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OUTDOOR ADVERTISING EFFECTIVENESS EVALUATION FROM CUSTOMERS' VIEWS

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Abstract. This article aims to explore the techniques and features of outdoor advertising from customers' views. This article analyses outdoor advertising and outdoor advertising effectiveness. The literature analysis showed that previous studies on outdoor advertising peculiarities and effectiveness focused on different aspects of outdoor advertising; factors affecting attitudes towards new items and buying stimuli still need to be explored. This study aims to investigate contemporary methods and characteristics of outdoor advertising. The research questions are related to the purpose of the research. The authors seek to clarify which outdoor advertising elements are most effective and influence purchasing decisions. The study results showed that the most effective types of outdoor advertising were lighting advertising, advertising on outdoor screens, and mass advertising (large letters with brand names), with the new technologies playing the most critical role.

1. Introduction

Outdoor advertising is graphic, textual or other advertising information presented on unique stationary structures, in an open place or outside. It is one of the critical forms of marketing. Advertising in shopping centres, cinemas, gas stations or business centres is also classified as outdoor advertising. Outdoor advertising is compatible with creative solutions and innovations. Most often, these are interestingly designed showcases, raffles, or even the installation of instant cameras in the showcase. Outdoor advertising can also include other senses - window displays are created that can warm on cold winter days, play music of your choice, charge your phone or spread the smell of freshly baked buns and fragrant coffee. The planning of outdoor advertising depends on the set goals of the campaign, the target audience and the available budget. When investing in and actively using outdoor

advertising, it is recommended to conduct additional research - whether consumers saw the advertisement, how they understood the main message, and what they remembered. Many authors have studied outdoor advertising and its effectiveness, e.g. Belch and Belch (2004), Leppäniemi and Karjaluoto (2008), Ajzen (2012), Mohammadian and Pour Hosseini (2012), Vehovar et al. (2016).

At present, the effect of industrial outdoor advertising has intensified. Outdoor advertising is related to sales growth and higher demand. The current situation is problematic because the effectiveness of outdoor advertising needs to be a better-developed topic in the scientific literature. The research investigates the peculiarities of outdoor advertising effectiveness through customers' lenses.

 Objectives of the research are:
- to present outdoor advertising and outdoor advertising effectiveness concept;
- to apply the survey method relating it to outdoor advertising effectiveness in practice;
- to create recommendations based on the result of the research to develop outdoor advertising.

The article uses the method of theoretical analysis and quantitative research – the organisation of an online survey.

2. Theoretical background of outdoor advertising

Lichtenthal et al. (2006) stated that the use of outdoor advertising is deductively based on the unique characteristics of business markets, such as the geographic concentration of buyers, the need to direct members to the buying centre, the advantages of integrated communication, the ability to create derived demand and orientation to exhibitions. Outdoor advertising is a traditional type of advertising. Many small, medium and large business representatives choose outdoor advertising and agree that this is a great way to reach customers. Outdoor advertising encourages the behaviour of potential customers. Lopez-Pumarejo and Bassell (2009) mentioned that outdoor advertising is a good way of getting the target audience because it is becoming difficult for advertisers to reach people through other media.

Li (2019) noticed that advertisers also began to pay constant attention to outdoor advertising tools to increase the volume of advertising itself. Leonova et al. (2022) agreed and defined outdoor advertising as one of the essential components of mass media. Çiftçi and Karabulutlu (2020) mentioned that the most critical feature that distinguishes outdoor advertising from other types of advertising is that there is no additional need to pay any price to access the advertisement when it is showcased. This sector started with signboards or advertisements painted on buildings and has a very rapid development and change process. Murwonugroho and Wudarwati (2020) noticed that outdoor media is a form of advertising performed in public space, although its existence does not necessarily exclude the increasing use of social networks. However, at some point, people get tired of looking at a monitor or smartphone screen.

Many types and forms of outdoor advertising can be used to market a brand. Oni et al. (2019) defined different billboards used in non-commercial premises such as standing, portal, roof, curtain wall and street furniture. Swallehe et al. (2022) stated that billboards are the most visible form of advertising. Lai et al. (2017) said that digital outdoor advertising type makes outdoor advertising more flexible and allows advertising to respond to changes in target audience over time. To maximise the effectiveness of outdoor digital advertising, advertising should be targeted to deliver the right content in the proper format, at the right time, and in the right place.

Dhandyal et al. (2020) noticed that outdoor advertising is vital in reinforcing brand messages among people. Outdoor media encourages more research about brands among target customers. Dhanalakshmi and Geevarathna (2021) noticed that outdoor advertising is an effective way to advertise goods or services while simultaneously

conveying a brand message to a target audience in a more concentrated form. Simatupang et al. (2021) mentioned that outdoor advertising around the streets had become a typical sightseeing example in some cities. Fasi and Begum (2017) stated that outdoor advertising remains a popular form for companies that can afford mass media advertising. Companies like IBM, McDonald's, etc., spend thousands of dollars on outdoor advertising yearly. This interest has grown steadily over the years.

Gebreselassie et al. (2019) mentioned that colour is essential in increasing the recognition of outdoor advertising. If that colour is a corporate colour, consumers may think of that advertised company brand when they see it outside advertisements because corporate colours symbolise the product's image. That is, users will come up with advertising companies when ads use company colours advertised companies and consumers know what the colour is.

Kovačič (2012) article showed that there are vital initiatives to build more and more panels for outdoor advertising. His research presented the inability to escape from the effect of outdoor advertising - as the quantity of outdoor advertising is increasing, consumers are becoming more influenced by this media, especially when implementing modern 3D technologies. Grigaliūnaitė et al. (2016) conducted the eye tracking experiment to measure users' visual attention to specific criteria of internal factors affecting the effectiveness of outdoor advertising. The selected criteria were the font size of the headline, the number of elements in the advertisement and the dominant elements (visual or textual). The study's main results revealed that when the surface size of visual and text elements of outdoor advertising is equal, text elements attract more visual attention than visual elements, and advertisements with many elements attract more visual attention than those with a small number of elements. Gebreselassie et al. (2019) mentioned that colour is essential in increasing the recognition of outdoor advertising. If that colour is a corporate colour, consumers may think of that advertised company brand when they see it outside advertisements because corporate colours symbolise the product's image.

Nowadays, outdoor advertising is based on new technologies. Adel (2021) declared that the rapid development of new technologies had given organisations many opportunities to rethink new alternatives for communication and interaction with customers through technologies. Altrjman et al. (2022) agreed that leading companies are increasingly using advanced technologies that offer a dynamic way to interact with consumers. Many examples of technology usage can appear in scientific papers. Vangelov (2022) analysed digital outdoor advertising in Shanghai metro station, which promotes Nescafe products through an interactive, engaging and immersive experience – a game on a digital screen. Gan and Tsai (2021) stressed that using new technologies in outdoor advertising makes it possible to interact with consumers' sensory systems, such as vision, hearing, smell, taste, and touch.

Wei et al. (2021) mentioned that consumers might be exposed to outdoor advertising in many technologically innovative ways, and their purchasing behaviour or decision-making may be unintentionally influenced by such exposure. With the rapid development of the Internet and "big data", outdoor advertising is no longer content with posters or electronic displays. The increasing use of mobile phones in public places makes it convenient for consumers to scan Quick Response (QR) codes on outdoor advertisements for information. This also benefits marketers as they can attract more potential consumers. Even Google Street View can be used when detecting the attention of outdoor ad panels in images; it could replace the publicity appearing inside the boards with another from a different company (Morera et al., 2020). Augmented reality could be defined as one of the most frequently investigated features of outdoor advertising (Ciftci, Karabulutlu, 2020).

The effectiveness of outdoor advertising has been analysed in research papers. Donthu (1995) noticed the importance of external advertising of services and investigated the influence of consumer-related factors on its effectiveness. The results show that outdoor advertising is very effective. Gurumoorthy (2015) mentioned that despite the infrequent mention of the outdoors as an industrial advertising part, such marketing tools could be

very effective. Wilson and Till (2011) have used associative learning techniques to investigate the effects of outdoor advertising environments on attitudes, beliefs, and purchase intentions of the advertised brand. The four experiments showed that outdoor advertising is an effective marketing tool, and even the background environment does not affect the effectiveness of advertising. Lesser et al. (2013) mentioned that outdoor advertising is limited by the difficulty of determining how ads are noticed during a given period.

Alavijeh et al. (2019) stated that outdoor advertising is designed to attract the audience's attention. Authors have identified outdoor advertising effectiveness indicators: broad access and high frequency, geographic flexibility, creativity, high recall power, short and limited messages, and quite a low cost. Wei et al. (2021) defined three factors of incentive framing: call to action, definiteness, and incentive forms to identify the most effective ways to design incentives for outdoor interactive advertisements. Urban et al. (2020) recognised the association method as a possibility to evaluate the effectiveness of outdoor billboards. Wang et al. (2022) stated that the exposure strength, advertisement matching degree, and advertising repetition effect could characterise the advertising influence and effectiveness. Huang et al. (2021) research was based on models of how to control digital billboards based on when and where the specific ads appear. The results show that maximising the target audience and environment should be an efficiency criterion. Czajkowski et al. (2022) proposed a theoretical outdoor advertising model. They showed how the economic value of externalities associated with outdoor advertising in an urban environment could be assessed using specified preference methods.

According to Pluciennik and Heldak (2019), outdoor advertising significantly influences public space - advertisements can refer to a place, promote a brand, sign and image company; outdoor advertising has become an integral part of cities. Othman et al. (2020) agreed and examined how outdoor billboards explain advertising visuals' role in forming social spaces.

Despite the analysis of previous research, all investigations are focused on different areas of outdoor advertising, the attitudes towards new elements factors, and their influence on the purchase decision needs to be sufficiently detailed. This study aims to investigate the methods and peculiarities of outdoor advertising. Research questions are based on the aim of the study: which outdoor advertising elements can be the most effective and influence the purchase decision?

3. Research methodology and methods

The research is based on the quantitative research methodology. The purpose of quantitative analysis is to identify and isolate specific variables in the research context and to look for correlation, connections and causality (Park & Park, 2016). Using quantitative research, the objective is determined through empirical evaluation involving numerical measurement and analysis (Cooper & Schindler, 2012). This method uses scales that directly or indirectly provide numerical values. These values are then used in mathematical and statistical analysis to test and confirm the hypotheses (Degen, 2017). The research process often includes the following stages: hypothesis formulation, model creation, data collection, analysis and presented results (Cooper & Schindler, 2012; Park & Park, 2016; Degen, 2017). Thus, using quantitative research, it is possible to obtain detailed data from respondents and conduct proper research.

The research questionnaire is designed as an exploratory study. Collecting the data from respondents' perspectives towards outdoor advertising has helped in testing hypotheses designed for the study:

H0 - Respondents' selected factors, which encourage greater interest in outdoor advertising, do not depend on the level of influence (strong or weak) of outdoor advertising on the purchase decision.

Ha - Respondents' selected factors encourage greater interest in outdoor advertising, depending on the level of influence (strong or weak) of outdoor advertising on the purchase decision. An online questionnaire was distributed to find out the respondent's views and perceptions on outdoor advertising, and from there, the primary data for the research analysis was gathered. To gather the primary data in the form of survey answers online, a free online survey form by Google was used and distributed. The survey was based on the previous theory and research presented in this paper.

Due to limited resources, a non-probability sampling type was chosen for conducting the survey. Non -probability sampling is a sampling method which assumes that not all population is available to participate in the survey. Thus a small sample out of the whole population is being selected (Vehovar et al., 2016). Non-probability sampling does not treat the participants' possibilities equally, while probability sampling assumes that the whole population has identical odds of being chosen. The methods used for the distribution of the questionnaires were Snowball sampling method and Convenience sampling. The online survey was distributed from 1st October – 5th November, 2022. The total amount of participants is 300 people.

The questionnaire consists of 15 questions. The first set of questions introduces the topic and generates the overall perspective of participants' general attitude towards the issue of investigation. The second set of questions defines factors encouraging more significant interest in outdoor advertising. The third group of questions is dedicated to evaluating the content of outdoor advertising and the effectiveness of different types of outdoor advertising. Finally, the last section of the questionnaire is based on the demographical information of the participants, including gender and age (the questionnaire used is presented in the Annex).

Some questions were close-ended (Yes/No), elective, and the 5-point Likert scale was used. A 5-point Likert scale was used to measure the results, as suggested by Ajzen and Fishbein (2012). Based on the theoretical review of the literature, the main independent variables were chosen – attitude towards outdoor advertisement and purchase intention.

The collected data was exported from Google Forms and then submitted to the IBM SPSS program. Since all the questions were mandatory in the Google Forms, all questions were answered. This is why there has been no need to code the missing data fields explicitly. All the answers were transformed into numbers ranging from 1 to 5. The numbers were analysed using the IBM SPSS system to find the correlation between the respondents' responses and the research problems and to define if the raised hypothesis was correct.

3. Research results analysis

The survey involved 300 respondents, 32% of respondents were male, and 68% of respondents were female. The vast majority of respondents live in Vilnius and Vilnius district. As Table 1 indicates, having analysed the demographic characteristics of participants in this survey, most of them were over 41 years old (60%), and 26% of the respondents were in the age range of 18–25. The respondents' analysis has considered the influence of outdoor advertising on purchase decisions. The results show that 39% of the respondents evaluated the effect as neutral, 25% selected a very strong or strong impact on purchase decisions, and 21% defined weak influence.

Table 1. The demographic characteristics of the sample

	Frequency	Percentage
Gender		
Female	205	68
Male	95	32
Total	300	100
Age		
18–25	77	26
26–30	10	3
31–34	12	4
36-40	20	7
41 and more	181	60
Total	300	100
Influence of outdoor advertising on purchase decision		
Very strong	14	5
Strong	61	20
Neutral	118	39
Weak	63	21
Very weak	44	15
Total	300	100

During the study, it was essential to investigate the factors encouraging more significant interest in outdoor advertising. Research results show that according to most respondents (33%), integrating new technologies (e.g. display based on virtual/augmented reality) is essential. Links with other elements (e.g. to change the advertising message in outdoor advertising according to the time of day, UV radiation, air temperature, weather forecast, etc.) are defined by 19% of the respondents. 14% of respondents have selected outdoor showcases that can heat on cold winter days, 12% - outdoor showcases that can play music chosen (see Table 2).

Table 2. Factors, which encourage greater interest in outdoor advertising

Answer options	Number	Per cent
Integration of new technologies (e.g. display based on virtual/augmented reality)	202	33%
Links with other elements (e.g., change the advertising message in outdoor advertising according to the time of day, UV radiation, air temperature, weather forecast, etc.)	113	19%
Outdoor showcases that can heat on cold winter days	84	14%
Outdoor showcases that can play selected music	73	12%
Outdoor showcases that can charge the phone	70	11%
Outdoor storefronts that can emit freshly baked muffins and fragrant coffee, and other smells	69	11%

After analysing the factors that encourage greater interest in outdoor advertising, the hypothesis can be checked. The Spearman R - Spearman ordinal correlation coefficient was calculated to test the hypotheses. In this case, it was 0,0259. The significance level α = 0,05 was selected. In this case P-level—observational significance level refers to proving H0 hypothesis, and Spearman correlation coefficient is significantly close to zero. Respondents' selected factors, which encourage greater interest in outdoor advertising, do not depend on the level of influence (strong or weak) of outdoor advertising on the purchase decision.

During the study, it was also essential to investigate respondents' evaluation of the unique outdoor advertising content. The study results show that it is difficult for most respondents to evaluate which outdoor advertising

content can be memorable or forgotten. Nevertheless, it can be seen that most of the respondents assessed advertising dominated by visual content (pictures and colours) and advertising dominated by video content (changing images) in a positive approach (4-memorable and 5- very memorable) (Figure 2).

	1- Very forgotten	2 - Forgotten	3 - Neutral	4 - Memorable	5 - Very memorable
Advertising that contains brand name	8.1	15.1	33.8	27.9	15.1
Advertising dominated by visual content - pictures and colours	3.5	2.8	12.6	32.2	49.
Advertising dominated by video content - changing images	5.7	10.3	20.6	34.5	28.8
Advertising dominated by information-text	24.9	27.5	18.3	19.4	9.9

Fig 2. Respondents' evaluation (%) of what content of outdoor advertising is mostly memorable
Source: authors

Respondents were asked what aspects are most important in outdoor advertising. There can be seen that strategic location (24%), exceptional brightness and uniqueness (22%) and clarity and attractiveness of advertising text (20%) can be defined as the most critical aspects (see Table 3).

Table 3. Aspects that are most important in outdoor advertising

Answer options	Number	Per cent
Strategic location	203	24%
Special brightness and uniqueness	191	22%
Clarity and attractiveness of the advertising text	167	20%
The brand is highlighted symbols: brand, company colours	132	15%
Not too small dimensions	124	14%

Further analysis was focused on respondents' evaluation of the effectiveness of outdoor advertising types from 1- very ineffective to 5- very effective. Brightening advertising, advertising on outdoor screens, and bulk advertising (large letters with brand names) were evaluated as the most effective outdoor advertising types (mostly 4- effective or 5- very effective).

	1- Very ineffective	2 - Ineffective	3 - Neutral	4 - Effective	5 - Very effective
Bulk advertising (large letters with brand names)	3.6	9.4	28.3	35.5	23.2
Brightening advertisement	3.1	3.8	13.5	42.4	37.2
Advertising on outdoor screens	3.1	6.3	21.3	36.	33.2
Advertising stands, panels, awnings	6.4	10.4	38.9	28.6	15.7
Advertising on vehicles	7.5	21.5	31.9	29.	10.
Decoration of showcases	4.6	12.4	32.3	32.6	18.1
Advertising in shop windows	5.7	15.1	29.4	36.2	13.6

Fig 3. Respondents' evaluation of the effectiveness of outdoor advertising types
Source: authors

The presented research of 300 Lithuanian participants have concluded that most of the time, there can be seen neutral, sometimes very strong or strong impact of outdoor advertising on purchase decisions. Also, the factors encouraging more significant interest in outdoor advertising, evaluation of the unique outdoor advertising content

and effectiveness of outdoor advertising types were investigated. Integration of new technologies has shown the most substantial impact on effectiveness.

Conclusions

The analysis of the scientific literature showed that outdoor advertising remains a powerful marketing tool since it brings excellent results, is highly visible, and, by specific indicators, still outperforms its price campaign with other advertising options. Before starting to evaluate the effectiveness of advertising, it is essential to know the purpose of advertising. Many companies choose outdoor advertising to inform the user, attract new customers and, thus, increase the circle of customers and brand awareness. Companies choose this outdoor advertising to provide important information to people who are already aware of that brand.

The survey results show that:
1. According to most respondents, the most critical factor is the integration of new technologies (e.g. virtual/augmented reality display).
2. The factors selected by the respondents that encourage greater interest in outdoor advertising do not depend on the influence (strong or weak) of outdoor advertising on the purchase decision.
3. During the research, it was essential to investigate the respondents' assessment of what outdoor advertising content they remember the most. The study results show that it is difficult for most respondents to assess what outdoor advertising content can be remembered or forgotten. However, it can be seen that advertising dominated by visual content (pictures and colours) and advertising dominated by visual content (changing images) were positively evaluated by the majority of respondents.
4. Brightening advertisement, advertising on outdoor screens, and bulk advertising (large letters with brand names) were evaluated as the most effective outdoor advertising types so it can be recommended the brands rely more on those types of outdoor advertising.

Novelty and research limitations: the study's novelty is in attempts of evaluating the effectiveness of outdoor advertising, which is not very intensively studied in the scientific literature.
Limitations of the study: the study examined the peculiarities of the effectiveness of outdoor advertising in Lithuania, and the conclusions cannot necessarily be applied to other countries.

Annex. Survey questionnaire

1. When is the last time you remember seeing outdoor advertising?
• This week
• Last week
• Last month
• During a period of 3 months
• I don't remember seeing it

2. What content of outdoor advertising do you remember the most? Rate from 1 to 5.
• Advertising that includes the brand name
• Advertising dominated by visual content - pictures and colours
• Advertising dominated by video content - changing images
• Advertising dominated by information–text

3. Rate the effectiveness of types of outdoor advertising from 1 to 5:
* bulk advertising (large letters with brand names)
* illuminating advertising
* advertising on outdoor screens
* advertising stands, panels, awnings
* advertising on vehicles
* decoration of showcases
* advertising in shop windows
* other.

4. Choose which aspects are most important in outdoor advertising (you can tick several):
• exceptional brightness and uniqueness
• not too small dimensions
• clarity and attractiveness of the advertising text
• corporate symbols are highlighted: brand, corporate colours
• strategic location
• a long period of use of outdoor advertising

5. Evaluate the influence of outdoor advertising on your decision to buy in a 5-point system (1 - no influence, 5 - very influential)

6. What would encourage greater interest in outdoor advertising? You can select multiple.
• Integration of new technologies (e.g., stands based on virtual/augmented reality)
• links with other elements (e.g., to change the advertising message in outdoor advertising according to the time of day, UV radiation, air temperature, weather forecast, etc.)
• outdoor showcases that can provide warmth on cold winter days
• outdoor showcases that can play music of your choice
• outdoor showcases that can charge your phone
• outdoor display cases that can emit freshly baked muffins and fragrant coffee, and other smells

7. Where do you most often see brand ads?
• In outdoor advertising
• On television
• On the radio
• In the press
• On the Internet

8. Your gender:
• Man
• A woman

9. Your age:
•18-25 years old
•26-30 years old
•31-35 years old
•36-40 years old
•41 and over

10. Your place of residence (type by yourself).

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ASSESSMENT OF THE INNOVATION POTENTIAL OF THE SELECTED REGIONS[*]

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Abstract. Assessment of innovation potential is becoming an increasingly urgent problem. Many scientists and researchers are interested in this issue, alas, evaluate innovation potential differently. Some scholars emphasize resources, while others think about the achieved result. Another group of researchers focus on the transition process from resources to results while evaluating innovation potential. This paper attempts to integrate the three basic approaches (resource, process and resulting) and suggest a combination of known innovation potential assessment methods. The author claims that the innovation development goal is the result (abilities) and initial resources (opportunities) and stresses a process of transformation into an innovative product. The author offers an original definition of the innovation potential of a region. Complex evaluation with the sum method leads to an original integral indicator. Selected geographical areas are grouped into quintiles; the obtained results are depicted on maps for more convenient perception and visualization. The obtained results are interpreted, and policy implications are suggested.

Keywords: innovation; innovation potential; innovation potential evaluation methods; Latvia; Lithuania; other neighbouring countries

1. Introduction

The competitiveness of regional goods and services is vital for the economic development of any region. Regional production can play an essential role in this aspect. Innovations are one of the main factors in the region's growth.

Assessing the region's innovation potential is crucial for substantiating the regional innovation policy and developing regional development programs facilitating the effective use of regional innovation resources.

The purpose of the presented research is to develop a methodology for assessing the innovation potential of regions. Latvia, Lithuania and Belarus are selected as geographical areas, which are evaluated and compared.

Here it has to be noted that Belarus, as the geographical area for the research, was selected before dramatic events took part in the state. In addition, it has to be stated that in the given study, the innovation potential of the selected regions is not a key issue. Still, it is essential to reveal differences in results when different methods are used.

The following tasks have been set to achieve the goal:
- to analyze the theoretical and methodological foundations of regions' innovation potential;
- to determine the indicators of the innovation potential from the point of view of the resource approach;
- to determine the indicators of the innovation potential from the point of view of the process approach;
- to determine the indicators of the innovation potential from the point of view of the result approach;
- to compare the results of different basic approaches and to propose a method for evaluating the innovation potential in different regions.

Methods of the research: logical analysis and synthesis; monographic, analytical, logical-constructive methods of researching international economic theoretical and empirical sources; method of the sum of the coefficients of determination of the largest dependent variable using the explanatory variable; method of linear scaling principle; frequency analysis; correlation analysis; sum method analysis; quintile grouping method; cartographic method and other methods of statistical analysis.

The scientific novelty of the research:

- epistemological aspect – new data on the innovation potential of regions and the essential interrelationships of resources have been obtained in the research process;
- methodological aspect – the methodology for determining the innovation potential of regions developed and approved by the author;
- the author clarifies the content of the concept of innovation potential and adapts it to the regional context within the given research, emphasizing the connection with initial resources.

The practical value of the research:
- the research can be used in practice at various levels of state structures to develop policies that would stimulate the implementation and development of innovations in specific regions;
- the author determines the level of innovation potential development, which is an essential prerequisite for the development of an investment policy;
- the author identifies regions with a labour shortage, which creates additional opportunities for the implementation of interregional development policy, and the need for universities to improve training programs for qualified employees in the field of innovation.

The author does not analyze most of GII (Global Competitiveness Index) indicators, which is since many of these indicators are not collected in official statistics in the regions of the given research, some of them are not available at all or are only available at the national level or are available in several regions. Thus, the author uses selected (Schumpeter, 1939; Schlesinger Jr., 1986; Freeman, 1995; Farrow, 2021; Carlström, 2022; Erdin & Caglar, 2022; Franco et al., 2022.; Jaiswal et al., 2022; Liu & Shao, 2022) and available indicators, which will be used for evaluation of innovation potential of the regions of selected countries.

2. Theoretical and methodological framework of innovation potential

The concept of innovation is quite complex. Schumpeter (1939); Mensch (1979); Whitfield (1979); Twiss (1989); Fukuda and Watanabe (2012); Lukjanska (2014); Freeman (2017); Hudakova, Fila and Marosh (2018); Waldron and Wetherbe (2020); Liu and Shao (2022); Maâlej (2022), Mikelsone, Spilbergs, Volkova and Liela (2022); Nikina-Ruohonen (2022); Repeshko (2022); Sawalkar, Shinde, Mali, Parlikar and Mortale (2022) and many other scientists also studied a wide range of phenomena impacted by various types innovations.

Scientists (e.g. Schumpeter, 1939; Schlesinger Jr., 1986; Twiss, 1989; Sangadiyev et al., 2006; Lunarski et al., 2007; Drucker, 2009; Freeman, 2017; Hudakova et al., 2018; Langham et al., 2020; Waldron et al., 2020; Farrow, 2021; Shvets et al., 2021; Andriushchenko et al., 2022; Franco et al., 2022; Heilala, 2022; Liu et al., 2022; Maâlej, 2022; Mikelsone et al., 2022; Nikita-Ruohonen, 2022; Repeshko, 2022; Sawalkar et al., 2022; Sheffield et al., 2022; Shvindina et al., 2022; Sinclair-Desgagne, 2022; White, 2022) analyze innovation though different lenses. They look at this broad phenomenon via changes, resources, processes and results.

The concept of innovation potential follows from the definition of innovation.

Poznanska (1998) asserts that innovation potential is the ability to implement innovations effectively, i.e., to introduce new products, technologies, organizational methods and marketing innovations. Innovation potential understood in this way depends on four main elements: financial potential, human potential, material potential, and knowledge.

Nikolayev (2001) believes it is a system of factors and conditions necessary to implement the innovation process.

Zhits (2007) understands innovation potential as available economic resources that society can use to develop at a given moment. He mentions scientific-technical, educational potential and investment potential. The set of these factors, according to Zhits, constitutes the innovation potential of the macro system.

Davies, Gann and Douglas (2009) argue that the innovation potential can be enhanced via collaborations between different structures.

Hudakova, Fila and Marosh (2018) consider the innovation potential of regions as the primary source of their competitiveness in achieving their economic, social and environmental goals.

The GII (Global Innovation Index) 2021 model includes 81 indicators, which fall into three categories: quantitative data (63 indicators), index data (15 indicators) and qualitative data (3 indicators), including indicators relating to the political situation, education system, infrastructure and knowledge creation in each country.

Maâlej (2022); Chehabeddine, Grabowska and Adekola (2022) point out that innovation is essential in the environmental dimensions of economic growth.

Shvindina, Taraniuk, Kotenko, Abayomi, Taraniuk and Qiu (2022) understand the innovation potential as a difference between the system's current state in terms of innovation performance and its potential outcomes based on existing innovative capabilities.

Most of the current research in this area is mainly general and theoretical or is devoted to solving innovation management issues. The growing role of innovation potential has created the need for a scientific understanding of problems related to research, development, management of innovation processes, stimulation of innovation activity and commercialization of innovations. In the 1950s-1960s, the problems of scientific and technological development aspects were evaluated mainly at the macro level, with the definition of the concept in the context of a broad approach as measures that promote or hinder countries' economic growth. Since the 1970s, scientists' interest in innovation development problems gradually moved from macroeconomic to microeconomic tasks. Since the 90s of the XX century, scientists have evaluated the development of innovation potential at the meso-level, considering it a combination of different types of resources, which is a relatively narrow definition of this

economic category. Still, some scientists associate this concept with the result of innovation activity, which also narrows the explanations to the innovation process for the resulting product. The author believes that scientists do not pay enough attention to the abilities and opportunities for the implementation of innovation activity in the definition of innovation potential at the meso-level, because this interpretation indicates the type of innovation development, the goal of which is the result (abilities) and the initial resources (opportunities), and the existence of a connection should also be emphasized with the transformation of resources into an innovative product.

Thus, the innovation potential of the region is the readiness of the region for innovation, which is manifested as the opportunity and ability of the region to transform the initial resources available to the region into a competitive and market-demanded innovation - a new product or service.

