case-by-case basis. Furthermore, acknowledging that the dimensions observed in our study are limited to our investigation of selected successful foreign-owned SMEs, future studies may identify and include more dimensions to the VPM.

Table 4. Typology of the value proposition of successful foreign-owned SMEs based on line of business

Line of Business	Retail Business	Legal Consultancy	Information Technology and Electronics	Construction and Maintenance Services	Cosmetics and Beauty Services	Hospitality Services
Product/Service Values	Product/Service quality	Product/Service quality	Product/Service quality	Product/Service quality	Product/Service quality	Product/Service quality
	Affordability	Affordability	Product/Service uniqueness	Product/Service uniqueness	Product/Service uniqueness	Product/Service uniqueness
	Good service	Good service	Affordability	Affordability	Affordability	Affordability
			Good service	Good service	Good service	Good service
Customer Interaction Values	Accessibility	Serving the marginalised	Accessibility	Understanding clients	Accessibility	Accessibility
	Serving the marginalised	Serving diverse Customers	Serving the marginalised		Serving the marginalised	Serving diverse customers
	Serving diverse customers	Understanding clients	Serving diverse customers		Serving diverse customers	Understanding clients
	Understanding clients		Understanding clients		Understanding clients	
Business Process Values	Payment terms	Authenticity and honesty	Authenticity and honesty	Timeous delivery	Authenticity and honesty	Authenticity and honesty
		Timeous delivery	Timeous delivery	Payment terms	Timeous delivery	Timeous delivery
		Payment terms	Payment terms		Payment terms	Payment terms

5. Discussions

Our study set out to identify the value propositions of successful foreign-owned SMEs to use these value propositions to inform the broad development, sustainability, and growth of the SME sector in South Africa and beyond. Understanding the value propositions of successful foreign-owned SMEs is a key step towards cross-cultural and cross-border knowledge transfer and diffusion and, thus, a move towards international entrepreneurship. This study could provide new insights into the initiatives aimed at addressing the high failure rate among SMEs in South Africa (Asah, Louw & Williams, 2020; Schachtebeck, Groenewald & Nieuwenhuizen, 2019).

While many studies (for example see Moos & Sambo, 2018; Musara & Fatoki, 2011; Pillay, 2019; Schachtebeck et al., 2019; Wentzel, Smallwood & Emuze, 2016) sought to provide solutions to the high failure rates of SMEs in South Africa from a native-owned SMEs perspective. Our study set out from the premise that, potentially, new insights could be drawn from studying the business models of successful foreign-owned SMEs. This premise is not unique to our study. Extant global literature (for example see Choudhury & Kim, 2018; Ling, Yen, & Yen, 2016; Makkonen, Williams, Weidenfeld & Kaisto, 2018) based their investigations on similar premises and found that in most cases foreign-owned businesses are a reservoir of unexplored knowledge that could benefit native-owned businesses.

Although some of the value proposition dimensions revealed in this paper have been noted in other contexts, for example as success factors from a marketing perspective (see, Alfoqahaa, 2018; Gupta & Mirchandani, 2018; Moeuf, 2020) and in business model literature (see, Osterwalder, et al., 2014)), this paper still contributes to the broad range of existing literature by providing insights from successful foreign-owned SMEs. This endowment is important in advancing the theoretical discourse on the subject matter by offering insights from an unexplored context of successful foreign-owned SMEs.

While successful foreign-owned SMEs also employ commonly known value propositions, this study identified some of their unique value propositions. The commonly used value propositions are in the form of product/service values that have been identified in the existing literature, for example in the findings of Osterwalder, Pigneur, Bernarda & Smith, (2014). In addition to commonly adopted value propositions, successful foreign-owned SMEs include customer interaction and business process values in their VPM.

Both customer interaction and business process values have been observed to be key facilitators of the co-creation of value for customers. Previous studies such as Vorbach, Müller, and Poandl (2019) as well as Quero and Ventura (2019) attest to the co-creation potential that arises from our observed dimensions of customer interaction values, i.e understanding clients, authenticity, and reliability. The focus on customer interaction values follows the service-dominant (S-D) logic which emphasizes that value is co-created by customers and is the outcome of the activities and interactions in which resources are integrated and utilized for mutual benefits (Skålén, et al., 2014). In the study entitled “*Dynamics of value propositions: Insights from a Service-Dominant Logic*”, Kowalkowski (2011) expressed the importance of customer interaction as being among the guiding principles for designing market offerings, strategic communication of the firm’s value proposition, and development of competitive advantages. In addition, customer interaction values enable the discovery of opportunities for value creation that would otherwise be constrained by the traditional goods-dominant logic (Kowalkowski, 2011; Skålén, et al., 2014). Our research findings confirm those of Zaborek & Mazur (2019) who in their study of value co-creation in Polish Manufacturing and Service SMEs revealed that “Service firms benefit from engaging in dialogue with customers, while manufacturers show the positive influences of enhanced interaction and more choice options”. Thus, the inclusion of the customer interaction values enables the businesses to understand their customers’ needs

and, as a result, engage in the co-creation of value propositions with their customers which, in turn, engenders an unfettered source of competitive advantages.

Similarly, business process management, which is akin to our business process values, was noted to facilitate the co-creation of customer value (Noci, 2019; To, Chau & Kan, 2020). The business process values provide an anchorage to the customer interaction values in which business processes support the holistic value creation practices of the business. Supporting this view, previous studies such as those of Ebert (2016) and Kirchmer (2017) emphasised that SMEs need value-driven business process management to succeed. According to Kirchmer (2017) value-driven business process management provides insights into the most critical areas that the firm should improve upon to unlock untapped value. This view espouses that the business process values observed in this study are important for success.

Both customer interaction and business process values require that SMEs work closely with their customers for the co-creation of value propositions. This situation implies the need for SMEs to forge relationships with their customers. Considering the South African SME context, the long history of SMEs' failure rate due to challenges such as a failure to access markets (Cant, 2012; van Scheers & Mmatli, 2019), access to finance (Elizabeth, Popoola & Popoola, 2020; Musara & Fatoki, 2011), among others can be addressed through the introduction of mutually beneficial customer interaction and business process values. This perspective is supported by Chen, Liu, and Wan (2020) who concluded that SMEs would find it worthwhile to focus their attention on maintaining strong relationships, based on trust and commitment, with their customers. This fact is especially important for SMEs in South Africa primarily because Hare & Walwyn, (2019) observed a lack of trust as being among the inhibitors of access to markets for SMEs in South Africa. Thus, the application of customer interaction and business process values are important in this context.

The VPM framework addresses the four core customer values proposed by Fernandes et al. (2019), namely functional, emotional, change of life, and social impact. The functional values are synonymous with product/service values in the VPM framework, while the emotional, change of life, and social impact values relate to customer interaction values. These business process values are unique to this study and are equally valuable for the success of businesses. For example, authenticity means that the business exercises truth throughout its business processes and operations within its resource constraints.

Extant literature (Baldassarre, Calabretta, Bocken & Jaskiewicz, 2017; Katz, 2010; Payne, Frow & Eggert, 2017) has focused extensively on product/service values with little regard for customer interaction and business process values. The inclusion of customer interaction and business process values in the VPM provides a holistic view of the value proposition concepts. The VPM frameworks present a holistic view of what values customers receive (product/service values), how customers interact with the business and participate in the co-creation of values (customer interaction values) as well as how the business creates and delivers the values to customers (business process values). This holistic view of the value proposition provides SMEs with much-needed opportunities for growth and ultimate success.

6. Practical value of the findings

The insight arising from the findings of this paper is that successful foreign-owned SMEs have a VPM that includes product/service values, customer interactions as well as business process values has some merit. Understanding such a VPM is not only important for the success of SMEs but also provides opportunities for co-creation of value proposition between the SMEs and their customers. While this study focussed on successful foreign-owned SMEs due to their distinctiveness within the SME sector in South Africa, in having succeeded regardless of their having experienced additional business challenges, the findings of this study could be applied to native-owned SMEs. This can inform policy aimed at growing the SME sector in South Africa and abroad through cross-cultural and cross border transfer of business knowledge.

7. Research Limitations and future research

This study is based on a qualitative grounded theory investigation of selected successful foreign-owned SMEs in South Africa. However, the study provides a springboard for further studies on value propositions in the broader SME sector. In this regard, we are looking forward to three exciting research streams in the future. The first research stream could seek to expand the menu of the value proposition dimensions by exploring a variety of industries, including value propositions in successful locally owned businesses as well as value propositions in large organisations that may be adapted to the SME sector. The second research stream could explore quantitative methodologies to generate research instruments, validate, and increase the generalisability of the findings of the study. The third research stream could conduct longitudinal studies to test the effectiveness of a variety of VPMs in the SME sector. Thus, further development of the VPM concepts is undoubtedly imminent.

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DESIGNING THE GUIDELINES FOR FINTECH CURRICULUM

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Abstract. This paper aims to share the experiences of developing the FinTech (Finance Technology) curriculum at a leading business school in the Middle East. This research paper presents the findings on various methodological issues of curriculum design, i.e., degree naming convention, degree structure, dissertation versus project, specializations. The objective of the current study was to develop a postgraduate curriculum for FinTech studies. The entire procedure was based on the notion of "adoption" to "adaptation" originated by the benchmarking approach using a comparative account of 22 universities offering FinTech Masters. A multipronged approach was used to study the existing FinTech curriculum and suggests the gap in the existing curriculum. Eight major areas are identified as the pillars of FinTech education, including FinTech, Business and Data Analytics, Programming using Python and R, Blockchain and Cryptocurrency, Artificial Intelligence, and Machine Learning, Information Systems & Technology, Regulatory Environment (RegTech), Quantitative Methods, Finance and others. Researching on new and emerging topics is always tricky. It is difficult for even FinTech students and aspirants to evaluate the quality of FinTech qualifications. People from different streams of education would like to join FinTech studies, and there is no standardization of professional association certifying FinTech Curriculum.

Keywords: FinTech; Curriculum Designing; Education

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JEL Classifications: A2

1. Introduction

FinTech could be considered the biggest revolution in the times to come, and it is becoming the most common manifestation of the latest phase of globalization in the modern age. FinTech is a new industry that broadens financial services and uses technology to enable its financial activities (Schueffel, 2016; Knewton et al., 2020, Wojcik, 2021).

FinTech can be defined as "any innovative ideas that improve financial service processes by proposing technology solutions according to different business situations" (Leong, & Sung, 2018). Therefore, the term "FinTech" can be interpreted as the application of information technology in the fields of finance, financial innovation, and digital

innovation, in addition to start-ups or, in other words, the financial service industry outside of banks (Lee & Shin, 2018; Suryono, Budi, & Purwandari, 2020).

The rapid emergence and evolution of financial technology have raised significant concerns for businesses. One example of this is the rise of online loan services, which have caused controversy in various communities (Haddad & Hornuf, 2019; Suryono, Budi, & Purwandari, 2020).

Cryptocurrencies and money laundering were also considered challenges along with the FinTech penetration in the societies, especially in emerging and developing countries where the regulatory framework is not yet ready enough to handle the FinTech industry for example in Indonesia (Davis, Maddock, & Foo, 2017) or in Poland (Kliber, Będowska-Sójka, Rutkowska, & Świerczyńska, 2021). In general, the regulators promote innovation in the financial industry and adopt sound risk management principles to ensure financial services' safety and proper operation (Davis, Maddock, & Foo, 2017).

The emergence of e-finance and mobile technology-enabled financial companies to create new business models and improve efficiency (Lee, & Shin, 2018). The rise of digital banking has created new challenges for traditional financial institutions (Davis, Maddock, & Foo, 2017). For start-ups, this opportunity provided them with a competitive advantage in terms of scale and customer base (Gimpel, Rau, & Röglinger, 2018). Like banks, FinTech also offers various services such as payment and loan services, personal financial consulting, and crowdfunding (Stern, Makinen, & Qian, 2017). Similarly, there are six FinTech business models: Insuretech (insurance services), payment, lending (microfinance), wealth management (personal financial management), capital markets, and crowdfunding (Lee, & Shin, 2018). Therefore, financial literacy is becoming an important factor in the well-being of adults (Panos, & Wilson, 2020).

2. Theoretical background

Much has been written on FinTech and relevant areas, and most of it is within the last seven years. The concept of FinTech is still in its infancy and its offerings are mainly focused less on theoretical underpins and more on a functional perspective (Gimpel, Rau, & Röglinger, 2018). With the emergence of FinTech, it is widely believed that the financial industry is entering a new era of innovation (Lee, & Shin, 2018). The evolution of FinTech has also affected the educational sector. The demand for skilled professionals with a broad range of skills in this field is increasing. This has resulted the educational institutions to offer needed by the rise of FinTech (Kuzmina-Merlino, & Saksonova, 2018).

From the perspective of a periodical timeline, FinTech history can be expanded to four periods: FinTech 1.0, FinTech 2.0, FinTech 3.0, and FinTech 4.0 (Setiawan, & Maulisa, 2020). FinTech curriculum can also be seen evolving on the same footprints.

FinTech 1.0 (1866-1966) is the period when the analog industry was still widely used. It was the first transatlantic cable that was established in 1866, connecting the US to Europe. The financial sector has always been influenced by the various analog technologies that have been used to connect and communicate across borders. This period also marks the first time the credit card was used as a payment instrument (Arner, Barberis, & Buckley, 2015). During this period FinTech curriculum did not exist as a single entity, and all subject areas were considered separate fields of study like electrical engineering, finance, business studies.

FinTech 2.0 (1967 – 2007) is the digitalization of the financial industry that started in 1967. The introduction of the ATM in 1967 is believed to have initiated the digitalization of the financial sector. The emergence of automated clearinghouses and the formation of international financial messaging networks during the 1960s and 1970s provided new opportunities for financial intermediaries and regulators. In 1995, Wells Fargo launched the first internet banking using the protocol www (World-Wide-Web), followed by the emergence of branchless banking in 2005. FinTech 2.0 refers to the various types of financial institutions commonly known as banking

conglomerates and insurance companies (Arner, Barberis, & Buckley, 2017). During this period, all ingredients of today's FinTech curriculum were taught as separate fields of studies in one program with different concentrations like undergraduate programs having a business major with Management Information systems or Information technology as a minor.

FinTech 3.0 (2008 - 2018) is the era of start-ups in the developed world. The evolution of digital innovation has brought about a paradigm shift in how financial services are provided. This shift, which began with the emergence of non-bank financial start-ups, has led to a rethink of how banks are perceived. Following the Asian Financial Crisis in 1997, many financial start-ups started their journey in the same direction. One of these is Paypal, which was established in 1999. Over the years, various companies and institutions launched their digital wallets. In 2005, the launch of ZOPA became the first example of P2P Lending disruption. Some believe that geographical location played a significant role in developing FinTech start-ups during the third generation of the financial system (Arner, Barberis, & Buckley, 2017). During this period, all ingredients of today's FinTech curriculum were taught as separate fields of studies under one program with different concentrations like programs having a business major with AI, Machine Learning, Blockchain, programming, etc., as elective courses.

FinTech 4.0 (2019 – to date) is the era of FinTech start-ups from developing and emerging countries. The rise of FinTech start-ups is mainly due to the increasing number of regulations and the decline of public perception. In addition, the rise of trust in the public toward financial start-ups has caused banks to become more cautious in their approach toward dealing with customers. Therefore, the emergence of FinTech start-ups in developing markets has been mainly influenced by the pursuit of achieving economic goals and becoming the last mover advantage after the transition.

The third world is a greenfield project that's focused on developing financial services for unfeasible consumers. This is because most individuals are ineligible to receive traditional financial services (Setiawan, & Maulisa, 2020). During this period, universities started offering FinTech programs as a single integrated curriculum like programs having FinTech as central with AI, Machine Learning, Blockchain, programming, etc., as core courses (Table 1).

Table 1. Evolution of FinTech Curriculum

Generation	FinTech 1.0	FinTech 2.0	FinTech 3.0	FinTech 4.0
Years	1866-1966	1967-2007	2008-2018	2019-todate
Penetration	<ul style="list-style-type: none"> Global & developed countries 	<ul style="list-style-type: none"> Global & developed countries 	<ul style="list-style-type: none"> Global & developed countries 	<ul style="list-style-type: none"> Emerging & developing countries
Objectives	<ul style="list-style-type: none"> Information Technology, Finance, and Banking evolved separately but had a handshake 	<ul style="list-style-type: none"> Use of information technology in traditional financial institutions to improve the quality of products or services. 	<ul style="list-style-type: none"> Use of technology by new entrants to provide non-intermediary services directly to customers 	<ul style="list-style-type: none"> The new competitive environment for financial institutions to offer products and services as a result of the fusion of technologies
Characteristics	<ul style="list-style-type: none"> Analog Banking Infrastructure development Usage of Telegraph & Telephone in Finance & Banking Computerization 	<ul style="list-style-type: none"> Electronic Banking Digitalization Traditional Internet Payment Gateways ATMs Online Banking Paypal 	<ul style="list-style-type: none"> Digital Banking Mobile/Smart Phone Banking Focus on Apps Hi-Tech Start-ups Distributive model of FinTech Digital Wallets Bitcoin Apply Pay/ Samsung Pay/ Google Pay 	<ul style="list-style-type: none"> Mobile Banking Fourth industrial revolution or Industry 4.0 Digital Transformation Agglomeration model of FinTech
Education / Curriculum **	<ul style="list-style-type: none"> Separate fields of study 	<ul style="list-style-type: none"> Programs having a business major with MIS or Information technology as a minor 	<ul style="list-style-type: none"> Programs have a business major with AI, Machine Learning, Blockchain, programming, etc., as elective courses. 	<ul style="list-style-type: none"> Programs have FinTech as central with AI, Machine Learning, Blockchain, programming, etc., as core courses.

Sources: (Bouaziz, & Sghari, 2021; Setiawan, & Maulisa, 2020; Jiao, Shahid, Mirza, & Tan, 2021). ** Observations by authors

FinTech, or technology-based solutions that disrupt and strengthen the financial services industry, has become one of the most promising sectors in the tech industry (Kursh, & Gold, 2016). Technology, Finance, and Management are often combined in order to improve the efficiency and profitability of financial services. This intersection of disciplines made financial services more accessible and less costly (Sung, Leong, Sironi, O'Reilly, & McMillan, 2019). The new FinTech sector is often considered disruptive due to its potential to improve the efficiency and profitability of financial institutions (Karkkainen, Panos, Broby, & Bracciali, 2017). Additionally growth in venture capital and credit markets also affected the growth of FinTech entrepreneurship (Kolokas, Vanacker, Veredas, & Zahra, 2020).

According to industry experts, the lack of skilled professionals has raised concerns about the profitability of FinTech start-ups (Karkkainen, et al., 2017). It is expected that mobile FinTech payment services will develop into more secure services in the future (Kang, 2018) and this area is still facing shortage of trained work force. There are shortages in both the finance and business fields for graduates from various social sciences and computer science disciplines. Such shortages exist for graduates from both the social sciences, such as finance and business, and the computer science background as the FinTech industry neither requires a financial expert nor needs hardcore programmers. Instead of just focusing on academics, they should also consider careers in finance, technology, or data analytics. Moreover, it often leads to new business models or even new start-ups (Leong, & Sung, 2018). The rapid emergence of FinTech has created new opportunities for business schools to develop new methods and solutions. The new skills requirements must be planned and are expected to be delivered through an integrated delivery model. This includes the necessary technical skills in programming, data analysis, and the development of applications (Karkkainen, et al., 2017).

3. Research objective and methodology

The objective of the current study was to develop a robust, validated customized curriculum structure for FinTech studies. All postgraduate qualifications on FinTech were searched. The initial search was filtered, and all distance learning institutions and online-only institutions were removed from the shortlisted list of institutions. At the second round of data screening, all the other degrees offering a minor in FinTech were removed. Many business schools offering FinTech as a course or significant in their MBA programs were also removed from shortlisted institutions. For example, New York Stern offers MBA FinTech, but the curriculum structure is based on the Global MBA curriculum and does not match the study's objectives. Finally, a list of 22 institutions offering MSc/MS degrees in FinTech was finalized (Table 2).

Table 2. List of Institutions offering MSc FinTech programs

No.	Degree Title	Institution Name	Country
1	MS Finance (FinTech and Financial Analytics)	HK Baptist University	Hong Kong
2	MS Financial Technology	New Jersey City University	USA
3	MSc Financial Technology	HK University of Science & Technology	Hong Kong
4	MSc Financial Technology	Imperial College Business School	UK
5	MSc Financial Technology	University of Birmingham	UK
6	MSc Financial Technology	University of Essex	UK
7	MSc Financial Technology	University of Glasgow	UK
8	MSc Financial Technology	University of Liverpool	UK
9	MSc Financial Technology	University of Strathclyde	UK
10	MSc Financial Technology (FinTech)	Nanyang Technological University	Singapore
11	MSc Financial Technology (FinTech)	Coventry University	UK
12	MSc Financial Technology (FinTech)	Manchester Metropolitan University	UK
13	MSc Financial Technology (FinTech)	Teesside University	UK

14	MSc Financial Technology (FinTech)	University of Salford	UK
15	MSc Financial Technology (FinTech)	University of Stirling	UK
16	MSc Financial Technology (FinTech)	University of Exeter	UK
17	MSc Financial Technology (FinTech)	University of West England - Bristol	UK
18	MSc FinTech, Risk and Investment Analysis	University of Sussex	UK
19	MSc FinTech with Business Analytics	University of Westminster	UK
20	MSc FinTech and Policy	University of Surrey	UK
21	MSc FinTech and Financial Markets	Nottingham Trent University	UK
22	MSc FinTech	University of Huddersfield	UK

In the second phase, courses were classified into broader subject areas and sub-subject areas (Table 2). Six subject areas were identified including (a) FinTech; (b) Technology; (c) Finance; (d) Analytics; (e) RegTech; and (f) Others.

4. Results and discussion

This research paper presents the findings on various methodological issues of curriculum design for a master's degree in FinTech, i.e., degree naming convention, major subject areas, degree structure, culmination point, dissertation versus project, specializations.

Major Subject Areas: A total of 249 courses (138 core courses and 111 electives) were classified into six subject areas (Table 2) including (a) FinTech; (b) Technology; (c) Finance; (d) Analytics; (e) RegTech; and (f) Others. Technology was again sub-divided into four distinct areas: information systems, Blockchain and Cryptocurrency, artificial intelligence and machine learning, and programming with R and Python. Similarly, finance was subdivided into three areas Corporate Finance, Investments, and Applied Finance. Analytics was subdivided into two areas quantitative and data analytics (Table 3).

Table 3. Identification of major/minor areas in FinTech Curriculum

Areas	Minor Areas	Core Courses	Elective Courses	Total
FinTech	FinTech	18	10	28
Technology	Programming	14	2	16
	Blockchain & Cryptocurrency	11	4	15
	Artificial Intelligence & Machine Learning	8	9	17
	Information Systems & Technology	7	10	17
Finance	Corporate Finance	18	8	26
	Investments	14	9	23
	Applied Finance	7	14	21
Analytics	Business & Data Analytics	16	10	26
	Quantitative Methods	5	7	12
RegTech	Regulatory Environment (RegTech)	7	4	11
Others	Entrepreneurship, Ethics & Risk	7	8	15
	Miscellaneous	6	16	22
Total		138	111	249

Pre-Masters Courses: As the nature of the degree is based on diversified disciplines, it is imperative to add pre-semester courses for students with academic deficiencies (Table 4).

Table 4. Semester Zero Courses / Pre-Masters Courses

Applicant's Deficiency	Course Title	Credit Hours
Finance	Introduction to Finance	3
AI & Machine Learning	Introduction to Information Systems	3
Programming	Introduction to Programming	3
Data Analytics	Introduction to Data Sciences	3
	Total	12

Degree Structure: An ideal postgraduate degree in FinTech must have at least 30 credit hours span over two semesters of course work, having four courses each semester and one project or dissertation in the third semester (Table 5).

Table 5. Sample study plan for Masters in FinTech

Semester	Subject Area	Course Title	Credit Hours
I	Finance & Banking	Corporate Finance	3
	FinTech	Financial Technology (FinTech)	3
	Programming	Programming in Python and R	3
	AI & Machine Learning	AI & Machine Learning	3
II	Blockchain & Cryptocurrency	Blockchain and Cryptocurrency	3
	FinTech-RegTech	RegTech	3
	Data & Business Analytics	FinTech Data Analytics	3
	Others	FinTech Strategies	3
III	FinTech Project	Project	6
Total			30

Degree Naming Convention: There are two primary degree naming conventions observed in MSc FinTech Curriculum. One is MSc Financial Technology, and the other one is MSc Financial Technology (FinTech). MSc FinTech was offered by 20 institutions, mainly from UK, Singapore, and Hong Kong, while two US business schools are offering MS FinTech. These degree nomenclature differences are inherent in two different countries, i.e., the US versus the UK. In addition, many institutions differentiated their offering with specializations evident from the degree title. For example, MSc FinTech, Risk and Investment Analysis (University of Sussex, UK); MSc FinTech with Business Analytics (University of Westminster, UK); and MSc FinTech and Policy (University of Surrey, UK). (See Figure 2).

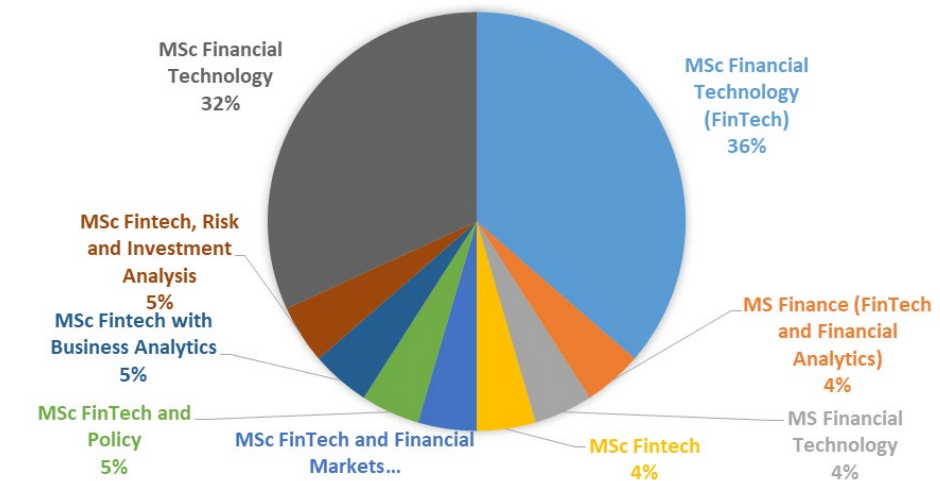


Figure 1. Distribution of Degree Naming Conventions for Master's degree in FinTech

Research: Usually, there are three options as a culmination point for a master's degree. Firstly, a semester-long project titled Applied Project, Final Project, or Research Project is equivalent to three-credit-hour courses.

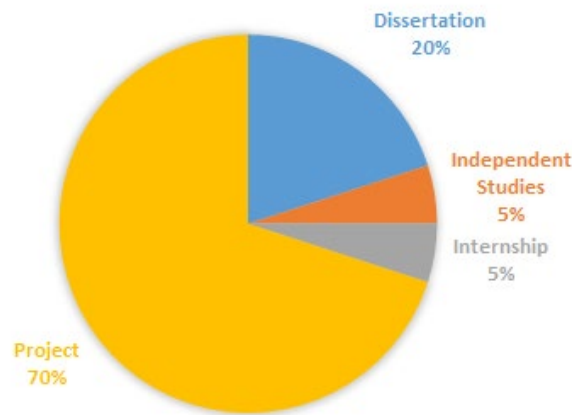


Figure 2. Research Component in FinTech Curriculum

Secondly, a semester-long internship, practicum, or work placement. They are also given equivalence to a 3-credit hour course. Sometimes grades are subject to the submission of a report. Thirdly, a semester-long dissertation on a relevant academic topic is closely supervised by senior research faculty members and often subject to available defense at the end. Commonly dissertations, sometimes called the thesis, are equivalent to 6-credit hour course work. There are merits and demerits of offering different options in a master's degree. Figure 2 presents the distribution of projects, internships, and dissertations in master's degree in FinTech. Further analyses show that 14% of universities offer all three options mentioned above, while 18% offer two methods and 68 % offer only one of the three options mentioned above. Additionally, 5% of universities do not offer any project, internship, or dissertation as part of degree requirements towards masters in FinTech, for example, Hong Kong University of Science & Technology.

5. Conclusion

FinTech could be considered the biggest revolution in the times to come, and it is becoming the most common manifestation of the latest phase of globalization in the modern age. The study explores how educational institutions and industry leaders are addressing the current FinTech curriculum problems. It also highlights the various opportunities for FinTech-related education and training in the region. The study focused on the various response strategies that were used to address the situation. The findings also reveal how educational institutions are addressing the needs of their students in terms of technical expertise. This paper also highlights how FinTech companies require skill enhancement programs for various industries. Various programs are aimed at cultivating local talent and boosting the financial industry's growth in the area. This theme focused on the various government and policy interventions to address the chronic skill shortage in FinTech. Due to the nature of the profession and the lack of sufficient peer-reviewed sources for this research, it is not easy to gauge the level of interest and response to the topic. However, this research also identifies various opportunities that could help develop the FinTech ecosystem. To validate these suggestions, various stakeholder groups should comprehensively assess the curriculum items related to FinTech.

6. Limitations

Researching on new and emerging topics is always tricky. It is difficult for even FinTech students and aspirants to evaluate the quality of FinTech qualifications. Moreover, people from different streams of education would like to join FinTech studies, and there is no standardization of professional association certifying FinTech curriculum, which has made the situation even worse.

7. Recommendations

This research provides numerous recommendations for universities, policymakers, and society in general. FinTech services can be classified into five broad categories: (a) payments, clearing, and settlement; (b) deposit, lending, and capital raising; (c) insurance; (d) investment management; and (e) market support. However, the FinTech curriculum offered by most of the universities covers one or two services only. However, this paper identifies the gaps in current FinTech education and suggests suitable remedies. Still, no single program covers all five categories in terms of courses, projects, or applications. This requires the development of new courses or amendments in existing courses to cover this gap. Business schools may find this opportunity to specialize their offering in one of the five broad categories mentioned above and position their brand image accordingly.

As universities worldwide begin to examine how they can prepare for the inevitable rise of FinTech, many are creating coursework to fill the skills gap. Unfortunately, this course does not go into depth about specific technologies, leaving students with limited job opportunities. To avoid teaching students the wrong version of FinTech, universities must constantly seek input from industry. Therefore, universities may need to take specific steps (such as improving collaboration and partnership with FinTech organizations) towards improving education curriculum to align more closely with the needs of FinTech employers. If possible, universities are advised to offer FinTech programs in collaboration with Cryptocurrencies exchanges and university business incubators so that graduates and society can get maximum benefits from the programs.

Master of Business Administration (MBA) programs have always been considered more in width and less in depth while other science, technology and engineering programs were always considered more in depth compared to the width of topics covered in those programs. The success of MBA programs was always attributed to their width. In other words, MBA programs offer courses in a wide range of subject areas like accounting, finance, management, marketing, operations, and supply chain information technology. Universities must learn to balance the vertical depth of FinTech programs versus the horizontal width of the FinTech programs. Similarly, business schools are hosting most of the FinTech programs. Considering the width of the subject areas offered in FinTech, it is advised to offer FinTech programs through multi-disciplinary teaching centers established in collaboration with computer science, information systems departments. Universities may also consider developing and promoting online education programs that provide an in-depth look at FinTech-related skills.

Lastly, the FinTech curriculum is still evolving, and there is no standardization available in academia in terms of the contents; neither any educational accreditation body has started giving accreditations to institutions offering FinTech programs or courses. Therefore, applying the standardization for FinTech curriculum development will provide confidence to existing FinTech professionals and provide a roadmap to FinTech aspirants.

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CROSSING THE VALLEY OF DEATH: LESSONS FOR YOUNG ENTREPRENEURS

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Abstract. Valley of Death (VoD) is a metaphor often used to describe the situation in which many new startups fail to survive. This paper aims to share the experiences of developing guidelines for young entrepreneurs to successfully cross the Valley of death. The ideal target audience for this paper includes young entrepreneurs eager to launch their startups and preferably attending business incubation or acceleration programs. This research hypothesized to make a conceptual model crossing the Valley of death using the entrepreneurial ecosystem. The entrepreneurship ecosystem consists of six higher-order domains, including enabling government policies and leadership, financial capital, culture, support services, human capital, and markets. From earlier studies, entrepreneurial actions to cross the Valley of death were extracted. Entrepreneurship experts, including business incubation center managers, mentors, entrepreneurship faculty from business schools, validated these entrepreneurial actions. Analyses show four domains replicated in the study, enabling government policies and leadership, financial capital, support services, and markets. Furthermore, culture was partially replicated while the experts did not validate human capital. Finally, it presents entrepreneurial actions used to cross the Valley of death by new startups. These entrepreneurial actions are mapped on the entrepreneurial ecosystem. Findings include an emphasis on the understanding of ten issues including, entrepreneurial ecosystem, government rules, procedures, and incentives (like tax benefits, grants) for similar startups, intellectual property rights for similar projects, the role of leadership in startup performance, financial capital for the startup, risks and decision-making choices, regional entrepreneurial culture, support services for similar startups, markets, customers & competitors, the commercial value of the research project/product. Findings also show how to perform these actions and the appropriate timings of these entrepreneurial actions.

Keywords: Valley of Death; entrepreneurship; lessons for entrepreneurs

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JEL Classifications: L26

1. Introduction

One critically important concept for new startups is the concept of the Valley of death; a metaphor often used to describe the gap between innovations and their commercialization in the marketplace (Markham, 2002, Merrifield, 1995). The left side of the Valley shows entrepreneurs with ideas, scientists, innovation teams, and university resources necessary for startups. This is the technology development stage. Inventions turned into products have product resources like market and product. These appear in the middle of the Valley, forming the second stage of Product development. Finally, products turned into ventures possess the resources for commercialization appears on the right side of the Valley and reflects the third stage, i.e., commercialization. The Valley of Death between technical development through product development and product development and commercialization represents the chances of product failure or venture failure due to lack of resources and expertise. Startups need numerous steps to cross this Valley of death successfully. This paper aims to share these actions as guidelines for young entrepreneurs.

2. Theoretical background

In an entrepreneurial context, the term Valley of Death (VoD) was first used by Stephan Markham (2002), describing a firm's failure to attain sustainable business models (Markham, 2012). Figure 1 shows a typical valley of death for new startups. VoD is often used for commercialization projects of new high technologies (Budi & Aldianto, 2020). Getting a return on investment comes first, overcoming the risk factors associated with these technologies. These risk factors are collectively referred to as Valley of Death (VoD) and are often linked as the significant reason for high-tech venture failures (Al Natsheh, 2021).

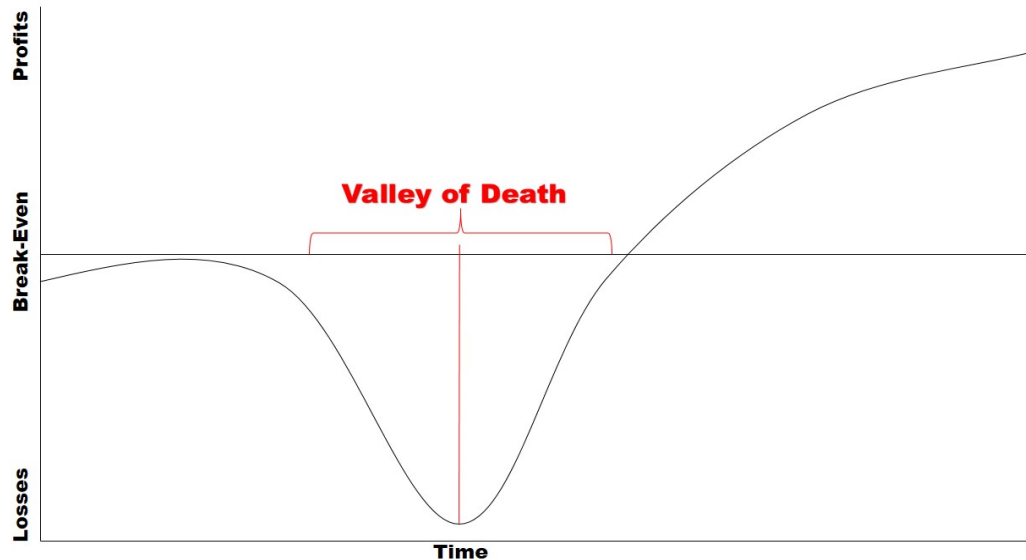


Figure 1. The Valley of Death (Source: author's contribution; adapted from Markham, 2012; McIntyre, 2014)

Many studies are linking the Valley of Death (VoD) concept to entrepreneurs and startups, for example (Barr, Baker, Markham, & Kingon, 2009; Verhoeff, & Menzel, 2011; Abereijo, 2015; Takata, Nakagawa, Yoshida, Matsuyuki, Matsuhashi, Kato, & Stevens, 2020; Etzkowitz, Mack, Schaffer, Scopa, Guo, & Pospelova, 2020; Barron, & Amorós, 2020; Stefanelli, Boscia, & Toma, 2020; Calza, et al., 2020; and more recently Sung, 2021).

Different studies have suggested different entrepreneurial actions to avoid VoD. One such study had suggested that students develop commercialization skills to prepare them for success in the tech industry (Barr, et al 2009). Another study had suggested that building up one's social capital could reduce the risk of the Valley of death. The authors show that an interactive training approach can enhance social capital through the training of entrepreneurs (Verhoeff, & Menzel, 2011). In another attempt, establishing entrepreneurial universities has been considered the solution for VoD (Abereijo, 2015); Stanford University's success could be an excellent example of an entrepreneurial university (Etzkowitz, et al., 2020). University spin-offs were also considered as a possible bridge for VoD. The appointment of a technology transfer professional (TTP) was also considered a possible solution to the problem of VoD (Takata, et al., 2020). Finally, some studies were focused on specific industry sectors like the Biopharma industry (Calza, et al., 2020) or specific to an entrepreneurship program (Barron, & Amorós, 2020).

Many observations can be made on existing literature on VoD linking to entrepreneurship. Firstly, most of the relevant literature is specific to the industry and unable to generate generalizations. There is no significant research or conceptual model for entrepreneurial actions bridging the gap of VoD. This research hypothesized to make a conceptual model crossing the VoD using the entrepreneurial ecosystem. This section aims to provide literature support for entrepreneurial actions to cross the VoD using the entrepreneurial ecosystem successfully.

There is no standard definition of entrepreneurship ecosystems among academic and practitioner groups (Stam, & de Ven, 2021). The first component of this concept is often referred to as entrepreneurial. The concept of entrepreneurship is often narrowed down to high-growth startups or scale-ups, claiming that these are innovation and productivity growth engines. However, this claim seems too exclusive. In the literature on entrepreneurship, it has become increasingly emphasized that innovation and growth-oriented approaches are prevalent. The second component of the ecosystem is similar to a biotic community, which is defined as a complex network of living organisms interacting in various ways. A community ecology perspective considers the various roles that various institutions and organizations play in the evolution of a community. This mutualistic interdependence is often linked to the interests of various actors, such as local communities, universities, and business establishments. For instance, if a startup company wants to start a business in a particular region, its investors and local partners will develop mutually beneficial relationships. Aside from these, other actors also play critical roles in developing and sustaining an entrepreneurial ecosystem (Duan, Sandhu, & Kotey, 2021).

The entrepreneurship ecosystem consists of many elements, converged into six higher-order domains: (1) enabling government policies and leadership, (2) availability of financial capital, (3) a conducive culture, (4) an infrastructure and institutional support from professional organizations, (5) quality of human capital, (6) venture-friendly markets for products (Isenberg, 2021). Table 1 shows domains of the entrepreneurial ecosystem.

Table 1. Domains of Entrepreneurial Ecosystem

Domain	Sub-Domain	Major Components
Policy	Government	<ul style="list-style-type: none"> • Institutions, e.g., Investment, Support • Financial Support, e.g., R&D fund, Jumpstart funds • Regulatory Framework Incentives, e.g., Tax benefits, Bankruptcy, contract enforcement, property rights, and labor
	Leadership	<ul style="list-style-type: none"> • Unequivocal Support • Social legitimacy • Open door for advocate • Entrepreneurship strategy • Urgency, crisis, and challenge • Research Institutions • Venture Friendly legislation, e.g.,
Finance	Financial Capital	<ul style="list-style-type: none"> • Micro-loans • Venture capital funds • Angel investors, friends, and family • Private equity • Public capital markets • Bank loans, Debt • Zero-stage venture capital
Culture	Success Stories	<ul style="list-style-type: none"> • Visible successes • Wealth generation for founders • International reputation
	Societal Norms	<ul style="list-style-type: none"> • Tolerance of risk, mistakes, failure • Innovation, creativity, experimentation • Social status of an entrepreneur • Wealth creation • Ambition, drive, hunger
Supports	Infrastructure Support	<ul style="list-style-type: none"> • Telecommunications • Transportation & logistics • Energy • Zones, incubation centers, clusters
	Support Professions	<ul style="list-style-type: none"> • Legal • Accounting • Investment Bankers • Technical Experts, advisors
	Non-Government Institutions	<ul style="list-style-type: none"> • Entrepreneurship promotion in non-profits • Business plan contests associations • Entrepreneur-friendly associations • Conferences
Human Capital	Educational Institutions	<ul style="list-style-type: none"> • General degrees (professional and academic) • Specific entrepreneurship training
	Labor	<ul style="list-style-type: none"> • Skilled and unskilled • Serial entrepreneurs • Later-generation family
Markets	Early Customers	<ul style="list-style-type: none"> • Early adopters for proof-of-concept • Expertise in productizing • Reference customer • First reviews • Distribution channels
	Networks	<ul style="list-style-type: none"> • Entrepreneur's networks • Diaspora networks • Multinational corporations

Source: author's contribution; adapted from Isenberg, 2011

Table 2 shows lessons learned to cross the Valley of death using entrepreneurial ecosystems. These lessons are extracted from earlier studies.