3. Evaluation methodology of the innovation potential

The structure of innovation potential is different for various levels of the economy. When determining the innovation potential of the region, the level of innovation development of the regional economy should be assessed, as well as the opportunities of innovation development of existing organizations in the specific territory. Assessment of the region's innovation potential must be related to different components (see Figure 1).
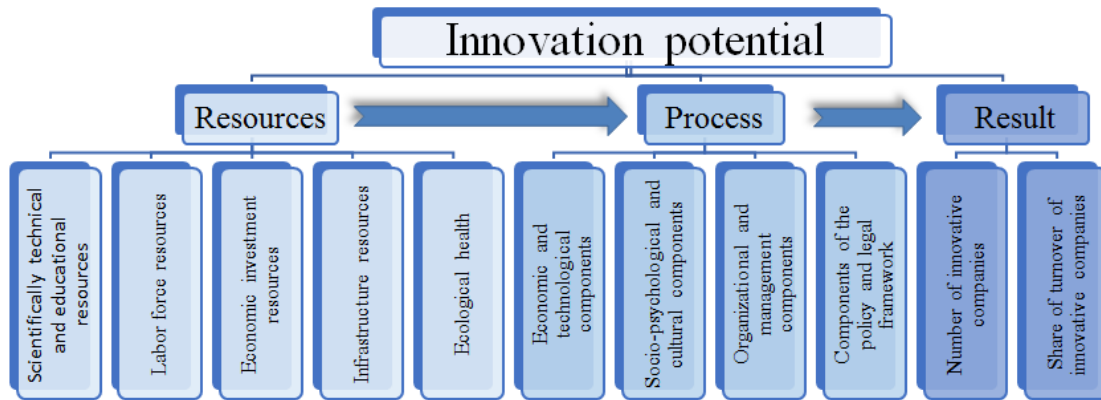
Figure 1. Structure of the innovation potential in the innovation system

Source: made by author using critical review of literature provided above

The author examines the region's innovation potential according to the following components (Santo, 1990; Matveykin et al., 2007; Drucker, 2009; Agarwal et al., 2022; Birkner et al., 2022; Bychin, 2022; Carlström, 2022; Erdin & Caglar, 2022):
- The resource component:
  - scientifically technical and educational resources, which include the number of scientific research centres and the number of people employed in them, the number of students in secondary schools of general education, the number of students enrolled in vocational schools and universities, the number of public education schools, number of libraries, distribution of companies by main types of activity, etc. indicators in relative units of measurement;
  - labour force resources, which include population density, population up to working age, at the working age, above the working age, natural increase, migration rate, level of demographic burden, economic activity, birth rate, mortality rate, employment rate, unemployment, etc. indicators in relative units;

- o financial investment resources, which include GDP, inflation, average wages, value-added indicators by types of activity, distribution of companies by main types of activity, accumulated direct foreign investments, non-financial assets, number of companies, number of people employed in agriculture, purposes of citizens' use of the Internet, etc. indicators in relative units;
  - o infrastructure resources, which include the relative indicators of the region's territorial area, share of cities in the total number of cities, counties or districts of the country, percentage of counties or districts in the total number of cities, counties or districts in the country, distribution of the territory by land type, road density, agricultural land, forestry, swamps and land of water bodies, computer and Internet availability, purposes of Internet use, provision of passenger cars, etc. indicators in relative units;
  - o ecological health, which includes indicators of emissions of harmful substances into the atmosphere (kg per capita), relative indicators of the chemical composition of harmful substances;
- process component:
  - o Economic and technological components;
  - o Socio-psychological and cultural components;
  - o Organizational and management components;
  - o Components of the policy and legal framework;
- result component:
  - o number of innovative companies;
  - o share of turnover of innovative companies.

The innovation management style depends on the level of technological and economic development of the economy and the innovation potential of the territory.

Summarising the above, the main principles of the innovation potential development are determined:

- the development of science and technology at the current stage cannot be isolated from each other;
- innovation and technological development lead to profound structural changes in the economic, social and political fields;
- for the effective implementation and development of science and technology, appropriate economic conditions and institutions must be created;
- the development of innovations can have not only positive but also negative consequences;
- economic downturn creates a new wave of innovation development;
- the development of innovation and technologies is cyclic;
- based on the analogy with natural systems, economic development can be viewed through the prism of innovation ecosystems, the distinguishing feature of which is the ability of internal dynamics and development under the influence of both endogenous and external factors;
- innovation potential can be defined as a combination of different resources: science, education, labour, economy, investment, infrastructure, and ecological.

The given classification of approaches is also still being determined. These approaches can be created entirely differently if other criteria are accepted and used, for example, directly using strategies to define the concept of innovation potential.

Regional innovation development must meet at least two requirements:

- transfer national-level powers to the regional level,
- promote the development of the state, society and private organizations in the specific region.

The innovation potential at the regional level is a strategic factor in the market, which is part of the overall business development strategy aimed at gaining or maintaining the leading position in the sector. With the development of innovation potential, it is possible to create competitive products to ensure long-term growth.

Creating an integral indicator by the selected indicators

The method of creating the integral indicator consists of several stages:
- unification of statistical data according to the principle of linear scaling, determining the value range in the row interval [0; 10] according to the following formulas: (Ayvazyan, 2005):
  - indicators-stimulants: $x'_{ij} = \dfrac{x_{ij} - x_{\min j}}{x_{\max j} - x_{\min j}} * 10$ (1)

  - indicators-destimulants: $x'_{ij} = \dfrac{x_{\max j} - x_{ij}}{x_{\max j} - x_{\min j}} * 10$ (2)

where x'_{ij} — "j" the unified notation for the region "i",

$x_{\min}$ – the lowest (worst) value of the output indicator in the study period,

$x_{\max}$ – the output indicator's highest (best) value in the study period.

- dimension reduction for the selection of the innovation potential diagnostic indicators from the wide range of available statistical indicators, which can replace all previous indicators without reducing the objectivity of the results and exclude indicators with duplicate or similar meanings:
  - correlation coefficient (r(Pearson)) calculation for statistical indicators by the formula: (3)

$$r(\text{Pearson}) = \frac{\sum_{i=1}^{n}(x_i - \bar{x}) \cdot (y_i - \bar{y})}{(n-1) \cdot S_x \cdot S_y} = \frac{\text{cov}(x, y)}{\sqrt{S_{x}^{2} S_{y}^{2}}},$$

  - calculation of coefficients of determination for statistical indicators, where the significance of correlation coefficients is within the range [0,01;0,05] by the formula: $R^2 = r^2,$ (4)
  - calculation of the sum of the obtained coefficients of determination for each statistical indicator:

$$y_i = \sum_{j=1}^{m} R^2{}_{ij} ,$$ (5)

  - selection of statistical indicators according to the obtained sums of determination coefficients using the logical and largest sum principle.

- creation of the integral indicator based on the selected indicators:
  - aggregation of indicators of factors determining innovation potential:

$$y_{ij} = \sum_{j=1}^{m} x_{ij} ,$$ (6)

- o unification of the values of the obtained innovation potential factors, determining the value in the row interval [0;10] by the formula 1,
- o aggregation of the obtained unified values of innovation potential factors in creating an integral indicator of the region's innovation potential:

$$y_i = \sum_{j=1}^{m} x_{ij} , \qquad (7)$$

- o unification of the obtained innovation potential values determining the value range within the interval [0;10] by the formula 1.

4. Empirical data and analysis

The following regions are included in the study:

Latvia - 6 statistical regions (Order of the Cabinet of Ministers No. 911 of 07.12.2021 "About the statistical regions of the Republic of Latvia and the administrative units included in them" 2021): Riga region, Pieriga region, Vidzeme region, Kurzeme region, Zemgale region, Latgale region.

Lithuania - 10 counties (Law of Republic of Lithuania No I-558 "Law on the Territorial Administrative Units and their Boundaries" 1994): Vilnius county, Alytus county, Kaunas county, Klaipeda county, Marijampole county, Panevežys county, Siauliai county, Taurage county, Telšiai county, Utena county.

Belarus (Law of Republic of Belarus 154-3 "On the administrative and territorial division and the procedure for solving the issues of the administrative and territorial organization of the Republic of Belarus" 1998): 6 oblasts: Brest oblast, Vitebsk oblast, Gomel oblast, Grodno oblast, Minsk oblast, Mogilev oblast, Minsk (capital).

The studied regions are border areas of the EU and the CIS: Latvia and Lithuania are EU members, and Belarus is a CIS member.

Evaluation of the resource component of the innovation potential of the selected regions

The author unifies statistical indicators by applying the linear scaling principle, dividing the indicators into indicators-stimulants and indicators-destimulants. As a result, the range of indicator values is determined within the interval [0;10].

The author performs dimension reduction for optimization of statistical indicators using the method of the sum of the coefficients of determination of the most significant dependent variable by the explanatory variable and evaluates the innovation potential according to the following indicators:

- • scientifically technical and educational resources:
    - o the number of scientific research centres per 100,000 inhabitants,
    - o the number of people employed in scientific research centres per 100,000 inhabitants,
    - o the number of students enrolled in vocational colleges per 10,000 inhabitants,
    - o the number of students enrolled in higher education institutions per 10,000 inhabitants,
    - o number of general education schools per 10,000 inhabitants,
    - o number of library visitors per 100,000 inhabitants,
    - o distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - scientific and technical services;
- • labour force resources:
    - o population density (people/sq.km),
    - o population up to working age, %,
    - o population at the working age, %,
    - o the level of the demographic burden - in total,
    - o employment level, %,

- o unemployment level, %,
  - o economic activity, %;
- economic investment resources:
  - o GDP per 1 inhabitant, euro,
  - o distribution of companies by main types of activity in selected countries and their regions, % - production,
  - o distribution of companies by main types of activity in selected countries and their regions, % - power industry,
  - o distribution of companies by main types of activity in selected countries and their regions, % - information and communication,
  - o distribution of companies by main types of activity in selected countries and their regions, % - education, healthcare, social work,
  - o the amount of accumulated foreign direct investment in the region relative to the total amount in the country, %,
  - o non-financial assets, in actual prices, in the region relative to the total volume of the country, %,
  - o inflation,
  - o average salary (gross), euro,
  - o total number of enterprises (micro (small), small, medium, large) per 1000 inhabitants,
  - o purposes of inhabitants' internet use – for internet banking, %,
  - o purposes of inhabitants' internet use – for goods sale, %;
- infrastructure resources:
  - o the proportion of cities in the total number of cities of the country, %,
  - o the proportion of counties or districts in the total number of cities of the country, %,
  - o the ratio of the area of the region in the whole area of the three countries, %,
  - o agricultural land, %,
  - o land of other types, %,
  - o road density per 1000 km^2 of the territory,
  - o Internet availability in various households, %,
  - o provision of passenger cars per 1000 inhabitants,
  - o purposes of inhabitants' internet use – for information search, %,
  - o purposes of inhabitants' internet use – receiving/sending e-mails, %,
  - o purposes of inhabitants' internet use – for communication with the state, %;
- ecological health:
  - o emissions of harmful substances into the atmosphere (kg per inhabitant),
  - o emissions of harmful substances into the atmosphere, kg per inhabitant - solid particles,
  - o emissions of harmful substances into the atmosphere, kg per inhabitant – carbon monoxide,
  - o emissions of harmful substances into the atmosphere, kg per inhabitant - other substances.

The author evaluates each resource included in the innovation potential with the help of an integral indicator, summing up the indicators of each resource and determining the value in the row interval [0;10].

The author evaluates the innovation potential of regions with the help of an integral indicator, summing up the resources included in the innovation potential and determining the range of the indicator's value in the interval [0;10].
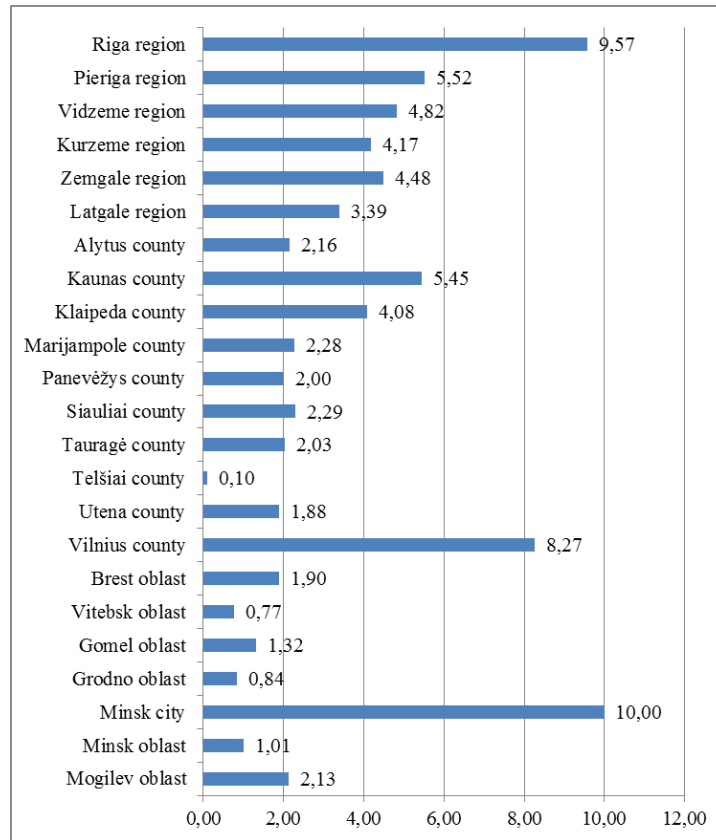
Figure 2. Evaluation of the resource component of the innovation potential of Latvia, Lithuania and Belarus regions.
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the developed innovation potential evaluation methodology

According to the obtained results, the author classifies the regions of Latvia, Lithuania and Belarus, dividing the value series into quintiles (see Figure 3). The first quintile group includes areas with meagre innovation potential, while the fifth has very high innovation potential.
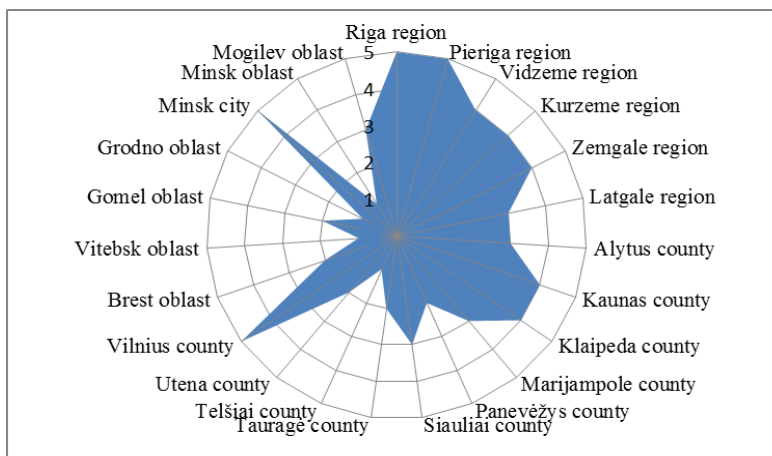
Figure 3. Map of the quintile groups of the innovation potential resource component of the regions of Latvia, Lithuania and Belarus
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the developed innovation potential assessment methodology

The map of quintile groups shows that the regions of Latvia have a relatively high level of innovation potential, the regions of Lithuania have a lower level of innovation potential, and the regions of Belarus have a deficient level of innovation potential. A very high innovation potential has been found in the capital cities. Still, in the other areas – there is a much lower level of innovation potential, which, according to the author, is related to the flow of resources towards the capital cities. The China-Belarus Innovation Commercialization Center largely determines the development of the innovation potential of Minsk; in Riga - by the Innovation and Technology Transfer Center of Riga Technical University (RTU), and in Vilnius - by the laser research and production company *"Šviesos konversija*".

The most significant quantitative and structural differences between capital cities and other regions' innovation potential can be observed in Belarus. Minsk has the highest rating for innovation potential, while the other regions have low values.

Assessment of the process component of the innovation potential of the Latvian, Lithuanian and Belarusian regions

The author surveys experts to assess the process component of the innovation potential of Latvia, Lithuania and Belarus regions.
The circle of experts consists of 30 persons, among whom are the following specialists:
- 10 state and local government administration employees,
- 10 employees of scientific institutions (researchers, lecturers, professors, etc.),
- 10 business representatives.

The author divides the expert survey into four blocks. The author in each block identifies the factors that promote and hinder the development of innovation potential.
The first block is dedicated to economic and technological components:
- existence of a financial reserve,
- presence of a reserve of material and technical means,
- modern technologies,
- the existence of the necessary economic infrastructure,
- the required scientific and technological infrastructure,
- cooperation between different bodies,
- lack of funds to finance innovation projects,
- insufficiency of the material base,
- insufficient scientific and technical base,
- lack of spare capacity,
- the dominance of current production interests.

The second block reflects the socio-psychological and cultural components:
- moral remuneration of participants in the innovation process,
- public recognition,
- possibility of self-realization,
- opportunity for creative work,
- acceptable psychological climate in the work team,
- resistance to changes that may lead to changes in the status of employees,
- resisting change that may necessitate finding a new job,
- resistance to changes that may lead to the restructuring of new jobs,
- resistance to changes that may lead to the reorganization of certain activities,
- resistance to changes that can lead to breaches of behavioural stereotypes and established traditions,
- fear of uncertainty,
- fear of penalties for failure.

The third block consists of organizational and management components:
- the flexibility of the organizational structure,
- democratic leadership style,
- the predominance of horizontal information flows,

- self-planning,
- allowing adjustments,
- decentralization,
- autonomy,
- formation of target work groups,
- the existence of a motivation policy for the creation of clusters,
- a constant organizational structure of the company,
- excessive centralisation,
- authoritarian leadership style,
- the predominance of vertical information flows,
- secrecy of public authorities,
- difficulties in cross-sectoral and inter-organizational interactions,
- the rigour of planning,
- focusing on existing markets,
- emphasis on short-term repayment,
- difficulties in reconciling the interests of innovation actors,
- cluster formation - lack of motivation to create clusters.

The fourth block consists of the components of the policy and legal framework:

- legislative measures (especially incentives) that encourage innovation,
- state support of innovation,
- policy to support transnational economic cooperation,
- antitrust restrictions,
- tax law restrictions,
- restrictions on depreciation legislation,
- restrictions on licensing patent law,
- political barriers to international economic cooperation.

The author offers the respondents to evaluate the factors of each block in the interval from 1 to 5, where:

- 1 – completely uncharacteristic,
- 2 – uncharacteristic,
- 3 – semi-characteristic,
- 4 – characteristic,
- 5 – entirely characteristic.

The author assesses the process component of the innovation potential of the regions using an integral indicator, defining a range of indicator values in the interval [0;10] and dividing the series of values of the process component of the innovation potential into quintiles for comparison and analysis.

Table 1. Standardized values and quintile groups of the innovation potential process component of the regions of Latvia, Lithuania, and Belarus

Region	Normalized values	Quintile groups
Riga region	8,87	4
Pierina region	7,37	4
Vidzeme region	1,58	2
Kurzeme region	2,95	4
Zemgale region	1,11	1
Latgale region	0,57	1
Alytus county	2,40	4
Kaunas county	5,31	4
Klaipeda county	8,29	4
Marijampole county	2,18	3
Panevežys county	1,91	3
Siauliai county	3,28	4
Taurage county	2,28	3
Telšiai county	2,09	3
Utena county	1,82	2

Vilnius county	8,18	4
Brest oblast	0,75	1
Vitebsk oblast	2,33	3
Gomel oblast	1,29	2
Grodno oblast	1,36	2
Minsk city	10,00	5
Minsk oblast	0,10	1
Mogilev oblast	1,17	2

Source: author's calculations based on the statistical indicators of the regions of Latvia, Lithuania and Belarus, using the developed innovation potential assessment methodology

The author presents the obtained results in a diagram to provide a more convenient and straightforward analysis.
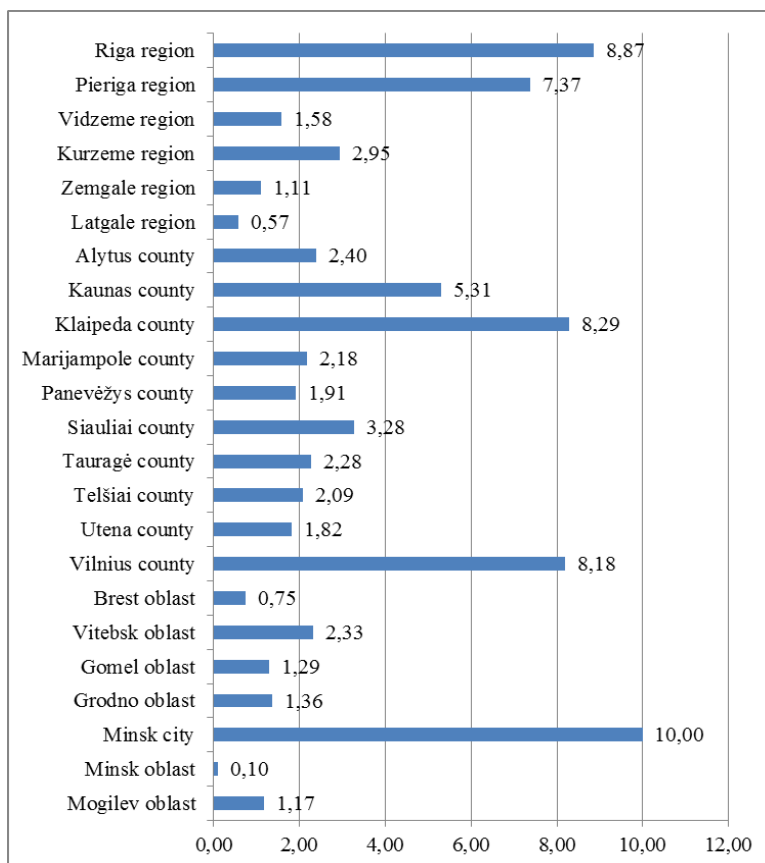
Figure 4. Evaluation of the process component of the innovation potential in the regions of Latvia, Lithuania and Belarus
Source: made by the author based on the data of the regions of Latvia, Lithuania and Belarus, using the innovation potential assessment methodology developed by the author

The highest value of the process component of the innovation potential is obtained by Minsk (10,00 normalized values), Riga region (8,87 normalized values), Klaipeda county (8,29 normalized values), Vilnius county (8,18 normalized values), Pieriga region (7,37 normalized values). The lowest value of the process component of the innovation potential is obtained by Minsk oblast (0,10 normalized values), Latgale region (0,57 normalized values), Brest oblast (0,75 normalized values), Zemgale region (1,11 normalized values), Mogilev oblast (1,17 normalized values), Gomel oblast (1,29 normalized values), Grodno oblast (1,36 normalized values).

For a more detailed analysis of the obtained results, the author creates a quintile groups map of Latvia, Lithuania and Belarus regions.
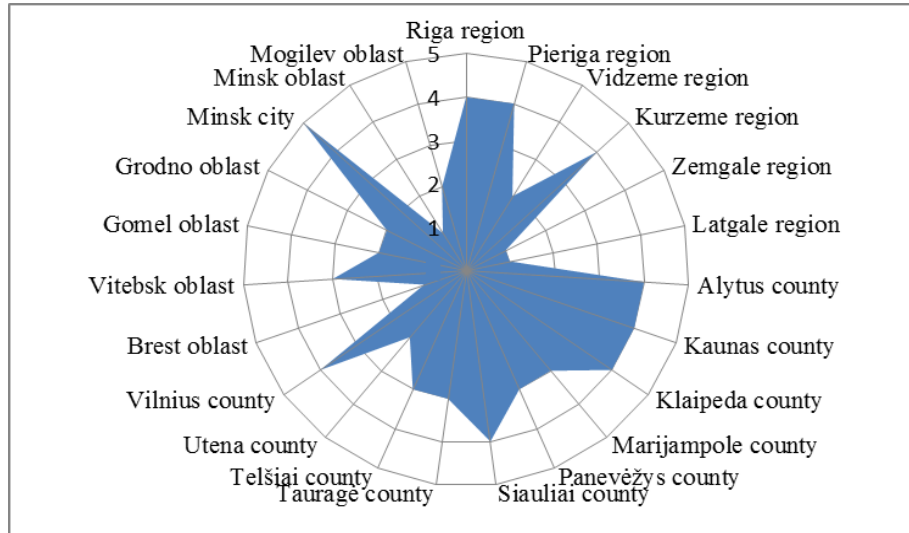
Figure 5. Map of quintile groups of innovation potential process components of Latvian, Lithuanian, and Belarusian regions
Source: developed by the author, based on the data of the regions of Latvia, Lithuania and Belarus, using the suggested methodology

The first quintile group includes Zemgale region, Latgale region, Brest region and Minsk region. The second quintile includes Vidzeme region, Utena county, Gomel oblast, Grodno oblast, Mogilev oblast. The third quintile includes Marijampole county, Panevėžys county, Tauragė county, Telšiai county, Vitebsk oblast. The fourth quintile includes Riga region, Pieriga region, Kurzeme region, Alytus county, Kaunas county, Klaipeda county, Siauliai county, and Vilnius county. The fifth quintile includes Minsk.

According to the values of the integral indicator of the process component of the innovation potential, the highest rating is obtained in Minsk (5th quintile). This is mainly because of the Belorussian China Innovation Center in Belarus, Minsk, which was established in 2010 as a part of the National Innovation Development Program of the Republic of Belarus. Innovation potential as transfer of resources into results is also well managed in the Riga region, Pieriga region, Kurzeme region (Republic of Latvia), Alytus county, Kaunas county, Klaipeda county, Siauliai county, Vilnius county (Republic of Lithuania). Several innovation development centres operate in these regions. There is a high level of development of the process component of innovation potential in capital cities and large urban areas, which the one-way influence of various factors can explain.

Assessment of the result component of the innovation potential of the Latvian, Lithuanian and Belarusian regions

The author evaluates the innovation potential result component with the help of an integral indicator, determining its values in the interval [0;10] and dividing the series of values into quintiles.

Table 2. Standardized values and quintile groups of the innovation potential result component of the regions of Latvia, Lithuania, and Belarus

Region	Normalized values	Quintile groups
Riga region	5,66	3
Pierina region	4,68	3
Vidzeme region	5,61	3
Kurzeme region	3,95	2
Zemgale region	5,41	3
Latgale region	2,58	2
Alytus county	7,52	4
Kaunas county	9,70	5
Klaipeda county	8,40	4
Marijampole county	6,99	4
Panevežys county	6,61	3
Siauliai county	7,55	4
Taurage county	10,00	5
Telšiai county	8,63	4
Utena county	9,26	5
Vilnius county	9,63	5
Brest oblast	1,32	1
Vitebsk oblast	2,72	2
Gomel oblast	1,74	2
Grodno oblast	0,63	1
Minsk city	2,40	2
Minsk oblast	0,34	1
Mogilev oblast	0,10	1

Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

The highest value of the innovation potential result component is obtained by Tauragė county (fifth quintile group) and the lowest by Mogilev oblast (first quintile group).
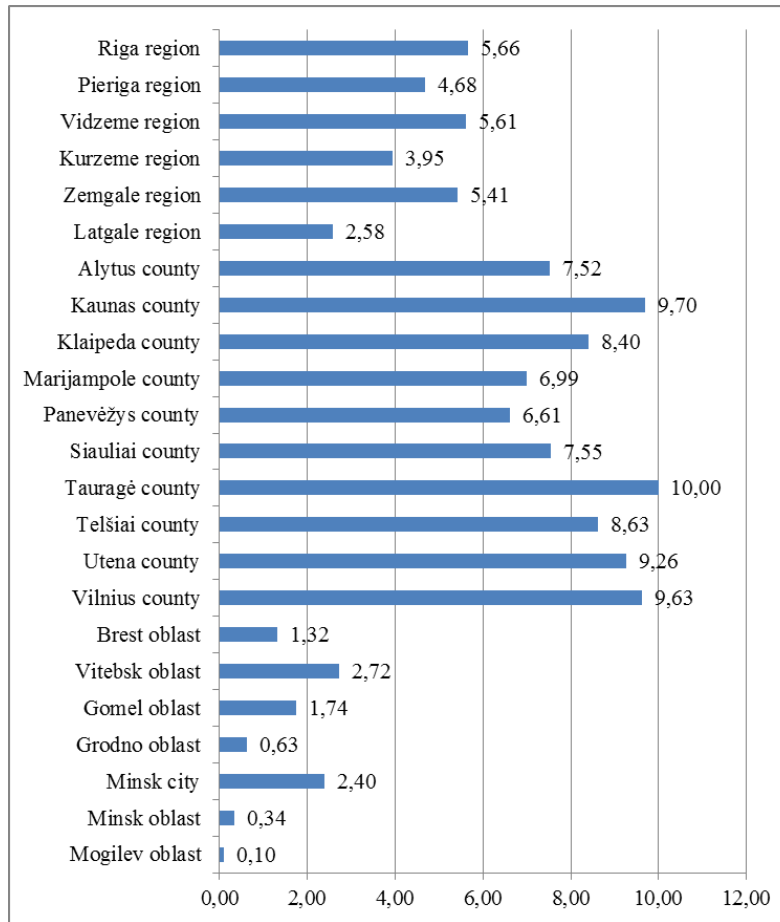
Figure 6. Assessment of the innovation potential result component of the regions of Latvia, Lithuania and Belarus
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

High values of innovation potential result component are obtained only by the counties of Lithuania: Tauragė county (10,00 normalized values), Kaunas county (9,70 normalized values), Vilnius county (9,63 normalized values), Utena county (9,26 normalized values), Telšiai county (8,63 normalized values), Klaipeda county (8,40 normalized values), Šauliai county (7,55 normalized values), Alytus county (7,52 normalized values). Low values of the innovation potential result component are obtained by: Mogilev oblast (0,10 normalized values), Minsk oblast (0,34 normalized values), Grodno oblast (0,63 normalized values), Brest oblast (1,32 normalized values), Gomel oblast (1,74 normalized values), Minsk (2,40 normalized values), Latgale region (2,58 normalized values), Vitebsk oblast (2,72 normalized values).