Table 2. Lessons learned to Cross the Valley of Death – Entrepreneurial Ecosystem

Entrepreneurial Action	Reference
Understand the local entrepreneurial ecosystem.	(Calza, et al., 2020; Jucevičius, et al., 2016).
Use heuristics or rules of thumb as a checklist to mitigate risks, reduce uncertainty and make a decision	(Markham, 2002).

Role of Country Governments in building Entrepreneurial Ecosystems: Governments play a pivotal role in establishing an entrepreneurial ecosystem (Chandra, & Fealey, 2009). There are three different governance models for the entrepreneurial ecosystem: top-down, bottom-up, and hybrid (Figure 2). First, the top-down method, as exhibited by Japanese and Swedish governments, provide subsidies in research and promote technology commercialization of the startups (Lynn, & Kishida, 2004) or establish mechanisms of direct interactions between universities, research centers, and relevant industrial sectors (Sun, Zhang, Cao, Dong, & Cantwell, 2019). The second method, the bottom-up method, as exhibited by the U.S. government by setting up competition-based rules to facilitate linkages and networks among universities, entrepreneurs, accelerators, venture capital, large firms, and consultants (Sun et al., 2019; Pauwels, Clarysse, Wright, & Van Hove, 2016; Belz, Terrile, Zapatero, Kawas, & Giga, 2019). Finally, the third approach is a hybrid method by combining the strengths of top-down and bottom-up methods, mainly observed in developing countries, including China, Taiwan, and Singapore (Sun et al., 2019).

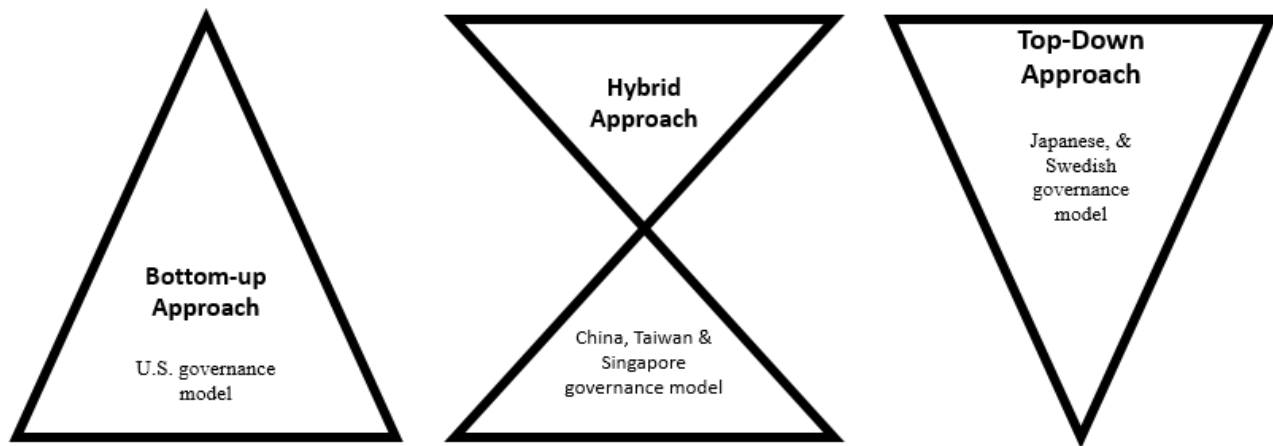


Figure 2. Entrepreneurial Ecosystem – Role of Country Government
Source: author's contribution; adapted from Sun et al., 2019

The government acts as a 'planner' in the top-down and directly creates mechanisms of commercialization. In contrast, the government sees its position as more of a 'facilitator' in the bottom-up approach and encourages innovation through market processes, such as indirect incentives (Sun et al., 2019). Apart from these patronizing roles, government agencies also play a regulatory role. This role may vary from country to country and industry to industry. Table 3 presents governments' role in using entrepreneurial ecosystems to cross the Valley of death successfully.

Table 3. Lessons learned to Cross the Valley of Death – Role of Government

Entrepreneurial Action	Reference
Understand the government rules, procedures, and incentives (like tax benefits, grants) for similar startups.	(Shinkle, & Suchard, 2019; Minniti, 2008)
Join the local entrepreneurial network.	(Hallen, et al., 2020)
Join business incubators at an early stage	(Siddiqui et al., 2018).
Join business accelerator programs at a later stage.	
Understand the intellectual property rights (like Patents, Copyrights) for similar projects.	(Halt, et al., 2017; Rai, et al., 2008)
Secure intellectual property (I.P.) rights as soon as possible.	(Rai, et al., 2008)

Role of Leadership in Crossing the Valley of Death: One of the most important reasons for the innovation project failure is the lack of leadership (Markham, 2002; Schön, 1963). Leadership plays a pivotal role in the early stages of any startup and has a significant and positive effect on startup further performance (Zaech, & Baldegger, 2017). However, within the new startups, those engineers or scientists typically play this role busy in new product development or new feature development, and they have a lack motivation to commercialize their ideas (Upadhyayula, et al., 2018; Dobrenkov, et al., 2017). Therefore, there might be a shift in a leadership role from scientists to 'innovation champions' (Markham, 2002) or, more precisely, to the team members having a more entrepreneurial mindset once the innovation moves towards product development or commercialization stages. Table 4 shows the role of startup leadership in crossing the Valley of death successfully.

Table 4. Lessons learned to Cross the Valley of Death – Leadership's Role

Entrepreneurial Action	Reference
Understand the role of leadership in startup performance.	(Zaech, & Baldegger, 2017)
Shift the leadership role from a scientific mindset to a more entrepreneurial mindset	(Markham, 2002)

Role of Financial Capital in Crossing the Valley of Death: Turning innovations into commercial products typically financed by many entities in different Valley of Death stages. It starts with scientist's won savings and support from family and friends (Mcintyre, 2014). In subsequent stages, the innovation teams may get financial support from angel investors or venture capitalists (Figure 3). Angel investors are willing to take risks by investing in new ventures and providing capital for startup or expansion. In addition, they can instantly provide small-to-mid-size amounts as an investment with a higher rate of return than would be given by more traditional investments (Cavallo, et al., 2019).

Venture capitalists (VC) are private equity investors who can invest mid-size capital to new companies exhibiting high growth potential in exchange for an equity stake (Mcintyre, 2014). Also, provide bridge finance to startups that wish to expand and go for their IPO but do not have access to equities markets. Finally, at later stages in commercialization, either through an initial public offering (IPO) or through bank borrowing, the innovation team can raise funds for their operations. An initial public offering (IPO) refers to offering shares to the public investor to raise capital (Shinkle, & Suchard, 2019). It is an expensive option but typically meets a large funding target amount with having detailed disclosure requirements. Table 5 shows lessons learned for financial capital in crossing the Valley of death successfully.

Table 5. Lessons learned to Cross the Valley of Death – Financial Capital

Entrepreneurial Action	Reference
Understand the financial capital for the startup.	(Gejun, 2021)
Use business plan/feasibility to attract stakeholders (investors, customers, authorities)	(Barr, et al. 2009)
Understand the risks and decision-making choices.	(Barr, et al 2009, Tversky & Kahneman, 2004)
Acquire resources to mitigate risk.	
Contact angel investors in the early stages.	(Savaneviciene, et al., 2015)
Contact venture capitalists in late stages.	
Choose venture capitalists from the entrepreneurial ecosystem.	

Role of Culture in Crossing the Valley of Death: Culture has been classified as an essential component of the entrepreneurship ecosystem (Isenberg, 2011). It influences the participants' level of risk acceptance and creativity, and it can also enforce one particular activity or another (Dubina, & Ramos, 2016). Culture is learned, not inherited, and comes from the social environment, and the differences between members of a group are reflected in their culture (Hofstede, Hofstede, & Minkov, 2010). These similarities are passed down from generation to generation. It is also common for parents to teach their children about values. Those who prefer a particular state of things are also known as appropriate individuals. Japanese culture is highly risk-averse. This makes it hard to imagine a type of business activity that is suitable for Japanese consumers. Literature also supports the idea that regional entrepreneurial culture and early-stage entrepreneurial activity can be linked (Bosma, & Holvoet, 2015). Culture has a lot to offer when it comes to entrepreneurship (Donaldson, 2021). The cultural aspects within leading entrepreneurial ecosystems can be divided into various aspects such as the tolerance of risk, the preference for starting a business, the positive perception of entrepreneurship, etc. Table 6 shows lessons learned for regional culture in crossing the Valley of death successfully.

Table 6. Lessons learned to Cross the Valley of Death – Culture

Entrepreneurial Action	Reference
Understand the regional entrepreneurial culture.	(Donaldson, 2021, Bosma, & Holvoet, 2015)
Join business incubators at an early stage	(Siddiqui, et al., 2018).
Join business accelerator programs at a later stage.	

Role of Support Services in Crossing the Valley of Death: Various support services are needed for entrepreneurial ecosystems, which may be classified into three broad classes; (a) infrastructure support, (b) professional support, and (c) development support (Markham, 2002). Infrastructure support reflects the essential physical and organizational structures and facilities (e.g., telecommunications, buildings, roads, energy, water, power supplies) needed to operate a venture. Professional support includes services needed for a venture's launch and operations (e.g., legal, accounting, advertising, information technology, etc.). Finally, development support services help startups develop and accelerate their growth by providing training, business support, and office space (Siddiqui, et al., 2018). These development supports are either in the form of business incubators and business accelerators. Business incubators help new ideas, novice entrepreneurs, and new startup companies develop by providing services such as management, training, or office space (Hausberg, & Korreck, 2021). Business accelerators are programs that give developing companies access to mentorship, investors, and other support services that help them become stable, self-sufficient businesses. Startups that use the services of business accelerators are typically those having moved beyond the earliest stages of getting established (Hausberg, & Korreck, 2021). Table 7 shows lessons learned for support services in crossing the Valley of death successfully.

Table 7. Lessons learned to Cross the Valley of Death – Support Services

Entrepreneurial Action	Reference
Understand the support services for similar startups.	(Prasetyo, 2020)
Acquire infrastructure support services (e.g., telecommunications, buildings, roads, energy, water, power supplies) at early stages.	(Markham, 2002)
Acquire professional support (e.g., Legal, Accounting, Advertising, I.T.) using 'outsourcing.'	
Choose the startup location based on the availability of infrastructure support (e.g., telecommunications, buildings, roads, energy, water, power supplies)	
Look for business incubators with experienced staff and mentors.	(Siddiqui, et al., 2018).
Look for faculty-led business incubators.	
Look for business incubators with a built-operate-transfer model.	
Join business incubators at an early stage.	(Siddiqui, et al., 2018).
Join business accelerator programs at a later stage.	
Look for business incubators with support services.	
Look for business incubators with network support.	
Look for business incubators with financial support.	
Look for business incubators with economic development.	
Look for business incubators with greater alumni success.	

Role of Human Capital in Crossing the Valley of Death: The role of human capital in innovation has always been given paramount importance (McMullan, & Melnyk, 1988; Gunasekara, 2006), especially the role of universities and tertiary education institutions (Owen-Smith, & Powell, 2003). The decisive role of human capital is the primary key in driving economic growth both directly and indirectly (Prasetyo, 2020). Universities are often considered an 'engine' for innovation (Etzkowitz, 2008) and as a 'catalyst' for technology development (DaSilva, 1997). Integrating both the 'innovation engine' and 'sustainability catalyst' roles is best reflected in their engagement in the entrepreneurial ecosystem. In entrepreneurial ecosystems, they play a foundation role or the first stage of the ecosystem. In top-down countries, research has been done in universities or affiliated research centers and funded mainly by the public sector resources, while in bottom-up countries like the USA, the funding to universities and research centers is through grants, incentives, and support for commercialization (Sun et al., 2019).

The quality and quantity of employees a company has is its human capital domain and is represented by its environment. The human capital domain is a collection of components that affect the pace of business growth. The components include the management and technical expertise, entrepreneurial spirit, the availability of a skilled immigrant workforce, and the ability to outsource. Education of the human capital is a critical component of an entrepreneur-friendly ecosystem. It can help individuals develop their knowledge and skills in areas such as entrepreneurship. The importance of entrepreneurship can be seen in the various ways that universities promote it. For instance, they play a vital role in helping new companies get off the ground. Table 8 shows lessons learned for human capital in crossing the Valley of death successfully.

Table 8. Lessons learned to Cross the Valley of Death – Human Capital

Entrepreneurial Action	Reference
Understand the role of universities and research centers in startup performance.	(Son, et al., 2020; Barr, et al. 2009)
Attend formal training on entrepreneurship.	(Johannisson, et al., 1998; Taatila, 2010)
Attend formal education, either academic or professional.	(Johannisson, 1991; Putta, 2014)
Look for faculty-led university business incubators	(Siddiqui, et al., 2018).
Participate in entrepreneurship expo, conferences, or other events.	(Jauhainen, 2021)
Participate in business plan competitions.	(Qureshi, Saeed, & Wasti, 2016).
Develop a business model canvas instead of writing a business plan.	(Türko, 2016; Jackson, et al., 2015; Siddiqui, 2021)
Spend more time to gather and process information and finalize the business feasibility study.	(Barr, et al. 2009)

Role of Markets and Networks in Crossing the Valley of Death: The markets domain refers to people willing to pay for a product or service (Isenberg, 2011). This domain is often referred to as the customer base. Establishing an ecosystem with accessible markets is an essential step for businesses to grow. Therefore, customers' potential is a crucial aspect to consider when assessing the competitive advantage, and it is a crucial component to consider when selecting a vendor. Table 9 shows marketing lessons learned to cross the Valley of death.

Table 9. Lessons learned to Cross the Valley of Death – Markets

Entrepreneurial Action	Reference
Understand markets, competitors, and customers.	(Isenberg, 2011)
Understand the commercial value of the research project/product.	(Markham, 2002)
Transform research/idea into a saleable product or at least prototype.	
Acquire the resources needed to establish a potential product/idea.	
Understand mass-scale production/operations or scale-up or for startups.	(Cavallo, et al., 2019)
Use unconventional/ innovative methods to understand customers.	(Stam, & Ven, 2021)
Use market intelligence rather than market research to understand competitors.	(Falahat, et al., 2020)
Join the innovative distribution channels.	(Barr, et al 2009; Brettel, et al., 2011).
Reach to customers in innovative manners.	(Hermanto, 2017)
Reach to reference customers and early influencers.	
Find early adopters as a customer for the proof of concept	
Develop innovative promotion techniques.	(Abdul-Rahim, & Saad, 2015)
Join the networks of multinational corporations	(Williams, & Lee, 2009)

The market domain is a critical component of consumers' willingness to buy products and services (Isenberg, 2011). This domain is often represented by the size of the company and its geographical reach. Another most important issue to cross the Valley of death is the commercialization of the product. Entrepreneurs must understand the commercial value of the research project/product, transform research/idea into a saleable product, or at least prototype and acquire the resources needed to establish a potential product/idea (Markham, 2002).

3. Research objective and methodology

This paper aims to share the experiences of guiding young entrepreneurs for their entrepreneurial initiatives. Initially, 60 short entrepreneurial actions were extracted from earlier studies (Table 1 – 7), which help the young entrepreneurs to cross the Valley of death successfully using the entrepreneurial ecosystem. These entrepreneurial actions were validated through a two-staged process. In the first stage, an online survey was sent to a limited number of experts to validate the entrepreneurial actions. They were asked to rate each item on a scale of one to five, one being the least critical and five being the most critical entrepreneurial action. Then, they were instructed to consider these entrepreneurial actions in the earlier stages of a new startup to cross the Valley of death. Participants of this expert survey include faculty members of business school teaching entrepreneurship, experienced entrepreneurs affiliated with business incubators as 'mentors' or 'executive in residence,' directors/managers/senior staff of business incubators, past attendees of the business incubation, and acceleration programs. Table 10 presents the demographic details of participants of this expert survey (N = 16).

Table 10. Demographic details of participants (N = 16)

Variable	Category	Frequency	Percentage
Age	Up to 34 years	4	25.0%
	35-44 years	8	50.0%
	45-54 years	2	12.5%
	Above 55 years	2	12.5%
Gender	Male	10	62.5%
	Female	6	37.5%
Profession*	Entrepreneur	10	62.5%
	Incubator Manager/Staff	5	31.3%
	Entrepreneurship Professor/Faculty	4	25.0%
	Entrepreneurship Mentor	4	25.0%
	Venture Capitalist/Angel Investor	1	6.25%

* Multiple professions allowed for each participant; total may not be 100%

Based on survey responses, some entrepreneurial actions secured more petite than a 3.0 rating out of 5.0 were dropped from the further analysis. Few observations are made here. Firstly, four domains of the entrepreneurial ecosystem were replicated in this study namely government policies and leadership, financial capital, support services, and markets. The culture was partially replicated, while the experts did not validate the human capital. Secondly, those items dropped from the study were considered invalid for this study but can be used in others studies. These entrepreneurial actions may not be directly helping entrepreneurs get out of the Valley of death, hence dropped from the further analyses. Thirdly, few observations make sense. For example, faculty-led business incubators or build-operate-transfer models of business incubators were not theoretically possible. Experts were not convinced that formal or professional education needed to cross the Valley of death; however, the entrepreneurial mindset was critical. The role of universities in the performance of startups is well established, but results do not favor them critical for Valley of death. Business plan competitions, conferences, business model canvas, or feasibility studies may not be helpful to cross the Valley of death. Those items that pass this validity test are considered critical to cross the Valley of death successfully. Table 11 presents items dropped from this analysis.

Table 11. List of dropped items from the analysis (N = 16)

Entrepreneurial Action	Reference	Mean Score
Look for faculty-led university business incubators	(Siddiqui, et al., 2018).	1.65
Look for business incubators with a built-operate-transfer model.		1.75
Spend more time to gather and process information and finalize the business feasibility study.	(Barr, et al. 2009)	2.21
Participate in business plan competitions.	(Qureshi, Saeed, & Wasti, 2016).	2.28
Participate in entrepreneurship expo, conferences, or other events.	(Jauhiainen, 2021)	2.59
Attend formal education, either academic or professional.	(Johannisson, 1991; Putta, 2014)	2.78
Attend formal training on entrepreneurship.	(Johannisson, et al., 1998; Taatila, 2010)	2.78
Develop a business model canvas instead of writing a business plan.	(Türko, 2016; Jackson, et al., 2015; Siddiqui, 2021).	2.9
Understand the role of universities and research centers in startup performance.	(Son, et al., 2020; Barr, et al. 2009)	2.91

4. Results

At a later stage, some of the remaining items were combined to form a single item and re-arranged in such a way to answer three basic questions. These three essential questions include; (1) What lessons need to be understood by young entrepreneurs? (2) How to implement these actions? (3) When to implement these actions. Table 12 presents validated entrepreneurial actions to cross the Valley of death.

Table 12. Validated Entrepreneurial Actions to Cross the Valley of Death

Type of Action	Entrepreneurial Action Reference	Type of Action	Entrepreneurial Action Reference
What	Understand the entrepreneurial ecosystem (Calza, et al., 2020; Jucevičius, et al., 2016).	When	Join business incubators at an early stage and join business accelerator programs at a later stage (Siddiqui, et al., 2018).
		How	Look for Business incubators with experienced staff; and faculty-led incubators; and a built-operate-transfer model (Siddiqui, et al., 2018).
		How	Look for Business incubators with support services; network support; financial support; economic development; alumni success (Siddiqui, et al., 2018).
What	Understand the government rules, procedures, and incentives (like tax benefits, grants) for similar startups. (Shinkle, & Suchard, 2019; Minniti, 2008).	How	Join business incubators at an early stage and join business accelerator programs at a later stage (Siddiqui, et al., 2018).
		How	Join the local entrepreneurial network. (Hallen, et al., 2020).
What	Understand the Intellectual Property Rights (like Patents, Copyrights) for similar projects. (Halt, et al., 2017; Rai, et al., 2008).	When	Secure Intellectual Property (I.P.) rights as soon as possible. (Rai, et al., 2008).
What.	Understand the role of leadership in startup performance. (Zaech, & Baldegger, 2017)	How	Shift the leadership role from a scientific mindset to a more entrepreneurial mindset (Markham, 2002)
What	Understand the financial capital for the startup. (Gejun, 2021)	How	Use business plan/feasibility to attract stakeholders (employees, investors, customers, authorities) (Barr, et al. 2009)
		How	Look for venture capitalists from the regional entrepreneurial ecosystem (Savaneviciene, et al., 2015).