Figure 7. Map of quintile groups of innovation potential result component of regions of Latvia, Lithuania, Belarus
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

The first group of quintiles includes Brest oblast, Grodno oblast, Minsk oblast, and Mogilev oblast. The second quintile group includes Kurzeme region, Latgale region, Vitebsk oblast, Gomel oblast, and Minsk city. The third group of quintiles consists of Riga region, Pieriga region, Vidzeme region, Zemgale region, Panevėžys county. The fourth quintile includes Alytus county, Klaipeda county, Marijampole county, Šiauliai county, and Telši county. The fifth quintile includes Kaunas county, Taurage county, Utena county, and Vilnius county.

Evaluation of the innovation potential of the regions of Latvia, Lithuania and Belarus

The author reflects the values of the integral indicator of innovation potential within the range of values [0;10], and its value rows are divided into quintiles.

Table 3. Standardized values and quintile groups of the innovation potential of the regions of Latvia, Lithuania and Belarus

Region	Normalized values	Groups of quintiles
Riga region	9,20	5
Pierina region	6,56	4
Vidzeme region	4,31	3
Kurzeme region	3,93	3
Zemgale region	3,90	3
Latgale region	2,10	2
Alytus county	4,34	3
Kaunas county	7,73	4
Klaipeda county	7,85	5
Marijampole county	4,09	3
Panevežys county	3,71	2
Siauliai county	4,76	4
Taurage county	5,24	4
Telšiai county	3,79	2
Utena county	4,70	4
Vilnius county	10,00	5
Brest oblast	1,06	1
Vitebsk oblast	1,81	2
Gomel oblast	1,21	2
Grodno oblast	0,60	1
Minsk city	8,51	5
Minsk oblast	0,10	1
Mogilev oblast	0,79	1

Source: author's calculations based on data from the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

The highest value of the integral indicator of innovation potential is obtained by Vilnius county, and the lowest is by Minsk oblast.
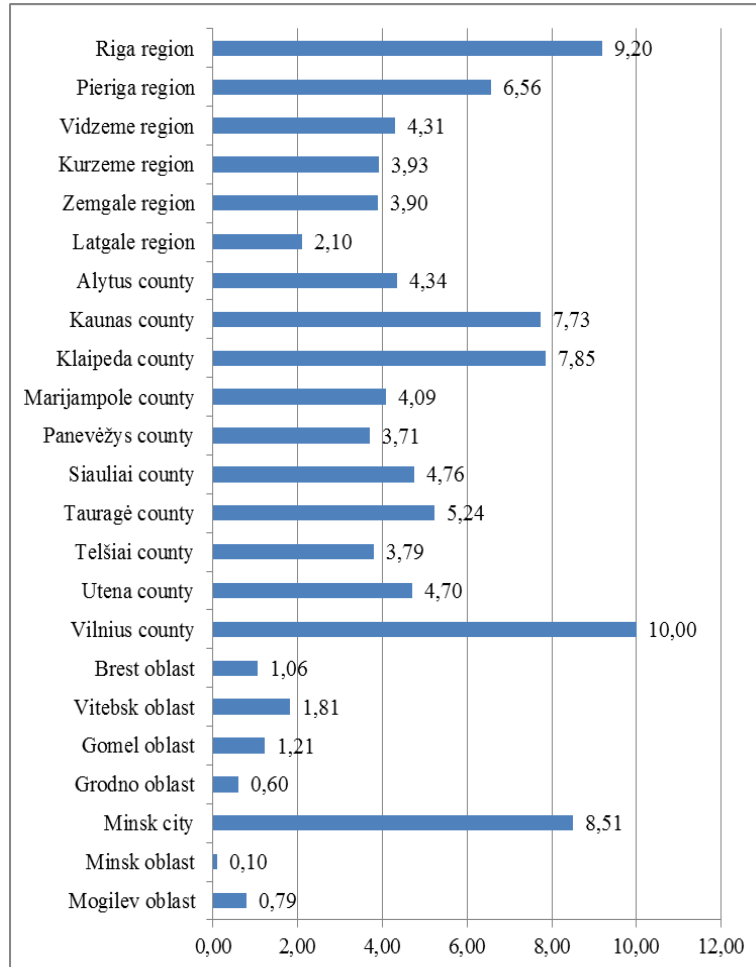
Figure 8. Assessment of the innovation potential of the regions of Latvia, Lithuania and Belarus
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

The highest value of innovation potential is obtained by Vilnius county (10.00 standardized values), Riga region (9.20 standardized values), and Minsk city (8.51 standardized values), which are the capital regions. Oblasts obtain the lowest values in Belarus: Minsk oblast (0,10 standardized values), Grodno oblast (0,60 standardized values), Mogilev oblast (0,79 standardized values), Brest oblast (1,06 standardized values), Gomel oblast (1,21 standardized values), Vitebsk oblast (1,81 standardized values).
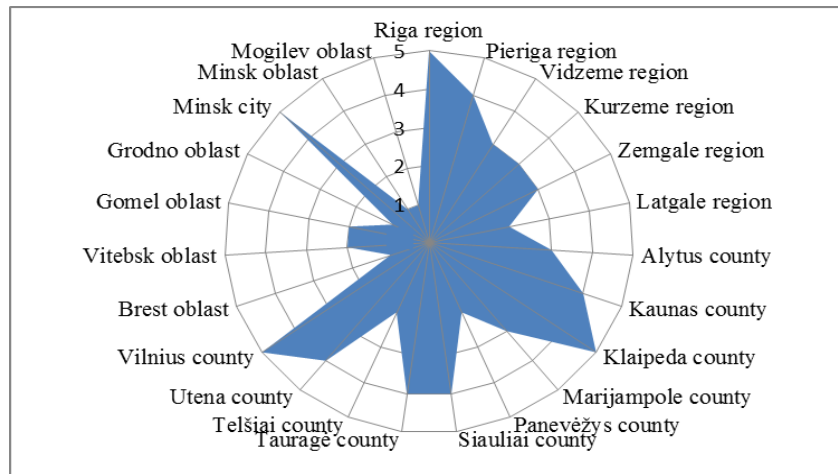
Figure 9. Map of quintile groups of innovation potential of regions of Latvia, Lithuania, Belarus
Source: created by the author based on the data of the regions of Latvia, Lithuania, and Belarus, using the innovation potential assessment methodology developed by the author

The author defines quintile groups of innovation potential. The first quintile group with the lowest innovation potential values includes Brest oblast, Grodno oblast, Minsk oblast, Mogilev oblast. The second group of quintiles includes Latgale region, Panevėžys county, Telšiai county, Vitebsk oblast, Gomel oblast. The third group of quintiles includes Vidzeme region, Kurzeme region, Zemgale region, Alytus county, Marijampole county. The fourth quintile group includes Pieriga region, Kaunas county, Siauliai county, Tauragė county, Utena county. The fifth quintile group with the highest rating includes Riga region, Klaipėda county, Vilnius county and Minsk.

In Belarus, Minsk has a high innovation potential (belongs to the fifth quintile group). Still, the other regions of the country have deficient innovation potential (Vitebsk and Gomel oblasts are in the second quintile group, and Brest, Grodno, Minsk and Mogilev oblasts are in the first quintile group).

Conclusions

Each of the basic approaches for evaluating the innovation potential considers the region's potential at some stage. The application of a specific system is justified under certain conditions; however, within the framework of the given study, it is best to apply a complex method, combining both resource, process and resulting basic approaches.

At the same time, the region's innovation potential should be considered both at the stage of formation and use. This approach allows for determining the resource component and results component of innovative potential. Consequently, the result of using innovation potential will be different types of innovation (new technologies, new types of goods and services).

Each approach (resource, process, result) should be determined as one of the components of the total innovation potential of the regions, which allows for identifying the development problems of the innovation potential, as well as assessing the degree of their influence on the final result, finding ways to solve the identified problems.

From the view of resources, the regions of Riga, Pieriga, Vilnius county, and the city of Minsk get the best rating, i.e. metropolitan regions with a one-way flow of resources towards capitals and other large cities.

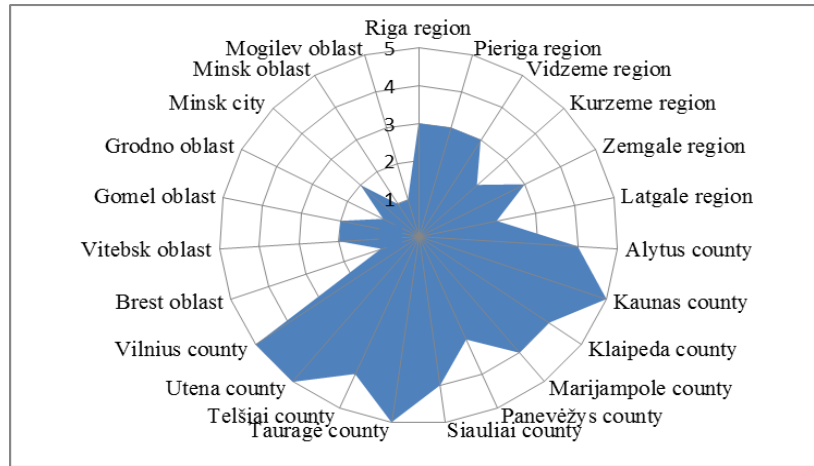The study of the components of innovation potential processes shows that in Latvian, Lithuanian and Belarusian regions, only the city of Minsk ranks in the fifth quintile; the regions of Riga, Pieriga, Kurzeme, Vilnius county and several other counties of Lithuania are in the fourth quintile. The China-Belarus innovation commercialization centre largely determines the place of Minsk in the fifth quintile.

In the fifth and fourth quintiles regions, there is good cooperation between public administration institutions, scientific institutions and business representatives. Other regions should promote the development of interaction between the state, science and business and development cooperation programs that promote the development of innovation potential at the meso-level.

A very high and high level of the resulting component of innovation potential can be observed only in the counties of Lithuania. Vilnius, Utena, Tauragė, and Kaunas counties belong to the fifth quintile group, and Telšiai, Siauliai, Marijampole, Klaipėda and Alytus counties belong to the fourth quintile. Latvian regions get average (Riga, Pieriga, Vidzeme and Zemgale regions) and low (Kurzeme and Latgale regions) values of the resulting component of innovation potential. But the oblasts of Belarus are ranked in the second and first quintiles, which can be assessed as low (Vitebsk, Gomel oblasts, Minsk city) and very low (Grodno, Minsk and Mogilev oblasts) level.

The overall level of innovation potential gets a very high rating (fifth quintile group) in Riga region, Vilnius and Klaipeda counties and Minsk city. Pieriga region, Kaunas, Siauliai, Tauragė, and Utena counties get a high rating (fourth quintile group).

As part of the study, it was found that in regions with high values of the resource component of innovation potential, there are average and low values of the resulting component and the total innovation potential, which low values of the process component can explain.

This certifies that in the given regions, all three components of the innovation potential of the regions exist separately. There is insufficient interaction between them, which is also the biggest obstacle to the region's innovation potential, as well as to the economic development of the region; it hinders the increase of the region's competitiveness and the preservation of market positions and the expansion of market segments.

Research limitations: application of other approaches than chosen by the author might lead to rather differing ranking of considered regions.

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ENTREPRENEURS' CONCERNS ABOUT THE CORONAVIRUS PANDEMIC AND ENTERPRISE'S SUSTAINABLE DEVELOPMENT*

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Abstract. The coronavirus pandemic, both in terms of its scale and impact on the economy and society, was a surprise to everyone and raised many concerns for entrepreneurs. Some of these concerns materialized while others did not, but still, these concerns impacted entrepreneurs' more conservative attitudes, seeking savings or limiting activities. This study aimed to answer whether entrepreneurs' concerns about the coronavirus pandemic and its impact on business have affected the sustainable development of enterprises – did it stop or limit the social and environmental activities of small and medium enterprises in Poland? To answer this question 177 interviews among owners and senior executives were conducted in September 2020, using the CATI method. The study results have shown that entrepreneurs' concerns about the pandemic did not negatively affect enterprises' sustainable development. Moreover, the study's results did not confirm a statistically significant correlation between the materialization of pandemic-related concerns and enterprises' sustainable development.

Keywords: sustainability; coronavirus; SMEs; concerns

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JEL codes: H1, Q56, M14

1. Introduction

The worldwide spread of the coronavirus designated COVID-19 that reached Poland in March 2020 has significantly affected the economies around the world. It has affected not only the personal lives of many people worldwide but also entire economies, industries and nations (UNIDO 2020). The coronavirus pandemic is one of humanity's most complex challenges since the last world war.

However, both the short- and long-term effects of the pandemic do not only directly concern economic aspects, but due to the pace of development of the situation and the threat posed by the epidemic, the consequences are also social and environmental. After the pandemic caused by the COVID-19 outbreak, global issues such as poverty, hunger, social inequality, and environmental sustainability have worsened (Giannetti et al., 2023).

2. Literature review

2.1. Impact of the pandemic on the economy

Experts predict that in the economic sphere, the open, service-based economies that dominate the OECD will suffer more and longer due to the pandemic. According to the United Nations, between five and 25 million people worldwide lost their jobs in the first three months of the pandemic alone. Moreover, the pandemic's harmful effects have primarily affected or will affect vulnerable groups: youth, women, and low-wage workers Berchin and de Andrade Guerra, 2020).

The impact of the COVID-19 pandemic on businesses varies greatly. It depends on several factors, among which the most significant is the kind of industry in which a given business operates. Industries related to broadly understood new technologies or e-commerce experienced a renaissance during the pandemic's peak, while industries such as tourism, catering, and hotel businesses faced an arduous struggle.

For some industries, the pandemic's adverse economic effects are coupled with positive environmental effects, as happened with the transportation industry (Periokaite and Dobrovolskiene, 2021). In two years, the world has shifted from a debate about overtourism to a discussion on how to restart, for example, the global aircraft fleet. With movement and other restrictions in place – such as the obligation to show a negative COVID-19 test upon arrival in another country – tourism traffic died down, and consequently, transportation emissions have fallen. Notably, in the case of mobility, the long-term implications for sustainable development may also be linked to permanent changes associated with workplace digitization and other daily activities, which entails reduced mobility needs in the future (Kanda and Kivimaa, 2020).

The COVID-19 pandemic has affected the continuity of many industries and businesses and how we work with new technologies, which we now use much more as remote work has become a standard solution. Many organizations had begun to develop digital workplace strategies even before the pandemic. Still, its outbreak forced most to urgently implement new initiatives and actions, allowing them to accelerate digital workplace transformation. The rapid transition to remote work can present many challenges to employees and employers (Caligiuri et al., 2020; Stefan et al., 2020; Okunola and Fakunle, 2021). Given that some enterprises like Twitter already declared that they would allow their employees to work from home permanently if they so decide (Peng Jiang et al., 2021), we should prepare for these challenges appropriately.

2.2. Pandemic and sustainable development

"Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development 1987, p. 41). It has been framed on the environmental ideology (Lélé, 1991; Balbinot and Borim-De-Souza, 2012), but it is a much broader concept and assumes sustainable development of the economy, society and environment. Concerning companies, researchers use corporate sustainability as an "outgrowth of earlier concerns expressed in CSR, sustainable development, and stakeholder theory" (Christofi, Christofi and Sisaye, 2012, p. 160).

Among many other effects, the pandemic may also impact changing priorities in the discourse on sustainable development. Currently, the world's attention is focused on environmental challenges. Still, we are also surrounded by many social challenges that, in the light of climate change or the problem of the availability of basic resources, have often been pushed to the background. The current situation shows that in times of public

health emergency, some goods and products are not sufficiently available (Sarkis et al., 2020). It also shows that even in developed economies, problems such as poverty and social inequalities, previously considered a problem of developing countries, are gaining importance.

The lack or limited availability of various types of products means that although both people and certain institutions currently have sufficient supplies of food and other products necessary for life, the needs of food banks are growing rapidly due to the increasingly difficult financial situation of many people (Sarkis et al., 2020). The difficult economic situation, bankruptcies of companies and growing unemployment may increase poverty and other social problems in individual countries and those where fundamental social issues such as poverty or hunger have long been solved. In the short term, the pandemic's positive effects can be indicated in the environmental dimension. Limited human activity, but above all, reduced industrial activity, limited mobility both by land and air, and the resulting more minor traffic jams in cities positively impact air quality. An apparent decrease in CO2 emissions was observed during the first epidemic wave in the spring of 2020. At the end of April 2020, more than half of the global population (54%) was in some form of lockdown due to the pandemic, with significantly reduced mobility controlled by governments.

Mandatory household lockdowns, quarantines, and additional travel restrictions related to the epidemic have had a significant link to energy demand and greenhouse gas emissions (Sovacool, Del Rio and Griffiths, 2020). According to estimates, the downward trend related to the level of emissions may allow for significant decreases in CO2 emissions compared to previous years (Jiang et al., 2021). The International Energy Agency (IEA) estimates that COVID-19 will decrease CO2 emissions by 8% in 2020 compared to 2019, meaning that they will be at the level from 10 years ago. Lower emissions are linked to energy consumption. Its decline has caused the demand and prices of fossil fuels and electricity to fall dramatically. The biggest drop was in oil - 25% in April 2020.

Interestingly, the decline in demand was less affected by renewable energy, for which demand is expected to increase by 1% in 2020. As a result, the share of energy from renewable sources in the overall energy mix may increase over the next few years, above pre-pandemic expectations. The short-term impact is evident: an unprecedented decline in energy demand, especially oil, with a modest but significant fall in electricity demand and prices (Kuzemko et al., 2020).

It should be emphasized that these are short-term changes resulting from restrictions on mobility imposed by the governments of individual countries and may, but do not have to translate into permanent changes in social behaviour (Androniceanu et al., 2022). Maintaining positive environmental changes will depend on the return to the intensity of certain phenomena compared to the time before the pandemic (Berchin and de Andrade Guerra 2020). Therefore, in addition to the visible improvement in environmental indicators as a result of the restrictions introduced around the world, there are also concerns that the environmental consequences of the pandemic will be felt in the future, as the economic crisis results in reduced spending on environmental activities and investments. The IEA warns that the decline in 2020 could be followed by a massive increase in energy demand and related CO2 emissions if the need for a low-carbon and carbon-free recovery is not emphasized in the development plans of individual economies. Climate-aware individuals and institutions see the current crisis as an opportunity and even an imperative for resilient, decarbonized and just structural change. According to many, including the UN secretary-general, the recovery from the pandemic crisis must lead to a different economy without attracting criticism (DeWit, Shaw, and Djalante, 2020).

2.3. Consequences of the pandemic for SMEs

Quarantine and the introduction of many restrictions to contain the COVID-19 pandemic have negatively affected all economies globally (Dečman et al., 2022). Notably, small and medium-sized enterprises (SMEs) were particularly affected by the pandemic and are the backbone of economies (Berchin and de Andrade Guerra, 2020; Chen et al., 2022).

SMEs have more limited resources, a vulnerable supply chain and relationships with contractors and customers and are much more exposed to pandemic risks than large companies (Levashenko and Koval, 2020). Companies are facing an unprecedented challenge. Their survival depends on the adoption of management strategies that will allow them to overcome the sharp decline in orders and cost pressures resulting not only from rents, wages and taxes, but also those related to the increase in raw material prices in an environment of a significant decline in suppliers (Wen, Wei and Wang, 2020).

According to Kaya's research, during the pandemic outbreak, SMEs' risk of insolvency increased by an average of 10% and by 21% throughout the pandemic (Kaya, 2022). That results in entrepreneurs' concerns about the future of their businesses but also in decisions on cost-cutting. Although financial performance during a coronavirus pandemic varies and depends on the industry in which the company operates, the results of many studies have confirmed the heavy blow of the pandemic on SMEs (Cepel et al., 2020; Dai et al., 2021; Yi et al., 2020; Androniceanu, 2020).

As SMEs still do not pay much attention to corporate sustainability (Artin 2022) or even are reluctant to that concept (Ernst et al., 2022), it seems reasonable that in the face of the negative impacts of the coronavirus pandemic – already existing or potential - the social and environmental activities may be the first to abandon. Instead of sustainable development, companies may decide to focus on financial performance only.

2.4. The gap in the existing body of knowledge

The coronavirus pandemic is an unprecedented phenomenon in this century and the second half of the previous century, resulting in larger business uncertainty for entrepreneurs (Rakshit et al., 2021) and a direct threat to the financial stability and survivability of enterprises, also in Europe (Androniceanu & Marton, 2021; Kaya, 2022). The pace of the pandemic's development, its global scope, and the consequences for entire economies and businesses caused great instability and uncertainty among entrepreneurs.

The above literature review confirms that some studies on the coronavirus pandemic and are' impact on SMEs, as well as the impact of the pandemic on sustainable development, has been carried out. However, to the best of our knowledge, there is no publication considering whether there is a correlation between entrepreneurs' concerns about the coronavirus pandemic and corporate sustainability. Therefore, essential questions that have not been answered so far are:

- Have entrepreneurs' concerns about the pandemic negatively affected enterprises' sustainable development?
- Has the materialization of pandemic concerns negatively affected the enterprises' sustainable development?
- Which dimension (social, environmental, economic) was the most negatively impacted by entrepreneurs' concerns about the pandemic?
- Which dimension (social, environmental, economic) was the most negatively impacted by the materialization of entrepreneurs' concerns about the pandemic?

3. Methodology

We assigned specific indicators to each dimension of sustainable development: social, environmental, and economical. We defined the indicators based on the aspects included in the GRI Standards, to ensure the completeness of analyzed measures (Table 1). The GRI standards were chosen as a reference point as these are the best-known and widely used sustainability reporting standards (Etzion and Ferraro, 2010). The standards consist of a set of indicators used by organizations for sustainability reporting to show an organization's sustainability performance and how they manage their impact on the economy, society and environment. GRI standards are constantly updated to reflect best the key areas of the organization's impact and areas of sustainable development.

Table 1. The applied GRI indicators in the economic, social, and environmental dimensions

Economic	Social	Environmental
• Revenue (GRI 201, 2016) • Sales (GRI 201, 2016) • Operational expenses (GRI 201, 2016) • Expenses (for: innovation, investment, marketing, IT; GRI 201, 2016)	• Employment (GRI 401, 2016) • Salaries (GRI 202, 2016) • Forced leaves (GRI 401, 2016) • Payment terms for suppliers (GRI 204, 2016) • Social and philanthropic spendings (GRI 413)	• Environmental investments (GRI 201, 2016) • Resource consumption (electricity, water; GRI 302, 2016 GRI 303, 2018) • Spendings on environmental activities (GRI 201, 2016)

Source: own elaboration

For each analyzed indicator, we defined a change that had to occur to conclude a negative or positive impact on a given indicator of concerns about the coronavirus pandemic or the materialization of these concerns (Table 2). We assumed that it was not the level of change that was important but its occurrence. If there was no change, we assumed the impact on the enterprise's sustainable development was neutral.

Table 2. Impact assessment indicators

Negative Impact	No Impact	Positive Impact
• Revenue decrease • Sales decrease • Increased operating costs • Expenses reduction (concerning: innovation, investment, marketing, IT) • Employment decrease • Reduction in salaries • Introduction of forced leave • Extension of payment terms for suppliers • Reducing spending on social and philanthropic activities • Halting environmental investments • Failure to start planned environmental investments • Increased resources consumption • Reduction in spending on environmental activities	• Maintaining revenue levels • Maintaining sales level • Maintaining the level of operating expenses • Maintaining the level of expenses (for: innovation, investment, marketing, IT) • Maintaining the employment level • Maintaining the level of salaries • No forced leaves • Maintaining payment terms for suppliers • Maintaining the level of spending on social and philanthropic activities • Ongoing environmental investments • Launching planned environmental investments • Maintaining the level of resource consumption • Maintaining the level of spending on environmental activities	• Revenue growth • Increase in sales • Decrease in operating expenses • Increased spending (on innovation, investment, marketing, IT) • Increase in employment • Increase in salaries • Shortening suppliers' payment terms • Increase in spending on social and philanthropic activities • Decrease in resource consumption • Increased spending on environmental activities

Source: own elaboration

To answer the research questions, we assumed the following.

In the case of the question: Have entrepreneurs' concerns about the pandemic negatively affected the enterprises' sustainable development?
- A negative impact on enterprises' sustainable development corresponds to a change in the indicator according to the "negative impact" column in Table 2, occurring in at least 51% of the indicators.
- An entrepreneur who had concerns was an entrepreneur who answered the question "to what extent did your concerns about the consequences of the pandemic's outbreak for your businesses' operation confirm?" differently than "I have no concerns."

In the case of the question: Has the materialization of pandemic concerns negatively affected the enterprise's sustainable development?
- A negative impact on an enterprise's sustainable development corresponds to a change in the indicator according to the "negative impact" column in Table 2, occurring in at least 51% of the indicators.
- An entrepreneur whose concerns materialized is one who, when asked, "to what extent did your concerns about the consequences of the pandemic's outbreak for your businesses' operation confirm?" answered "partially confirmed" or "fully confirmed."

In the case of the question: Which dimension (social, environmental, economic) was the most negatively impacted by entrepreneurs' concerns about the pandemic?
- The dimension with the highest negative impact was the dimension in which we observed the change for the highest percentage of indicators in the "negative impact" column in Table 2.
- An entrepreneur who had concerns was an entrepreneur who answered the question "to what extent did your concerns about the consequences of the pandemic's outbreak for your businesses' operation confirm?" differently than "I have no concerns."

In the case of the question: Which dimension (social, environmental, economic) was the most negatively impacted by the materialization of entrepreneurs' concerns about the pandemic?
- The dimension with the highest negative impact was the dimension in which we observed the change for the highest percentage of indicators in the "negative impact" column in Table 2.
- An entrepreneur whose concerns materialized is one who, when asked, "to what extent did your concerns about the consequences of the pandemic's outbreak for your businesses' operation confirm?" answered "partially confirmed" or "fully confirmed."

Research Method

The survey was conducted among small and medium-sized enterprises operating in Poland. We conducted the survey using computer-assisted telephone interviews (CATI) in September 2020 among owners or senior executives on the sample n=177.

4. Results

We conducted statistical analyses using the IBM SPSS Statistics 26 software to answer the research questions. In this way, we analyzed basic descriptive statistics with Kolmogorov-Smirnov tests, cross-tabulation analysis with Fisher's exact test, and the analysis of variance (ANOVA) for dependent samples. The significance level was $\alpha = 0.05$.

First, we removed from the dataset two extreme observations (greater than $Q3 + IQR*3$) in the scope of the dimension relating to negative environmental change, which could have negatively affected the results of the performed statistical tests.

In the first step of the analysis, we calculated the basic descriptive statistics with the Kolmogorov-Smirnov test, which examines the normality of the distribution for all quantitative variables, namely negative changes in the overall dimension, along with the economic, social, and environmental dimensions, understood as the percentage of indicators for which a negative change was observed (Table 3).

Table 3. Basic descriptive statistics of the studied variables with the Kolmogorov-Smirnov test for quantitative variables

	M	*Me*	*SD*	*Sk.*	*Kurt.*	*Min.*	*Max.*	*D*	*p*
Overall negative change (%)	24.34	23.53	19.55	0.87	0.46	0.00	88.24	0.14	<0.001
Negative change in the economic dimension (%)	37.59	42.86	27.54	0.27	-0.86	0.00	100.00	0.2	<0.001
Negative change in the social dimension (%)	18.74	20.00	23.08	1.29	1.28	0.00	100.00	0.27	<0.001
Negative change in the environmental dimension (%)	12.30	0.00	18.82	1.56	1.78	0.00	80.00	0.36	<0.001

Source: own elaboration

The result of the Kolmogorov-Smirnov test for all entered variables proved statistically significant, which means that the distributions of these variables deviated significantly from the normal distribution. However, the skewness of the distributions of all variables did not exceed the conventional absolute value of two, as postulated by George and Mallery (2010), which meant that the distributions were relatively symmetrical (George and Mallery 2010). Therefore, we decided to conduct the analysis based on parametric tests as long as their other assumptions were met.

Entrepreneurs' Concerns and Enterprises' Sustainable Development

In the next step, we checked whether entrepreneurs' concerns about the pandemic were associated with negative impacts on the enterprises' sustainable development for the overall economic, social, and environmental dimensions. Moreover, we performed cross-tabulations with Fisher's exact test to verify the correlation. Table 4 below shows the results.

Table 4. Correlation between entrepreneurs' concerns and the negative impact on enterprises' sustainable development in overall economic, social, and environmental dimensions

		Entrepreneurs' concerns						*p*	*ϕ*
		No		Yes		Total			
		N	%	*N*	%	*N*	%		
Overall negative change	No	13	86.7%	139	89.1%	152	88.9%	0.675	-0.02
	Yes	2	13.3%	17	10.9%	19	11.1%		
Negative change in the economic dimension	No	13	86.7%	105	67.7%	118	69.4%	0.154	0.12
	Yes	2	13.3%	50	32.3%	52	30.6%		
Negative change in the social dimension	No	15	100.0%	138	88.5%	153	89.5%	0.373	0.11
	Yes	0	0.0%	18	11.5%	18	10.5%		
Negative change in the environmental dimension	No	14	93.3%	146	93.6%	160	93.6%	1.00	0.00
	Yes	1	6.7%	10	6.4%	11	6.4%		

Note: as the occurrence of a negative impact, we considered a situation in which the change was assessed negatively for the minimum of 51% of indicators.