		When	Contact angel investors in the early stages and venture capitalists in the late stages. (Savaneviciene, et al., 2015).
What	Understand the risks and decision-making choices. (Barr, et al 2009, Tversky & Kahneman, 2004).	How	Acquire resources to mitigate risk. (Barr, et al 2009, Tversky & Kahneman, 2004).
		How	Use heuristics or rules of thumb as a checklist to mitigate risks, reduce uncertainty and make a decision (Markham, 2002).
What	Understand the regional entrepreneurial culture. (Donaldson, 2021, Bosma, & Holvoet, 2015)	How	Join business incubators at an early stage and join business accelerator programs at a later stage (Siddiqui, et al., 2018).
		How	Join the local entrepreneurial network. (Hallen, et al., 2020).
What	Understand the support services for similar startups. (Prasetyo, 2020)	How	Acquire Professional Support (e.g., Legal, Accounting, Advertising, I.T.) using 'outsourcing.' (Markham, 2002).
		Where	Choose the location based on the availability of Infrastructure Support (e.g., telecommunications, buildings, roads, energy, water, power supplies) (Markham, 2002).
		When	Acquire support services (e.g., telecommunications, buildings, roads, energy, water, power supplies) at early stages. (Markham, 2002).
What	Understand markets, customers & competitors	How	Use unconventional/ innovative methods to understand customers. (Stam, & Ven, 2021)
		How	Use market intelligence to understand competitors. (Falahat, et al., 2020).
		How	Reach to customers in innovative manners. (Hermanto, 2017)
		How	Reach to reference customers and early influencers. (Hermanto, 2017)
		How	Find early adopters as a customer for the proof of concept. (Hermanto, 2017)
		How	Join the innovative distribution channels. (Barr, et al 2009; Brettel, et al., 2011).
		How	Develop innovative promotion techniques. (Abdul-Rahim, & Saad, 2015)
		How	Join the networks of multinational corporations (Williams, & Lee, 2009)
What	Understand the commercial value of the research project/product. (Markham, 2002).	How	Acquire the resources needed to establish a potential product/idea. (Markham, 2002).
		How	Transform research/idea into a saleable product or at least prototype. (Markham, 2002).
		How	Scale-up or mass-scale production/operations for startups. (Cavallo, et al., 2019).

Figure 3 presents a timeline of entrepreneurial actions to cross the Valley of death. The X-axis represents the period while Y-axis shows the income of the startup is placed and presented in two halves, i.e., profits and losses.

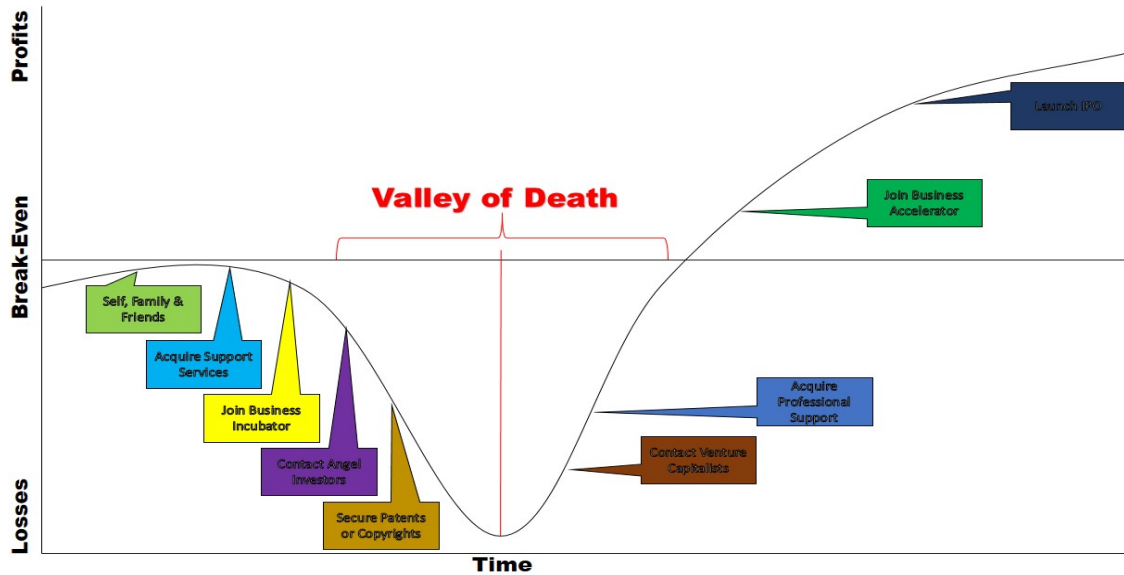


Figure 3. Valley of Death – Timeline of Entrepreneurial Actions (Source: author's contribution; adopted from McIntyre, 2014).

Several entrepreneurial actions are placed across the timeline, like self, family, and friends are usually contacted in earlier days of startup to fund the project. Next, young entrepreneurs are advised to join business incubators, certain I.P. rights, and contact angel investors to get funds without collateral. Finally, venture capitalists usually are contacted at later stages, followed by business accelerator programs. Few entrepreneurial actions like offering initial public offering and getting funds through banks are subsequent activities. Meanwhile, ideas are transformed into products and reached to markets.

5. Conclusions and Recommendations

This study provides recommendations in the form of guidelines for young entrepreneurs to cross the Valley of death successfully. These are generic recommendations with minimum influence on industrial sectors. Recommendations of this study are presented here as different domains of the entrepreneurial ecosystem.

Policy: Before transforming an idea into a saleable product or service, entrepreneurs must understand their entrepreneurial ecosystem and governmental support for startups. In order to understand the local or regional entrepreneurial ecosystem, entrepreneurs must join business incubators and local entrepreneurial networks. This will enhance their knowledge of government rules and procedures for new startups.

The first and foremost activity needed to cross the Valley of death is a mindset change. Within the technology development phase, it is usually a scientific mindset that works well, but crossing the Valley of death needs a more entrepreneurial mindset. It is an exciting phenomenon. Unfortunately, there is no formal innovation championship; universities and R&D centers do not hire someone as an innovation champion or an entrepreneurial mindset. However, these 'innovation champions' or 'entrepreneurial minds' take charge voluntarily and become informal leaders of the innovation team. While they remain without official powers, their entrepreneurial mindset takes the risk beyond the comprehension of their colleagues. They persuade their team members for the positive feasibility of the project by providing them vision and direction to proceed and manage and acquire resources for the project. Sometimes they are naturally talented entrepreneurs, but they have to acquire new skills most of the time after realizing their new role. Alternatively, persons with such qualities may

be hired as 'consultants' to the innovation team, or the innovation team may join business incubators and accelerators to overcome their deficiencies.

The most critical activity in crossing the Valley of death is to manage I.P. rights. It refers to creating a systematic process to make invention disclosure, allowing the patent review committee or stakeholders to evaluate the market potential. It also deals with I.P. protection, including drafting and filing a patent application and deciding which countries or regions I.P. should be protected and enforced. According to U.S. Patent and Trademark Office (2020), more than 90% of all patents granted are utility patents (the US. Patent and Trademark Office, 2020). A 'utility patent' is awarded to an invention, discovering a new or improvement in any machine, manufacturing process, the composition of matter, or process.

The value of innovation depends on the patentability of the innovation; typically, patentable innovations fetch higher market value due to their protection. However, the value of any innovation is the present value of all cash inflows by selling products under the patent and getting licensing fees from licensees of the innovation.

Financial Capital: The second most crucial activity for any innovation team is managing their financial capital. Turning innovations into commercial products typically financed from the outset by equity investments, not by bank loans. In the initial stages, scientists or inventors try to finance their ventures themselves, either with their savings or by working somewhere else as a part-time employee or with the help of family and friends, who are usually close to the scientist or inventor and believe in the invention. The amounts are generally small and considered soft loans. When an invention takes the shape of a commercial product in the subsequent stage, Angel Investors provide finance. When the product has shaped up, and the company has been formulated in the next stage, Venture Capitalists provide large amounts of investment. Subsequently, if a company wishes to offer its shares to the general public through Initial Public Offering, it can secure significant investments at lower financial costs. Banks do not provide loans in the initial stages of any venture; instead, they provide essential basic business tools, such as opening an account and other routine financial advice. After the startup succeeds in its IPO, banks get enough confidence to extend credit facilities to startups.

Finance and investment decision-making are permanently attached with its risk component. Entrepreneurs must understand the risks associated with their startup and the decision-making choices available to them. Different risk mitigation strategies are available to new startups, and entrepreneurs are known for their risk-taking tendencies. In order to mitigate risks, they must use heuristics or 'rules of thumb' as a checklist to mitigate risks, reduce uncertainty and make a decision. Mentors or incubation center faculty often share these heuristics during the early stages of business incubation programs. One common strategy is to acquire resources to mitigate risks.

Culture: Entrepreneurial ecosystems have a cultural dimension inspired by regional cultural norms and beliefs. Therefore, entrepreneurs must understand the regional entrepreneurial culture. Firstly, two ways can achieve this by joining business incubators at an early stage and joining the local entrepreneurial network. Mentors or incubation center faculty often share success stories of local startups and entrepreneurs that may not be procured in other forms like books, publications, or news.

Support Services: Another important activity needed to cross the Valley of death is to activate the support services. There are various support services needed for ecosystems; infrastructure support (e.g., buildings, roads, energy, water, telecommunications, power supplies); (b) professional support (e.g., legal, accounting, advertising, information technology); and (c) development support including busies incubators and accelerators. in the earlier stages of any innovation, the business incubator also provides infrastructure and professional support. Therefore, entrepreneurs must be able to understand the support services for similar startups. This helps to take a pivotal decision, choosing the location of a startup. Ideally, this decision must be based on the availability of infrastructure support (e.g., telecommunications, buildings, roads, energy, water, power supplies), and this

infrastructure support must be acquired at an early stage of the startup. On the other hand, professional supports services (e.g., legal, accounting, advertising, I.T.) must be acquired using 'outsourcing' when the need arises.

Human Capital: The role of human capital, especially the role of universities and higher education institutions, is paramount in the entrepreneurial ecosystem, but none of the items are extracted for human capital validated by experts. All the items for human capital were dropped during the analysis phase due to a validity check. This has generated a new debate. Human capital, in general, plays a vital role in helping new companies get off the ground, but they might not help cross the Valley of death.

Markets: Probably, the most binding domain of the entrepreneurial ecosystem is Markets, and it includes competitors, customers, and market mechanisms. Young entrepreneurs must identify their customers and competitors correctly, and this needs a good understanding of the market, customers, and competitors, preminent players in the market. One of the significant differences between corporate managers and entrepreneurs is their marketing skills. Typically, corporate managers rely on traditional marketing research tools to understand their customers, while entrepreneurs use unconventional or innovative methods to understand their customers' needs and wants. Similarly, entrepreneurs use their entrepreneurial networks and market intelligence to understand their competitors and major market actors as the product are new in the market, so entrepreneurs should find early adopters as customers for the proof of concept. At the same time, they need to reach reference customers and early influencers.

Innovation is the key for entrepreneurial marketing concepts and a necessity for reaching early customers. Entrepreneurs must reach their customers in innovative manners; adopt innovative distribution channels, and develop innovative promotion techniques. They are also advised to join multinational corporation's networks. Another critical aspect of the market is the commercialization of products or ideas. Entrepreneurs must be able to understand the commercial value of the research project/product. This can only be possible after transforming the research/idea into a saleable product or prototype with the product's current and future features. This phase needs resources to establish a potential product/idea and learning methods or techniques to scale up or mass-scale production/operations for startups.

6. Originality

This research offers many distinctions on many counts. Firstly, most of the literature focusing on crossing the Valley of death is industry-specific and unable to generate generalizations. For example, some literature focuses on improving the curriculum and pedagogy (Barr, et al., 2009), but the study focuses on developing a single conceptual model to cross the Valley of death. Secondly, there is no significant research or conceptual model for entrepreneurial actions bridging the gap of VoD. However, this research hypothesized to make a conceptual model crossing the VoD using the entrepreneurial ecosystem. Secondly, some literature focuses on universities' role to cross the Valley of death (Etzkowitz, 2008; Son, et al., 2020). However, the role of universities in crossing the Valley of death was not validated in this research. Finally, some research supports the view that technology transfer programs can bridge the Valley of death (Takata, et al., 2020), but that might be partially true for only high-tech products or services.

7. Limitations

This study has certain limitations. First, this study used a smaller sample size for the validity procedure. Larger sample size may enhance the generalizability of the research. Secondly, the scope of this study is limited to exploring and presenting the entrepreneurial actions using validity procedures using only descriptive techniques and not finding the reasons behind such patterns.

8. Need for Future Research

This study provides a baseline for further research. The agenda for further research on using an entrepreneurial ecosystem to cross the Valley of death can be classified into three novel ideas. Firstly, the respondents validated only five domains of entrepreneurial ecosystems, including Policy, Financial Capital, Culture, Support Services, and Markets. The experts did not validate the sixth domain of human capital. Now the interesting question is, human capital (universities) helps new companies get off the ground, but they might not help cross the Valley of death. Why? Secondly, this research used a battery of 60 items as entrepreneurial actions, but this list is not exhaustive.

Further research is needed to generate an exhaustive list of entrepreneurial actions to cross the Valley of death; collecting the quantitative data from incubation experts and mentors, and entrepreneurship faculty may give a chance to apply advanced statistical techniques like factor analysis or cluster analysis to analyze and create the clusters of entrepreneurs based on their input data. Thirdly, this research used the entrepreneurial ecosystem as one of the means to cross the Valley of death successfully. Other approaches or techniques may also be considered. Knowing these entrepreneurial strategies would be beneficial for academicians and as well as for entrepreneurs, incubation managers, mentors, venture capitalists, and other entrepreneurial network members. All these questions require in-depth research and analysis from a brand equity point of view.

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**PERCEPTION OF LOCAL FOOD IN DIRECT SALE FROM BUYER'S PERSPECTIVE -
A CASE OF POLAND***

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Abstract. In industrialized countries, both government bodies, local authorities, and consumers express a growing interest in local food. The legitimacy of the expansion and promotion of the local food concept stems from the support of regional development while maintaining the principles of sustainable development in the social, economic, and environmental dimensions. In order for the local food sector to develop, it is essential to learn about the opinions of consumers and to recognize their expectations towards the production and distribution of this food. Therefore, this research aimed to identify buyers' perception of local food and to reveal the attributes (values) affecting this perception. The scope of this research is complements the cognitive gap, and has a practical dimension. A mixed-method approach was adopted in the study to explore the research problem. Qualitative research (n=5 mini-FGI) and quantitative research (n=770 interviews) were conducted. The study revealed that local food is perceived by an integrated set of features, among which product attributes, socio-economic and environmental benefits resulting from its production and distribution are equally important. The perceived attributes related to the quality of local food products reflect consumer confidence in its producers and should be considered as indicators of expectations towards these products. The survey has shown that local products are ranked higher than mass food because they are perceived as of better quality, healthier, and safer. The distinctive attributes of local food products make them superior over conventional foods, constitute their added value, and should be used in constructing a marketing message. The study results are a valuable source of information for producers and entities acting for the development of local food systems. They also provide a number of key insights that can be used in designing marketing communication.

Keywords: consumer; attributes; values; sustainability of food systems; sustainable consumption

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1. Introduction

Within their sustainable development policy, many countries undertake measures to stimulate the growth of supply and demand for local food. Authors of many works have emphasized that food production and distribution in the local food system yield economic, social, environmental and even health benefits (McEachern et al., 2010; Farmer, 2012; Arsil et al., 2014b; Bogomolova et al., 2018; Radzymińska & Jakubowska, 2018). Considering these putative benefits, the local food sector's development has spurred interest among the representatives of government, local authorities, and science.

However, no common, uniform definition of the local food concept has been developed so far. For this reason, multiple terms and theoretical concepts related to a local product are in use, depending on the adopted point of reference (Feldmann & Hamm, 2015). Local food is usually defined considering the distance between the geographical region in which it was produced and where it is sold (Blake et al., 2010; Khan & Prior, 2010; Pearson et al., 2011; Knight, 2013). In the United States of America and Canada (Campbell et al., 2014), enterprises from the food sector are encouraged to place the "local" label on their products. The labeling can be placed voluntarily on food products following legal regulations defining the use of the "local" term. For example, the US government defines locally or regionally produced goods as: - manufactured in the town or region where the final product is sold, except that the total transport distance is less than 400 miles from the production site of the product; - sold within the state in which it was manufactured. In turn, the Canadian Food Inspection Agency (CFIA) defines "local" as either produced within the province or sold outside of the province, within 50 km of the provincial border. Other definitions refer to the political borders of a country or community (Khan & Prior, 2010; Knight, 2013). Local food is also understood as an alternative to industrially-processed food (Zepeda & Deal, 2009; Adams & Salois, 2010; Weiss, 2011; Knight, 2013). Other approaches link the local food to its attributes (Blake et al., 2010; Knight, 2013) and present it in the context of relations between a consumer and a producer (Smithers et al., 2008; Weiss, 2011). The literature provides a definition encompassing a broad range of consumer expectations and taking account of a strictly defined production-sale area. Emphasis is also put on the need to establish the percentage contribution of local ingredients in the final local product (Pearson et al., 2011).

The EU Committee of the Regions calls for a broad terminology for sustainable food systems, including agricultural food production, food processing and nutritional patterns, to be defined, which is crucial to identify the prospects for a common and comprehensive EU food policy (Opinion of the European Committee of the Regions, 2017). According to the EU Committee of the Regions' proposal, the term "local food product" should refer to products:

- with unique characteristics (such as taste, freshness, high quality, cultural determinants, local tradition, local specialty, animal welfare, environmental value, health aspects, or conditions of sustainable production);
- produced locally/regionally;
- contributing to the implementation of the local/regional rural development strategy;
- sold to the consumer through the shortest, most rational, and efficient chain possible, in a local retail store or marketplace under a local contract.

It is emphasized that the point of sale should be the closest within the consumer's reach (this distance may vary from 1 to 50 km) (Opinion of the Committee of the Regions, 2011, p. 4).

The term “local food” is relatively often used interchangeably with regional food by both public sector authorities and scientists. So, the question is whether it is right? Due to its specific characteristics, certified regional food is a specialty of the region and may be available in various regions, while local products are intended for narrow local markets. Given the definition of local products, assuming that they are manufactured in a non-industrial, non-mass manner, from local raw materials or using local production methods, and are intended for the local market, it can be concluded that the local products include those that may be traditional and regional. Consequently, the lack of an unequivocal position in individual countries regarding the criteria for local food and its legal definition translates into:

- inaccuracies related to the use and application of this term in scientific bodies, in local government and government institutions as well as in messages addressed to the consumer;
- difficulties in actually determining the size of the local food sector;
- limiting the comparability of consumer research results between countries due to the lack of a unified methodology for the subject of research.

In the context of the presented issues, it becomes important to diagnose local food’s perception among its buyers to enable the local development policy and business practice, including the development of a uniform local food concept.

2. Literature review

Investigations conducted thus far have pointed to the growing consumer interest in local food products (Adams & Salois, 2010; Memery et al., 2015). Individual countries have developed their own forms of their direct and indirect sale. In response to the growing number of interested consumers, certain retail networks in the United States and Europe have begun to complete their assortment with local food products.

An overview of literature approaching local food from the consumer perspective has shown the number of related scientific works to increase dynamically in recent years. The consumer surveys on the local food market have been conducted by scientific and academic centers from the economic, management, sociological, and social psychology perspectives. Works of many researchers, especially American (Zepeda & Deal, 2009; Adams & Adams, 2011; Bellows et al., 2010; Onozaka & McFadden, 2011; Campbell et al., 2014; Costanigro et al., 2014; Khachatryan et al., 2018), Chinese (Zhang et al., 2019), British (Penney & Prior, 2014; Memery et al., 2015), Finish (Roininen et al., 2006), Canadian (Knight, 2013; Cranfield et al., 2012), Australian and Indonesian (Arsil et al., 2014a, 2014b, 2018), Italian (Vecchio, 2010; Tempesta & Vecchiato, 2013), German (Feldmann & Hamm, 2015), and Danish ones (Denver & Jensen, 2014; Ditlevsen et al., 2020), have emphasized the importance of undertaking consumer studies related to local food. In the works published so far, authors have focused on the qualitative approach (Roininen et al., 2006; Zepeda & Deal, 2009; Adams & Salois, 2010; Adams & Adams, 2011), qualitative approach in most cases (Onozaka & McFadden, 2011; Bean & Sharp, 2011; Gracia et al., 2012; Cranfield et al., 2012; Hu et al., 2012; Costanigro et al., 2014; Denver & Jensen, 2014), and rarely a mixed approach (Ditlevsen et al., 2020). Most of the presented works relate to the local food in general, without distinguishing product categories. However, a few studies have addressed meat (Roininen et al., 2006; Gracia et al., 2012), fruit and vegetables (Costanigro et al., 2014; Denver & Jensen, 2014), or processed food products (Hu et al., 2012; Stolzenbach et al., 2013). In turn, some other works have investigated the issue of local food together with organic food (Zepeda & Deal, 2009; Campbell et al., 2013; Haas et al., 2013; Campbell et al., 2014; Denver & Jensen, 2014). However, it is unclear whether organic and local are two complementary or competitive trends in food consumption (Ditlevsen et al., 2020). These two product categories offer an alternative to the anonymous, globalized food supply chain, but are usually presented in literature as somehow similar but also competitive groups of food products. It has been demonstrated that despite no scientific evidence the consumers perceive local and organic food products as healthier than the conventional ones (Haas et al., 2013). An interesting asymmetry

has been noted in the consumer preferences regarding apples from the organic and local production systems. The respondents who see the benefits offered by organic products showed relatively high preferences for the apples from organic and local production. In turn, the consumers who see the benefits from the locally manufactured products showed high preferences only for the locally produced apples (Denver & Jensen, 2014). Some surveys attempt to explore the producer-consumer relation in the local food system network (Selfa & Quazi, 2005) and determine benefits and barriers from the consumption of locally-produced goods (Knight, 2013; Penney & Prior, 2014). The benefits from the local production and consumption include both the internal traits associated with a food product (i.e., its attributes like appearance, freshness, taste, wholesomeness, authenticity) and the external determinants, such as support of the local economy and agriculture, preservation of arable lands, ensuring food safety, reduced pesticide use, decreased transportation distance, reduced energy consumption, and better treatment of employees and animals (Zepeda & Deal, 2009; Adams & Salois, 2010; Onozaka & McFadden, 2011; Pearson et al., 2011). The results of a study conducted by Knight (2013) indicate that the product-related attributes are more important than social considerations in the hierarchy of benefits perceived by consumers.

The group of experienced and real barriers related to the purchase decisions made regarding local food products includes limited assortment, unsatisfactory availability, and problem with identification (Conner et al., 2010; Pearson et al., 2011). Local food is generally perceived as cheaper in high season and more expensive in low season. The high price and poor availability of local food products have been proved to be the main barriers to their purchase (Khan & Prior, 2010; Murphy, 2011; Penney & Prior, 2014). The prices of local food are usually higher compared to those of goods from industrial production (Lang et al., 2014). At the same time, as evidenced by the results of scientific research, the consumers are willing to pay more for local food products (Adams & Salois, 2010; Onozaka & McFadden, 2011; Nurse Rainbolt et al., 2012).

It has also been found that the consumers find it difficult to unambiguously define a local product (Khan & Prior, 2010; Onozaka et al., 2010). In the consumer approach, local food is often defined considering the distance between production place and retail site, and encompasses a smaller or a larger geographical range. This defined distance is expressed in kilometers/miles (Adams & Adams, 2011, p. 77) or in time needed to travel it (Zepeda & Leviten-Reid, 2004, p. 2, 3). English consumers define local food using distances of 20, 30, 50, and 100 miles (Ilbery & Maye, 2006, pp. 352-367). Over 70% of the surveyed American respondents claimed the local products to be those produced within a radius of 50 miles, whereas 40% of them considered local foods as those produced in their country (Onozaka et al., 2010, pp. 1-6). A study conducted among American consumers from Florida has demonstrated half of them to have no knowledge about local food labeling and 36% of them to be unfamiliar with "Fresh from Florida" logo. Only half of the surveyed respondents were able to indicate a local food manufacturer (Haas et al., 2013, pp. 214-226).

The overview of literature data allows concluding that the scope of research into the local food is associated to a much lesser extent with the cognitive and affective component, and to a greater extent with the behavioral component of the investigated consumer attitudes (Cranfield et al., 2012; Megicks et al., 2012; Maples et al., 2013; Memery et al., 2015; Tackie et al., 2015; Schoolman, 2017). In most studies, it is not the buyers that are the subject of the study. It should be added that the Polish scientific literature rarely addresses the issue of a local food consumers, while available works are fragmentary and non-exhaustive.

In today's market realities, the production of consumer goods should be subordinated to the buyers. Therefore, for the local food sector to develop, it is essential to know the opinions and beliefs of consumers and to properly identify their expectations regarding the production, distribution, and consumption of this food category. Useful consumer knowledge can be exploited by food producer or other entities interested in the development of local food systems to develop market offer and marketing communication strategies. In the face of the increasing number of measures and initiatives undertaken for the development local food systems, the scope of consumer studies on the local food market is topical and of practical/utilitarian significance. Therefore, this research aimed to investigate the

conceptualization of local food among its buyers. Specifically, the paper aims to identify buyer's perception of local food and to reveal the attributes (values) affecting this perception. An attempt was made in this study to answer the following research questions:

RQ1. How is local food defined among consumers purchasing local products and what is their emotional attitude towards this product category?

RQ2. By what dimension of attributes (values) is local food perceived and which attributes are the most valued ones in the hierarchy of perceived attributes?

RQ3. Do the assigned characteristics of local food relate to gender, age, education, and frequency of local food purchase?

3. Research objective and methodology

A unique feature of this study is that it is based on observations made among buyers of food produced and sold under sustainable food systems. It was conducted exclusively in a group of consumers purchasing food in short supply chains, in direct sale. The study was accomplished in two stages, adopting a hybrid research method involving the qualitative and the quantitative approach (Fig. 1).

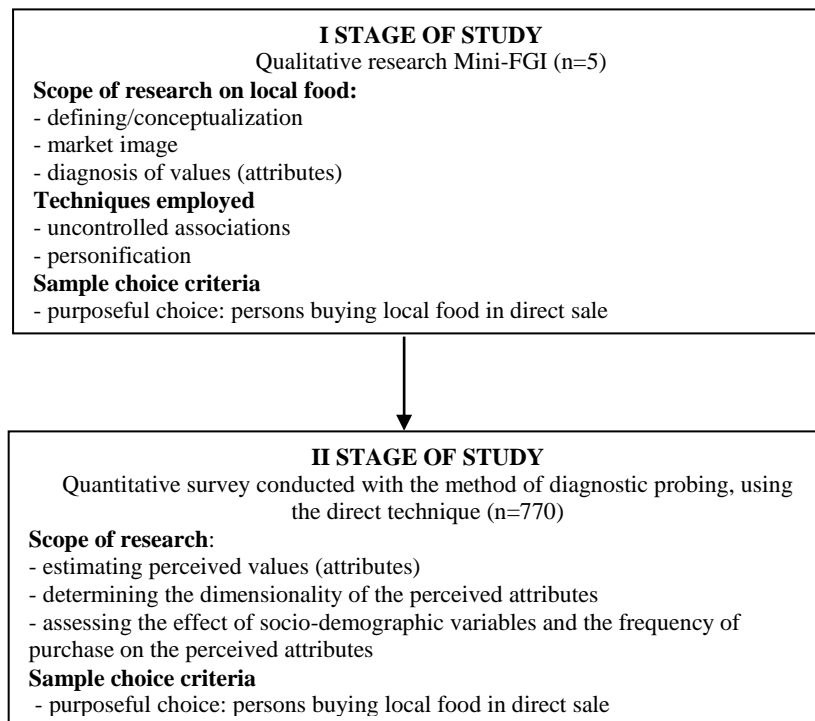


Figure 1. Scheme of the research process

Source: own research

At the first stage, a qualitative survey was carried out using a Mini Focus Group Interview (Mini-FGI). It aimed to explore the issues related to the beliefs and emotions associated with local food, and to establish, i.e., how this food was conceptualized and what values were ascribed to it. Including the emotional attitude of consumers,

perceptions about this food were examined as well. This study was conducted in August and September 2019 and involved a series of five group interviews with inhabitants of the north-eastern Poland (Warmia and Masuria region). Each session was attended by 5-6 persons, buyers of local food in direct sale, including farms and farm markets. Group discussions lasted ca. 1.5 h and were conducted following the customized semi-structured discussion guide, containing issues related to local food, like ways of its defining, visualizing, and imagining. The projective techniques implemented included uncontrolled associations and personification.

The second stage of the study involved the quantitative research. It was carried out since October 2019 till February 2020 at farm markets located in five cities of the north-eastern Poland (Warmia and Masuria region), using the technique of non-probabilistic sample selection – purposeful selection. The respondents were persons purchasing local food at the selected retail points at least once every two months. The structure of the surveyed sample is presented in Table 1. The majority of the respondents were women (69.48%), as they usually buy food more often than men. The most numerous groups among the surveyed were the respondents aged 40-55 years (41.04%), those with high school education or lower educational level (60.52%), and persons buying local food once a week (43.25%).

Table 1. Characteristics of the respondents (n=770)

Variable	n	% Of Total
Gender		
Male	235	30.52
Female	535	69.48
Age (years)		
Under 25 years	103	13.38
25–39 years	196	25.45
40–55 years	316	41.04
56+	155	20.13
Education		
High school or below	466	60.52
Above high school	304	39.48
Frequency of purchase		
two times a week	58	7.53
once a week	333	43.25
once every two weeks	190	24.68
once a month	135	17.53
once every two months	54	7.01

Source: own research

The survey was conducted by face-to-face interviews. A total of 770 interviews were conducted. The questionnaire contained statements referring to the perception of the attributes of local food (15 items). The respondents expressed the degree of their agreement or disagreement with the particular statement (Lušňáková et al., 2019) using 7-point Likert scale, where the values 1,2,3 meant: definitely no, no, rather no; the value 4 denoted an answer: I do not know, I have no opinion; and values 5,6,7 corresponded to answers: rather yes, yes, definitely yes. A questionnaire was developed using the insights and vocabulary gleaned from the focus group discussions.

The results were statistically analyzed using the Statistica 13.3 software. The hierarchy and multi-dimensionality of the perceived values of local food (scores derived from the seven-point Likert scale) were estimated using measures of central tendency, i.e., arithmetic mean, and median, and the principal component analysis (PCA). The Kaizer-Meyer-Olkin (KMO) criterion and the Cattell criterion based on the scree plot were used to evaluate the PCA results. The influence of gender, age, and education of the respondents on the perceived attributes of local food was assessed using the one-way analysis of variance ANOVA (Pieloch-Babiarz, 2020; Raisová et al., 2020). The correlations between the frequency of purchase of local food products at the marketplace and their perceived attributes were evaluated using correlation analysis.

4. Results and discussion

The implemented qualitative approach allowed determining the way the consumers conceptualize local food products, learning about the perceptions of these products, and determining by which set of features/attributes they are perceived. In general, the discussions were rich in ideas and views.

The study demonstrated that the consumers defined local food products based on the criteria linked with the site of its production and sale. According to them, these are food products manufactured by local producers, i.e., entities located in a commune or town, and sold in a poviát, voivodeship, or even the whole country.

However, opinions about the distance between the place of production and the sale were divided. Some respondents claimed that local food is sold only in the poviát or voivodeship, while others that it is sold across Poland. In the respondents' opinion, local food can be purchased primarily at marketplaces, on farms, in small shops, including the producer's shops, and in some cases in the local entrepreneur's on-line shops. Few claimed that it is also available in discounters and supermarkets. According to the respondents, local food may fall within the group of regional and traditional products and may be considered traditional or regional. This is due to the common areas of these food categories. Especially the production-sales distance and traditional manufacture methods mean that local food can be regional or traditional. The local food was perceived by the consumers as better than food produced by large producers (so-called mass, conventional food) and also as healthier, tastier, and safer. Consumers emphasized that its production is friendly to the environment and the local economy. According to the respondents, products purchased directly from small, local producers feature high quality and health value, naturalness, and authenticity. These products are of guaranteed quality, traditional, natural, and without stabilizers. Therefore, they are perfect for children.

The health value of this food was understood in two ways. On the one hand, it was associated with the lack of artificial additives and preservatives, while on the other hand it was perceived from the dietetic perspective, i.e., as food providing the appropriate levels of nutrients. In turn, naturalness was associated with the lack of colorants, preservatives, enhancers, and genetically non-modified ingredients. In the respondents' opinion, the local food is characterized by a stable quality, which is very important to consumers.

The price of local food was perceived as relatively higher compared to the price of conventional food products, which - in the respondents' opinion - is due to the higher costs of manufacturing this food in small production plants. The study showed that, in all discussion groups, local food was described as of good quality, not cheap, but worth its price, tasty, healthy, easily available, for everyday use, and that its production was claimed environmentally friendly (e.g., through a shortened supply chain) and useful for the region by supporting the development of the local economy (including providing jobs and promoting the region). The weakness of the local food is the lack of advertising, marketing, and clout.

In the conducted mini-FGI, personality characteristics of local food were established using the personification technique. The respondents were asked to describe the food as if it were a person, they were to imagine what character traits it had and what it looked like. Based on the analysis of the collected empirical material, it was found that the image of this food group was natural and familiar. The food represented human qualities, i.e., was trustworthy, joyful, friendly, unique, natural, solidary, authentic, and original. On the emotional level, the image of local food was dominated by such features as modesty and classics. The imagined person was a woman: dressed modestly but elegantly, in good quality materials made of natural fabrics, like cotton and linen. The described image was close to the respondents.

The identification of the characteristics of local food, initiated in the qualitative research, was continued in the quantitative research. The assessment of the perception of local food in terms of the attributes assigned to it is presented in Table 2.

Consumers showed a positive emotional attitude towards these products, which is indicated by the evaluation of the attributes assigned to them. The mean scores ranged from 5.43 to 5.83, $M = 6$. It was found that local food was perceived through the prism of product-related values such as: natural ingredients (average score 5.59), authenticity (average score 5.65), guaranteed quality (average score 5.51), a low degree of processing (average score 5.52), traditional character resulting from the use of ancient production methods (average score 5.43), and organoleptic characteristics resembling traditional Polish food (average score 5.83). The values assigned to these food products lead to the belief that they are ideal for children nutrition (average score 5.60).

The results of quantitative and qualitative research proved that local food was positioned higher than products from mass (conventional) production. It was perceived as: of higher quality (average score 5.55), healthier and safer (average score 5.53), fresher (average score 5.69), containing less additives and preservatives (average score 5.78), and ensuring a higher nutritional value (average score 5.60). Also, the respondents evaluated it as more expensive compared to conventional food products (average score 5.47).

Altruistic values also gained a high position in the hierarchy of the ascribed characteristics. The respondents perceived local food also in the context of socio-economic benefits for the local economy (average score 5.77) and environmental benefits (average score 5.63).

Table 2. Evaluation of attributes assigned to local food purchased in direct sale

Items	Mean	Standard Deviation	Median	Factor loadings
1. Local food is healthier and safer than other mass-produced food products	5.53	1.09	6	0.62
2. Local food has natural ingredients	5.59	1.03	6	0.66
3. Local food contains lower amounts of additives and preservatives compared to conventional food products	5.78	1.07	6	0.67
4. Local food offers a higher nutritional value (more vitamins and minerals) than mass-produced food products	5.60	1.21	6	0.72
5. Local food is authentic	5.65	1.06	6	0.72
6. I equate local food with guaranteed quality	5.51	1.18	6	0.73
7. Local food is manufactured with traditional, ancient methods	5.43	1.16	6	0.68
8. Local food is low-processed	5.52	1.09	6	0.70
9. Food from local, small producers is of higher quality than other food products available in the market - conventional food	5.55	1.20	6	0.69
10. The manufacture of local food is beneficial to the region, it ensures workplaces	5.77	1.00	6	0.60
11. Taste, aroma, and appearance of local food resemble those of traditional Polish food	5.83	1.01	6	0.67
12. Local food is fresher than conventional food	5.69	1.10	6	0.67
13. Local food is less detrimental to the natural environment	5.63	1.12	6	0.65
14. Local food is perfect for children	5.60	1.17	6	0.67
15. Local food is more expensive than other mass-produced food products	5.47	1.19	6	0.67
% of variance	76.20			

Source: own research

The results of the PCA were presented in Table 2. The principal component analysis extracted one factors which classified variables. This factor was correlated with all items representing the values of local food (factor loadings > 0.60). Extracted factor explained 76,20% of the variance of variables. Results demonstrated that the perception of local food attributes by consumers was integrated through the prism of one dimension. This dimension consisted of attributes not necessarily similar in terms of the functions performed, including both internal and

external attributes of these products. This proves that the product-related, socio-economic, and environmental values are of the same importance for the consumer in the perception of local food.

The study demonstrated (Table 3) that gender and age of the persons buying local food had no statistically significant ($p > 0.01$) effect on the perception of its attributes. It was only found that education of the respondents differentiated the perception of these food products as authentic and of guaranteed quality ($p < 0.01$). The correlation (strength and significance of the correlation) between the perceived attributes of local food and the frequency of its purchase at the marketplace (Table 3) was also determined in the presented study. Weak correlations were demonstrated based on the analysis of the coefficients of the two-way correlation between the variables. Even though the calculated correlation coefficients were below 0.2, the correlations were, in most cases, found statistically significant ($p < 0.01$). The results obtained suggest that the frequency of purchasing food in direct sales is very little related to the perceived attributes of this food.

Table 3. Effect of socio-demographic variables of the respondents and the frequency of purchase of local food on the perception of its attributes

Items	Gender		Age		Education		Frequency of purchase	
	ANOVA						Correlation analysis	
	F	p	F	p	F	p	r	p
1	0.44	0.82	0.56	0.70	1.57	0.18	0.13	0.00
2	2.11	0.07	0.40	0.80	1.66	0.15	0.15	0.00
3	0.76	0.57	0.75	0.56	1.02	0.40	0.11	0.00
4	2.20	0.06	1.79	0.15	2.11	0.77	0.07	0.05
5	0.93	0.46	1.36	0.24	4.78	0.00	0.09	0.08
6	0.99	0.42	0.86	0.49	5.32	0.00	0.11	0.00
7	1.31	0.26	1.55	0.19	1.46	0.23	0.13	0.00
8	2.12	0.07	1.87	0.11	1.94	0.10	0.11	0.00
9	1.82	0.11	2.05	0.09	0.57	0.68	0.11	0.00
10	1.01	0.41	1.40	0.23	2.09	0.08	0.16	0.00
11	2.15	0.06	0.41	0.80	1.91	0.11	0.09	0.01
12	1.81	0.11	1.18	0.32	2.36	0.05	0.15	0.00
13	1.60	0.16	1.76	0.13	1.58	0.18	0.12	0.00
14	0.40	0.84	0.99	0.41	1.37	0.24	0.16	0.01
15	0.43	0.82	1.25	0.29	2.06	0.09	0.01	0.87

Source: own research

The analysis of the results of empirical research presented in this manuscript enabled accomplishing the study goal and answering the research questions. The study has demonstrated that consumers define local food based on the place of production and the place of sale but are, however, inconclusive regarding the distance between these places. The study results confirm conclusions formulated by other authors, which suggested discrepancies in defining this term by consumers and demonstrated the range of consumer conceptualization of local food. This food was defined by consumers from the perspective of reducing miles (kilometers) of its transportation (Campbell et al., 2013, 2014). According to the respondents, local food means the food produced within both the place of residence and within the country (Wilkins, 2002). The British respondents indicated the area within a maximum distance of 20–50 miles from the place of residence as an area of local food production and sale (Chambers et al., 2007). When asked which geographical area the local food should come from, 24% of the British consumers answered that from the city, 33% from the poviats area, while 30% indicated that from the surrounding poviats (Pearson et al., 2011). A study conducted by Arsil et al. (2014b) has indicated that 28% of the Indonesian respondents perceive the production place as the key attribute of the local food.

The results of the qualitative and quantitative research presented in this work indicate a positive emotional attitude of consumers to local food. The results showed that local food was perceived by an integrated set of features, among which the attributes related to the quality of these products, socio-economic and environmental benefits resulting from their production and distribution were found equally important/valuable. The study has proven that local food products are ranked higher than conventional food products. They are rated as of better quality, healthier, and safer. The majority of available research addressing the perception of local food is based on the quantitative approach, while fewer works describe the qualitative approach. The scarcity of data on the perception of local food products by Polish consumers purchasing them makes the complete confrontation of the results obtained impossible.