Source: own elaboration

The responses revealed that most entrepreneurs had pandemic-related concerns about its impact on all the analyzed dimensions. At the same time, the analysis showed no statistically significant correlations between the occurrence of entrepreneurs' concerns and negative changes in the overall economic, social, and environmental dimensions.

Materialization of Concerns and Enterprises' Sustainable Development

In the next step, we examined whether the materialization of pandemic concerns was associated with negative impacts on enterprises' sustainable development for the overall economic, social, and environmental dimensions. For this purpose, we performed cross-tabulations with Fisher's exact test (Table 5).

Table 5. The correlation between the materialization of concerns and the perception of negative impact in terms of the overall economic, social, and environmental dimensions

		Materialization of concerns						p	ϕ
		No		Yes		Total			
		N	%	N	%	N	%		
Overall negative change	No	35	94.6%	117	87.3%	152	88.9%	0.373	0.10
	Yes	2	5.4%	17	12.7%	19	11.1%		
Negative change in the economic dimension	No	34	91.9%	84	63.2%	118	69.4%	**0.001**	0.26
	Yes	3	8.1%	49	36.8%	52	30.6%		
Negative change in the social dimension	No	35	94.6%	118	88.1%	153	89.5%	0.368	0.09
	Yes	2	5.4%	16	11.9%	18	10.5%		
Negative change in the environmental dimension	No	36	97.3%	124	92.5%	160	93.6%	0.460	0.08
	Yes	1	2.7%	10	7.5%	11	6.4%		

Note: as the occurrence of a negative impact, we considered a situation in which the change was assessed negatively for a minimum of 51% of indicators.

Source: own elaboration

The analysis showed a statistically significant correlation only between the materialization of entrepreneurs' concerns and the perception of an adverse change in the economic dimension ($p = 0{,}001$; $\varphi = 0{,}26$). In the group of entrepreneurs whose concerns materialized, 36.8% of respondents experienced a negative change in economic terms. In contrast, in the group of entrepreneurs whose concerns did not materialize, only 8.1% of respondents experienced a change in the economic dimension. For the remaining variables, the correlations were statistically insignificant, meaning that entrepreneurs felt negative changes similarly, regardless of the materialization of their concerns.

Entrepreneurs' Concerns and Negative Changes in the Economic, Social, and Environmental Dimensions

In this analysis, we compared three dimensions of negative change – the economic, social, and environmental dimensions – in a group of entrepreneurs concerned about the pandemic. For this purpose, we performed a one-factor analysis of variance with repeated measures, in which the within-subject factor was the type of change (economic, social, and environmental). We performed the analysis of variance in a univariate model. Table 6 below shows descriptive statistics for individual measurements.

Table 6. Descriptive statistics for negative change in economic, social, and environmental dimensions and the ANOVA results for the tested within-subject effect

	N	M	SD	F (2.308)	p	η_p^2
Negative change in the economic dimension (%)	155	39.54	26.69			
Negative change in the social dimension (%)	155	20.26	23.57	99.64	**<0.001**	0.39
Negative change in the environmental dimension (%)	155	12.90	18.76			

Source: own elaboration

The analysis showed that the tested within-subject main effect was statistically significant. This means that the perception of a negative change differed according to the change type. The dimension for which we observed the highest percentage of negatively-rated indicators was the economic dimension ($M = 39.54$; $SD = 26.69$). To verify between which averages the differences were statistically significant, we conducted a paired (post-hoc) least significant difference (LSD) test comparison. The LSD test showed that the mean score for the economic dimension was higher than for the social dimension ($p < 0.001$) and higher than for the environmental dimension ($p < 0{,}001$).

Moreover, the score for the social dimension was higher than that for the environmental dimension ($p < 0.001$). The analysis results are further illustrated in Figure 1. Moreover, 39% of the variation in perceived change that was not explained by other factors could be explained by the change type. The observed effect could be considered strong.

Figure 1. Mean values with 95% confidence intervals for each dimension of change (economic, social, and environmental) in the group of entrepreneurs who had concerns about the pandemic

Error bars: 95% CI

Source: own elaboration
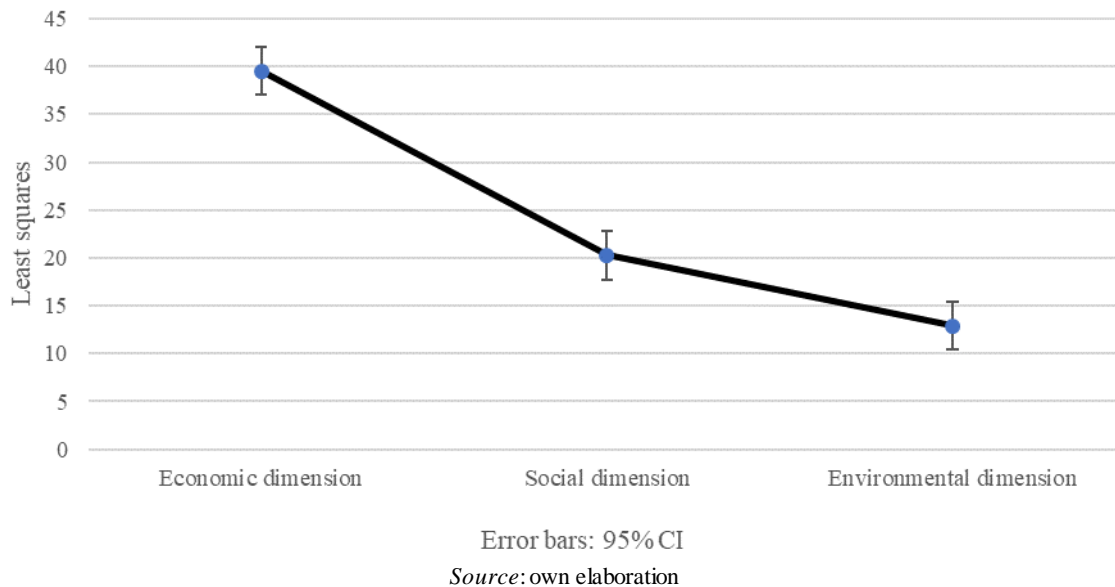
Materialization of Concerns and Negative Changes for Economic, Social, and Environmental Dimensions
In the final analysis, we compared the three dimensions of negative change (economic, social, and environmental) in the group of entrepreneurs whose concerns materialized. For this purpose, we performed a one-factor analysis of variance with repeated measures in a univariate model (Table 7).

Table 7. Descriptive statistics for negative change in economic, social, and environmental dimensions and ANOVA results for the tested within-subject effect

	N	*M*	*SD*	*F* (2.264)	*p*	η_p^2
Negative change in the economic dimension (%)	133	43.82	25.62			
Negative change in the social dimension (%)	133	21.80	23.54	116.05	**<0.001**	0.47
Negative change in the environmental dimension (%)	133	13.68	19.29			

Source: own elaboration

The analysis showed that the tested within-subject main effect was statistically significant. We observed the highest percentage of indicators rated negatively in the case of the economic dimension ($M = 43,82$; $SD = 25,62$). A post-hoc LSD test showed that the average score for the economic dimension was higher than for the social dimension ($p < 0.001$) and higher than for the environmental dimension ($p < 0,001$). Furthermore, the social dimension score was higher than the environmental dimension ($p < 0,001$; Figure 2). Moreover, 47% of the variation in perceived change that was not explained by other factors could be explained by the change type. The observed effect could be considered strong.

Figure 2. Mean values with 95% confidence intervals for each dimension of change (economic, social, and environmental) in the group of entrepreneurs whose concerns materialized
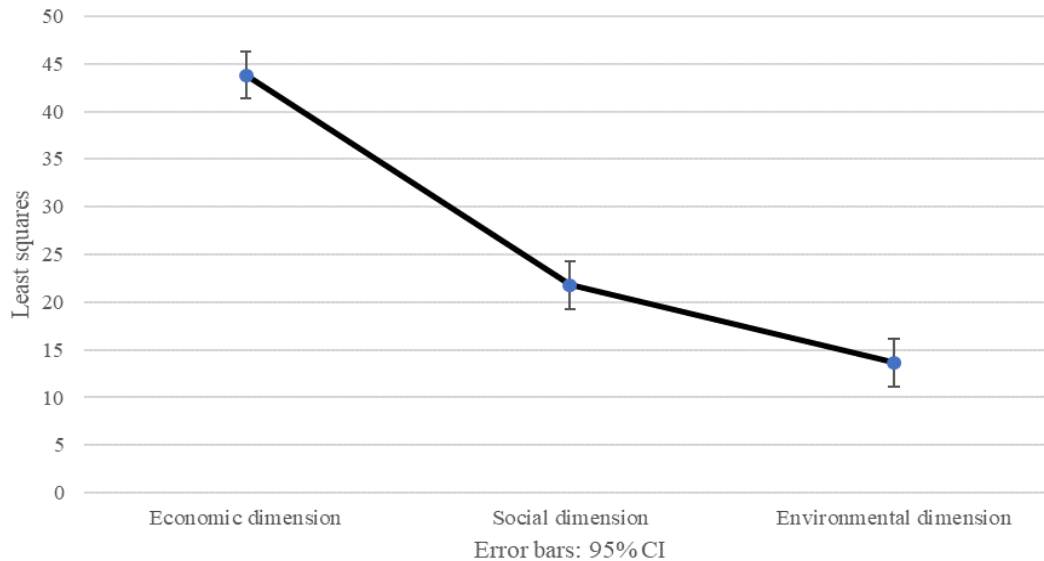
Source: own elaboration

Discussion

Despite many pandemic-related concerns and a certain level of uncertainty about the pandemic's consequences, we should emphasize that crises such as war, famine, or pandemics change public and private institutions and can have a long-lasting impact on the crisis-affected societies, and not just a negative one. The financial crisis of 2007–2008 is a case in point, as it resulted in regulatory, technological, and cultural changes that emerged as a response to the gaps and problems that the crisis highlighted. In some dimensions, the current pandemic is also an opportunity to accelerate sustainable development transformation, especially in production and supply chain management (Sarkis et al., 2020).

Regardless of the industry, the pandemic accelerated digital transformation in all sectors. Moreover, in the short term, the pandemic made it more difficult to seek environmental sustainability development by some enterprises due to the financial risks that emerged and threatened enterprises' survival. This limited managers' willingness and ability to respond to environmental challenges, which, while providing short-term savings and liquidity, may have negative long-term consequences. According to Wellalage et al. (2022), enterprises' environmental activities positively impact performance even during a crisis such as a coronavirus pandemic because they lower business risk and increase access to financing (Wellalage et al., 2022). This is another reason why decisions to maintain environmental activities despite concerns and uncertainties among enterprises can be an essential factor in building long-term stability and competitive advantage.

The COVID-19 outbreak also highlighted the structural fragility of current societies and the urgent need for actions to review production and consumption patterns that are causing enormous environmental impacts on the ecosystems on which human depends (Ranjbari et al., 2021).

Conclusion

The study fills the identified gap in the existing body of knowledge, answering the questions on the correlation between entrepreneurs' concerns about the coronavirus pandemic and corporate sustainability.

Based on the results, we conclude that entrepreneurs' concerns about the pandemic did not negatively affect enterprises' sustainable development. Moreover, the study's results did not confirm a statistically significant correlation between the materialization of pandemic-related concerns and enterprises' sustainable development. Entrepreneurs experienced negative changes to a similar degree, regardless of the perceived concerns and their materialization. This may mean that concerns did not translate into entrepreneurs taking precautionary measures to prepare the enterprise to limit the pandemic's potential negative effects. Still, on the other hand, they did not translate into activity-reducing measures that could ultimately negatively impact enterprises' sustainable development.

In the case of entrepreneurs who had concerns and those whose concerns materialized, the analysis showed that the perception of negative change varied according to the change type. The dimension for which we observed the highest percentage of negatively-rated indicators was the economic dimension. In the social and environmental dimensions, the percentage of respondents whose concerns materialized was higher (88.1% and 92.5%, respectively) than the percentage of respondents in the economic dimension whose concerns materialized (63.25%). This may mean that entrepreneurs were much more concerned about severe consequences and negative changes for the economic dimension, which did not materialize, than about the social and environmental dimensions, in the case of which concerns materialized significantly.

A significant negative change in the economic area, with a smaller percentage of negatively-rated indicators in the social and environmental dimensions, may mean that active measures were not taken in these areas. As a result, even the materialization of concerns did not impact reducing them. However, a negative impact in the economic dimension may be reflected in the future and has a deferred effect. This means that the negative economic impact will translate into reduced spending only after a certain period, along with impacting activities in the environmental and social dimensions.

Regarding that, it can be concluded that it is recommended that managers not resign from social or environmental activities, which can bring long-term value, in light of the short-term crisis and concerns about financial performance. That approach can make the company more resilient if the deferred impact does not occur and will not limit the enterprise's chance for sustainable development while allowing for the potential reduction of such activities in the future if the financial situation requires that.

Limitations

We conducted the study before the second wave of the coronavirus pandemic in Poland, which was a time when several protective mechanisms for entrepreneurs were in place (the so-called Anti-Crisis Shield). To verify the relationship between entrepreneurs' concerns, their materialization, and enterprises' sustainability development, future research should repeat our study after the pandemic ends or after all state support measures cease. Moreover, as we mentioned, the negative impact on the environmental and social dimensions may be experienced later due to unfavourable changes in the economic dimension, which makes for yet another reason to repeat our study later.

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BUSINESS INTERRUPTION MANAGEMENT IN THE CONTEXT OF THE COVID-19 PANDEMIC FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN SLOVAKIA[*]

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Abstract. From the beginning of 2020 to the end of 2021, a nationwide survey was conducted to examine business interruption due to the COVID-19 pandemic and to identify the impact of the pandemic on SMEs in the Slovak Republic. It also focused on identifying areas such as risk management with BCM, and crisis management within individual enterprises. The survey was carried out using a questionnaire distributed to SMEs operating in the country. Based on the questions from the questionnaire, four research hypotheses were developed. Based on the results of our investigation, we found that enterprises cannot correctly assess their capability level and manage risks effectively, potentially exposing themselves to further threats arising from such a relationship. There is a correlation between the business sector and the extent to which an enterprise has been affected by a pandemic. Enterprises with implemented risk management areas had operations halted for shorter periods than enterprises without implementation. There is a relationship between business sectors and the extent to which they were affected by the pandemic. The discussion concludes that the pandemic posed a type of threat for which several SMEs were unprepared. At the same time, no established risk minimization procedures would address this issue. Effective implementation of risk management as prevention or crisis management as response and application of BCM principles is one of how enterprises could prepare for risks and crises and increase their resilience.

Keywords: business continuity management (BCM); COVID-19; crisis management; enterprise; resilience; risk management

1. Introduction

The impact of the pandemic and the governmental anti-pandemic measures taken has affected most enterprises in the world and society as a whole. The business has also been very negatively affected by COVID-19. Many enterprises did not survive after the significant drop in demand caused by the movement restrictions and other significant mobility restrictions imposed by countries to stop the outbreak. Conversely, in some cases, this situation

has led to new areas of business that some entrepreneurs are taking advantage of, such as home delivery, internet sales, etc. (Cohen 2020). Enterprises worldwide have had to confront and respond to the COVID-19 pandemic. The evolution of the COVID-19 pandemic has had an unpredictable impact on business continuity. Changes in the enforcement of social distancing policies have affected economic and social activities, causing significant complications for enterprises in managing their human and financial resources (Rumman 2022).

Recently, a comparison was made between two economic crises: the economic crisis caused by the pandemic and the climate crisis. In this sense, people have raised the possibility that the response to the economic recession caused by COVID-19 and the climate emergency is interlinked and mutually reinforcing. This is because the coronavirus outbreak presents opportunities to advance the climate agenda alongside broader transitions to sustainability in production and consumption (Cohen 2020, Markard 2020).

The impact of the COVID-19 pandemic and other factors affect business continuity. Both natural and man-made disasters can disrupt business continuity, so enterprises need to be prepared to respond promptly (Smith 2003; Doğrusöz 2022, Muparadzi 2021, Vasović 2022, Shipanga et al. 2022). One of the factors of business continuity sustainability is to ensure the implementation of crisis management and business continuity management (BCM) into the enterprise to improve the management system (Vasović 2022). Riglietti (2022) states that it is BCM that is the key management discipline that, through the framework, can establish measures so that resilience is ensured. Bajgoric (2022) argues that implementing BCM into the enterprise leads to improved enterprise performance. With BCM, enterprises will have a system for organizing their resources and inventory. Consequently, they know how to manage them and use them in a crisis to stabilize them (Croitoru et al. 2021, Nyakato 2022). Alshehhi (2022) states that during pandemics and crises, crisis management also plays an essential role in ensuring business continuity. Crisis management, unlike BCM is a familiar term commonly used and addresses the issue of guaranteeing enterprise resilience. Ewertowski (2022) considers crisis management, BCM, and enterprise resilience as important roles in ensuring societal security due to the issue of protecting society and enterprises from all kinds of crisis phenomena and human failures.

Palačić (2022) understands business continuity as an organization's strategic and tactical capacity to plan for and respond to crises and business disruptions to continue operating at a previously determined acceptable level. BCM is a process that focuses on identifying potential impacts that could disrupt the operational viability of the enterprise and aim to find the most effective solutions to maintain business continuity. BCM focuses on ensuring prevention and recovery, critical elements of increasing resilience to business interruption and other enterprise values (Palačić 2022, Bajgorić 2022). According to Herrmann (2022) BCM is a process of proactive planning that controls the various activities within the enterprise, thereby ensuring the long-term continuity of the enterprise and, thus, the enterprise's prosperity. Through BCM, vital and critical processes are identified that may cause interruption to operations and therefore damage the enterprise's reputation.

Vasović (2022) argues that improving enterprise resilience can be achieved through an effective Business Continuity Management System (BCMS). The result of an effective BCMS within an enterprise is an enterprise that can identify its vulnerabilities and has plans to mitigate risks and respond when necessary. Alkhrabsheh (2022), in turn, argues that to maintain business continuity in complex situations, it is essential to adopt suitable administrative safeguards to avoid unnecessary time loss during its resolution. United Nations World Economic Situation and Prospects (2021) claims that "there is no sustainable development without resilience and no resilience without sustainable development. Building economic, social and environmental resilience must guide the recovery from the crisis". Having control over the business environment is impossible. The business environment is constantly changing, giving enterprises room to evolve continuously. Implementing BCM and crisis management in an enterprise expands the range of management approaches enterprises can take to prepare for different events, thereby ensuring business continuity and increasing resilience (Business 2003). Janaćković (2022) looks at resilience from two perspectives, as a way of surviving on the one hand and thriving on

the other. He sees thriving as the ability of a resilient enterprise to turn challenges into opportunities. Karunaratne (2022) has the same view and considers resilience a tool for the enterprise to help it respond to unexpected situations. An unexpected situation that could threaten its survival is just used as an opportunity.

According to Herrmann (2022), resilience is a question of sustainability, defined as a system's ability to manage severe perturbations and sustained stress. According to Burhan (2021), resilience focuses on building mechanisms that enable actors to recognize, adapt, and employ resources to fight disruptions before, during, and after a crisis to ensure dependable operation. Marquez-Tejon (2021) introduces the concept of organizational resilience, which he views as the ability of an enterprise to flexibly adapt to environmental changes to maintain the maintenance and achievement of enterprise objectives and thrive. Regarding business continuity, Doğrusöz (2022) views organizational resilience as a set of activities such as planning, responding, rescuing, and strengthening the enterprise itself so that it can survive during a crisis and is prepared for it.

Karunaratne (2022) argues that building resilience rests on creating stability and organizational change within the enterprise. According to Marquez-Tejon (2021), developing resilience should be a strategic corporate goal and the outcome of solid business practices and effective risk management. Each enterprise operates in a different business environment and has various resources. Enterprises are constantly exposed to risks that can affect their development and future direction. Risks are an integral part of the business that affect the enterprise Demyen (2022). Any undetected and unacceptable risk can cause significant negative impacts on business activities if the enterprise cannot respond appropriately and does not have sufficient resources. Risk management and BCM are disciplines that represent a way of creating and increasing the resilience of enterprises to adverse impacts and environmental changes. Risk management and BCM are part of integrated management systems, including the business environment (Bjornsdottir 2022, Foli 2022). Ostapenko (2021) argues that risk management is an effective tool through which the continuity and operability of an enterprise can be ensured even during an adverse situation. Risk management methods and procedures embedded in the enterprise will enable risks to be identified, analyzed, and assessed on time so that the enterprise can then design measures to manage them to an acceptable level. Effective risk identification, analysis, and assessment can prevent risk spread and negative impact on the enterprise. By effectively integrating risk management into business activities, risks can be managed, and losses can be prevented, which can also help to ensure the resilience and sustainability of the business.

Business sustainability is essential to the business environment (Hasbaoui 2022, Mthiyane 2022). Dean (2007, p. 58) defined sustainable business as: "the process of discovering, evaluating, and exploiting economic opportunities that are present in market failures that reduce sustainability, including those that are relevant to the environment". Enterprises, from small start-ups to multinationals, increasingly claim to contribute to a more sustainable future. Increasingly, enterprises and corporations say they take sustainability seriously as part of their business models (Hart 2003, Hockerts 2010, York 2010). Entrepreneurship is seen as the "engine of sustainable development", with its innovative power expected to "bring about the next industrial revolution and a more sustainable future" (Pacheco 2010, p. 464, Hummels 2021). Steal (2005) also argues that entrepreneurship is widely recognized as an engine of economic growth. Sustainable development differs from economic development because sustainable development includes not only economic development (Bromley 1991) but also integrates environmental development (Khan 1993).

Entrepreneurship and entrepreneurship research focuses on understanding the discovery, exploitation, and creation of entrepreneurial opportunities. However, several barriers prevent opportunities from being exploited, identified, and discovered. These barriers may be associated with market failures that

prevent the efficient functioning of the market (Carter 2006, Dean 2007, Venkataraman 1997). Several studies have also examined different types of entrepreneurship in other countries (Bergmann 2007).

The COVID-19 pandemic has shown that business sustainability is paramount. COVID-19 poses an existential threat to enterprises (especially small and medium enterprises (SMEs)) (Hossain Rokibul 2022). The COVID-19 pandemic has mainly affected SMEs, which account for more than 90% of enterprises worldwide. In this sense, SMEs have a significant role to play in developing the world economy. During the pandemic, it was, and still is, SMEs that were most at risk and vulnerable. The measures taken were a barrier for enterprises that prevented them from operating (Croitoru et al. 2021, Du 2022, Chandak 2022, Iancu 2022, Sarker 2022). The business interruption has become a global problem that has caused a slowdown in the world economy. The continuity of individual enterprise activities is interrupted by changes in the business environment, with the global pandemic COVID-19 being the most frequent cause in recent years (Androniceanu, 2020; Androniceanu & Marton, 2021). Enterprises were unprepared for this change, which affected their operational efficiency (Brand 2022, Dos 2022, Kaya 2022, Yang 2022).

Amankwah-Amoah (2021) reports that the COVID-19 pandemic was identified by the Organisation for Economic Co-operation and Development in 2020 as one of the most significant public health and economic crises of our time.

2. Methodology

Our nationwide survey focused on the interruption of operations due to the COVID-19 pandemic. The identification of the impact of the pandemic on SMEs in the Slovak Republic (SR) is dedicated to the identification of potential problems that arose for SMEs during the pandemic while also focusing on identifying the presence of areas of risk management with BCM, crisis management within the administration of individual enterprises. The survey was conducted using a questionnaire distributed to SMEs operating within the country. The statistical population is made up of a total of 597171 SMEs, with this figure based on the Statistical Office of the Slovak Republic's 2020 survey. The respondents to the questionnaire were the managing directors of the SMEs that were contacted for the survey, who answered the questions on behalf of the enterprises they represent. The statistical unit comprises a total of 1145 SMEs, to which the questionnaire was distributed for the survey. A random sampling method was used for the study. Of these enterprises, a total of 359 SMEs completed the questionnaire and therefore participated in the survey, which forms the statistical population on which the defined hypotheses will be tested, and the statistical questions will be examined. Considering the confidence interval at the 95% level, with a specified estimation error of 5.5% and a proportion of the trait of interest at the 0.5 level, a minimum sample size of a total of 319 respondents is assumed. The statistical population is composed of a total of 359 respondents, representing a sampling error of 5.18%.

The first three questions in the questionnaire covered basic information about the enterprise. They examined its size in terms of the number of employees, the time it has been in the enterprise, and the sector within which it carries out its business activities. This was followed by questions that focused on the extent to which the risk management, BCM, and crisis management processes were implemented in the surveyed organizations and how they were mastered and adopted in these enterprises. Other questions included the risks occurring in the enterprises, the impacts of the COVID-19 pandemic on the enterprises surveyed and on their activities, the extent to which these enterprises were affected by the pandemic, the enterprises' view of the measures implemented, and the enterprises' preparedness to deal with the pandemic situation. The last set of questions concerned the prospects of these enterprises, particularly in the context of pandemic recovery, and possible frameworks for measures to deal with a similar situation in the future. The qualitative and quantitative data thus obtained were processed into a tabulator from which contingency tables were compiled based on an appropriate selection of features for the hypotheses.

To examine the relationship between the variables identified by the survey, the Pearson chi-square test of independence was used. To examine the dependence, the significance level was set at $p < 0.05$. This method was used for all the hypotheses identified to determine whether there was a dependent relationship between the variables. The value of the $\chi2$ test statistic is:

$$\chi2 = \sum_{i=1}^{R} \sum_{j=1}^{C} \frac{(n_{ij} - E_{ij})^2}{E_{ij}}$$

where:
R - number of rows
C - number of columns
n - number of cells in the table
Eij - expected (theoretical) abundance

To examine the strength of the relationship between the stated variables in the research hypotheses, Cramer's V and Pearson's contingency coefficient were used. Through Pearson's contingency coefficient, the contingency relationship between variables was assessed based on qualitative traits. The coefficient value ranges from 0 to 1, taking the value of 0 in the case of contingency independence of the studied traits and the value of 1 in the case of complete contingency dependence of the studied traits. The values between these two extremes represent different degrees of contingent dependence between the qualitative traits. Pearson's contingency coefficient was used in the evaluation of all hypotheses and is calculated as:

$$C = \sqrt{\frac{\chi2}{\chi2 + n}}$$

where:
n - number of cells in the table
$\chi2$ - chi-square
Cramer's contingency coefficient V determines the most appropriate measure of association between the two variables under study. Cramer's contingency coefficient V a takes values from 0 to 1, where 0 indicates no relationship and 1 indicates a perfect relationship. Again, this method was used in examining all the hypotheses stated. Cramer's contingency coefficient V is calculated as:

$$V = \sqrt{\frac{\chi2/n}{\min(R, C) - 1}}$$

where:
R - number of rows
C - number of columns
n - number of cells in the table
$\chi2$ - chi-square

For each contingency table, the condition that all expected abundances (Eij) in the contingency table must be Eij>1, and at least 80% of Eij>5 was monitored. This condition is considered a conservative condition when looking for dependencies in contingency tables (Luha 2007).

3. Results

Hypothesis 1 (H1)

H1 was based on the question of whether there is a relationship between enterprises believing they can manage risks and the closure or non-closure of their operations during a pandemic, with the wording being: **"Enterprises that think they are capable of managing risks did not close their operations during the pandemic."**

To confirm or refute this hypothesis, data obtained from the following statistical questions were used:

1. *Question 7: Do you think you can manage risks in your enterprise (1 - definitely yes, 5 - not at all)?*
2. *Question 11: During the COVID-19 pandemic, your enterprise: (Had a stopped (closed) operation; Had a working operation).*

Respondents answered question 7 on a numerical scale, assigning each quantitative trait a qualitative value. For question 11, the qualitative data from respondents' answers were divided into two categories to confirm or reject this hypothesis - those confirming the cessation of enterprise operations and those confirming a different type of measure for a functioning operation. A contingency table (Table 1) was then constructed from the statistical data obtained above, and the existence and strength of the relationship between the variables were examined using Pearson's chi-square test of independence, Pearson's contingency coefficient, and Cramer's contingency coefficient V.

Table 1. Contingency table H1

		Do you think you can manage risks in your enterprises?					
		Definitely yes	**Rather yes**	**I don't know**	**Rather no**	**Not at all**	
During the COVID-19 pandemic, your enterprise:	**Had a stopped (closed) operation**	4	19	24	4	3	**54**
	Had a working operation	76	90	102	19	18	**305**
		80	**109**	**126**	**23**	**21**	**359**

Source: Authors

Based on the calculations performed using the above methods, the following results were found:

Pearson's Chi-Quadrat	$\chi^2 = 8,4905$
The critical value of the Chi-Quadrat	**9,4877**
ρ value	**ρ = 0,0752**

Given that the observed value of Pearson chi-square is lower than the calculated critical value for this variable, it can be concluded that there is no dependent relationship between the identified variables. Hence, H1 can be considered to be refuted.