Earlier studies (Radzyńska & Jakubowska, 2018) conducted among young respondents who do not buy local food have proven that this food category was perceived by them as offering mainly socio-economic benefits, and to a lesser extent as ensuring the product-related attributes and environmental benefits resulting from its production and distribution. Other results, similarly to those presented in this study, have indicated that this food is perceived as of better quality and safer in opposition to mass food (Ditlevsen et al., 2020). It has also been proven in the literature that the consumers' perception of local food is associated not only with product-related values, but also with social and environmental considerations (Hunt, 2007; Thompson & Coskuner-Balli, 2007). In the study conducted by Roinien et al., (2006), this food was perceived as supporting the economy, related to its short distribution chain, freshness, and guaranteed origin. Amilien et al. (2007) have demonstrated the neighborhood (proximity), expressed by product and consumer affinity, production methods and natural composition, to be the most important attribute in the perception of local products. Haas et al. (2013) found that these products have a strong social dimension, represented by the will to belong to the local community, while the environmental attributes assigned to them rank much lower compared to organic food. The literature works describe interesting studies in which the results of research on the perception of local food next to organic food are presented in relation to production practices (Campbell et al., 2013, 2014). It has been proven that some consumers perceive local and organic food based on the reduced number of miles in transport (local products) and the reduced use of synthetic pesticides (organic products), which is a consequence of intensive promotional activities aimed to clearly display these attributes. At the same time, it is suggested that consumers do not have full knowledge of the manufacturing methods of these products, and that consumer perception focuses only on the main differences resulting from the manufacture methods (Campbell et al., 2013). Local food was mainly associated with shorter transport times and, to a lesser extent, with reduced carbon dioxide emissions, greenhouse gas emissions, as well as product attributes related to better taste and nutritional value. The environmental attributes (no use of synthetic pesticides, lower pesticide residues, use of organic fertilizers, no use of synthetic pesticides, genetically unmodified) also dominated, while product characteristics (better taste, nutritional value) were significantly inferior in the assessment of organic food characteristics. According to the French respondents

(Amilien et al., 2007), the essential features of local products are their origin (including geographical scope) and tradition. The most important factor in the perception of local food is the neighborhood (closeness), defining the relationship between the product and the producer. The relationship between the consumer and the region is also important, with the notion of region referring to the region of origin, the consumer's residence area, and the place of leisure. According to French consumers, a local product is closely related to the producer's know-how and naturalness. On the other hand, the Norwegian consumers living in rural areas feel a close link of the local product with the short supply chain and the producer. The relationship with the producer is based on trust in product quality, environmental protection, and rural development potential. The advantage of local products is their non-industrial origin. In turn, the Norwegian local consumers refer to the vision of local products in which origin is associated with added values, such as tradition and the nature of the products, which play an important role in stimulating demand in municipal, local markets by producers. A study conducted by Zepeda & Leviten-Reid (2004) has demonstrated attitudes towards local food products expressed by the buyers of conventional food and alternative (organic) food. The alternative group was interested in purchasing local food because of the environmental, economic, social, and health benefits. Both studied populations emphasized the essence of the features of these products, i.e., their organoleptic attributes, like freshness and taste. It has been shown that their added value is undoubtedly, *inter alia*, their character, resulting from both the recipe and the passion of the people who produce them. This is evidenced by the statements of the survey participants (Zepeda & Leviten-Reid 2004) about the hidden love (the heart), that the farmer/producer includes among the product ingredients. According to Roininen et al. (2006), the production of local food is associated with such attributes as freshness, short transportation, contribution into the local economy, and animal welfare. It has been found that the respondents from rural areas, compared to those living in urban areas, are more interested in supporting the local economy. According to the respondents, the production of local food is related to the protection of the environment and health. The negative associations were related to the price of these products, which was considered high. In turn, affordable price, high availability, unhealthy, and industrially-produced are the attributes that were most often ascribed to mass-produced industrial food. Haas et al. (2013) used the verbal association technique to define unconscious consumer attitudes towards local food. The verbal associations that came to mind of the respondents were related to: freshness, the smell of fresh flowers, farms, animal welfare, landscape beauty, and the aspect of communal happiness.

This research has shown that buyers of local food constitute a homogeneous group in terms of the values assigned to this food category. The perception of local food in the group of buyers generally does not depend on gender, age, or education, and is not strongly related to the frequency of its purchase. The literature lacks studies examining the impact of socio-geographic variables on the perception of this food in the group of consumers who buy it. Therefore, it is impossible to compare the results obtained with findings of other authors. Published works concern the role of sociodemographic variables in explaining the choice of local food. However, they are inconsistent regarding the influence of those variables on the choice of the so-called sustainable food products (Vermeir & Verbeke, 2006; Hughner et al., 2007; Campbell et al., 2010). On the one hand, research indicates that demographic factors are not good predictors of the likelihood of buying local food (Zepeda & Li, 2006; Cranfield et al., 2012). In turn, other works have shown women to be more willing to buy these food products than men (Knight, 2013), which is substantiated by their sensitivity to social impacts (Gracia et al., 2012). It is suggested that inhabitants of rural areas (Racine et al., 2013) and the elderly (Dukeshire et al., 2011; Khan & Prior, 2010; Knight, 2013) are more willing to buy local food. Research conducted in the North Carolina (USA) has shown that local products are purchased by families with children, with low income, living in the countryside, eating five or more servings of vegetables a day, whose children suffer from some health issues (Racine et al., 2013). In turn, a study by French scientists (Bougherara et al., 2009) has shown that younger people (under 35 years of age), representing richer households, are more likely to buy local food and participate in initiatives to support agriculture. Likewise, research carried out in Canada (Ontario) (Smithers et al., 2008) has shown that middle-aged persons account for a larger share of local food market customers. Finally, some other study has demonstrated that the enthusiasm for buying local food increases with age (Khan & Prior, 2010).

Conclusions

The results of the present research and the works of other authors enable concluding that it is necessary to try to develop and adopt a uniform concept of local food. It should contain the basic criteria for local recognition of a product, based also on the perception of the food by consumers. The study has shown a division in the consciousness of local food buyers into mass/conventional and alternative food, including local, traditional, and regional food products. Common areas of local, regional, and traditional food do not allow for an unambiguous definition of local food and limit its market identification. Introducing a uniform concept of local food would eliminate consumer confusion.

This research has also shown that local food is perceived by an integrated set of features, among which product-related attributes, socio-economic, and environmental benefits resulting from its production and distribution are equally important. On the one hand, the characterization of local food products based on the attributes related to their quality is a sign of consumer confidence in their producers. On the other hand, the attributes important to the perception may be treated as a hint for producers regarding expectations towards this food category. The main effort of a local food company should therefore be focused on reliable product design, taking into account production methods that minimize the impact on the original characteristics of the products. The results obtained in this study are also a valuable source of information for entities acting for the development of local food systems. They provide a number of key insights that can be used in designing marketing communication, including visual communication. The distinctive attributes of local products that make them superior over conventional food constitute their added value and should be used in constructing a marketing message. It is also necessary to popularize local food with reference to the socio-economic and environmental benefits related to its production and distribution.

However, there are some limitations related to the presented study. It was conducted in a narrow geographical range; therefore, the results obtained cannot be generalized to other regions of Poland. The scope of the presented research was also limited as it focused only on the perception. In the future, research should be conducted in a broader subjective and subject scope. More research is needed to determine if the perceived characteristics of local foods are reflected in the motives for choosing that food by consumers.

This article is based on a large-scale project exploring consumer attitudes towards local food in Poland. As part of further research, it is planned to: - determine to what extent the perceived attributes determine the choice of this group of products, - make a broad characteristic of consumers purchasing local food, based on psychosocial characteristics, determinants resulting from the social structure, and factors determining the choice of this food, - indicate significant variables explaining the attitudes of consumers towards local food in the behavioral sphere based on model concepts, - identify factors conditioning and limiting the demand for this food category. Further research in this area is useful and justified in order to support regional development in line with the principles of sustainable development in the economic, social, and environmental dimensions.

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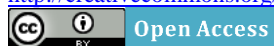
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THE ROLE OF UNIVERSITIES IN URBAN DEVELOPMENT ON THE EXAMPLE OF POLISH CITIES

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Abstract. Schools of higher education, including universities, can become important landmarks of cities and contribute to sustainable urban development. This study attempts to determine the ways in which universities benefit cities, evaluate the scope of cooperation between territorial governments and universities, identify the main obstacles to cooperation and the preferred objectives of collaborative projects. A survey conducted in Polish university towns revealed that the opportunities stemming from collaboration with universities are not fully harnessed by territorial governments. A survey conducted in Polish university towns revealed that the opportunities stemming from collaboration with universities are not fully harnessed by territorial governments. Cities should undertake active measures to work in concert with universities, promote cooperation between research units and businesses, participate in research projects and co-organize internships for students. Efforts should also be made to overcome the barriers to partnership between local authorities and universities, mainly the lack of cohesive state policies targeting urban development and limited funding.

Keywords: university; school of higher education; urban development; university town

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JEL Classifications: O12, O18, O32, R11, R58

1. Introduction

Schools of higher education promote the development of human capital, generate knowledge as the key production factor in the modern world, contribute to the emergence of knowledge-based economies, generate jobs, attract new residents, and build a positive image of university towns. Universities offer many other advantages for urban authorities and residents. This study attempted to determine which of these benefits play the most important role and whether they contribute to urban development. A target population of local government representatives was surveyed in Polish university towns. The purpose of the survey was to establish whether local governments harness the opportunities resulting from the presence of colleges and universities in their cities. Attempts were also made to evaluate the scope of cooperation between the local authorities and universities, and

to identify the main barriers and preferred directions for cooperation. The theoretical part of the paper reviews the literature, proposes a definition of a university town, and describes the extent to which schools of higher education contribute to urban development. The results of the study were discussed, and conclusions were formulated in the last chapter.

2. Theoretical background

In the literature, development is defined as a process of structural changes in a society which is fueled by economic growth. There are four main dimensions of development: economic, political, social and cultural. These processes are not homogeneous, and they mutually interact. Development is understood as a social condition within a nation, in which the authentic needs of its population are satisfied by the rational and sustainable use of natural resources and systems. The utilization of natural resources is based on a technology which respects the cultural features of the population of a given country (Reyes 2001, p. 1; Chovancová & Tej, 2020, pp. 235-251). The main idea is to create divergence, where increasing economic growth should be combined with a reduction in the amount of natural resources consumed and a reduction in the amount of waste produced (Chovancova, Tej 2020, p. 239). Development is a positive phenomenon in all aspects and dimensions. It consists of much else besides economic growth and should be measured along other axes, such as poverty, unemployment, inequality, and the strength of education and rights of citizenship (Pike, 2016, p. 6; Cyrek, 2019, pp. 405-424). A major challenge for development is to reinforce the role of urban systems as drivers of economic growth (Duranton, 2015, p. 43). Development promotes specialization, infrastructure investments (telecommunications, transport), support for financial and consulting institutions, and services for business and education (Szajnowska-Wysocka, 2009, p. 77). It involves the creation and renewal of regional industrial paths. Path renewal denotes the emergence of new activities and new industries via regional branching. The existing knowledge and skills in a region are combined in new ways and may be linked to relevant, extra-regional knowledge to provide new knowledge for a region that promotes innovation and entrepreneurship. Path creation represents the growth of entirely new industries for a region (Isaksen, 2017, p. 356; Bal-Domańska et al., 2020, p. 785).

The sustainable development concept is the most popular theory of regional development which accentuates the role of environmental factors. The sustainability principles become more and more popular among the policy makers while setting not only the strategies of the whole co (Semenko, Halhash, Sieriebriak 2019, p. 318). There are three pillars of sustainability: economic viability, social equity, and environmental protection. Sustainable development has become the dominant concept in the study of interactions between the economy and the biophysical environment, as well as a generally accepted goal of environmental policy (Mulder, van den Bergh 2001, pp. 110-134; Semenenko et al., 2019, p. 317). The concept of conserving resources for future generations is one of the major features that distinguish a sustainable development policy from a traditional environmental policy, and it also seeks to internalize the externalities of environmental degradation. The overall goal of sustainable development (SD) is the long-term stability of the economy and environment. This can only be achieved through the integration and acknowledgement of economic, environmental and social concerns throughout the decision-making process (Emas 2015, p. 2). Sustainability (sustainable development) means positive changes in respect to the future of an association to guarantee its long-term survival (strengthening) (Reiljan 2014, p. 125). Ecological sustainability is most difficult to achieve in cities because urban development relies heavily on environmental resources not only in the urban core, but also in peripheral areas. Some authors regard the eco-development of cities as a philosophy of development (Urteaga 2011, p. 399) which should aim to limit urban expansion (through the construction of compact cities with multifunctional districts and residential estates), while maintaining a high quality of life. Worth-living integrated development satisfies the need for comprehensive dialectical harmony, symmetry and balance in the process of aligning development in economic, social, political and cultural dimensions. This development is in harmony with nature and traditions, but also with the progress of science and technology (Koroneos, Rokos 2012, p.146).

The determinants of sustainable development have to be identified to promote positive social, economic and environmental changes. Recently, it is being investigated more and more the endogenous potential and competitive advantages inherent in a given region of economic, infrastructural, social and environmental nature (Bal-Domańska, Sobczak, Stańczyk 2020, p. 786). And in addition to traditional production factors, the importance of qualitative factors, including knowledge, is increasingly often recognized in urban development. Knowledge is of the most important types of capital and a profitable resource that is based on various relations and/or social norms. This collective and indivisible resource is regarded as a public good (Boccella, 2016, p. 293). The educational system is responsible for the creation and expansion of knowledge resources and the development of social capital. Schools of higher education, including universities, play a special role in generating high-quality knowledge resources. Universities influence the development of not only cities, but entire regions. In a macroeconomic approach, schools of higher education further the development of entire nations. However, this study focuses on the role of colleges and universities in promoting the development of towns and cities in which they are located.

Universities have been a part of college towns for centuries, and they act as a core component of economic, social, and environmental development. Universities affect urban development in terms of employment, housing, mobility, leisure and consumer activities (Cannas da Silva, Heitor, 2014). The towns and cities that host schools of higher education are referred to as university or college towns. Most of these cities are multifunctional metropolises with a large population, and they also host other schools of higher education (Rewers, 2016, p. 152). The academic function is not predominant in large cities. However, in smaller towns with long-standing academic traditions, university buildings often play a dominant role in public space. The first articulated a concept of an urban university that focused on urban-oriented education, research, service strategies and community responsibilities was formulated more than three decades ago (Hill, 1981, p. 38). In 1994, Boyer (1994, p. 48) proposed a model for higher education that dealt with the concept of community involvement. His model involved undergraduates in social issues, extended classrooms into communities, balanced theory and practice, promoted an integrated view of knowledge, and expanded the nature of scholarly work. Boyer's concept has spurred research on the influence of community engagement on faculty work, learning and teaching, campus mission, and the quality of life in communities.

In addition to providing academic infrastructure, many universities organize cultural, sports and educational activities (universities of the third age, courses for adults, adolescents and children) for local community members. Academic infrastructure, often of high historical value, also contributes to the positive image of a town or city. The academic lifestyle influences the rhythm of life in the city. Schools of higher education are one of the largest employers in university towns. Students and faculty members contribute a unique academic or campus culture to the urban fabric, and they become members of the creative class (Florida, 2007). The academic culture combines work with play, it influences the organization of urban life and sets new social norms and behaviors (Rewers, 2016, p. 158). In American college towns, the interplay between academic work and alternative youthful activities became known as the student lifestyle (Chatterton, Hollands, 2003, p.). Universities are regarded as urban institutions that engage with the people, institutions, and businesses of the city and share its challenges and celebrations (Perry, Wiewel, 2005, p.3). Universities shape not only professional, but also social attitudes. They create desirable moral attitudes, cultural habits, behaviors and value systems. Research and academic activities prepare young people for entrepreneurship, promote innovation and encourage new patents (Breschi et al., 2007, p. 101). As a result, universities contribute to the social and economic development of local communities.

Schools of higher education influence the economy by joining regional cooperation networks and commercializing the results of research and scientific inquiry. They also offer stable employment opportunities. Universities generate production factors, including human capital, knowledge and innovation, they are hotbeds of creativity and entrepreneurship, and they stimulate economic growth (Piotrowska-Piątek, 2014, p. 41). They attract new residents (students) who increase the demand for local goods and services. Higher consumer demand

stimulates investment demand, and it fuels the economic development of cities and entire regions. Universities shape and strengthen regional and sub-regional hubs (Rokita-Poskart 2015, p. 165). They act as important local landmarks which increase a city's competitive advantage and attract new inhabitants, not only students, but also scientists, investors and businesses. The transfer of knowledge, technology and innovation between academia and industry boosts the competitive edge of regions. Recent years have witnessed the emergence of the concept of universities' third mission which suggests that in addition to providing education and research, universities are also obliged to foster regional growth (Kauf, Stec, 2017, p. 94). Universities are regional science hubs and learning regions that act as repositories of knowledge and ideas, promote innovation and economic growth (Florida, 2001, pp. 255-277). Universities can identify technologies that are in special demand in a particular region or city. They may be especially adept in fulfilling this demand, in particular by promoting the development of industries that meet local needs and creating access to export markets. In this context, university research could be deliberately channeled (Hall, 1997, p. 309).

The role of universities in cities can be evaluated in four dimensions. A university is an economic entity, a producer of knowledge, an institution that fosters the growth of human capital, and a local actor (Boucher et al., 2003, pp. 887-897). The university-city complex model has been a major contributor to the social, cultural, and economic life of modern cities (Ngo, Trinh, 2016, p. 93). Quantitative analyses that explore the role of universities in the development of cities and regions focus on the student population in university towns, gross added value of the generated services, the number of universities in a city or region, and the number of academic teachers per student. However, the results of quantitative assessments should be supplemented with qualitative data.

3. Research Methodology

In this study, a target population of local government representatives was surveyed to identify the ways in which schools of higher education generate benefits for the towns and cities in which they are located. The survey was conducted in Polish university towns. Poland has 43 public universities and two private universities in 20 cities which are referred to as university towns. The survey involved the representatives of local governments in 16 Polish university towns: Białystok, Bielsko-Biała, Gdańsk, Katowice, Kielce, Koszalin, Cracow, Lublin, Olsztyn, Opole, Poznań, Radom, Rzeszów, Szczecin, Warsaw and Zielona Góra. Filled out questionnaires were returned by 80% of the queried respondents. The aim of the survey was to collect information about collaborative efforts between territorial governments (city halls) and schools of higher education (universities), including the areas of cooperation, the encountered obstacles, and the preferred objectives of collaborative projects. The study was conducted in 2020.

4. Results

In the first part of the questionnaire, city hall employees were asked to describe the role of universities in urban development (Fig. 1).

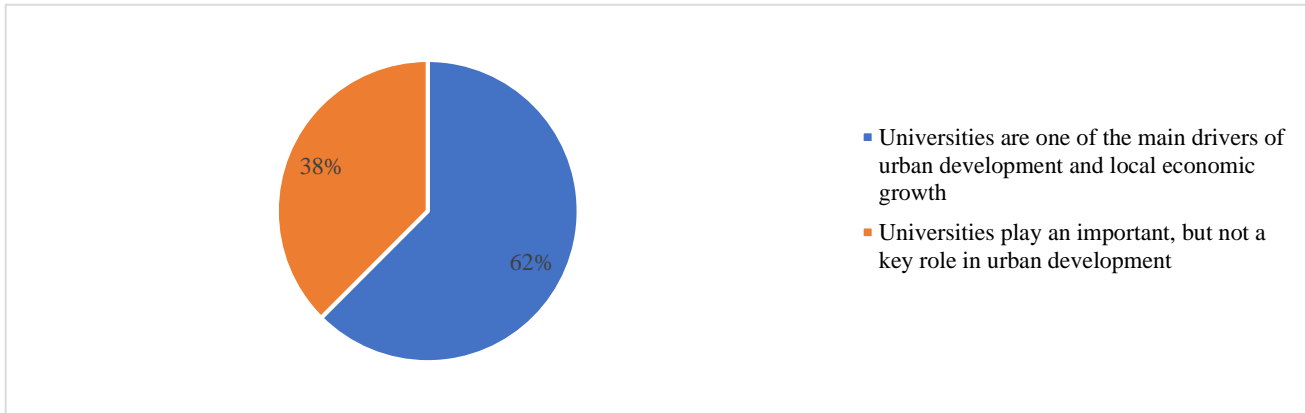


Figure 1. Role of universities in urban development

Source: own elaboration based on the results of the conducted survey

In most Polish university towns, schools of higher education play a very important role and significantly contribute to urban development. According to 62% of the respondents, universities are one of the key drivers of urban development and local economic growth, whereas 40% of the surveyed subjects were of the opinion that universities play an important, but not a key role in urban development. It should be noted that the second opinion was more frequently voiced in the largest Polish cities which have a vast development potential and where schools of higher education, including universities, are only one of the existing resources. The potential of smaller cities relies on fewer determinants of local identity, and universities are often the main source of a city's competitive advantage.

In the next question, the respondents were asked to identify urban functions that are influenced by schools of higher education (Table 1).

Table 1. The influence of universities on urban functions

The influence of universities on urban functions	N	%
Universities supply a highly skilled workforce and improve the quality of human capital	16	100
Universities create a positive image of a city / university town (prestige)	11	68.75
Universities generate innovative concepts	11	68.75
Universities contribute to an increase in the local population	10	62.5
Universities contribute to the emergence of a unique urban culture	10	62.5
Universities contribute to the emergence of the creative class	10	62.5
Universities promote the development of culture and entertainment in the city	10	62.5
Universities increase the demand for local goods and services (stimulate economic growth)	9	56.25
Universities foster tolerance and respect (for residents of other regions, countries, for other cultures, religions and races)	8	50

Universities create numerous jobs on the local market	7	43.75
Universities stimulate entrepreneurship - research findings are implemented in practice	7	43.75
Universities encourage international cooperation	7	43.75
An increase in the local population contributes to the growth of the local real estate market	7	43.75
As a result, universities increase the quality of life in cities	6	37.5
Other	3	18.75

Source: own elaboration based on the results of the conducted survey

The respondents in all studied cities were of the opinion that universities supply a highly skilled workforce and improve the quality of human capital. This factor is a significant determinant of a city's economic development. A high number of 11 respondents argued that schools of higher education help build the image of a university town. The academic identity and the image of a university town are intangible assets that indirectly influence local economic growth and attract students, new residents, investors (capital) and tourists (such as the Jagiellonian University in Cracow and other universities with historical heritage). These factors enhance a city's prestige and image in the long term. Eleven respondents emphasized the importance of research conducted by universities and pointed out that universities generate innovations (new technologies and novel products) and contribute to technological progress that drives local economic growth. In ten surveyed cities, the respondents were of the opinion that universities contribute to an increase in the local population, the emergence of the creative class, the creation and popularization of a unique urban culture, and the promotion of culture and entertainment. These effects are interlinked. The creative class is composed of designers, artists, scientists and engineers. Universities are generally regarded as the "cradle of social elites" because they provide a supportive environment for the emergence of skilled professionals and experts. Members of this creative class contribute to economic growth as well as a unique urban culture which is based on the academic culture and intellectual attitudes. Universities promote desirable moral attitudes, cultural habits, behaviors and value systems in various social groups, not only students and scientists, because the accumulated intellectual capital affects all social strata in the city.

The increase in the urban population results mainly from the inflow of young people. This factor stimulates local economic growth by minimizing the adverse effects of social decline and population aging. It increases the supply of labor and boosts consumer demand. Half of the respondents stated that universities contribute to the supply of skilled labor, increase the quality of human capital, and promote tolerance and respect for the residents of other cities and countries, for other religions, races and cultures. International student exchange programs in university towns promote acceptance of diversity in local communities. Respondents in nearly half of the analyzed cities argued that universities create new jobs, stimulate entrepreneurship and international cooperation, and contribute to the development of the real estate market. Six respondents were of the opinion that by stimulating economic growth, universities ultimately improve the quality of urban life. The respondents in two of the analyzed cities also noted that universities increase the number of libraries in the city and that the cooperation between universities and secondary schools delivers tangible benefits for young people. School students in university towns have ample opportunities to learn about the courses and programs offered by local universities; therefore, they are able to make more informed choices about their future. The surveyed subjects claimed that universities directly attract investors and that international cooperation between academic centers increases the number of flights to various destinations around the world. Universities organize cultural events addressing students from different countries. Schools of higher education should be regarded as major economic units in the city because they promote investments by financing the construction and modernization of buildings that enhance the urban landscape.

In the following part of the questionnaire, the respondents were asked to evaluate the cooperation between the local authorities and universities. The responses indicate that all Polish university towns work in concert with local governments to a greater or lesser extent. The responses provided in this part of the questionnaire are presented in Figure 2.

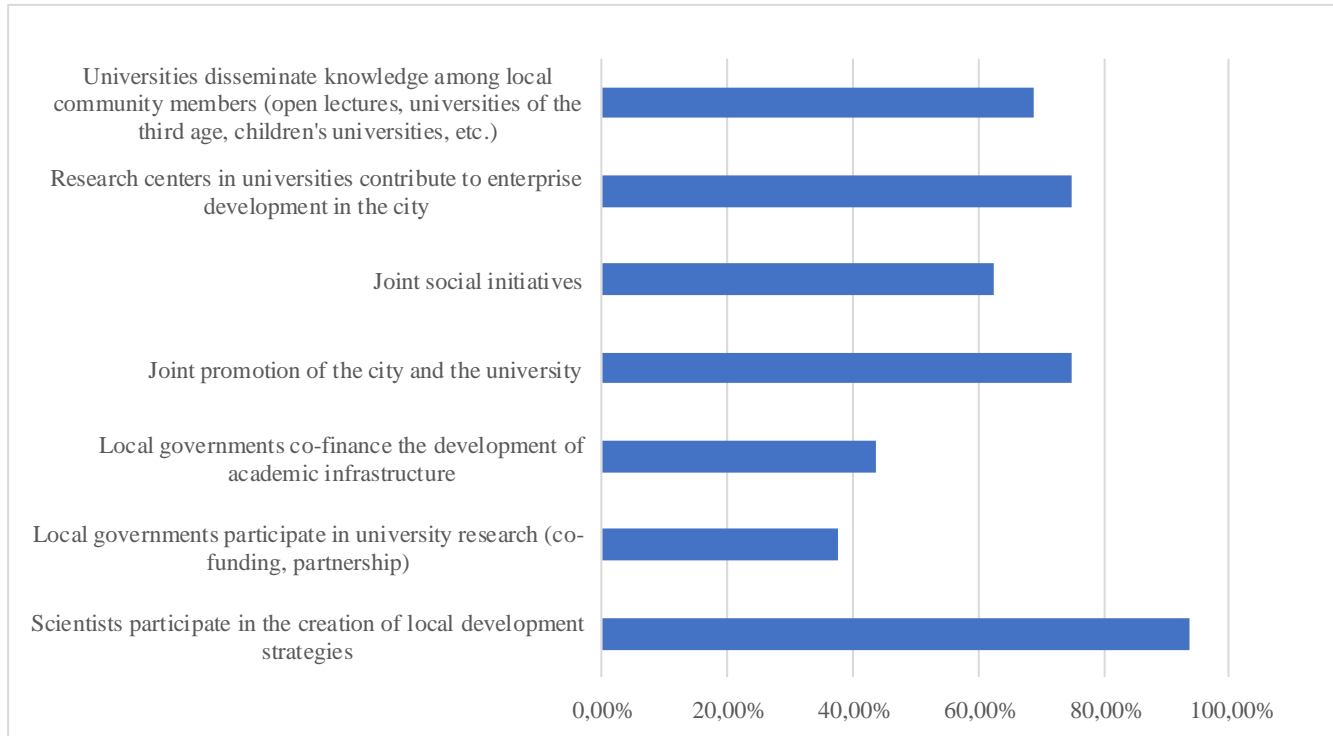


Figure 2. Areas of cooperation between universities and local governments

Source: own elaboration based on the results of the conducted survey

In nearly all university towns, scientists participate in the creation of local development strategies. Members of the academic community conduct strategic analyses of local development, develop growth forecasts, and rely on expert knowledge to determine strategic goals, plan local budgets and develop local promotional campaigns. In the survey, 75% of the respondents noted that universities and territorial governments conduct joint promotional campaigns. The local authorities recognize the fact that students are new members of the local community who can potentially contribute to a city's development and economic growth. The same proportion of the surveyed subjects acknowledged that research centers in universities promote enterprise development. Universities are also a valuable source of knowledge that delivers tangible benefits for urban dwellers, not only students. According to more than 68% of the respondents, universities disseminate knowledge by organizing open lectures, universities of the third age, children's universities, open science days and science nights. More than 60% of the respondents indicated that city halls and universities stage joint social initiatives. In 43.75% of the surveyed cities, the local authorities co-finance the development of academic infrastructure, and provide universities with access to municipal land at no charge or at a discount. According to 37.5% of the surveyed subjects, the local authorities participate in or co-finance research projects undertaken in joint effort with universities.

The barriers to cooperation between territorial governments and universities were identified in the following part of the questionnaire (Fig. 3).

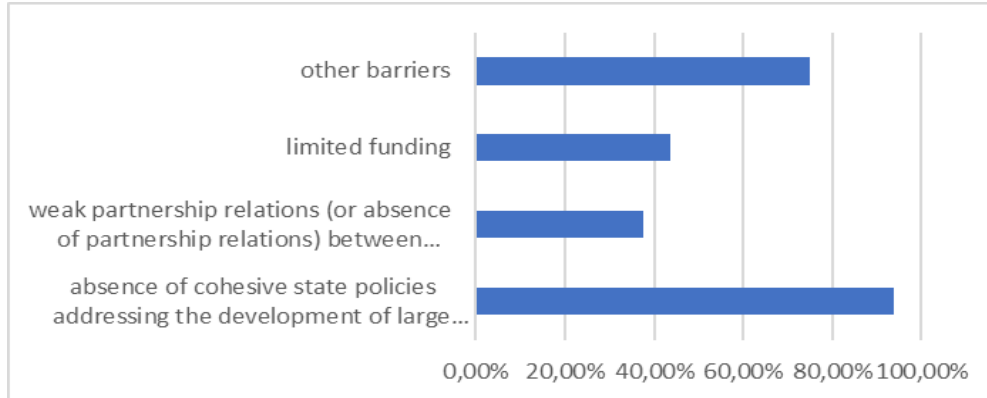


Figure 3. Barriers to cooperation between territorial governments and universities.

Source: own elaboration based on the results of the conducted survey

According to 15 out of the 16 surveyed subjects, the absence of cohesive state policies addressing the development of large cities was the main barrier to effective collaboration between academic communities and the local authorities. Other obstacles included limited funding (more than 43% of the answers) and weak partnership relations (more than 37%) between territorial governments and universities. Some respondents also indicated that not all partnership initiatives can be initiated because local governments have limited powers under the municipal governance act. Not all universities readily respond to future employers' requests regarding specialist training for graduates. Complex formal procedures in both city halls and universities also inhibit effective cooperation. According to some respondents, universities do not provide the local authorities with support in identifying local problems, planning urban development, or proposing solutions to the most pressing local issues. In isolated cases, the respondents claimed that universities show very little or no interest in local affairs. The establishment of partnership relations between territorial governments and universities is also impeded by excessive red tape and lack of information about each party's specific operating environment.

In the following part of the questionnaires, the respondents were asked to indicate whether the local authorities have an interest in creating the city's image as a university town (Fig. 4).

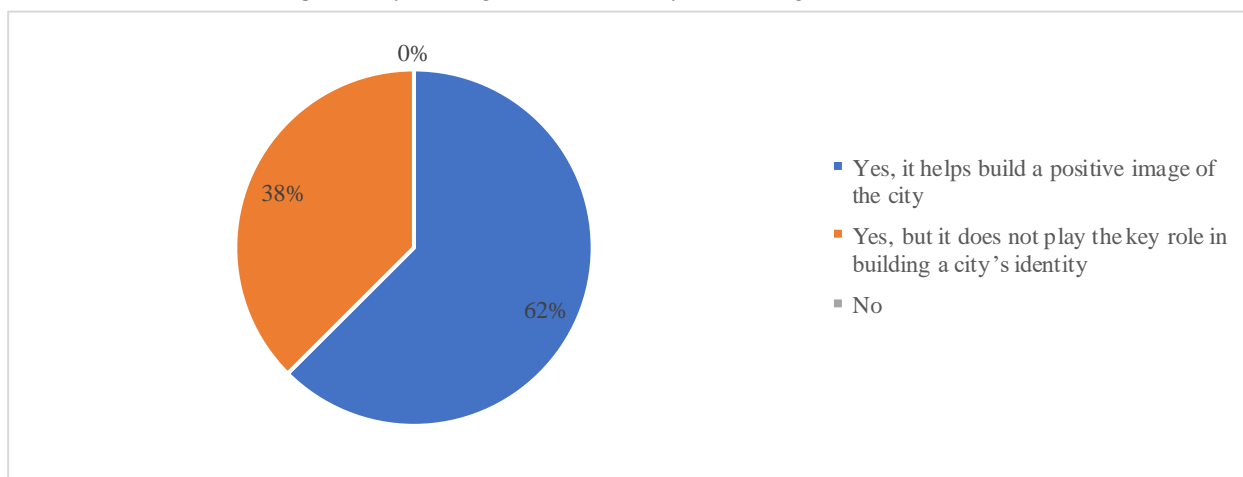


Figure 4. Do you have an interest in creating the city's image as a university town?

Source: own elaboration based on the results of the conducted survey

Ten out of the 16 respondents declared that the local authorities have an interest in creating the city's image as a university town. Academic centers are perceived as intangible assets that contribute to urban development in the previously discussed categories. Six respondents claimed that city halls recognize the significance of universities, but academic centers do not play a key role in creating the city's identity.

In the last question, the respondents were asked to indicate the type of measures that could be undertaken to boost the city's image as a university town (Fig. 5).

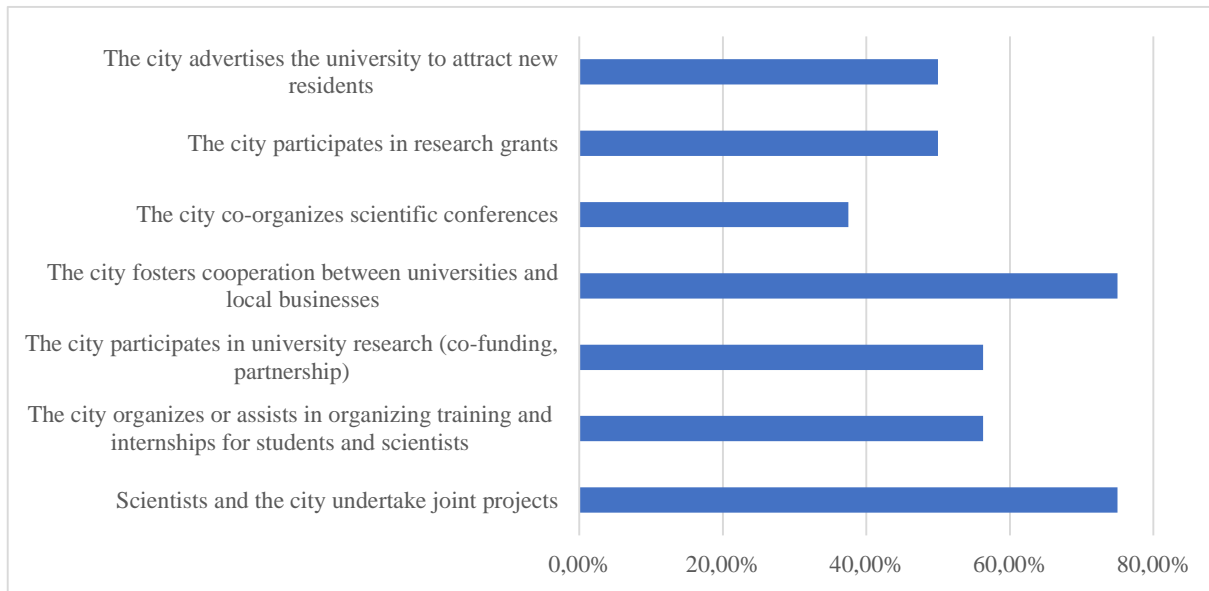


Figure 5. Measures that could be implemented to boost the city's image as a university town.

Source: own elaboration based on the results of the conducted survey

According to 75% of the respondents, above all, city halls should strive to build stronger relationships with universities. Territorial governments should also foster cooperation between academic communities, industry and local businesses, and this role could be equally important. By participating in business management, commercializing research findings and registering new patents, universities can contribute to technological progress, enhance the performance of local businesses and, consequently, contribute to local economic growth. Such measures would build a positive image of the city as a university town in the long term, and they would enable local authorities to fully harness the potential of academic centers to stimulate regional growth. City halls should participate in research projects conducted by universities, encourage projects that meet market needs, and facilitate the commercialization of research findings. Territorial governments should provide training and internships for students or encourage local businesses to offer such opportunities to ensure that graduates are skilled professionals who can find employment on the local job market and contribute to local development. These measures would increase the quality and competitiveness of the human capital produced by schools of higher education. Training and internships would provide students and graduates with practical job experience, thus boosting their appeal for potential employers. Nearly one-half of the respondents were of the opinion that cities could benefit from applying for research grants in collaboration with universities. A similar proportion of the surveyed subjects argued that territorial governments should promote university programs and courses to attract new students to the city. Joint promotional campaigns could reach a larger audience and deliver more satisfactory results. Students could also participate in promotional efforts by organizing educational events addressing important social issues. According to six respondents, universities and city halls could strengthen their ties by co-organizing events such as scientific conferences, by participating in trade fairs, or inviting famous

scientists to open lectures. Several respondents remarked that academic communities should organize educational and promotional events and stage debates concerning pressing social problems in the city. Universities should develop programs that align with workforce needs and current occupational trends. To eliminate barriers to effective cooperation, schools of higher education and the local authorities could also develop science and technology parks. Effective communication, exchange of information and establishment of shared goals are key to successful partnerships between universities and territorial governments.

5. Conclusions

Sustainable urban development involves the search for sources of competitive advantage that would enable cities to implement desirable social, economic and environmental changes. Schools of higher education generate knowledge and play a very important role in a knowledge-based economy. In a creative economy, cities rely on social capital, in particular members of the creative class who are university graduates, to build their competitive advantage. For this reason, schools of higher education significantly contribute to the social and economic development of university towns. The majority of the surveyed representatives of local governments in university towns were of the opinion that universities increase the quality of human capital and supply a highly skilled workforce. Most territorial governments recognize that universities are the key landmarks of local identity, and they actively strive to build a positive image of their cities as university towns. Universities are appreciated for conducting research, for their contribution to building the creative class, promoting culture and entertainment, and co-creating the urban culture. As a result, university towns attract new students, residents, businesses, investors and tourists who stimulate economic growth and local development. Universities promote tolerance and respect, stimulate entrepreneurship, create jobs, contribute to the growth of the real estate market, and improve the quality of urban life. All Polish university towns cooperate with schools of higher education to a greater or lesser extent. Universities co-create local development strategies, participate in local promotional campaigns, and organize various events, such as open lectures, to disseminate knowledge not only among students, but also local community members. The main barriers to closer cooperation between territorial governments and universities are the lack of cohesive state policies addressing the development of large cities in Poland, as well as limited funding. Local governments should build strong and lasting relationships with schools of higher education by fostering cooperation between scientists and local businesses, participating in research projects and organizing internships for students. By harnessing the opportunities for cooperation that exist between urban and academic authorities, territorial governments can actively contribute the social and economic development of cities in the long term.

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WAGE CONVERGENCE AFTER EURO ADOPTION – THE CASE OF SLOVAKIA^{*}

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Abstract. According to the theory of integration, welfare increase is the long-term indirect effect of joining the euro area. Monetary integration accelerates the processes of economic convergence, including income convergence, which is particularly desired by the societies of catching-up economies. This process is crucial for increasing the long term potential for macroeconomic sustainable growth of the economy. The countries of the Visegrad Group are institutionally and structurally similar. But only Slovak Republic adopted euro in 2009, another Visegrad countries stay by their own currencies. So it is a good opportunity to assess the effects of joining the euro zone on wage growth in the medium term through a comparative analysis. The aim of the research is to assess the impact of joining the euro area on the wage growth rate in Slovakia. The research was carried out using the comparative method. Three types of convergence are taken into account: beta, sigma and gamma. An extension of the implementation of the concept of beta, sigma and gamma convergence is the estimation for variables other than GDP, i.e. for the wage growth rate. The analysis covers the 2009-2019 period. The study confirms the existence of beta and sigma convergence. The convergence of earnings between EU countries occurs, wages in less developed CEE countries, tend to grow faster than do in wealthier ones. On the other hand, no gamma convergence was found. The higher rate of wage growth in Slovakia as compared to other countries of the Visegrad group was also not confirmed.