Hypothesis 2 (H2)

H2 was based on whether there is a relationship between the business sector and the extent to which the enterprise was affected by the pandemic. The wording was: **"Enterprises in the accommodation and catering sector were the most affected by the pandemic."**

To confirm or refute this hypothesis, data obtained from the following statistical questions were used:

1. Question 1: *What industry are you in?*
2. Question 10: *Has the situation related to the COVID-19 pandemic affected your enterprise (1 - definitely yes, 5 - not at all)?*

Respondents answered question 1 by selecting from pre-determined qualitative options. For question 10, respondents answered on a numerical scale, with a qualitative value assigned to each quantitative trait. A contingency table (Table 2) was then constructed from the statistical data obtained above, using Pearson's chi-square test of independence, Pearson's contingency coefficient, and Cramer's contingency coefficient V to examine the existence and strength of the relationship between the variables.

Table 2. Contingency table H2

		Has the situation related to the COVID-19 pandemic affected your enterprise?					
		Definitely yes	**Rather yes**	**I don't know**	**Rather no**	**Not at all**	
What industry are you in?	**Transport, information**	6	7	8	3	4	**28**
	Business services	21	14	14	9	9	**67**
	Other services	29	21	24	14	15	**103**
	Agriculture	3	3	3	3	0	**12**
	Industry	7	8	7	9	5	**36**
	Construction	7	9	14	8	0	**38**
	Accommodation, catering	46	10	7	10	2	**75**
		119	**72**	**77**	**56**	**35**	**359**

Source: Authors

Based on the calculations performed using the above methods, the following results were found:

Pearson's Chi-Quadrat	$\chi^2 = 55,5116$
The critical value of the Chi-Quadrat	36,4150
ρ value	$\rho = 0,0003$
Cramer's contingency coefficient	V = 0,1966
Pearson's contingency coefficient	C = 0,3660

Based on the fact that the value of Pearson chi-square is higher than the calculated critical value for this variable, it can be concluded that there is a dependent relationship between the identified variables. At a confidence interval of 95%, based on the calculation of the variable ρ, it is possible to conclude that the calculated dependence is statistically significant since the relationship $\rho < 0.05$ holds. Given that a statistically significant relationship has been found between the variables under study, it is possible to proceed to the calculation of Cramer's contingency coefficient, based on which we conclude that the identified relationship between the variables under study occurs at a low level. Based on the calculation of Pearson's contingency coefficient, it can be concluded that there is a weak contingency relationship between the variables under study. Therefore, H2 can be considered partially confirmed.

Hypothesis 3 (H3)

H3 was based on the question of whether there is a relationship between the implementation of risk management, crisis management, BCM, and how long enterprises had operations interrupted during a pandemic, with the wording being: **"Enterprises with implemented risk management, crisis management, BCM had operations suspended for a maximum of 3 months or not at all."**

To confirm or refute this hypothesis, data obtained from the following statistical questions were used:

1. Question 4: *Do you have.... embedded in the management of your enterprise? (You can tick more than one option).*
2. Question 12: *During the COVID-19 pandemic, you had interrupted operations at (as of 31.10.2021)....*

Question 4 was answered by respondents selecting from pre-determined qualitative options. For question 12, respondents also answered qualitatively from the predefined options. Subsequently, the statistics obtained in question 4 were divided into two categories - those indicating the implementation of risk management, BCM, or crisis management and those that did not include any of these options. A contingency table (Table 3) was then constructed from the statistical data obtained above, and the existence and strength of the relationships between the variables were examined using Pearson's chi-square test of independence, Pearson's contingency coefficient, and Cramer's V contingency coefficient.

Table 3. Contingency table H3

		Do you have.... embedded in the management of your enterprise?		
		Yes	**No**	
During the COVID-19 pandemic, you had interrupted operations at (as of 31.10.2021)....	**Not at all**	104	22	**126**
	Within 1 month	51	8	**59**
	1 to 3 months	46	12	**58**
	4 to 6 months	40	17	**57**
	7 to 9 months	10	11	**21**
	10 to 12 months	17	5	**22**
	More than one year	12	4	**16**
		280	**79**	**359**

Source: Authors

Based on the calculations performed using the above methods, the following results were found:

Pearson's Chi-Quadrat	$\chi^2 = 17,4375$
The critical value of the Chi-Quadrat	**12,5916**
ρ value	**ρ = 0,0078**
Cramer's contingency coefficient	**V = 0,2204**
Pearson's contingency coefficient	**C = 0,2152**

Through the application of Pearson's chi-square test, in which the calculated chi-square value is higher than the calculated critical value, it was found that there is a dependent relationship between the variables. The statistical significance of this relationship was confirmed by calculating the quantity ρ, which at the 95% confidence interval takes a value lower than 0.05 (the relationship ρ<0.05 is valid). After identifying a statistically significant relationship, the calculation of the Cramer contingency coefficient was applied. Based on the calculated value, it can be concluded that the relationship between the dependent variables occurs at a low level. Through the calculation of Pearson's contingency

coefficient, it was found that the observed contingency relationship between the variables is weak. Therefore, based on the above calculations, it can be concluded that H3 has been partially confirmed; however, the dependence between the variables is low.

Hypothesis 4 (H4)

H4 was built around the question of whether there is an association between the type of enterprise (by size) and the extent to which it has been affected by the pandemic, with the wording being: **"The smaller the enterprise, the higher the degree to which it is affected by the pandemic."**

To confirm or refute this hypothesis, data obtained from the following statistical questions were used:

1. Question 2: *According to the number of employees, your enterprise is: (a micro enterprise, small enterprise, or medium enterprise).*
2. Question 10: *Has the situation related to the COVID-19 pandemic affected your business (1 - definitely yes, 5 - not at all)?*

Respondents answered question 2 by selecting from pre-determined qualitative options. For question 10, respondents answered on a numerical scale, with each quantitative trait assigned a qualitative value. A contingency table (Table 4) was then constructed from the statistical data obtained above, using Pearson's chi-square test of independence, Pearson's contingency coefficient, and Cramer's contingency coefficient V to examine the existence and strength of the relationship between the variables.

Table 4. Contingency table H4

		Has the situation related to the COVID-19 pandemic affected your business?					
		Definitely yes	**Rather yes**	**I don't know**	**Rather no**	**Not at all**	
According to the number of employees, your enterprise is:	**Microenterprise**	69	28	35	31	16	**179**
	Small Enterprise	36	22	35	18	11	**122**
	Medium enterprise	14	22	7	7	8	**58**
		119	**72**	**77**	**56**	**35**	**359**

Source: Authors

Based on the calculations performed using the above methods, the following results were found:

Pearson's Chi-Quadrat	$\chi^2 = 22,3898$
The critical value of the Chi-Quadrat	**15,5073**
ρ value	**ρ = 0,0042**
Cramer's contingency coefficient	**V = 0,1766**
Pearson's contingency coefficient	**C = 0,2423**

Based on the fact that the Pearson chi-square value is higher than the calculated critical value of this variable, it can be concluded that there is a dependence between the identified variables. For the 95% confidence interval based on the calculation of the variable ρ, it can be concluded that the calculated correlation is statistically significant, as the relationship ρ<0.05 holds. Given the statistically significant correlation between the variables, we then proceeded to calculate Cramer's contingency coefficient. We conclude that the correlation identified by the Pearson chi-square test occurs at a low level. From Pearson's contingency coefficient calculation, it can be concluded that there is a weak contingency correlation between the variables under study. Therefore, H4 can be considered partially confirmed.

4. Discussion

One of the four stated hypotheses addressed in this research was disproved, and the remaining three were partially confirmed. None of the stated hypotheses was fully confirmed, but this opens the way for further future study and discussion of the specificities of the pandemic that may have influenced these results.

H1 was built around the question of whether there is a correlation between enterprises thinking they can manage risks and the closure or non-closure of their operations during a pandemic. In the context of disproving this hypothesis, it is helpful to reflect on whether the ability of enterprises to manage risk is indeed related to the maintenance of a functioning operation in the particular environment created by the pandemic. There is also the possibility that enterprises cannot correctly assess their capacity to manage risk properly and effectively, thereby potentially exposing themselves to further threats arising from such a relationship. Therefore, the refutation of this hypothesis creates scope for future closer examination of the risk management capabilities of enterprises and their perceptions of this area.

Ostapenko (2021) argues that the risk management methods and practices embedded in the enterprise will enable risks to be identified, analyzed, and evaluated promptly so that the enterprise can then design measures to manage them to an acceptable level. By effectively identifying, analyzing and assessing risks, we can prevent the spread and, in particular, the negative impact of hazards on the enterprise, which could cause interruption of operations or even complete closure.

H2 was built around whether there was a relationship between the business sector and the extent to which the enterprise was affected by the pandemic. Through statistical examination, it was found that there was a relationship between the industry of the enterprises surveyed and the extent to which they were affected by the pandemic. However, this relationship is relatively weak and cannot be seen as entirely indicative. This may be due to the specific circumstances of the pandemic and, in particular, to regional differences in the strength of the pandemic's impact on business sectors.

The impact of the pandemic and the governmental anti-pandemic measures taken have affected most enterprises in the world and society as a whole, affecting all business sectors. Many enterprises only survived following the significant drop in demand caused by the restriction of customers entering the premises. Establishments that were only generating sales when their operations were open could not cope with the limits imposed. Therefore, sectors such as accommodation and catering establishments had the most difficulty adapting and were most affected by the pandemic. It was challenging and sometimes impossible to adapt to the changes. The impact of constant changes in the enforcement of social distance policies created significant complications for enterprises in retaining business (Rumman 2022; Androniceanu et al., 2022).

H3 was built around whether there was a relationship between the implementation of risk management, crisis management, BCM, and how long enterprises had operations interrupted during the pandemic. H3 confirmed that enterprises with implemented MR, KM, and BCM had operations suspended for a maximum of 3 months or not at all. The results suggest an association between risk management, BCM, or crisis management implementation and how long enterprises had operations suspended. In this case, however, it is questionable whether the enterprises have these processes appropriately implemented and, if so, how effective these were in the particular situation associated with the pandemic.

In H3, Vasovic's (2022) assertion that the sustainability of business continuity depends on implementing crisis management and BCM into the enterprise while improving the management system was confirmed. Also, Bajgorić (2022) argues that implementing BCM into the enterprise would improve the performance of the enterprise while ensuring effective management of resources and inventory within the enterprise. Through BCM in the enterprise, the management and utilization of these resources in the event of a crisis would be aligned (Nyakato 2022), which was also evident in enterprises with embedded risk management, crisis management, or BCM into the enterprise.

H4 was built around whether there is an association between the type of enterprise (by size) and the extent to which it has been affected by the pandemic. The statistical survey found a relationship between the industries of the enterprises surveyed and the extent to which they were affected by the pandemic. However, this relationship is relatively weak and cannot be considered entirely indicative. One possibility is that the COVID-19 pandemic affected the business sector in a particular way, the impacts of which could be observed in all types of enterprises regardless of their size. This case, therefore, creates scope for future research to confirm or refute such an explanation.

The COVID-19 pandemic has shown that business sustainability is paramount and was particularly disrupted during the pandemic for SMEs. The COVID-19 pandemic mainly affected SMEs, which play a significant role in developing the world economy. The measures taken were restrictions for enterprises, which caused the closure of establishments (Brand 2022, Yang 2022). Enterprises needed to prepare for the changes in the business environment, and the continuity of various activities in enterprises was interrupted. Based on the results from the nationwide questionnaire, SMEs were the ones most affected by the pandemic. Their overall functionality was affected.

Based on the comparison of the research results with the claims of other authors, it can be concluded that the claims about the importance and relevance of risk management, crisis management and business continuity management as important tools for the functioning of small and medium-sized enterprises in times of crisis and their ability to cope with unexpected events have been confirmed. The impact of the pandemic on different enterprises has manifested itself in different ways. Nevertheless, enterprises that had implemented these tools could overcome the effect of the crisis significantly better than SMEs lacking these tools. Therefore, the results of this survey have further highlighted the need for and importance of risk management, crisis management and business continuity management, which has also been discussed by other authors and confirmed by their findings.

5. Conclusions

The pandemic was a particular type of threat for which only a few businesses were prepared in advance, and damage minimization procedures needed to be in place. However, the survey results showed that although the pandemic affected almost all areas of social life, its impact on individual businesses was different but varied based on the characteristics of the companies.

This new finding opens up a space for reflection on how some of the practices and processes inherent in risk management, BCM and crisis management could be innovated and optimized to enable businesses to confront, prepare for and deal effectively with such threats in the future. At the same time, it raises the question of how to adapt these procedures and processes to the individual needs of each business. The findings from this research provide a practical insight into how the pandemic has affected the functioning of SMEs and what measures or processes have proven most effective in mitigating its negative impacts. They show that, given the relationship between risk management as a crisis prevention tool and crisis management as an effective response to unforeseen crises, BCM can be used in both phases, providing businesses with several options to prepare for potential risks and increase the resilience of their business. However, the research findings and results may have been partly influenced by the number of SMEs involved.

For this reason, it would be desirable to repeat a similar survey with a higher return rate of questionnaires. Another factor may be regional differences in the internal factors of the business environment, which are highly significant within the Slovak Republic. Government measures also firmly determined the pandemic's impact on SMEs. For this reason, it is desirable to compare the results of similar surveys abroad, as differences in measures at the national level may distort the final results.

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SECURITY AND DEFENSE ARE TRULY A PRIORITY FOR THE MEMBER STATES OF THE EUROPEAN UNION: FACT OR HOAX?

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Abstract. All the often-contradictory hoaxes concerning the European Union (EU) are so-called Euro-myths. They mostly have a negative tone and try to denigrate this institution. Their emergence is caused by the fact that individual states often need more information about what is happening in the EU, and the complex mechanism of the Union's functioning is difficult to understand. Therefore, when the next "EU wants to ban something" comes out, ordinary people tend to take it as a given without verifying the information, ensuring the defence of freedom, independence, sovereignty, territorial integrity, and population belongs to the main objective of each state. Thus, in response to the current political, security and economic situation, countries must earmark, within the framework of their national budgets, a proportion of the available resources to ensure their defence. The aim of this paper, based on current trends in the defence budgets of the EU member states, is to point out, that not only the global economic and financial crisis and the credit and debt crisis in the Euro-area have a significant negative impact on the amount of resources, which individual EU member states earmark to ensure their defence, but, in addition, all these aspects should be precisely understood, bearing in mind, the growing influence of disinformation spread, leveraged by the hoax rising influence.

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1. Introduction

The current institutional structure of the EU's common security and defence policy has developed based on historical developments and external influences that have shaped it so far and is part of the European Union's common foreign and security policy. Prosperity, development, and sustainable growth of living standards have never been in the past so significantly dependent on the level of state and citizen security as it is nowadays in the currently economically interconnected and rapidly changing world in response to the deepening exchange and flow of information, capital, transactions, goods and services, intensive socio-cultural contacts, and legal and illegal immigration, the war against global terrorism (Bučka, Marek, Andrassy, 2018). The emergence of new, especially asymmetric, security threats and their proliferation following the fundamental changes in the worldwide security environment after the end of the Cold War, the fall of the Iron Curtain and the resultant decomposition of the world significantly shaped the view on ensuring defence and security (Bučka, Andrassy, 2017; Procházka, 2018; Majchút, 2018; Belan, Petrufová, 2021; Dubauskas, 2021; Jurčák, Marek, 2022).

In this context, we would argue that the government, probably all the countries of the world, the EU Member States certainly, did not avoid the new requirements on sufficient military capacity and capability disposal as well as the ability to react on the current and newly resurfacing security threats. For these reasons, the importance of defence planning has been increasing in the respective countries; what constitutes a specific process via which each state or coalition of states accomplishes its function of operation and coordination by creating, maintaining and applying inevitable defence capacities for ensuring state defence and meeting international commitments to defend freedom, independence, sovereignty, territorial integrity, the principles of democratic constitutional order and the life and property of citizens (Zůna, Pikner, 2013; Kavan et al., 2014; Kazanský, 2018; Drelich-Skulska, & Domiter, 2020).

The primary objective of this article is to bring a theoretical view of the concept of funding defence as one of the public goods (financed from public resources) in the context of empirical data on defence spending in the EU Member States within interdisciplinary scientific research. The article, via comparison of defence expenditures in European countries, exhibits a possible decrease in the stability of the security environment regarding the reduction in defence expenditure from 2006 to 2018.

Among the main methodological approaches enforced in this study belong the economic theory of public goods, content, comparative, and trend analysis, since its analysis is going to be applied to the expenditure connected with ensuring defence from public resources along with utilizing comparison of defence spending among the monitored states. In the first part of this study, we will concentrate on the theoretical definition of defence in terms of economic theory. In the second part, we will focus on the defence spending in the European Union Member States.

In the processing of this study, we have used as a starting material the works of influential economists Stiglitz (1997), Samuelson and Nordhaus (2022), who claim that nothing is as vital for society as its security and defence. Economy and society can only prosper if the state guarantees these. During the preparation of this article, very useful was also the publications and articles of other reputable authors such as Smith (2017), Kennedy (1983), Horák (1998), Dutta (2005), Hartley (2011) and Soares et al. (2021), who in their works highlight the importance of economies of defence in practice and its impact on society and its security (Pruchnicki et al., 2022). From the domestic sources, we have used mainly work of Holcner et al. (2012), Mikušová Meričková and Stejskal (2014), Medveď et al. (2011), Ivančík (2012), Lasicová and Ušiak (2012) Kazanský (2015), or Hajdúková et al. (2022) which stress the necessity of ensuring national defence and security for the peaceful development of society and the interconnection of the economy and national defence.

In processing the analysis of current trends in defence expenditure, we also used the most recent data from the European Defence Agency (EDA) and Stockholm International Peace Research Institute (SIPRI), confirming the close link between defence and the economy. The issue's importance also lies in proving a direct link between the level of defence spending and the level of stability of the security environment in individual countries and the European Union as a whole.

2. Theoretical basis for the study of defence as a public good

Despite the EU Global Strategy being presented in 2016, there still needs to be a common approach to understanding security threats in the EU. The EU's strategic compass benefits the formation of a "common strategic culture". It is a document of a political-strategic nature, not to replace the Global Strategy but to develop the tasks in the defence and security resulting from it. The analysis of the potential and limits of the Common Foreign and Security Policy of the EU brings knowledge that in addition to systemic factors such as international interactions, the structure of the world political system, etc. and the national interests of the member states, which still play a very important role in shaping the foreign policy of the European Union, factors such as European values, political harmony, Europeanization of values also determine the CFSP. Strong identification of the population and elites with European identity is therefore considered a prerequisite for more substantial support of supranational institutions.

Ensuring defence as a public good and an indispensable part of the public sector is among a state's primary tasks. At the same time, protection also belongs among the fundamental economic activities of the state since, to fulfil these tasks; a state spends a part of its human, material, and financial resources. New security risks, along with the change of character and form of threats, require that the states adopt, except for many political, military, organizational and legislative measures, adequate economic measures as well (Ivančík, 2012). The issue of national defence is also an economic issue (Hitch, McKean, 1960; Grant, 2019; Palavenis, 2020; Becker, 2021; Becker, Dunne, 2021).

History confirms that demands on the economic security of state defence and life protection have constantly been increasing along with the development of human society. Because of that fact, from the overall summary of factors influencing the need for defence, the economy acts as a decisive factor. The economy represents a basis of state defence as it secures it with the necessary resources.

Along with solving the issue of state defence, society must deal with the issue of peaceful state development. Limited and precious economic resources must be divided into peaceful and defensive. Depending on the threat's situation or character, the state must try to optimize the choice between peaceful and defensive expenditures. This fact should get currently even more to the forefront when the consequences of the recent global economic and financial crisis and the currently ongoing loan and debt crisis were added to the list of new security threats of the 21st century. That is why the problems of economic security of defence and its financing require incomparably greater attention than before.

Defence and security should not thus be dependent on market fluctuations. On the contrary, the economic security of defence and state security should be stable since, in times of crisis and uncertainty, the feeling of danger is more intense, and the demand for defence and security increases. From the point of view of economic theory, defence is an integral part of the public sector. One of the first comprehensive definitions of the public sector in our conditions says that the public sector represents that part of the national economy which is financed by public finances, managed, and administered by public administration, is subject to public control and where decisions are taken by public choice (Meričková, 2007; Androniceanu, 2021).

From the perspective of Anglo-Saxon literature, this is also valid in our conditions; the mostly cited work is written by Stiglitz, who emphasizes that in civilized states, the activity and decisions of the government significantly influence the citizens' lives and not only in the field of education, healthcare, housing, or employment but also in the sphere of securing state and citizens' defence, which is ensured via specific public sector institutions (Stiglitz, 1997).

The neoclassical economy is based on the fact that the public sector, financed by public finances, plays a significant role and a constructive task in the economy (Medveď et al., 2011). This was already emphasized by A. Smith, who pointed out the essential functions of the state in the economy, while he regarded the task of ensuring the defence and security of the citizens as crucial. At the same time, the certainty of state interventions for guaranteeing the protection and security of citizens is accented in all consequent economic theories dealing with the issue of the public sector and public finances. If the public sector ensures public goods, the emphasis is on the economic substance, not its institutional manifestations. Public goods have two main characteristics: non-excludability (when it is impossible to provide interest without it being possible for others to enjoy) and non-rivalry (this means that when a good is consumed, it doesn't reduce the amount available for others). Based on this, defence is one of the few cases of pure public interest (Stiglitz, 1997).

Ensuring defence belongs among the typical examples of public goods. The benefit from these goods is so scattered among the citizens that every firm or consumer has the economic motivation to provide them complexly and systematically. In this regard, Samuelson and Nordhaus claim that nothing is more important for society than its defence and security (Samuelson, Nordhaus, 2022). The defence as a collective good cannot be divided into partial units, since each individual consumes it in a bloc. Benefit (utility), what the individual receives from it does not reduce benefit (utility) for the other members of society. Because of that, according to many authors, the marginal costs of additional consumption are in the case of defence zero (Dutta, 2005).

In terms of expenditure, height ensures defence or another collective good, for example, the usage of naval navigation, equal regardless of the fact, if the protection makes use of 999 thousand or 1 million citizens of the state, respectively if around the lighthouse on the coast sail 50 or 100 ships. In the first case, the armed forces of the respective state ensure defence, which serves all citizens of the state and from which it is not allowed to exclude anyone. In the second case, by using naval navigation, the lighthouse shines equally for all ships, which sail along regardless of whether their owners contributed to its construction (Sivák, 2007).

Following the narrow interrelation of the public sector with the state's performance of tasks, defence ensures the output of the security-defence function of the state. In the frame of public sector division, protection, which satisfies the needs of the state and its citizens' security, belongs to the group of society needs segments (Meričková, 2007). From the perspective of public interest is thus defence beneficial for all citizens of the state, as benefit from it has each single citizen. Ensuring public goods represents an economic activity bringing benefit to society, which cannot be left to private entrepreneurship. Considering the aspect of excludability and impossibility of measuring individual consumption, defence, and other similar goods, for example, security, are directly predetermined to be a subject of public financing (Medveď et al., 2011).

More than private initiative is required in these cases. At the same time, it is highly improbable that people provide, based on voluntariness, sufficient resources from their pensions to ensure defence or other public goods. Therefore it is inevitable that the state secures these from public resources. As the state decides within its performance of functions on the fields, to which, including defence, a disposable part of resources will be channelled, and ensures that goods and services, which the state buys for securing its defence, are truly produced and realized.

Claims on economic securing of liberty, independence, sovereignty, and territorial integrity of a state, but also the lives and property of citizens have been permanently increasing with the development of human society, and the economy has gradually become a decisive factor in securing defence. The dependence of building military state power on the economy has steadily become a lot stronger than before because it is proportional to the possibilities of the respective state economy, i.e. the size of gross domestic product, the rate of economic growth, the rate of work productivity growth, its sectorial and spatial structure, its elasticity and ability to react on the newest trends in the field of scientific and technological development and the recent years also on the changes resulting from globalization and its adverse impacts on defence and security (Ivančík, 2012).

Economy, in the case of defence, defines the possibilities of a country, especially in the field of building and forming armed forces, their structure, quantitative and qualitative level of military and civil personnel, quantity and quality of armament and equipment, training, technical preparation, material maintenance, possibilities and means of conducting an armed struggle or securing defence etc. The power of the country's economy significantly influences the economic and material maintenance of securing defence, preparation, and course and, to a considerable extent, the overall outcome of an armed struggle. The economic development of a country, resp. a coalition plays a decisive role by creating military-strategic conceptions which must respect real financial possibilities (Šefčík, 1999; Komarek, Wagner, 2021).

Ensuring defence also has a backward impact on the economic development of society, as it withdraws society a huge part of means and powers, which are consequently in a national economy not being used for the production of new peaceful economic goods (grocery, automobiles, electronics, furniture, clothing, medicaments etc.), but for purchasing and introducing new types of armed technique, weapons, weaponry systems and their modernization and maintenance.

3. Actual developments in defence spending in EU countries

The banking sector crisis and the subsequent economic and financial crisis, which broke out first in the United States of America (USA) and then expanded to the entire world, started a period of an economic recession that does not have any equivalent since the Second World War, with no exception of the USA no-one could escape the negative impact of the global economic and financial crisis, gradually because of the deepening globalization, including the EU Member States. The same applies to the coronavirus pandemic, which has engulfed the world and brought about a slowdown in economic growth and a number of economic problems with severe repercussions on state budgets.

Considerable reduction of the rate of economic growth, increase in the unemployment rate, development of budget deficits, worsening of paying the balance and other negative impacts of the crisis caused each government to and still has to via public expenditure adopt more penetrative or slighter economic, but also political and legislative measures in order to mitigate the impacts of the crisis. One of the first steps to which most countries have resorted is consolidating public finances by introducing restrictive financial measures concerning the state budget. From the economic point of view, the reasons are clear: decreased economic activity leads to reduced state budget income.

Budget mathematics is also ruthless. Dropouts on the side of income bring dropouts on the side of expenditure. Planned and in advance, approved budgets seem because of this reason as unsustainable and if the respective states within responsible fiscal policy do not want to increase their debts and via subsequent loans compensate the dropouts in income, they must execute cuts. Although unpopular, but inevitable, as the use of foreign loans for financing expenses in state budget incomes would not bring anything else but an increase in the countries' foreign debts, which represents an unwanted and, from the long-term point of view, unsustainable phenomenon.

Therefore, cuts are necessary, especially in the respective countries' fields that are not regarded as priorities. In most states, including the EU Member States, the first victim of saving became the expenses for ensuring defence. However, only in some countries. In some of them, security has remained, despite the crisis, a priority, as economic securing of protection should also be in times of crisis stabile since in times of crisis and uncertainty, the feeling of danger is more intense and the meaning of securing defence increases.
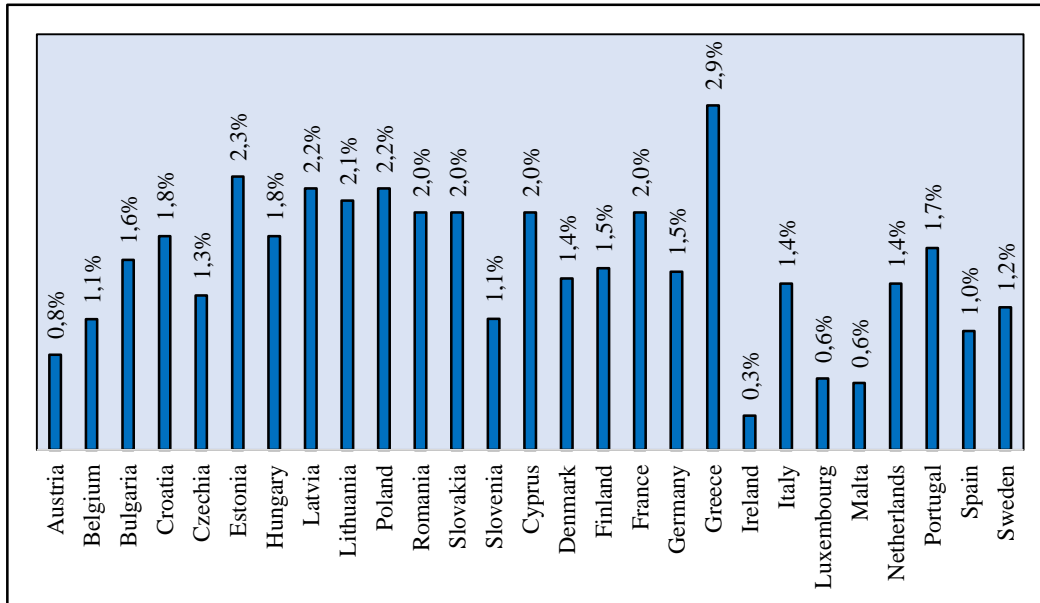
Figure 1. Defence Spending in the EU Member States in 2020
(as % of GDP)
Source: EDA, 2022

The above Figure 1 clearly shows that the differences between the Union member states are pretty substantial. Total average defence expenditure in EU Member States in 2020 reached 1.4% of GDP. However, the problem is not only a lack of spending on defence, but an even more significant problem is that this level (except for 2009, when there was a considerable decline in GDP because of the impact of the global economic and financial crisis and in last two years) is decreasing in recent years (see Figure 2).