Keywords: economic convergence; wage convergence; euro adoption; monetary integration; Visegrad Group

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JEL Classifications: E24, F14, F15, B29

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1. Introduction

In 2004, 10 countries joined the European Union, including the Visegrad Group: Poland, Hungary, Czechia and Slovakia. The Visegrad countries are now regarded as an example of a successful transition from a centrally planned to a market economy. The modernisation process has increased their competitiveness in the globalised economy (Bieszk-Stolorz & Dmytrów, 2020). Although all Visegrad countries committed to adopting the euro, only Slovakia joined the euro area in 2009.

The Central-Eastern Europe economies can be deemed relatively homogeneous. This results firstly from the fact that in the transition period, these countries have pursued quite similar systemic transformation strategies, socio-economic policies and structural reforms, geared towards building a fully-fledged market economy, strongly influenced by Western patterns. Secondly, the membership in the EU create similar economic conditions in terms of their institutional environment, economic structure, directions of trade and capital flows (so called integration anchor). Thirdly, all CEE countries have been offered similar windows of opportunity to use the EU aid funds. Hence, it can be assumed that all present members of the enlarged European Union face the same long run equilibrium or steady-state. They should, therefore, tend to equalize income levels as suggested - inter alia - by neoclassical models of economic growth. The process of equalization in GDP per capita levels is further fostered by the objectives of the EU policy, intended to reduce income disparities between countries and regions of the enlarged European Union (Rapacki & Próchniak, 2019). The problem of wage inequality is one step away from the problem of income inequality (Horodecka & Vozna, 2018). Sustainable growth is closely related to the process of equalizing the incomes of citizens from different Member States.

The concept of wage convergence, which is derived from factor price equalization, can be explored via the literature on international trade and labour economics. In the international trade literature, factor price equalization can be discussed as an outcome of the Heckscher–Ohlin trade model, which is designed for two economies, two products, and two production factors. It is a trade model that shows patterns of trading for those goods that are produced by the factor that is abundant in a certain country. Factor price equalization has certain restrictions such as identical technologies and sufficiently similar factor supply ratio. Moreover, it also demands an absolute equality of prices of commodities and factors, whereas the concept of factor price convergence is more flexible in the sense that it does not require the absolute equality of factor and commodity prices among the countries under free trade (Naz et al. 2017). Leamer (1995) attempted to define factor price convergence as a process that occurs “When two countries eliminate their mutual trade barriers, product price equalization eliminates factor price differences.” The adoption of common currency is a factor reducing the real barriers to trade and foreign investments by eliminating the exchange rate risk and costs of currency exchange.

The establishment of monetary union is expected to reduce wage differentials between the countries involved. There are three possible reasons for the fall in wage differentials in the Euro-area countries recorded since the establishment of European Monetary Union (EMU): migration, the Balassa-Samuelson effect, and the role of trade unions. With regard to the first of these factors, if workers from low wage economies move to those with high wages, the process of wage equalization is enhanced. The second possible explanation of the reduction in wage differentials is the existence of the Balassa-Samuelson effect. Third, EMU may reduce wage differentials across countries due to a “demonstration” or “fair wage” effect (Mora et al. 2005).

On 1 January 2009, Slovakia adopted the Euro as its national currency. Despite being a small economy, Slovakia is the largest new member of the euro area. In addition, it is institutionally and structurally similar to other countries of the Visegrad group (the Czech Republic, Hungary and Poland). Hence, it is possible to conduct a comparative analysis to assess the impact of the euro on wage growth in the catching-up economy.

Many empirical studies examine the territorial convergence among states in terms of a negative relationship between growth rate and the initial level of GDP per capita or labour productivity and less are focused on the wage. Differentiation of GDP per capita is widely discussed and analysed, while there is not so much research regarding the disparities in wages. GDP is the most synthetic indicator, but for people GDP is more abstract than their own earnings. For the inhabitants of Central and Eastern Europe, the more intriguing question is whether the euro adoption by the country accelerates wage growth?

The aim of the research is to assess the impact of joining the euro area on the wage growth rate in Slovakia. The secondary goal is assess of wages convergence between the countries of Central and Eastern Europe (CEE) which have accessed the European Union (EU11) and the 15 countries of Western Europe (EU15) which represent the EU's "old core". Cyprus and Croatia are excluded due the lack of data. The analysis covers the period 2009-2019, i.e. after Slovakia joined the euro area. The used methods are three type of convergence: β -convergence (beta), σ -convergence (sigma), γ -convergence (gamma) and a comparative analysis with particular emphasis on Slovakia. The used indicator is a average gross earnings, a source of data is Eurostat Database.

The structure of the research study is as follows: the introduction offers a clarification of the importance of addressing the research issue and a short review of relevant theory. Section 2 contains the short review of relevant literature. Section 3 provides details about data and their sources, hypotheses, detailed descriptions of concepts and methods on convergence. The next section contains the results of investigation and a discussion of the results, finally, Section 5 concludes the study.

2. Literature review

Although there is an extensive body of literature regarding EU- and eurozone enlargement, the economic convergence effects within the major EU countries and between developed and emerging economies, studies focusing on the CEE countries in context of wage equalization remain limited (Bernardelli et al. 2021). The prevalence of a real convergence of CEE countries vis-à-vis the EU15 group can be explained as a combined effect of multiple factors, including a comparable level of economic development and the structure of economies, similar direction of systemic reforms, mutual economic cooperation, trade liberalization, and dismantling barriers hampering the flows of productive factors (in particular labour and capital) between countries (Rapacki&Próchniak, 2019, Janus, 2019). The adoption of the common currency facilitates trade and the mobility of production factors, so it can be expected that it will also accelerate the convergence processes. An extensive body of literature exists on the affect euro on the economy (Moździerz, 2019). Kunroo et al. (2016) showed that the euro can cause economic convergence among Eurozone countries through intra-industry trade. The euro has also affected foreign direct investment (FDI). Petroulas (2007), Schiavo (2007), Brouwer et al. (2008), and Baldwin et al. (2008) suggested that the euro had a profound impact on intra-Eurozone FDI flows as well as FDI flows to and from the Eurozone to third countries. Lane (2006) argued that the elimination of exchange rate uncertainty would lead to real convergence between members, and in turn, higher levels of output and growth. Barrell et al. (2008) showed that the euro affected output growth directly, reduced real exchange rate volatility, and influenced the accumulation of production capital. Subsequent studies have demonstrated that the Eurozone has encountered difficulties but the trend about the euro has continued to be optimistic. Senjur (2012) argued that the success of the Eurozone's small middle-income members is questionable. Khan (2020) investigated the spillover effects of trade shocks in the Central and Eastern European and Baltic Countries. His study showed that the larger countries in the block, such as Poland and the Czech Republic, are the least affected by foreign trade shocks. Therefore, further integration is likely to enhance the growth potential of these countries. For Slovakia, the country in the sample most sensitive to external trade shocks, further integration may increase its risks during economic downturns in other countries. Slovakia already experienced this after the financial crisis of 2007-2008, when it suffered the most of all the CEE-Baltic countries. This indicates that although things can go well when there are positive shocks emanating from other countries, negative shocks can very quickly change the situation.

Khan (2020) conclude this can worsen when countries share a currency, as it limits their ability to handle the situation using country-specific tools of monetary policy.

The positive effects of joining the euro area in Slovakia occurred even before the official conversion of the Slovak koruna to the common European currency. This was the result of, inter alia, increased confidence in the Slovak economy. Comparing Synthetic Control Method with the actual performance of the Slovak economy after 2006 Zudel and Meloris (2016) found that by 2011 euro adoption increased the real GDP per capita in Slovakia by approximately 10%. Two thirds of the positive gain is observed already by 2008, emphasizing a strong anticipation effect. Nevertheless, the gap in GDP per capita widens between 2008 and 2011 by additional 3 percentage points. Grabia (2019) points out that if a similar method was used for the next five-year period (2012-2016), real GDP in Slovakia would also be higher thanks to the adoption of the euro, but only by approx. 1%.

However, studies focusing on the impact of the euro on wage growth in the new member states are rare. Mora et al. (2005) conducted convergence analysis to wages and productivity for Euro-area countries in the period from 1981 to 2001. Their study is based on three different methods of convergence: β convergence, σ convergence, and the unit root method. They found support for the β convergence of wages but no evidence for σ convergence or with respect to time series unit root tests for convergence. Their results support wage convergence but not productivity convergence. Further, their research suggested that the establishment of a single currency area has not accelerated the process of wage equalization.

From the review of the literature it may be seen that the most papers on the economic convergence between the rich, old EU and the CEE countries used a GDP per capita. Study focusing on wage convergence between CEE countries and old EU-15, especially in the context of euro adoption, remain limited. This paper complements the gap in existing literature.

3. Research methodology

The concept of real convergence is defined as the tendency to level off income among countries. Most research use GDP per capita as an income indicator. But this study concern on wages, so used indicator is annual gross earnings single person without children earning 100% of the average earning in euro. That way the redistribution effect of fiscal policy is not taken into account. The analysis covers the 2009–2019 period for 26 EU countries, Cyprus and Croatia are excluded in the analysis owing to a lack of data, whereas the UK is included, as it was an EU member state during the analysed time period. The calculations were based on annual gross earnings time series obtained from Eurostat database.

Two research hypotheses were formulated:

1. The convergence of earnings occurs between EU countries, wages in less developed CEE countries, with lower wage level, tend to grow faster than they do in wealthier ones, with higher wages.
2. After the adoption of the euro, Slovakia is characterized by higher wage growth than the other countries of Visegrad group.

The literature on economic growth proposes several methods to capture convergence. This study will use the concept of β (beta), σ (sigma) and γ (gamma) convergence. In general, β convergence reflects a negative association between the growth rates of a variable and the initial values of that particular variable. Wage convergence is actually a part of real convergence. In the context of wages, β convergence is said to exist if growth rates of wages are negatively correlated with the initial values of wage rates for each region. In other words, a country with smaller initial values of factor prices has a higher rate of growth than a country with higher initial values of factor prices (Naz et al. 2017). Therefore, lower-wage member states grow faster than higher-

wage one. Thus, in the long run, all labour markets tend to converge toward the same average wage. This convergence can be conditional or unconditional.

To verify empirically the hypothesis of the absolute β -convergence, the following equation should be estimated:

$$\frac{1}{T} (\ln Y_T - \ln Y_0) = \alpha_0 + \alpha_1 \ln Y_0 + \varepsilon_t \quad (1)$$

where:

$\ln Y_T$ – logarithm value of average gross earning at the end of the analysed period

$\ln Y_0$ – logarithm value of average gross earning at the beginning of the analysed period

T – periods number

α_0, α_1 – equations parameters

ε_t – random walk.

The explained variable is the average rate of gross earnings growth in examined period (from 0 to T), the explanatory variable is the logarithm of the initial level gross earning, while ε_t is a random component. A negative and statistically significant value of the α_1 parameter means the occurrence of the β -convergence. In this case, the value of β -coefficient measuring the rate of convergence, can be calculated from the formula (see e.g. Barro & Sala-i-Martin, 2003, Heller & Warżała, 2019, Kijek & Matras-Bolibok, 2020):

$$\beta = -\frac{1}{T} \ln(1 + \alpha_1 T) \quad (2)$$

In addition, the hypothesis concerning the occurrence of σ -convergence was verified, according to which the decreasing dispersion of annual gross earnings follows among the studied countries. The estimated σ -convergence quotation was as follows:

$$\sigma(\ln Y_t) = \alpha_0 + \alpha_1 t + \varepsilon_t \quad (3)$$

The logarithms of gross earning standard deviation in individual countries was the explained variable, and time series ($t = 1, \dots, 11$ for the period 2009-2019) was the explanatory variable. The ε_t - as before - is a random walk component. A negative and statistically significant value α_1 parameter means existence of σ -convergence.

Generally, γ -convergence occurs when countries change their positions in the ranking ordered in terms of some features (Próchniak, 2019). Gamma convergence (γ -convergence) is defined as the ranking concordance over time of per capita incomes within a group of countries (Siegel, 1956, Boyle & McCarthy, 1997). In other words, γ -convergence highlights whether, and to what extent, the highest-income and lowest-income countries remain the same within a given country grouping over time. Together with σ -convergence, γ -convergence helps to capture the complex dynamics of time-varying cross-country income distributions (Diaz del Hoyo et al. 2017). The Kendall rank concordance coefficient can be used to verify the γ convergence hypothesis (Próchniak, 2019). Kendall's coefficient of concordance ranges from 0 (no agreement) to 1 (complete agreement). Value of 0 indicates γ convergence and value of 1 indicates no γ convergence.

Annual gross earning as a percentage of EU-15 average was calculated only for Slovakia, Czechia, Hungary and Poland. For the purposes of this analysis, the average growth rate of gross earnings covering the years 2001-2003, 2004-2008 and 2009-2019 was calculated, i.e. the subperiod before accession to the EU, EU membership before accession to euro area, and in the third subperiod Slovakia is a member of the euro area.

4. Results and discussion

Taking into account the parameters included in table 1 it can be stated, that among examined EU countries the β -convergence was confirmed. This is because the α_1 parameter value is negative and statistically significantly dependent on the initial level of average gross earnings. Moreover, obtained α_1 parameter estimation is also negative, t-student statistic value (-7.45375), p-value (0.0000) and coefficient of determination value (69.8%) also confirm existing β -convergence. The catching-up process took place among the 26 countries of the whole examined sample. Countries with lower initial wage levels recorded more rapid growth on average than those with higher initial wage levels.

Table 1. Results of the estimation of regression equation parameters in relation to β -convergence in 2009-2019

Specificationt	Value
α_1	-0.022464
standard error	0.003014
t-students statistics	-7.45375
Value p	0.000000
α_0	0.0250344
standard error	0.029803
t-students statistics	8.40008
Value p	0.000000
N	11
R ²	0.698335
β convergence	Yes
β ratio	0.025803

Source: own calculations based on Eurostat database

The β -coefficients, measuring the speed of convergence, stand at 2.58%. These coefficients allow us to estimate the time needed to reduce the wage gap between the examined countries by a half. If the average growth patterns observed in 2009–2019 continued, the countries of the enlarged EU would need about 26–27 years to reduce the distance to their hypothetical common steady state by a half. These results point to a relatively slow catching-up process between Central Eastern and Western Europe. Based on these estimates, it cannot be expected that CEE countries will reach the wage levels seen in Western Europe soon.

The σ -convergence was measured by gross earnings standard deviation logarithms. To achieve this, the regression equation (3) parameters were estimated. The procedure results are presented in table 2. Similarly to results obtained by the β -convergence, also the σ -convergence among countries surveyed in researched period was confirmed. Negative and statistically significant α_1 parameter value and other factors placed in table 2 (p values standing at 0,000009, coefficient of determination value at 0.899) demonstrate very good fit of regression function to empirical data. The σ -convergence existence denotes that gross earnings dispersion among examined EU member states is shrinking.

Table 2. Results of the estimation of regression equation parameters in relation to σ -convergence in 2009-2019

Specification	Value
α_1	-0.017226
standard error	0.001925
t-students statistics	-8.94744
Value p	0.000009
α_0	0.820874
standard error	0.013057
t-students statistics	62.86680
Value p	0.000000
N	11
R ²	0.898941
σ convergence	Yes

Source: own calculations based on Eurostat database

The Kendall concordance coefficient stand at 0.901538462. With p -values standing at 0.000000 significance level is high. The indicator at the level of 0.9 should be assessed as the almost complete absence of γ convergence, because value of 0 indicates γ convergence and value of 1 indicates no convergence.

Annual gross earnings as a percentage of EU-15 average were calculated only for four states: Czechia, Hungary, Poland and Slovakia (table 3). Examined countries upon accession to the EU represent a similar, low level of wages at the level of about one fifth of the old EU average. At the end of the analysed period, they reach the level of one third, which confirms the process of wage convergence. In the year preceding the accession to the euro area (i.e. 2008), average earnings were the lowest in Slovakia in the entire surveyed Visegrad group. Despite a noticeable increase, 11 years after joining the euro, wages in Slovakia are still somewhat lower than in the compared countries.

Table 3. Annual gross earnings as a percentage of EU-15 average

Country	2000	2004	2008	2009	2019
Czechia	15.1	20.0	30.9	30.6	37.8
Hungary	14.0	20.6	26.3	24.9	32.5
Poland	19.3	18.2	27.2	23.1	32.8
Slovakia	16.9	19.4	25.0	25.9	31.3

Source: own calculations based on Eurostat database

The average growth rate of gross earnings in 2009-2019, calculated on the basis of Eurostat data, is 3.75% in Slovakia, 3.59% in the Czech Republic, 3.68% in Hungary, 3.64% in Poland (see Table 4). Although in this group the highest wage growth rate was recorded in Slovakia, the differences are not significant, so it cannot be concluded on this basis about the positive impact of the euro on wages growth acceleration.

Table 4. Average growth rate nominal gross earnings in euro

Country	2001-2003	2004-2008	2009-2019
Czechia	11.1%	12.26%	3.59%
Hungary	13.86%	8.71%	3.68%
Poland	2.05%	9.98%	3.64%
Slovakia	4.36%	9.0%	3.75%
EU-15	1.94%	2.26%	1.62%

Source: own calculations based on Eurostat database

It must be remembered that the absence of convergence γ does not necessarily mean a lack of convergence β and the lack of reducing disparities in income levels between countries. If the less developed countries show a faster pace of growth, but not fast enough to overtake the more developed countries, then the β convergence occurs and there is a decrease in income disparities, but the γ convergence does not occur (Próchniak, 2019).

A weakness in the use of the time series of nominal wages denominated in euro is their sensitivity to fluctuations in the exchange rate. This may affect the results of the countries using the floating exchange rates.

The results of the present research are concordant with performed analyses of Diaz del Hoyo et al. (2017). Starting with the dimension of real convergence, in the period 1999-2016 income convergence towards the EU average occurred and was significant in some of the late euro adopters (the Baltics and Slovakia), but not in the south of Europe. As for CEE countries, it seems that the transition to a market economy and the integration into global value chains, alongside the incorporation of the *acquis communautaire*, have played a much more important role than the introduction of the euro per se (Diaz del Hoyo et al. 2017).

Papai (2017) points out that flexibility of the Slovak economy has declined. The monetary regime change in Slovakia in 2009 affected significant labour market frictions present in the Slovak Republic and the recession in the examined small open economy was mainly caused by shocks originating in the foreign sector. In the periods 2006-2008 the positive situation in the euro area significantly boosted the Slovaks economy. However, with the arrival of the recession, the foreign sector had become the main cause of the economic slowdown (Papai, 2017). On the other hand, the study of Kliber & Pluciennik (2017) finds that Euro adoption did not make Slovakia more vulnerable to the pan-European problems.

Parteka & Wolszczak-Derlacz (2015) suggest that despite a considerable rise in trade integration, which is also visible in cross-border flows of intermediates, there is no evidence supporting absolute skill-specific wage convergence in the EU-27. Both descriptive evidence and the results obtained from the regression models estimated show that wage differentials in the EU-27 prove to be highly persistent. Similar studies documenting strong cross-country wage differentials (Magda et al. 2011) combined with a lack of a (or a very slow) wage equalization process in Europe (Mora et al. 2005) and rejection of an unconditional wage convergence hypothesis (Egger & Pfaffermayr, 2004). In general the findings in the article compared to findings of other authors are corresponding.

Conclusions

In theory establishment of monetary union is expected to reduce wage differentials between the countries involved, especially accelerate convergence process in catching-up economies. Studies on the impact of the euro on the convergence of earnings are of particular interest for societies facing the decision whether and when to change the currency regime and adopt the common currency.

The β - and σ -convergence existence denotes that gross earnings dispersion among examined EU member states is shrinking. The insights are economically substantial and highly statistically significant. The first hypothesis has been confirmed: The convergence of earnings occurs between EU countries, wages in less developed CEE countries, with lower wage level, tend to grow faster than they do in wealthier ones, with higher wages. The catching-up process took place among the EU countries, but based on β -coefficients estimates, it cannot be expected that CEE countries will reach the wage levels seen in Western Europe soon.

The higher rate of wage growth in Slovakia as compared to other countries of the Visegrad group was also not confirmed, so it cannot be concluded on this basis about the positive impact of the euro on wages growth

acceleration. The second hypothesis: After the adoption of the euro, Slovakia is characterized by higher wage growth than the other countries of Visegrad group, was verified negatively.

This research used the nominal gross earnings in euro indicator only. This indicator is sensitive to exchange rate fluctuations, which may distort the results in relation to countries outside the euro area. Another limitation is the relatively short time series. We must remember that Slovakia joined to eurozone during last world economic crisis, what must have additional influence on economic indicators. For future research, it would be interesting to assess the impact of the Covid-19 pandemic on the pace of the wage convergence among "old" and "new" EU.

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