Figure 2. Defence Spending in the EU Member States in the Period 2005-2020
(as % of GDP)
Source: EDA, 2022

Based on Figure 2, it can be said that the downward trend of defence expenditure it can no longer be directly associated with related to the global economic and financial crisis or debt and loan crisis, although, in most member countries, the crisis could have an impact on the increasing difference from the boundary of 2% of GDP, to which those European Union member states, which are also NATO members, committed (Androniceanu, 2019). In the case of some mentioned countries, it can also be said that they use or (according to some security experts and politicians) abuse the benefits and advantages of collective defence within the Alliance and Union.

The NATO Secretary General expressed the problem mentioned above during his visit to Slovakia. He said, "It is understandable that increasing the defence budget is not easy, and increasing the resources for the armed forces is currently very sensitive. However, the ongoing crisis in Ukraine demonstrates that defence is still extremely important." He emphasized: "Defence costs something, but if it was not secured, it would cost even more". At the same time, in this regard, the chief of the North-Atlantic Alliance appealed to the mainly European members of the Alliance to meet their commitment to spending 2% of GDP on defence.

Proponents of the approach based on the (1) acceptance of their own responsibility for security in Europe and (2) the end the reliance on the United States displease figures referring to the level of defence spending as a proportion of total government spending in European Union member states (Figure 3).

Figure 3. Defence Spending as a Proportion of Overall Government Expenditure in EU Countries in the Years 2005-2020 (in %)
Source: EDA, 2022

On this graph, it is possible to observe the impact of the global economic and financial crisis and the credit and debt crisis in the euro area countries on the defence budgets. According to the data, the decreased performance of the economy during a recession brings a smaller volume of GDP and, thus, a noticeable drop in defence expenditure. On the other hand, making excuses for the lingering effects of the global financial crisis and other financial crises does not stand up because Figures 2 and 3 show that in the countries of the Union, defence spending fell even before the outbreak of the situation as mentioned above, which just goes to show that the defence and security are not a priority in the Union. A small positive was at least a slight increase in defence spending in 2019 by one-tenth of a per cent. The following year, however, there was a decline again (Figure 3).

The analysis of the trend in defence expenditure development, following the above listed, thus points out the fact that over the years (from 2005 to 2018) there has been a significant drop in defence expenditure, and this is true towards the GDP as well as in terms of proportion to total government expenditures, in the economically and militarily strong and by area and population size big countries as well as in the traditionally, economically and militarily not so strong and by area and population size not so big EU Member States. Their defence budgets are thus still far from the 2% of GDP threshold, which is generally considered an adequate level of defence spending.

The European Commission (EC) announced recently that 61 projects of cooperation in research and development in the field of defence, which were selected based on the first calls for proposals under the European Defense Fund (EDF), will be supported with an amount of almost 1.2 billion Euros. The TASR reporter informs about it. EDF has selected funding proposals to support projects of cutting-edge defence capabilities, such as the next generation of combat aircraft, tanks and vessels, as well as critical defence technologies such as military cloud, artificial intelligence, semiconductors, space, cyber or medical countermeasures. The fund also supports breakthrough technologies, especially in the field of quantum technologies and new materials, where it will take advantage of promising small and medium-sized enterprises and startups. EC Executive Vice-President for Digitization Margrethe Vestager said that financial support for selected projects shows that cooperation in the defence industry in Europe is possible and even on a wide scale.

Conclusions

Increasing demands of defence on the economy, influenced by mainly political, security and military factors, impact restricted possibilities of the economy. Still, despite that, the current character of defence requires that the respective states, alternatively coalitions, concentrate on securing the demands mentioned above of defence and also on the protection of their economic resources against attacks of opponents and, at the same time, exploit all available means to weaken his economic strength. Mutual relations of defence and economy have been permanently developing and deepening and are gradually narrower and interconnected. Therefore, the defence issue currently requires more interest than before due to the Russian aggression in Ukraine.

Except for dynamic changes in other fields, changes also occurred in the economic securing of defence. The above-listed graphs confirm that the global economic and financial crisis has unquestionably harmed obtaining protection and singling out expenditure for security from the state budget of the respective states. Based on investigating several available relevant information, facts and characteristics, it is impossible to conclude one definite deduction that precisely the crisis represents the main reason for what, in the majority of the EU member states, a drop in defence expenditure has occurred.

As it was indicated above, the global economic and financial crisis or debt and loan crisis cannot be marked as the main trigger of decreasing defence budgets in EU member states since decreasing tendencies in defence expenditure development have significantly manifested themselves in a majority of countries for a longer period, not only in the period after the outbreak of the crisis. Other factors also influenced the drop in defence expenditure. In terms of economic theory, some countries took the position of "free riders" and began to rely more on the fact that the other members of the European Union or North-Atlantic Alliance would account to pay. It is clear that in many countries, a change in their defence policy occurred after the removal of the immediate threat of conflict between the East and the West in Europe on European territory and other countries changed the attitude of their political representation, which by the non-existence of direct military threat were not able to enforce that height of means in their national parliaments by voting on the state budget. And from the above graphs and data, it is clear that they have not been able to do this in recent years when there has been an actual deterioration in the global and continental security environment and the growth of security threats. At the same time, this means that their armed forces do not have sufficient resources for more extensive modernization and the training and maintenance of all military capabilities and capacities built up to that time.

The analysis of defence expenditure trends in EU member states results that while among some members securing their individual and collective defence and national as well as European Union interests also remained despite the crisis a high priority, among some members of the Union, the defence has gradually stopped to represent a priority and defence expenditures have become after the breakout of the global economic and financial crisis and during the loan and debt crisis the first victim of saving. Reduction of defence budgets in the majority of EU member states has also fundamentally influenced the overall trend of defence expenditure in the European Union as a whole since the reasons are not only economical but also political, and they are narrowly connected with the shortage of cohesion of the entire EU defence strategy within Common Security and Defence Policy.

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INSIGHT INTO THE RESILIENCE OF THE ROMANIAN ECONOMY[*]

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Abstract. We are contemporary with various financial crises of global magnitude, starting with the Great Depression of 2008-2009, so-called the "subprime crisis", the economic crisis generated by the COVID 19 pandemic, but also the one that is ongoing nowadays, caused by the Russian-Ukrainian conflict. All these extreme situations generate reactions of the most diverse and challenging to delimit and predict so that the economic entities must show permanent resilience to recover quickly and emerge victorious from the fight with the disturbing phenomena. The present study attempted an x-ray of the Romanian economy after the first year of the COVID pandemic, the most difficult year when the restrictions were among the most severe, analyzing at the same time the years before the beginning of the pandemic for an accurate picture. At the same time, we tried to answer the questions of why a company is more resilient than others using a sample of the top 100 companies in Romania, analyzing the impact on revenue growth of 13 indicators grouped in 4 classes, namely Business efficiency, Sustainable Profitability, Financial Stability, Business dynamics & stability. The obtained results may have significan economic policy implications.

Keywords: resilience; financial health; crisis; econometric model; economic growth

JEL Classifications: O11, O32 O47

1. Introduction

The "resilience" theme is the most topical, being intensively studied by research to find the best definition to establish the factors that determine a higher resilience or why a company shows more resilience than other similar companies. All this research has as its final goal the establishment of successful strategies and the recovery of organizations facing disturbing factors. The statements are confirmed by analyzing the Web of Science database, where the query by the keyword "economic resilience" generated an impressive number of results, namely 14,791 since 1982. In recent years this topic has gained importance among researchers, especially starting with 2020-2021 along with the economic crisis generated by the COVID-19 pandemic when the number of publications exceeds 2000 / year, the maximum reached in 2021 (2,839 publications), the most studies being in environmental science (2,917 publications), environmental studies (2,625 publications) or economics (1,967 publications) recordings including articles, proceeding papers, books, book reviews.

The theme "resilience" is attributed to several disciplines, including the ecology and environmental science, engineering, and psychology, but also the economic field, each offering its specific definition. Still, all converge towards the same common sense, namely the ability to adapt, respond, and react to various disruptive factors.

Martin et al. (2015) remark that a new term, "buzzword," has taken its place in the academic world and in the speeches of politicians, which describes the ability of an entity or system to respond to shocks and disturbances. However, although the concept has quickly entered the lexicon of the literature, there are still steps to understand and find ways to measure its determinants in the long run. Arrow et al. (1995) have a different perspective; at that time, the concept of resilience needed to be sufficiently analyzed, with research in the field being at the beginning. He considers resilience as "a measure of the magnitude of disturbances that can be absorbed before a system centred on one locally stable equilibrium flips to another", and economic activities will continue only if the ecosystem to which they belong is resilient.

The objective of this study is to present the Romanian economy's performance after the Covid-19 pandemic severely shook it. At the same time, we try to find the determinants that affect the resilience of companies by analyzing the financial situation of the top 100 most influential companies in Romania and extrapolating to the level of the entire economy.

The study has its limitations because although the sample is significant, the turnover of companies representing almost a quarter of the total sales of Romanian companies; however, these companies are the ones that performed best, being supported both in terms of financial support but also great know-how by their membership in international groups, they have access to new, foreign markets much easier, they invest in technology and innovation, they have a higher recovery capacity than the other companies, especially the micro or small ones. At the same time, finding indicators that influence economic growth is a continuous challenge, so the following studies can go in this direction, to find the best combination of determinants for drawing the most accurate conclusions.

2. Literature review

Resilience is defined as a notion that indicates the capacity of a system to respond to shocks (Martin et al., 2015) that disturb the ordinary course of work. In an equilibrium-based approach, the concept is directly linked to adaption and adaptability (Pike et al., 2010).

The resilience of an organization, economy or country is drafted in the literature by different notions such as survival, recovery, resistance, endurance, recovery or sustainability (Briguglio et al., 2006; Briguglio, 2009; Ates

& Bititci, 2011; Aparicio et al., 2016; Markovic et al., 2017; Tognazzo et al, 2016; Di Caro, 2017; Korhonen et al., 2018; Sabatino, 2019; BSI, 2021; FM, 2022; Shipanga et al., 2022; BSI. 2021; FM. 2022).

Most of the studies dedicated to examining resilience gained momentum, starting in 2008 when the severe economic and financial crisis shook the entire global economy from its foundations. Analyzing the specific publication, 2008 was a turning point in analyzing resilience until nowadays, when the term became a standard when talking about the resistance of an entity to the impact of actions coming from the external environment.

Martin et al. (2015) expose in a detailed study why economic entities acting in the same sector or region evolve different upward or downward, the authors attributing these developments to specific factors such as supply chains, different usage of production capacity, different adoption of technology, wage costs, productivity, specific labour needs. Peng et al. (2021) stresses importance of resilient supplier selection in contemporary conditions.

Resilience is a multidimensional network of favourable attitudes and behaviours (Ayala & Manzano, 2014). Therefore, compose of resilience continue to be challenging to explain and define (Luthar et al., 2000); as difficult as it has been to develop a measure of resilience, even if there were designed some measuring scaled but not widely validated (Windle et al., 2011). It is closely related to implementation of effective solutions to the crisis tasks and its regional management (Grega & Nečas, 2022)

A general conclusion that can be drawn analysis the specific literature is if proving and the economy is resilient or not must be examined their economic performance over some time and the criteria can be defined and pre and post-shock growth rates and levels of economic performance can be measured (Hill et al., 2008).

The literature analyzed and revised by the author of the highly cited papers indexed in Web of Science includes research and studies trying to find the most relevant determinants of resilience, including here "territorial capital" meaning endowed with material and immaterial capital assets (Fratesi & Rodrìguez-Pose, 2016), capacity for innovation, economic diversity, export propensity, human and social capital, and financial constraints (Martin & Sunley, 2015), socio-economic characteristics, financial resources, infrastructures, community capacity, innovation and technology, natural environment (Modica & Reggiani, 2014), foreign direct investment, clean energy, trade openness, carbon emissions (Sbia et al., 2014) or human capital, labour, government expenditure, inflation, foreign aid, foreign direct investment, financial development, globalization and debt servicing (Sy, 2020).

A separate strand of international research is devoted to resilience of enterprises to challenges caused by pandemics (Kong et al., 2021; Marcazzan et al., 2022; Wang et al., 2023).

Regarding the detailed analysis of the resilience of the Romanian economy in the face of the crisis, only a few studies are most recent and relevant to our research originating from Iancu (2022). The study concludes that "limited access to liquidity, lack of strong state support, poorly prepared and motivated human resources, low digitalization" are the main obstacles for the Romanian economic entities to be more resilient when facing various crises of different magnitudes. The small research panel on the resilience of the Romanian economy opened the way to the present research, trying through this research paper to find answers to the questions: *Was the Romanian economy resilient in these troubled economic times? In addition, what factors determine a greater or lesser resilience of the Romanian economy?*

3. Overview of Romanian companies' performance

The primary purpose of the present research, but also any research on concepts and phenomena, is to deepen and discover known or unknown realities to a greater or lesser or even unknown extent. The research work continues

in the form of an applicative research on the assessment of the resilience of companies in Romania and the radiography of their health status because of the impact of the effects of the economic crisis generated by the COVID 19 pandemic.

The research started with the presenting the indicators extracted from the annual financial statements of all economic entities that submitted financial information to the tax administration, including here: (i) entities that apply accounting regulations following Directive IV, (ii) entities that apply regulations under International Financial Reporting Standards, (iii) entities that apply the simplified accounting system, both those whose financial year coincides with the calendar year. Therefore, insurance companies, brokers, credit institutions, IFNs, ONGs, SIFs are excluded. The analysis periods include the years 2016-2020, so a total of 5 full years, which captures the reference year 2020, the year of the onset of the pandemic globally and respectively in Romania, the year in which traffic restrictions began both personally and supply chains and sales, the first year in the modern era in which a state of emergency was established in Romania and later a state of alert and which had important repercussions on the economy in general but also on enterprises in particular. Since the end of the first quarter of 2020, the economy has been negatively impacted by:
- ✓ supply chain delays and bottlenecks,
- ✓ declines in external demand
- ✓ quarantines in countries outside the country with which Romania has business relations or through which it transits the transport of goods
- ✓ quarantine at a national level, with more severe restrictions until May.

Strong domestic demand has put a strain on this period and helped the economy function and boost the exit from this period with as few adverse effects as possible.

Table 1. Financial picture of Romanian Companies

Mio RON	2020		2019		2018		2017		2016
Annual turnover	1,574,130	-7.9%	1,709,783	9.1%	1,566,660	11.9%	1,399,780	9.7%	1,276,046
Profit	141,973	3.4%	137,277	11.5%	123,071	11.7%	110,152	6.1%	91,979
Profitabilty margin	9.02%		8.03%		7.86%		7.87%		7.21%

Source: author realization, based on public financial staments

In 2020, the year of the pandemic's beginning, the cumulative sales of the entities surprised in the sample mentioned in our research suffered a contraction of 7.93% after the peak recorded in 2019. The decrease counterbalances the increase recorded in 2019 of 9.14%, and thus, sales reach the level from 2018. The highest percentage of decline, respectively 23.38%, is registered among the entities that apply the accounting regulations following the International Financial Reporting Standards, but the share of turnover generated by these entities in the total national economy is low, only 4.34%; therefore, their impact is attenuated in the final result. The contraction of 7.71% of the sales obtained by the entities that apply the harmonized accounting regulations decisively influences the final result, as the share of the turnover received by these entities is significant, i.e. 80.88%. The decrease of about 8% translates into the loss of a month of sales in 2020, a fact considered normal, and the recovery was rapid and concerted, taking into account the severe restrictions from the beginning of the pandemic but also the psychological reactions of consumers and uncertainties among companies about their future.

At the same time, the encouraging aspect is that the dynamics of profitability remain positive, the increase is 3.42%, the cumulative profit of the companies that registered profit (without taking into account the net losses recorded) follows a downward slope, documenting a maximum of the last 5 years analyzed.

The graphs below show in a suggestive way the dynamics of sales and profits recorded in the last 5 years, as well as the average profit margins calculated at the level of the entire sample of economic entities. The graphs below (see Figure 1 and Figure 2) show in a suggestive way the dynamics of sales and profits recorded in the last 5 years, as well as the average profit margins calculated at the level of the entire sample of economic entities.
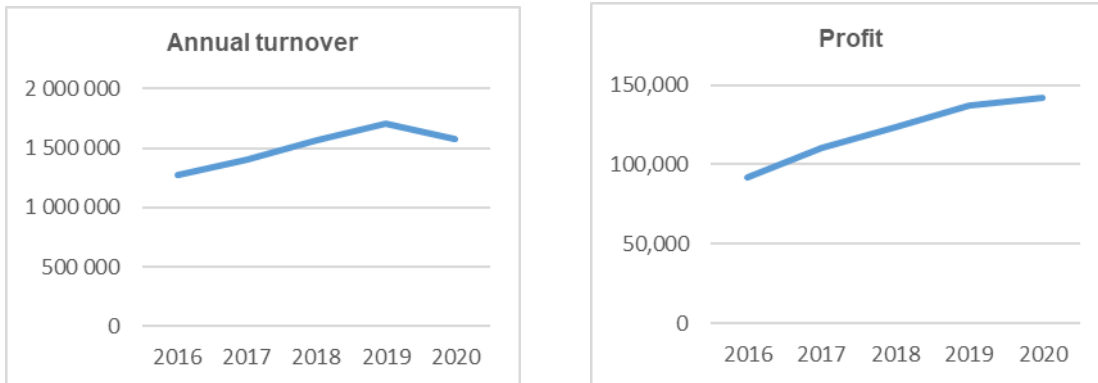
Figure 1. Total income and profit dynamics
Source: author realization, based on public financial staments

Figure 2. Evolution of net profit margins
Source: author realization, based on public financial staments

Considering the evolution of economic growth, the dynamics of turnover achieved by Romanian companies broadly follow the same trend, with a discrepancy in 2018. In addition, the slope of the decrease in cumulative turnover achieved by the mentioned companies is much steeper in 2020 compared to the macroeconomic decline (Figure 3).
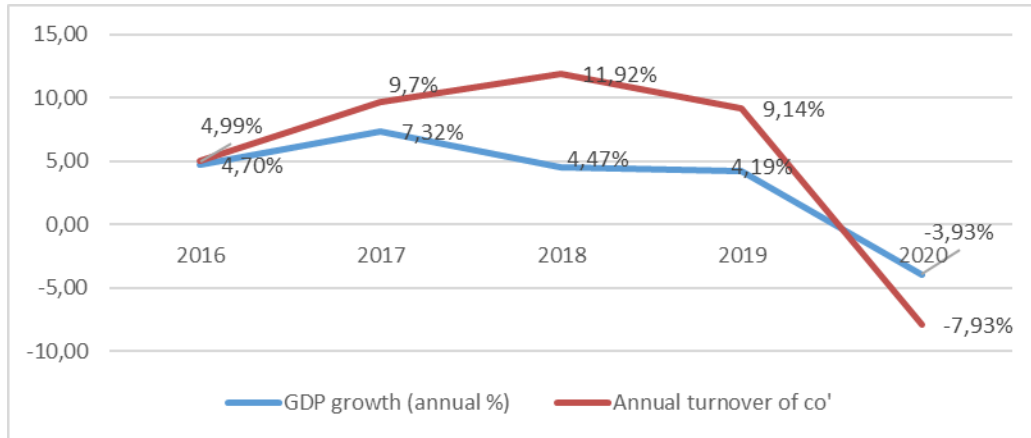
Figure 3. Trend dynamics: annual t/o vs. GDP growth
Source: author realization, based on public financial staments

If we correlate with the evolution of the GDP, the decrease of 3.93% registered in 2020 represents an unexpectedly good evolution; the estimates from the beginning of the pandemic considering the severity of the sanitary crisis predicted a decrease of 7-8% but the Romanian economy helped by the governmental measures showed high resilience. Thus, the second quarter of 2020 shows an economic decline of 10.3%, which has recovered since the third quarter, the situation even improved in 2021, when in the first 9 months of the year, the data presented by INS show an increase of 7.1%. (Figure 4).
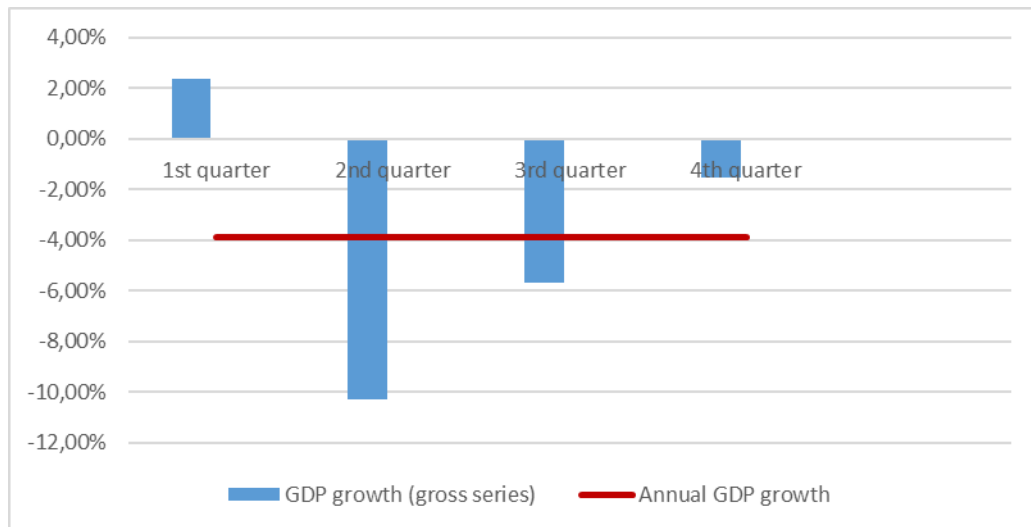
Figure 4. GDP quarterly evolution 2020
Source: author realization, based on public sources

The number of Romanian entities that submitted financial statements decreased in 2020; for the first time in the last 5 years, almost 26 thousand entities did not submit financial statements. However, the decrease is insignificant, only 3.31% and their total number in 2021 is over the one registered in 2018 (Figure 5).
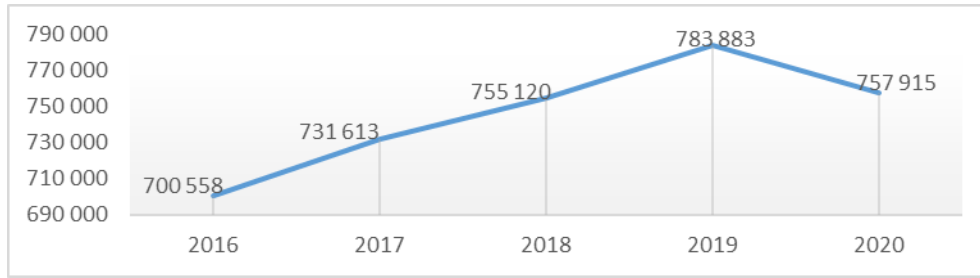
Figure 5. Number of companies
Source: author realization, based on public sources

At the same time, the number of employees employed in economic entities in Romania, decreases sharply in 2020, by 9% compared to the previous year. In recent years the dynamics were slightly ascending but relatively flat. The average number of employees in the organization decreased in 2020 to 5.10 employees/unit, the maximum recorded being almost 6 employees/unit in 2016 (figure 6).
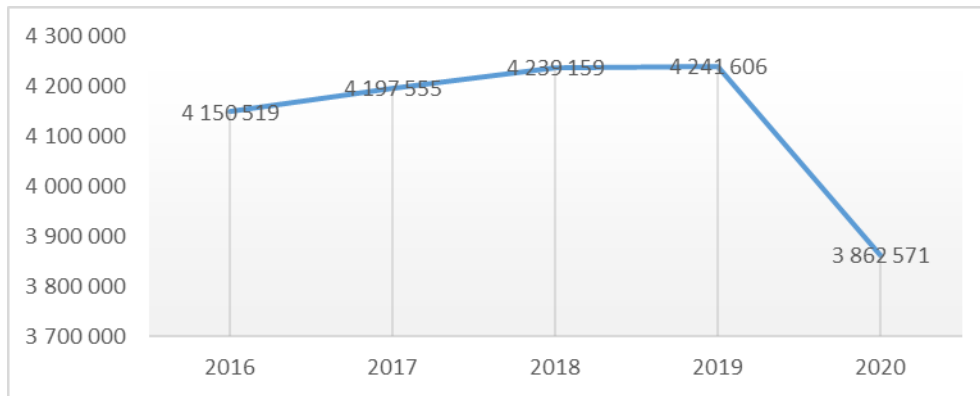
Figure 6. No. of employees
Source: author realization, based on public financial staments

Over the years, the dynamics is a descendant, some of the causes being the digitalization of processes within companies, implementation of advanced technologies which replace the work done by people but also the aging of the working age population and the migration of the labour force in more developed countries to ensure a higher standard of living.

4. Testing the resilience of Romanian companies

In the next chapter, we are taking steps to start a resilience test of Romanian companies by analyzing the evolution of some indicators that we consider relevant in our study using an econometric program namely Eviews
.
The final goal of this research study is to establish the level of resilience of Romanian companies as a result of the impact of the economic crisis generated by the COVID-19 pandemic by analyzing a sample considered significant in terms of volumes generated throughout the economy and which can the large scale replies. In this sense, we will examine the evolution of the companies included in the analyzed sample over 5 years, including 4 years before the onset of the crisis, such as 2020, the year in which the pandemic began in our country, the period in which the most severe measures were imposed since the 1990s, both in duration and intensity. In this way, we try to highlight the most important elements that influence the resilience of economic entities to face shocks of such intensity so that company management and decision-makers can react quickly by taking short-term rescue measures and long-term alignment strategies so that even in the event of other disturbing factors, the shock waves

may not be felt or only to a small extent and the lessons learned during this period may be useful for the difficult periods that will follow.

The sample consists of the first 100 companies in Romania classified in descending order according to the turnover registered in 2020 and which submitted financial statements to the Ministry of Public Finance. Excluded from the sample was a company that from our own analysis erroneously transmitted the financial information to the Minister of Finance, a judgment that was made based on the history of the company in recent years. At the same time, depending on the CAEN of each company, we grouped the industries into 14 main categories, which were assigned an indicator from 1 to 14, as follows: 1 = Automotive, 2 = Oil and gas, 3 = Retail Trade, 4 = Wholesale trade, 5 = Telecomunication & IT, 6 = energy, 7 = Pharma, 8 = Chemical Industry, 9 = Agri / food, 10 = Equipments manufacturing, 11 = Wood, 12 = Heavy industry (metallurgy), 13 = Transport, 14 = Textile industry.

The relevant financial analysis indicators that we have taken into account in our research approach are some of the most used financial indicators in practice and economic studies, which seek to express the actual financial situation of an economic entity. We considered 14 indicators that were grouped into several broad categories, taking into account the public financial information, as presented in Table 2 below.

Below are the indicators considered in our research, which we report on the dynamics of turnover obtained in 2020 compared to that obtained in 2019, which in our opinion, captures the fastest but also faithful resilience of companies to disruptive factors with significant impact as it was the one caused by the COVID-19 pandemic.

The Business efficiency group includes indicators that monitor the management of liquidity and cash flow of companies, which, in case of difficulties encountered, can take measures to reduce costs more efficiently through rigorous inventory management, collection of short-term receivables, and debt restructuring.

In the Sustainable Profitability category, the most crucial category of indicators, the capacity of the activity to generate profit and ensure the remuneration of the invested capital, is analyzed based on the resources it has at its disposal.

The indicators included in the Financial Stability class present the dependence of the enterprise on the financial resources coming from third parties; its importance generating from the fact that in case of aggravating situations, the companies will be able to honour or not their debts or to have access on more financing resources if indebtedness will permit.

The analysis of the business dynamics includes the Business dynamics & stability group, where the evolution in the last two years of the sales and the profitability of the business as well as the age of the companies in the activity, is highlighted.

Table 2. List of indicators used in our research

Class	Indicator	Formula	Abbreviation
	Resilience	*Total Income 2020/Total Income 2019*	*TOD*
Business efficiency	Inventory days (2020)	Inventories/Total Income*365 days	ID
	Receivables days (2020)	Receivables/Total Income*365 days	RD
	Total Debt days (2020)	Total Debt/Total Income *365 day	TDD
	Capital Intensity (2020)	Total Assets/Total Income	CI
Sustainable Profitability	Net profit margin (2020)	Net Profit/Total Income	NPM
	Annual labour productivity 2020/2019	(Total Income 2020/No. of employees 2020)/(Total Income 2019/No. of employees 2019)	ALP
	Return on assets (2020)	Net profit/Total Assets	ROA
	Return on equity (2020)	Net profit/Equity	ROE
Financial Stability	Equity ratio (2020)	Equity/Total Assets	EQR
	Leverage Ratio (2020)	Total Debt/Total Assets	LVR
	Debt to equity ration (2020)	Total Debt/Equity	DE
Business dynamics& stability	Net Profit Margin evolution 2020/2019	Net profit margin 2020/Net profit 2019	NPD
	Age	No of years from incorporation	AGE

Source: author realization

The theoretical economic model that we propose to develop is presented bellow:

$$TOD = \beta(1)*ID + \beta(2)*RD + \beta(3)*TDD + \beta(4)*CI + \beta(5)*NPM + \beta(6)*ALP + \beta(7)*ROA + \beta(8)*ROE + \beta(9)*EQR + \beta(10)*LVR + \beta(11)*DE + \beta(12)*NPD + \beta(13)*AGE + \alpha \quad (1)$$

The sample is significant because a small number of companies, the top 100 in the country, representing 0.01% of the total number of companies, generate over 20% of the turnover obtained by all companies in Romania. The concentration is even higher in 2020, reaching a maximum of 22% compared to 2016-2017 when the percentage was slightly lower, i.e. 20%. (Figure 7).
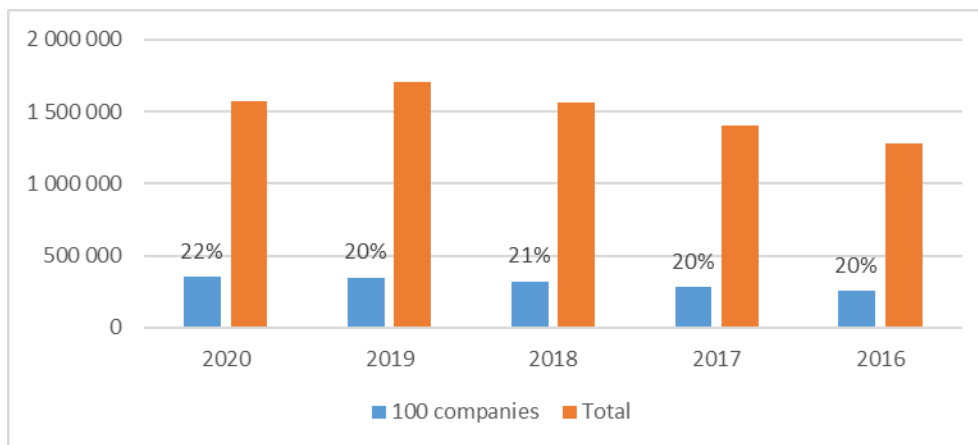
Figure 7. Annual sales share: top 100 companies vs total companies
Source: author realization, based on public financial staments

The highest sales are registered in order by the Retail sector (25.41%), by the automotive industry (20.34%), as well as by the en-gross or wholesale sales sector (11.18%) (Figure 8).
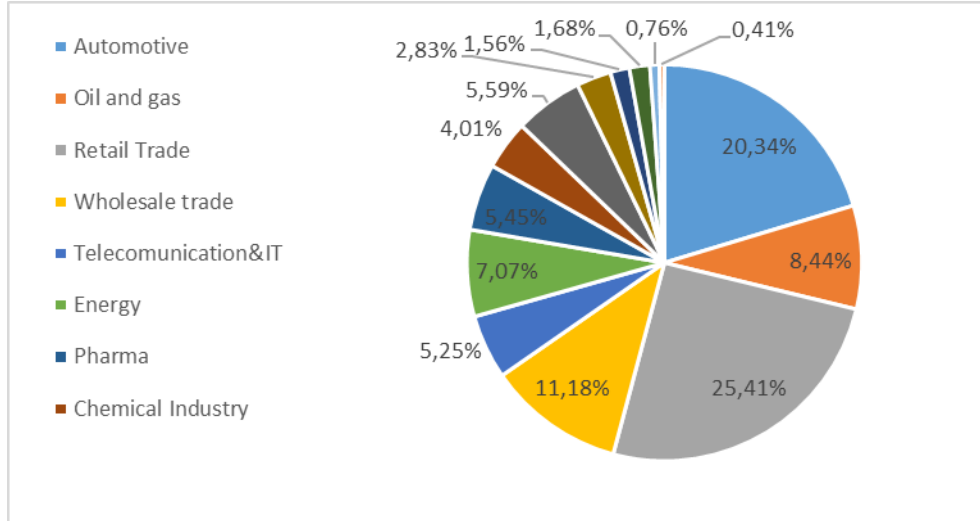
Figure 8. Break-down of sales per industry % (2020)
Source: author realization, based on public financial staments

The profits generated represent in percentages less than half compared to the turnover ratio obtained by the same companies. The trend increases in the last year analyzed, after the decrease from previous years, the maximum reached in 2016, as shown in the chart below (Figure 9).
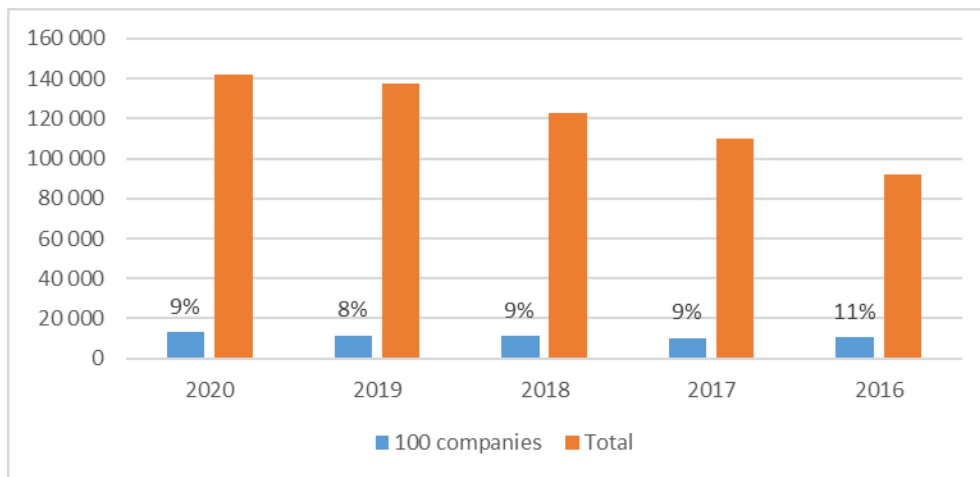
Figure 9. Net profit share: top 100 companies vs total companies
Source: author realization, based on public financial staments

The weight of the generated profits is registered in order by the companies from the Retail sector (32.40%), by the wholesale or wholesale sales sector (11.62%) and by the automotive industry (8.71%). The highest profit margins are obtained by a company in the wholesale sector, with a net profit margin of 40.39% and a heavy industry, with a margin of 33.44%. The average profit margin of the sample comprising the first 100 companies in Romania is 4.26% in 2020, increasing from an average margin of 3.53% in 2019 (Figure 10).
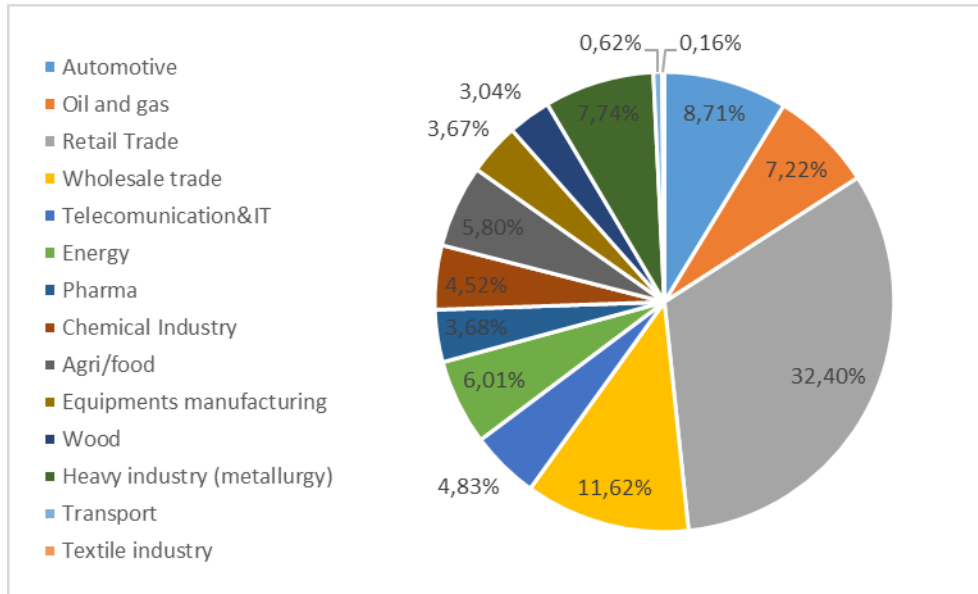
Figure 10. Break down of net profit per industry % (2020)
Source: author realization, based on public financial staments

These companies hire a significant number of employees in the national economy; on average, 7% of the total number of employees in Romanian companies are employed by these 100 companies.
In Table 3, we have surprised a descriptive analysis of the abovementioned indicators.

Table 3. Descriptive statistics

	Mean	Std Deviation	Skewness	Kurtosis	Prob	N
TOD	*0.114029*	*0.598985*	*7.323070*	*64.74045*	*0.000000*	*100*
ID	34.93900	22.82091	1.069457	4.807722	0.000000	100
RD	66.43077	57.23281	1.896054	8.459367	0.000000	100
TDD	102.0971	61.59973	1.441564	5.344982	0.000000	100
CI	0.565459	0.432493	3.897524	26.67695	0.000000	100
NPM	0.047892	0.064054	3.247982	16.24927	0.000000	89
ALP	0.093243	0.580093	7.956305	72.69895	0.000000	99
ROA	0.082161	0.088339	1.875387	8.467785	0.000000	100
ROE	0.224843	0.220311	1.214583	4.394435	0.000000	100
EQR	0.385574	0.247100	-0.104811	2.604900	0.659179	100
LVR	0.567140	0.244521	0.161891	2.379287	0.360205	100
DE	12.26169	90.17831	9.778928	97.08101	0.000000	100
NPD	2.49630	19.04550	8.795955	78.90245	0.000000	82
AGE	18.0300	7.405233	-0.080538	2.115974	0.185967	100

Source: author realization, based on Eviews

The average sales dynamics recorded in 2020 compared to 2019 is 11.40%, the maximum of 545.29% being recorded by an energy company with 2 years of experience since its establishment. On the other hand, the most significant decrease, of 48.67%, is attributed to an automotive company with 8 years of experience, which has also registered a loss for the first time in recent years.

It is noteworthy that these companies have shown incredible resilience over the years, going through various economic, political or social crises of local or even international magnitude, such as the Subprime Crisis from 2008-2009, including the health crisis caused by the pandemic Covid -19, so that on average, the life cycle of the analyzed companies is 18 years. Eight of the 100 companies surveyed have been established since 1990, so they have been in the market for 30 years, being from different fields of activity, and 41% have a history of 20 years or more. The companies established in the last 5 years are 5 in number, generating only 3.31% of the sales of the analyzed sample; the youngest company in the energy having 2 years old.

In terms of the cash conversion cycle, companies had applied stricter inventory management, with average storage days falling to 35 days from 36 and 41 days in the years before the pandemic began. At the same time, slightly longer deadlines were granted for collection in terms of receivables, the average being 66 days compared to 65, respectively 62 days in previous years. An exciting move occurred in the debt payment period, which at the end of 2020 is 102 days compared to 116 days in 2018 and 106 in 2019. The total debts used to calculate the payment period include, in addition to commercial debts and salary and social debts, debts to the state budget, bank debts and debts to shareholders in the form of dividends or loans received from shareholders. Even though debts increase in absolute size, the dynamics were significantly lower than the increase in income, which means that the average payment period expressed in days decreases. The cash available, including bank accounts, decreased by 2% in 2020, being used to settle the debts partially. Capital intensity is maintaining almost flat during the years, 56%, showing equilibrate usefulness and utilization of their existing assets, with higher values in industries that require large capital investments, known as capital-intensive businesses (chemical, telecommunication or heavy industry)

All indicators included in the Sustainable Profitability class are improving in 2020, considering the profit margin increased. The assets are used efficiently and productively by top companies in the country, generating a higher ROA, 8.22% versus 7.03% or 7.11% in the past. Labour productivity (ALP) follows an upward trend, 9.23% in 2020 compared to 8.11% precedent year, in the condition that; however, the number of employees has increased year by year, but the income grew faster as the economy becomes more competitive at the international level. A sustainable and increasing ROE over time, as it is posted at year-end 2020, respectively 22.48%, shows that the companies included in our sample used efficient equity financing for business growth and could reinvest their earnings wisely,

Regarding financial stability, the top companies have a good level of solvency; the average registered in 2020 is 38.56% as it is normal considering that the companies are for such a long time in business, many of them being at the maturity stage of life cycle, so they managed to accumulate profits over the years, part of it reinvesting in the activity part of it being distributed to shareholders. Although the critical aspect to mention is that the financing risk is significant, the financing policy is aggressive, and the debt is over 12 times the level of equity. A possible explanation could be that an essential part of the companies included in the sample are multinational companies with foreign shareholders, which have access to financing lines from mother companies that usually are cash-rich or that have easy access to bank loans or capital market financing and with costs that are by far more convenient than they would get in Romania, preferring financing in this form. At the same time, part of the profits obtained is transferred to remunerate shareholders as dividends so the level of equity could not reach the dynamics that the level of debts.

Table 4. Regression Statistics

Model	R Square	Adjusted R Square	Prob (F-statistic)
1	0.958998	0.950921	0.00000
a. Predictors: Constant, ID, RD, TDD, CI, NPM, ALP, ROA, ROE, EQR, LVR, DE, NPD, AGE			
b. Dependent Variable: TOD			

Source: author realization, based on Eviews

According to the data presented in Table 4, the determination ratio R Squared is 0.9589, the ratio which explains the influence of significant factors, which in our case define a strong relation between the dependent variable TOD and the independent variables ID, RD, TDD, CI, NPM, ALP, ROA, ROE, EQR, LVR, DE, NPD, AGE. The variation in one direction or another of the independent variables will implicitly lead to the variation of the independent variable TOD, meaning that 95.89% of the variation of TOD is explained through our chosen model.

Table 5. Regression Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ID	0.001682	0.000913	1.841540	0.0700
RD	-0.000195	0.000395	-0.493239	0.6235
TDD	0.000217	0.000738	0.293752	0.7699
CI	-0.055088	0.170715	-0.322691	0.7479
NPM	0.619251	0.710445	0.871639	0.3866
ALP	0.989919	0.039225	25.23678	0.0000
ROA	-0.630977	0.649950	-0.970808	0.3352
ROE	0.185910	0.164509	1.130095	0.2625
EQR	0.183239	0.264239	0.693461	0.4905
LVR	0.229176	0.251226	0.912231	0.3650
DE	-0.005352	0.006723	-0.795967	0.4289
NPD	0.000643	0.000895	0.718994	0.4747
AGE	-0.003931	0.002406	-1.633908	0.1070
C	-0.136060	0.234691	-0.579743	0.5641

Source: author realization, based on Eviews

Considering the coefficients above (Table 5), the estimated equation of the multiple linear regression model was constructed as below:

TOD = 0.0016*ID - 0.0002*RD + 0.0002*TDD - 0.0551*CI + 0.6193*NPM + 0.9899*ALP - 0.6310*ROA + 0.1859*ROE + 0.1832*EQR + 0.2292*LVR - 0.0054*DE + 0.0006*NPD - 0.0039*AGE - 0.1361

Having the model presented, if the income increases by 1%, ALP will increase with almost the same value, 0.99%. Net profit margin (NPM) growth will follow the same trend, but the dynamics are slightly diminished at 0.62%. The increase in income will cause a decrease in ROA, and the need for assets to support sales growth is significantly higher than the dynamics of profit growth. Positive influence occurs from ID, TDD, ROE, EQR, LVR, NPD, while RD, CI, DE and age negatively influence income increase.

Both pictures below (Figure 11) confirm that the series is usually distributed. The error histogram shows an asymmetric distribution on both sides of the Gaussian curve, strengthening our conclusions that the economic resilience of the top companies in Romania is present and powerful; the performance was acceptable but with small deviations that can be attributed to exceptional events, like COVID 19 pandemic that hit hard and unforeseen all economies around the world.
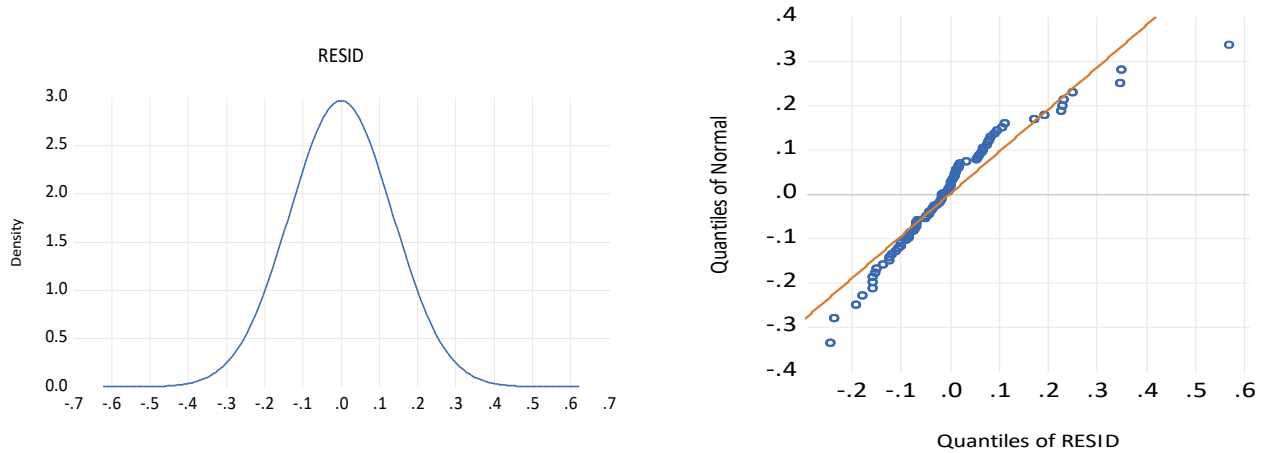
Figure 11. Histogram and Quantile of regression model errors in Eviews
Source: author realization, based on Eviews

Conclusions

The economy of Romania in general, but also the companies in particular, have performed well in recent years; the economic crisis caused by the Covid pandemic, although it hit unexpectedly aggressively at all levels, respectively economic, social, health, but also political, found an economy better prepared to face the shocks compared to Great Crisis of 2008-2009 when the liquidity crisis was decisive. Romania's performance over the years has been recognized internationally. The critical economic growth recorded places Romania among the top European performers, often called the Tiger of Europe, with the development recorded above the European average. At the same time, expectations are high regarding Romania's potential, considering the country's size and number of populations. Still, natural resources must be exploited and managed more efficiently.

Considering the current context full of uncertainties, the Russian-Ukrainian conflict that transmits shock waves around the world, the global energy crisis but also the galloping inflation that impacts the well-being and purchasing power of the population, it is necessary to diagnose which are the vulnerabilities of the companies to be able to adapt and impose strategies to help them survive or even more to become much stronger and stronger for the future.

Analyzing the situation of top 100 Romanian companies, some conclusions and recommendations can be mentioned as follows:

☐ the companies showed strong resilience, maintaining a positive sales trend, +11,4%, despite a general contraction of 7.93% of total turnover realized by Romanian companies. The largest companies have managed to maintain a good level of sales with scattered sales across various channels, including online, but also fueled by rising domestic consumption and maintaining a level of exports that would have ensured a good sales dispersion. Small companies have been much more affected by the traffic restrictions imposed, while switching to alternative sales has been much more difficult, which has led to a much larger contraction than big companies. However, we can affirm the level is still acceptable given the magnitude and brutality of the health crisis; these companies are achieving a rapid recovery, especially in the last two quarters of 2020.

☐ high concentration is noticeable as almost a quarter of the sales of Romanian companies are attributed to a tiny group of companies. Thus there is a structural risk that can lead to seismic hazards at the economic level in case of difficulty of such a company or the decision to leave the Romanian economy. This situation can create

major disequilibria while the negotiations at the point of exit can be complicated to manage, attracting another investor can be long-lasting and under unfavourable financial conditions for the Romanian economy.

☐ it is also confirmed through our analysis that the economy depends mainly on consumption; over 36% of the sales of leading companies in Romania are attributed to the retail sector or wholesale, while the generated profit is even higher, with over 44% coming from these two sectors.

☐ companies have been in the market for many years, some even being among the first to be established after the revolution of '89, and some new names appear in the list. Still, the barriers to entering elite Romanian companies are high; there are no significant fluctuations in time.

☐ Profitability margins maintain the dynamic trend; even if the COVID-generated crisis put pressure on margins, they managed to adapt to the new reality and translate the increases into the final price.

☐ The companies are well capitalized as they have been activating in business for a long time, generating a good level of profitability, part of it reinvested in the activity. Financial autonomy is a constraint; there is a risk to financial stability in terms of high indebtedness, as the debts are over 12 times the level of invested equity. Most of the analyzed companies belong to international groups of companies which ensure the financing of the activity and the investments needed for proper development, but the risks appear in case of blocking the financing or requesting the early repayments

☐ The resilience of the companies, which translates into their ability to recover from external shocks, is influenced positively by Inventory Days, Total Debt Days, Return on Equity, Equity Ration, Leverage Ration, and Net Profit Ratio Evolution while Receivables Days, Capital Intensity, Debt to Equity and age negatively influence the increase of income.

The importance of the study is given by the difficult economic situation we are in contemporary, starting with the economic crisis generated by the COVID-19 pandemic, followed by the crisis of raw materials, the energy crisis, the galloping inflation that has dominated the global economy and recently the Russian-Ukrainian conflict. Under these conditions, it is essential to establish whether an economy is resilient and to identify the vulnerable points to find recovery solutions and the vital points to boost and maintain resilience.

At the same time, the study also has its limitations since the top 100 companies. However, they represent a significant sample in terms of the level of turnover and added value generated for the economy, still have their specificity, benefit from certain competitive advantages and know-how, having more accessible access to financing and innovation. The research opens a way to analyze the small and medium-sized enterprises more vulnerable to various crises or unfavorable conjunctural situations as well as to find a unitary way to measure the resilience of an economic entity or an economy as a whole, so that it can be taken the most effective and timely measures to counteract the negative effects.

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THE IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT GOALS THROUGH COMMUNICATION TOOLS

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Abstract. The article validates the assumptions of implementing sustainable development goals (SDGs) using communication tools from a theoretical point of view. The research investigates the possibilities of implementing the SDGs through communication tools. 198 respondents took part in the study. Analytical descriptive, quantitative and statistical methods were used. The quantitative research strategy (questionnaire survey) was used to determine respondents' attitudes towards the SDGs in the environmental, social and economic spheres, to identify their experiences of engaging with the SDGs and to explore the possibilities of managing the SDGs using communication tools. Quantitative data analysis was carried out by calculating the analysis of variance (ANOVA) and percentage distribution (frequency). The results showed that more than two-thirds of the respondents were self-critical about their efforts to engage with the SDGs, with an overall mean score of $M = 4.81$ out of a maximum of 10. The research also found that more than half of the respondents are sometimes influenced and encouraged to act by the information provided on sustainable development and its implementation, and almost a quarter of the respondents are strongly influenced by the information towards the implementation of sustainable development principles. This confirms the importance of communication as one of the possible solutions to the implementation of the SDGs and indicates the need to find more effective means of information to enable the use of the chosen means of communication to shape attitudes towards sustainable development by exploiting the potential of television and websites, which, according to respondents' assessments, are the most frequent means of receiving information on sustainable development processes. The research results also revealed the need to strengthen the social responsibility of organizations and organize courses and training, which, according to the participants, need to be sufficiently exploited in the context of the prerequisites for disseminating sustainable development objectives and their implementation. The research results will have a lasting value for the scientific debate on the impact of the communication tools used in the implementation of the SDGs and their practical implications for the provision of guidelines for the management of sustainable development processes through communication tools.

Keywords: sustainable development; social dimension; economic dimension; environmental dimension; communication tools

1. Introduction

Melting glaciers, polluted water and air, and economic and social problems are growing concerns and prompt everyone to think and constantly look for solutions. The importance of sustainable development is emphasized to ensure the well-being of society for present and future generations and the survival and prosperity of humanity within the limits of acceptable environmental impacts. The United Nations General Assembly adopted 17 Sustainable Development Goals back in 2015, which are based on environmental, social and economic dimensions, covering the reduction of poverty and social exclusion, improvement of quality of life, health and education, sustainable management of resources, environmentally friendly production and use of resources, combating climate change, gender equality, peaceful societies, and others.

Research on the SDGs and their implementation has been carried out by Kates et al. (2005), Alraja et al. (2022), Arief et al. (2022), Burns (2016), Díaz-López et al. (2018), and others. There are also documents related to sustainable development, such as the National Sustainable Development Strategy (2009; 2011), and the Report on the Implementation of the National Strategy for Sustainable Development (2012)), which discuss possible ways to implement and manage sustainable development, develop models, and focus on sustainable production and consumption, among other topical issues. However, it should be acknowledged that, despite the efforts made, environmental problems, air pollution, climate change, the waste of natural resources and irresponsible consumption, poverty, unemployment, social inequalities, and educational deficiencies continue to be a challenge today. The subject of the SDGs and their implementation, and the theoretical and practical issues related to it, therefore, remain relevant and oblige the search for ways and means of tackling poverty and hunger reduction, health and education, sustainable management of resources, the fight against climate change, and other problems. One possible approach to managing sustainable development processes is using communication tools. By examining their impact on changing people's thinking and behaviour, it may be possible to predict the extent of the influence of communication and marketing in managing the SDGs. The added value of this type of research is to provide theoretical arguments on the preconditions for the use of communication and marketing tools in the implementation of the SDGs, as well as to identify the most effective ways and means of managing the implementation of the SDGs and of promoting consumer involvement in the SDGs through the results of an empirical study.

Janoušková et al. (2019) investigate how the media worldwide communicate on sustainability issues. The authors analyze the news media on sustainability issues over the last ten years in their paper. Janoušková et al. (2019) observe that while a few studies on the role of the media in sustainability communication have emerged recently, they tend to analyze the content (how a chosen topic such as climate change is conveyed) or explore particular communication theories. In the abovementioned article, the authors provide insight into how the media harnesses the communication potential of the holistic concept of sustainable development by examining global newspaper articles covering sustainability topics. Arief et al. (2022) point out that sustainability communication can be divided into participation and empowerment. From a social, regional or environmental perspective, any intervention must be based on a participatory model to be sustainable. Future concerns are expected to be linked to current needs through communication. The authors examine how sustainability communication contributes to children's knowledge. This study focuses on learning systems, processes and management in response to sustainability concerns.

The paper concretizes the problematic question: what are the preconditions for implementing the SDGs using communication tools?

The research explores the potential of communication tools to achieve Sustainable Development Goals.

Objectives of the research:

1. To identify the prerequisites for using communication tools to implement Sustainable Development Goals through an analysis of the scientific literature on the topic.
2. To determine respondents' attitudes towards the SDGs in the environmental, social and economic spheres.
3. To identify the participants' experiences in the study regarding their involvement in implementing the SDGs.
4. To explore the potential of communication tools to promote engagement in sustainable development processes.

2. The Sustainable Development Goals and their implementation: theoretical aspects

Scientific conceptualization of sustainable development, historical approach and research issues. Interest in sustainable development emerged in the 20th century. Lélé (1991) argues that in the last few years, "sustainable development" (SD) has become the latest development buzzword. Many NGOs and governmental organizations have adopted it as a new development paradigm (Zheng et al., 2020). A review of the literature on sustainable development shows that its interpretation is inconsistent. The current formulation of sustainable development is seriously flawed. These include an incomplete understanding of the problems of poverty and environmental degradation and confusion about the role of economic growth and the concepts of sustainability and participation. International trade, agriculture and forestry illustrate how these shortcomings can lead to weaknesses and contradictions in policy-making. The subject of Sustainable Development Goals and their implementation cannot be addressed without clarifying the concept of sustainable development. Žičkienė et al. (2019) argue that translating the term sustainable development into the Lithuanian language raises many debates. According to the authors, various Lithuanian versions of the term have been proposed: harmoningas vystymasis, subalansuota plėtra, tausojantis vystymasis, tolydi plėtra, darni plėtra, tvari plėtra etc. Other non-English-speaking countries also have difficulties with the national equivalent of the first word sustainable. English-Lithuanian dictionaries offer the following translations of the word sustainable: "išlaikantis ekologinę pusiausvyrą", "vykstantis pastoviai", "vykstantis nuosekliai", "išlaikomas", "palaikomas", "nuosekliai perteikiamas, "tvarus", "darnus", "tausojantis", "tausus". Burns (2016) observes that the concepts of "sustainability" and "sustainable development" have been extensively analyzed in the academic literature. These concepts have emerged from political and administrative processes. There has been a diversity of approaches to defining sustainable development. Environmental problems have been added to the previous issues under discussion. Meanwhile, Klarin (2018) argues that the concept of sustainable development is based on the concept of development (socio-economic development that meets ecological constraints), the concept of needs (redistribution of resources to ensure the quality of life) and the concept of future generations (the possibility of long-term use of resources to ensure the necessary quality of life for future generations). Kiselakova et al. (2020) note that in the international literature, attempts to operationalize the level of sustainable development in different countries around the world could be found. Difficulties in measuring sustainable development arise from the diversity of definitions and factors of this development. The choice of indicators to measure the implementation of the concept of sustainable development is the subject of ongoing debate. Mensah et al. (2019) argue that sustainable development has become a buzzword in development discourse, associated with different definitions, meanings and interpretations. SD would mean development that can continue indefinitely or for a certain period (Dernbach, 2003; Stoddart, 2011). Structurally, the concept can be seen as a phrase consisting of the two words "sustainable" and "development". Just as each of the two words that together make up the concept of sustainable development, "sustainable" and "development", have been defined from different perspectives, so too has the concept of sustainability been approached from various perspectives, resulting in a plethora of definitions.

Ministry of Environment of the Republic of Lithuania (2022) states that sustainable development is a path for the modern and responsible development of the state and its society, based on three equal policy areas - environmental protection, economic development and social well-being. In sustainable development, a historical retrospective is necessary to understand the relevance of developing and implementing strategies to achieve the SDGs in the scientific debate. Over 25 years ago, the first steps were taken to establish sustainable development worldwide. The Rio Declaration was adopted in Rio de Janeiro, listing the principles of sustainable development.

Subsequent international documents - the Johannesburg Plan of Implementation, the Rio+20 conclusions and others - have consolidated national agreements towards a more sustainable world. However, the growing human population, the depletion of natural resources, the increasing pollution of the environment, and other environmental, economic and social problems beyond national borders, call for a constant reminder and a more responsible implementation of the principles of sustainable development.

Kates et al. (2005), in their analysis of "what is sustainability", identified three main categories - nature, life support systems and community - as well as intermediate categories for each, e.g. land, environment and culture. Based on the literature reviewed, these authors found that the most common focus was on life support systems defining nature or environment. Meanwhile, Misiūnas et al. (2009) note that sustainable development must ensure economic growth and the compatibility of economic activities with environmental, social and intellectual aspects. This now widely accepted idea implies that economic growth, as the primary and only development goal, is insufficient to ensure the well-being of present and future generations.

Płonka et al. (2022), in their analysis of sustainable development, point out that the modern world increasingly desires sustainable development, which encompasses a clean and friendly environment; stability of living conditions; and health, energy and food safety. Meanwhile, Basheer et al (2022) note that the world is facing significant pressures and threats to sustainable development. Population growth, rising inequalities, climate change and emerging zoonotic diseases undermine many recent gains in human well-being, and the planet's health is deteriorating rapidly.

Jamoussi et al. (2022) note that a new approach is appropriate, expressing the need to integrate sustainable development and territorial attractiveness. The authors show the extent to which an evidence-based analysis of the SDGs influences the ranking of countries according to their level of development and their ability to move up the ranking of their performance. Based on data from a group of 52 countries observed over the last ten years and explicitly taking into account the "auxiliary" variables of sustainability, attractiveness and economic growth linked to measurable indicators, the paper aims to assess the main trends in sustainability. The authors' study confirms the growing gap between countries regarding their social, economic and environmental policies.

Sari Hassoun and Ayad (2020) claim to have examined the relationship between renewable energy and sustainable energy development. The authors used an endogenous variable as a driver of sustainable development, renewable energy consumption as an exogenous variable, and control variables such as gross fixed capital formation and labour force.

Sustainable development goals. Klarin (2018) argues that another way to define sustainable development is to consider what it aims to achieve. To illustrate, it is helpful to examine the three sets of goals used for different time horizons: the short-term (2015) goals of the United Nations Millennium Declaration, the short-term (2015) goals of the United Nations Millennium Declaration; the two-generation transition goals of the Council for Sustainable Development (2050); and the long-term (post-2050) goals of the Great Transition of the Global Scenario Group.

Fayomi et al. (2018) argue that the eight MDGs are: to reduce deprivation significantly; achieve the learning goals; promote gender equality; reduce child mortality; improve maternal well-being; combat HIV/AIDS, intestinal diseases and various ailments; ensure ecological support; and to create a universal development organization.

Díaz-López et al. (2021) argue that the article comprehensively analyses the MDGs. The literature review shows that discourses on sustainable development have evolved in transitioning from the SDGs to the MDGs. The MDGs had some shortcomings. It was recognized that the implementation of the SDGs needed to be improved.

The MDGs thus mark a historical and practical approach to global mobilization to achieve critical social priorities worldwide. They express broad public concern about poverty, hunger, diseases, gender inequality and environmental degradation. The SDGs help to promote global awareness, political ownership, improved indicators, social feedback and public pressure.

Sustainable development marketing. Kumar et al. (2012) and Belz, Peattie (2012) argue that a sustainability marketing strategy not only adds value to the customer but also builds long-term relationships with customers, which is good for business, society, and ecology. "Sustainable marketing is the marketing that effectively builds long-term relationships with customers - without any specific reference to sustainability or consideration of sustainability issues." Meanwhile, Danciu (2013) notes, that green marketing is an integral part of green development solutions, although sustainable marketing should also be part of and support sustainable development. To meet the challenge of sustainable development, sustainable marketing can promote more sustainable consumption levels and patterns. As Danciu (2013) states, citing Belz and Karstens (2010), sustainable marketing is "a management concept that takes care of environmental and social needs and ultimately transforms them into competitive advantages, providing value and satisfaction to customers". Green marketing is a set of practices aimed at increasing the value of brands, goods, information products and services related to environmental aspects and environmental and social responsibility. It also includes environmentally friendly products, information products and services, and practices that promote preserving the environment. Choudhary et al. (2013) argue that today green marketing encompasses a wide range of activities, including product modification, manufacturing process modification, packaging modification, and advertising modification. Other related green marketing terms are eco-marketing, environmental marketing and sustainable marketing. According to the American Marketing Association (AMA), green marketing can be defined in three ways: first, green marketing is the marketing of products that are safe for the environment (Retail Definition). Secondly, green marketing is the development and marketing of products designed to reduce the negative impact on the physical environment or to improve its quality (Social Marketing definition). Thirdly, green marketing is the efforts of organizations to produce, promote, and package products in a way that is sensitive or responsive to ecological processes (definition of the environment). Hsiao (2013) argues that to understand consumer behaviour, we should know how much consumers know about an eco-friendly product, what information they will pay attention to and which information will influence their choice, which will reflect what product characteristics the consumer has observed and what information has been used to assess the product's environmental performance. Dyma (2015) notes that sustainability initiatives should be initiated by senior management and supported by other employees. Partners and competitors also play an essential role in this process. Potential employees, investors, partners and other stakeholders are beginning to pay more attention to the company's sustainability initiatives.

Zhang et al. (2020) analyzed five significant emerging trends that will have a lasting impact on marketing theory and practice over the next decade and beyond: (1) market changes influencing the emergence of new business models and market dynamism; (2) technological developments driving consumer privacy and surveillance concerns; (3) socio-economic changes associated with increasing income inequality; (4) geopolitical changes and increased levels of international protectionism; and (5) environmental developments related to the sustainability of natural resources.

Matharu et al. (2020) note that the idea of sustainable marketing is to promote the development of the concept of sustainability and seeks to meet the needs of consumers without compromising the needs of future generations.

Papadasa et al. (2020) analyze that as green marketing becomes an essential tool for sustainable business strategy, companies are adopting green marketing practices to achieve better business results. However, research still needs to validate all the organizational aspects required to become a green marketing-oriented company.

Lee (2016) evaluated corporate sustainability marketing communications on social media implemented by "Fortune 500" companies. The results reveal significant differences between sustainability marketing communications on blogs and Facebook. This study makes a theoretical contribution by proposing a consumer-oriented framework that incorporates sustainability issues, the promotion of sustainable thinking and the promotion of sustainable consumption. It also shows how companies' sustainability marketing communications vary across different social media. Galiano-Coronil et al. (2021) argue that social networks have been described as part of political campaign strategies because they allow political leaders to establish a two-way connection with citizens. This study aims to empirically investigate leading Spanish political publications from a social marketing perspective. This way, it will be possible to verify how the Sustainable Development Goals (SDGs) are addressed. It should be noted that this study's results show differences between the social issues published by political parties, those that receive a better public response, and those that are most frequently posted on Facebook.

Tiagoa et al. (2021) note that in many sectors, consumers consider eco-labels to guarantee that companies are operating according to sustainability principles. The same is partly true in the tourism sector. The results show that (1) eco-label promotion by local official entities does not have a significant impact on the certification rates of local accommodation, but (2) smaller companies value eco-labelling when promoting their offerings on the Internet.

Alraja et al. (2022) argue that the Covid-19 pandemic has dynamically changed the business environment and raised sustainability as an issue in the business world. Business activities that challenge environmental stability have become exposed to more significant risks. Organizations have committed to being environmentally friendly and have adopted technologically advanced approaches to conducting sustainable operations.

The impact of communication and awareness-raising measures on the Sustainable Development Goals. Sustainable development initiatives will achieve the desired result with active and effective communication. Internal and external communication must reinforce the commitment of all parties to the idea of management based on the principles of sustainable development. Fischerabi et al. (2022) note that communication is essential in promoting sustainable consumption. Nadanyiova et al. (2020) analyze that green marketing, as part of socially responsible communication, can positively influence the attitudes of individual target groups towards a brand. Therefore, it is necessary to target communication to distinct target groups, which can be differentiated according to the consumer's age. However, how communication and sustainable consumption are conceptualized and linked in the academic literature still needs to be better understood, despite the growing number of communication research in the context of sustainable consumption. This paper provides the first comprehensive overview of sustainable consumption communication (SCC) research as a young and developing field of academic work.

Carrión-Martínez et al. (2020) point out that technological advances have played a critical role in our society in recent years and various educational contexts, including education for sustainable development. Information and communication technologies have made it possible to improve the quality of life of many people. The study by Carrión-Martínez et al. (2020) aims to review the scientific evidence on the use of ICT for sustainable development. The study results showed that mobile and distance learning are essential strategies for achieving the SDGs. Primožič et al. (2022) argue that communicators seek better communication strategies related to climate change, global warming, sustainability, etc. Today's issues related to climate change and sustainability are widespread across countries. In addition, the field of communication has undergone many changes due to technological developments and the speed of the Internet. Moser (2010) notes that social networks have become an important part of companies' marketing strategies. The development of communication technologies and digital platforms has brought many advantages, such as the ability to easily reach more people and create greater engagement; on the other hand, it has also led to the spread of misinformation without any control over what is being spread around. Kuzior et al. (2020) point out that the need to introduce and improve eco-marketing tools for the sustainable development of large industrial regions is essential. In the current context, it is in high demand. In

particular, the abovementioned authors note the social and economic efficiency of implementing the global sustainable development doctrine in regions with high industrial potential and thus impose a high ecological burden on the health of the socio-regional population and the community's living standards. Secondly, it is about the new challenges of globalization, linked to the introduction of the digital economy and new information technologies, without which intensive industrial development is taking place and the diversification of traditional energy-intensive industries in the light of innovations. García-Hernández et al. (2023) stated that in the last decade, new information and communication technologies have been widely used (ICT) in education has changed the nature of the teaching and learning environment in recent years. However, appropriate use of ICT is necessary to promote educational practices that contribute to this is sustainable development. Pilař et al. (2019) et al. stated that social media has become a particularly important platform for discussing sustainability in various contexts. Twitter's ubiquity makes it a handy tool for fostering a discussion that can lead to interactions with savvy users who hope to engage in dialogue on a topic. According Pilař et al. (2019) et al. based on this knowledge, the following key aspects of Twitter communication related to sustainability can be identified:
• The topic most related to sustainability is the area of innovation;
• Innovation is associated with technology (45% of all innovation-related tweets), which is most associated with the environment (26% of all technology-related tweets);
• Innovation in renewable energy is focused on mitigating climate change emissions of greenhouse gases;
• CSR, in terms of sustainability, is focused on ESG principles.
Cioacă et al. (2020) stated that the promotion of the ICT sector promotes the factors of sustainable development, but also changes the way added value is generated, resulting in increased productivity. With everyone these positive and negative aspects of digitization due to the complexity of the ICT sector, high qualification of the workforce and advanced technologies installed. The share of the ICT sector in the European economy has had and continues to have a positive impact. Development this sector led to GDP growth in less developed European countries.

3. The research methodology

Organization and sample of the study. The total sample consisted of 198 Lithuanian residents, of whom more than two-thirds were women (n=132 (66.7%)) and only 65 (32.8%) were men, and one respondent did not specify the gender. The analysis of the age distribution shows that more than half of the respondents were 36 years and older (n=115 (58.1%)), while a smaller proportion of the respondents belonged to the age group under 35 years (n=83 (41.9%)). The research sample is convenient.

The method of questionnaire distribution used was an online survey. The survey was conducted based on the ethical principle of voluntariness and free choice of participation. The survey was carried out anonymously, and the results were processed and presented in summary form.

Research methods. Analytical descriptive. The scientific literature related to the topic was analyzed, and the results were summarized. Scientific literature and documents on Sustainable Development Goals and their implementation through communication tools were analyzed. *Quantitative research method.* A quantitative research method (questionnaire survey) was used to analyze the opinion of the Lithuanian population towards the SDGs and their implementation, the experiences of the participants in the study in terms of their involvement in the implementation of the SDGs, and to predict the prerequisites for the implementation of the SDGs using communication tools. The questionnaire was constructed based on theoretical insights and the SDGs' social, economic and environmental dimensions identified in the scientific literature.

The validity of the questionnaire was established by calculating Cronbach's alpha values. The results of the statistical analysis of the data show that the overall internal consistency of the questionnaire's statements (number of variables = 54) is relatively high (Cronbach's alpha = 0.84) and ranges from 0.8293 to 0.8419. The internal

consistency of the variables was also checked for each group of questionnaires separately. In defining the SDGs and their implementation through communication tools, the questionnaire identified constructs covering: respondents' perceptions of the SDGs and their importance, how the SDGs and their implementation are communicated and disseminated, and the efforts made by the respondents to contribute to the SDGs. After calculating the values of Cronbach's alpha coefficient of the group of ways which consists of 11 statements of Communication and Dissemination of the SDGs and their implementation, Cronbach's alpha = 0.824 and varies from 0.816 to 0.831. The estimated internal consistency of the group of statements designed to assess the respondents' views on the implementation of the SDGs and their importance (number of variables = 23) has a Cronbach's alpha of 0.7439, ranging from 0.727 to 0.7461. The estimated internal consistency of the group of statements designed to assess the respondents' views on the implementation of the SDGs and their importance (number of variables = 23) has a Cronbach's alpha of = 0.9084, ranging from 0.9005 to 0.91. Based on the fact that internal consistency should be between 0 and 1 and a Cronbach's alpha of 0.60 is considered appropriate for research (Pakalniškienė, 2012), the Cronbach's alphas calculated in this study show the consistency of the groups of questions and the fact that the variables included in the constructed questionnaire are representative of the part under investigation and are oriented towards the study of the management of sustainable development processes through the use of communication tools. *Statistical research method.* Statistical analysis methods were used to process the data collected during the study: descriptive statistics (statistical averages, standard deviations). Quantitative data analysis was also carried out by calculating the analysis of variance (ANOVA) and percentage distribution (frequency). The difference was considered statistically significant when the significance level was less than 0.05. Data were processed using SPSS software version 17.

4.   The research results and their analysis of the chapter

When examining the possibility of using communication tools to manage sustainable development processes, it is crucial to analyze this in an integrated way by looking at research participants' attitudes towards the importance of the SDGs and their implementation, as well as their assessment of the information they receive about the SDGs through various channels, and of the efforts they make to contribute to the SDGs.

The analysis of the participants' opinions on the implementation of the SDGs (see Picture 1) shows that more than half of the respondents think that in the implementation of the SDGs, it is important to ensure comprehensive and high-quality education (59.6%), healthy life and health for all age groups (54.5%), as well as reducing air (57.1%) and water (57.1%) pollution and promoting responsible consumption (53.5%). A slightly smaller proportion of respondents identify the importance of the SDGs with promoting economic growth (45.5%), innovation (40.9%) and environmentally friendly businesses (44.4%), as well as ensuring responsible production and services (44.9%). Thus, considering that marketing is becoming an essential tool of the sustainable development strategy, the promotion of responsible production and services and the creation of environmentally friendly businesses, as well as the use of technologically advanced methods and innovation to carry out sustainable activities, are identified as among the key aspects linked to the SDGs. On the other hand, more than a third of the respondents highlighted the importance of creating new jobs (33.8%), eradicating poverty in all its forms (37.4%), ensuring food supply and better nutrition (35.9%) and preserving oceans and marine resources (39.9%), as well as promoting lifelong learning (35.9%), and improving existing laws (35.4%) and strengthening instruments (33.8%) in the pursuit of the sustainable development goals. Thus, the results show that participants in the research identify the importance of the SDGs with the environmental, social and economic aspects and recognize the importance of promoting economic growth, protecting the environment, innovating and creating environmentally friendly businesses, and changing consumer attitudes towards responsible production, services and consumption. Meanwhile, only a small number of the research participants identified the creation of new laws (24.7%), the achievement of gender equality (25.3%) and the promotion of agriculture (23.7%) as essential objectives in managing sustainable development processes. And only 16.7% of respondents considered the development of transport diversity and the encouragement of a mix of modes of transport when travelling to be important for

implementing sustainable development objectives. Based on the latter result, it is important to point out that the content of communication in the context of the SDGs should not only focus on quality education, healthy living and health for all age groups, economic growth and sustainable marketing but also on the promotion of elements such as changes in the production process and the production of environmentally safe products, but should also address relevant issues and contribute to shaping people's attitudes and values by changing the public's daily transport habits, such as reducing air pollution, increasing emphasis on promoting sustainable mobility and multimodality, and the implementation of sustainability ideas through communication tools.
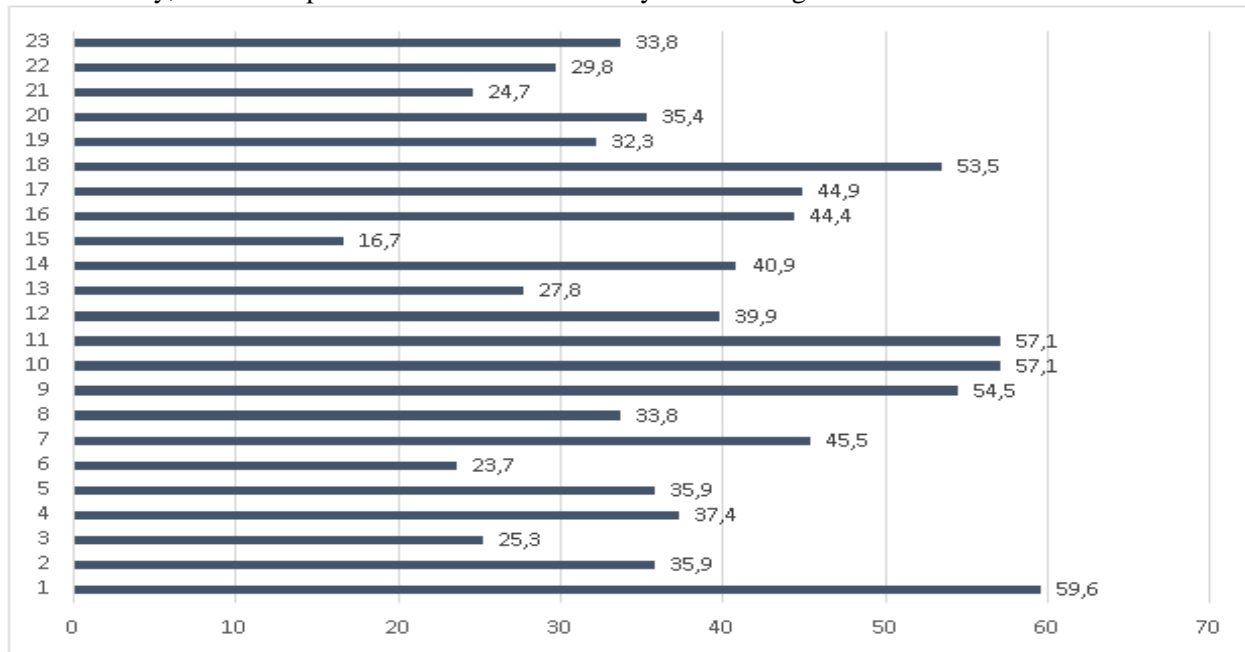
Picture 1. Attitude of research participants towards the implementation of SDGs (n=198; %)

Remark:

1. Ensure comprehensive and high-quality education
2. Promote lifelong learning
3. Achieve gender equality
4. Eradicate poverty in all its forms
5. Ensure food supply and better nutrition
6. Promote agriculture
7. Promote economic growth, employment and job security
8. Create new jobs
9. Ensure healthy life and health for all age groups
10. Reduce air pollution
11. Reduce ocean pollution
12. Preserve oceans and marine resources
13. Apply fines for environmental violations
14. Promote innovation in sustainable development
15. Develop of transport diversity and encourage a mix of modes of transport when travelling
16. Encourage the creation of environmentally friendly business
17. Ensure the creation of responsible production and services (energy, food, tourism, etc.) without polluting the environment
18. Promote responsible consumption (waste sorting, recycling, etc.)
19. Take urgent action to combat climate change and its effects: managing deforestation, restoring wildlife, combating desertification, halting soil erosion
20. Improve existing laws to promote the Sustainable Development Goals
21. Create new laws to promote SDGs
22. Promote cooperation with institutions pursuing sustainable policies
23. Strengthen measures to implement sustainable development

The comparative analysis of the data showed that attitudes towards certain SDGs and the importance of their implementation are statistically significantly related to the age of the respondents (see Table 1). The results of the analysis of variance showed that a higher proportion of younger respondents in the age group under 35 years

consider gender equality (44.6%), food supply and better nutrition (44.6%), and the creation of new laws to promote the SDGs (34.9%) to be important in the implementation of the SDGs than was considered by the older participants (aged 36 years and over) (11.3%, 29.6% and 17.4%, respectively); using analysis of variance (ANOVA), these variables were statistically significantly related to the age of the participants (F=32.654, p=0.001, (F=4.791, p=0.03, and (F=8.222, p=0.005, respectively)). Meanwhile, promoting agriculture (29.6%), ensuring responsible production and service creation without polluting the environment (53.9%) and promoting responsible consumption (waste sorting, recycling, etc.) (60.9%) were all statistically significantly higher in the opinion of older respondents (aged 36 and over) than in the opinion of respondents aged 35 and under (15.7% and 15.7% respectively). These variables were statistically significantly related to the age of the respondents (F=5.231, p=0.023, F=9.233, p=0.003 and F=6.054, p=0.015, respectively).

Variance analysis showed that ensuring comprehensive and high-quality education (F=1.072, p=0.302), promoting lifelong learning (F=0.278, p=0.599), as well as eradicating all forms of poverty (F=3.188, p=0.076), assessing the importance of promoting economic growth (F=2.33, p=0.129), creating new jobs (F=3.261, p=0.072) and ensuring healthy life and health for all age groups (F=0.006, p=0.938) in the implementation of sustainable development goals is not statistically significantly related to the age of the participants. Also, the analysis of variance (ANOVA) revealed that reducing air (F=0.157, p=0.692) and water (F=0.033, p=0.855) pollution, preserving the ocean and marine resources (F=0.001, p=0.973), promotion of innovation in the sustainable development (F=2.108, p=0.148), as well as the development of transport diversity and the encouragement of a mix of modes of transport when travelling (F=0.004, p=0.949), promotion of the creation of environmentally friendly businesses (F=0.697, p= 0.405), improving existing laws by promoting the implementation of sustainable development goals (F=0.636, p=0.426), promoting cooperation with institutions implementing sustainable policies (F=1.054, p=0.306) and strengthening the means of implementing sustainable development (F=1.543, p=0.216) is not significantly related to the age of the respondents. Thus, after summarizing the results, it can be seen that the evaluation of the importance of implementing sustainable development goals differs slightly regardless of age and is characteristic on a similar level.

Table 1. Assessment of importance in the implementation of sustainable development goals (in the age group under 35 (n=83), in the age group over 36 (n=115); per cent; results of variance analysis of estimates and age, when p<0.05))

	Age group under 35	Age group over 36	F	p
Ensure comprehensive and high-quality education	63,9	56,5	1,072	0,302
Promote lifelong learning	33,7	37,4	0,278	0,599
Achieve gender equality	44,6	11,3	32,654	**0,001**
Eradicate poverty in all its forms	44,6	32,2	3,188	0,076
Ensure food supply and better nutrition	44,6	29,6	4,791	**0,03**
Promote agriculture	15,7	29,6	5,231	**0,023**
Promote economic growth, employment and job security	51,8	40,9	2,33	0,129
Create new jobs	41,0	28,7	3,261	0,072
Ensure healthy life and health for all age groups	54,2	54,8	0,006	0,938
Reduce air pollution	55,4	58,3	0,157	0,692
Reduce ocean pollution	57,8	56,5	0,033	0,855
Preserve oceans and marine resources	39,8	40,0	0,001	0,973
Apply fines for environmental violations	34,9	22,6	3,685	0,056
Promote innovation in sustainable development	34,9	45,2	2,108	0,148
Develop transport diversity and encourage a mix of modes of transport when travelling	16,9	16,5	0,004	0,949
Encourage the creation of environmentally friendly business	41,0	47,0	0,697	0,405
Ensure the creation of responsible production and services (energy, food, tourism, etc.) without polluting the environment	32,5	53,9	9,233	**0,003**
Promote responsible consumption (waste sorting, recycling, etc.)	43,4	60,9	6,054	**0,015**

Take urgent action to combat climate change and its effects: managing deforestation, restoring wildlife, combating desertification, halting soil erosion	38,6	27,8	2,543	0,112
Improve existing laws to promote the Sustainable Development Goals	38,6	33,0	0,636	0,426
Create new laws to promote SDGs	34,9	17,4	8,222	**0,005**
Promote cooperation with institutions pursuing sustainable policies	33,7	27,0	1,054	0,306
Strengthen measures to implement sustainable development	28,9	37,4	1,543	0,216

Sustainable development process management initiatives will only achieve the desired result with consumer awareness and responsibility for their actions, guided by the principles of sustainable development. When analyzing the overall perception of the participants in the research on their efforts to contribute to the SDGs, the results of the research (see Picture 2) showed that more than two-thirds of the respondents (79.4%) were self-critical in the assessment of their efforts (on a scale of 5-8 out of a possible 10 points). In contrast, only 8% of the respondents rated their efforts to contribute to the SDGs in the highest terms (3.7% with a score of 10 and 4.5% with a score of 9), with an overall mean score of M = 4.81 out of a maximum of 10. The results show the need to find more effective means of communication in managing sustainable development processes, enabling them to shape consumer attitudes towards sustainable development using the chosen communication message.
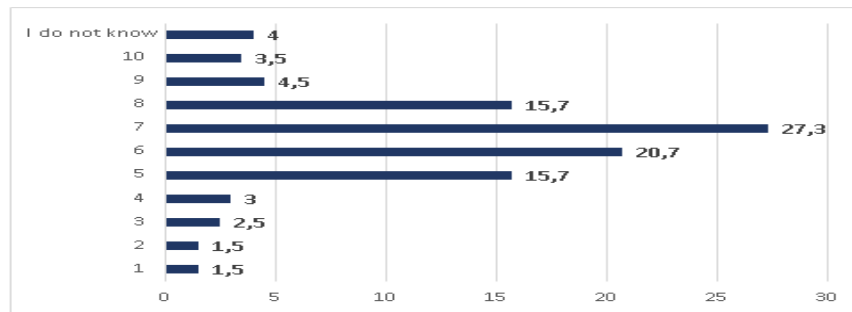
Picture 2. Assessment of involvement in the implementation of sustainable development goals (n=198, per cent)

Ecological, economic and social problems are worrying and show the need to promote global awareness in implementing the sustainable development paradigm. Sustainable development must be realized as a necessity that determines each person's choices and can contribute to improving the quality of life, improving health, protecting the environment, reducing poverty, economic development, ensuring justice guarantees and solving other problems. Therefore, in the creation of social, economic and ecological well-being, an important aspect to ensure sustainable development processes is the use of communication tools, which can be one of the prerequisites that enable the disseminated information to have an impact on the change in the mindset, attitude and attitudes of users, on decision-making, on the formation of awareness and responsibility, and as well as for the promotion of active involvement and participation in the processes of implementation of sustainable development goals.

Having assessed the fact that sustainable development process management initiatives will achieve the desired result by applying active and effective communication and selecting suitable means of information, the research aimed to find out the experience of the respondents, which means of communication they usually used to get information about the SDGs and their implementation. The analysis of the data in the general sample showed that according to the majority of respondents (see Picture 3), websites (52.5%) and television (49%) are the main channels from which the majority of research participants received information about the implementation of SDGs. By applying analysis of variance (ANOVA), the comparative analysis performed in groups of respondents of different ages revealed similar trends (see Table 2): both for research participants under the age of 35 and for respondents aged 36 and older, websites (respectively: 51.8 per cent and 53 per cent) and television (respectively:

51.8 per cent and 47 per cent) are named as the channels through which respondents mostly received information about the implementation of SDGs, and the differences in the evaluation of these channels are not statistically significantly related to the age of the respondents (respectively: websites (F = 0.029, p = 0.864), television (F = 0.45, p = 0.503)). Hence, regardless of age, websites and television are the most established and frequently used means of obtaining information about the implementation of SDGs. Undoubtedly, television broadcasting is still a popular and frequently used channel through which information on SDGs can be presented through the integration of both visual and audio means.

On the other hand, living in the age of information technology, a person is inseparable from social networks and technology; therefore, next to traditional means of disseminating information (television), providing information on the Internet becomes one of the main means that draws the most attention to the information provided and in today's context can be used to reach a wider audience of people, drawing their attention to the existing social, economic and ecological problems and shaping their attitude, encouraging them to follow the principles of sustainable development. Meanwhile, as the research results showed (see Picture 3), the smallest part of the research participants receives information about the implementation of SDGs in the organization where they work (17.7%) and by participating in training or seminars where sustainable development topics are discussed (16.2 per cent). Recent facts show the necessity of predicting the objectives of sustainable development and the prerequisites for their implementation to strengthen the social responsibility of organizations, to promote social dialogue and cooperation and active participation in the processes of learning the objectives of sustainable development, as well as to organize courses and training during which sustainable development topics would be discussed, encouraging attention to this problem, which can serve as a basis for a discussion on the reduction of social inequality and exclusion, protection of health, ensuring the quality of life, reduction of poverty, protection of the environment and other relevant issues.
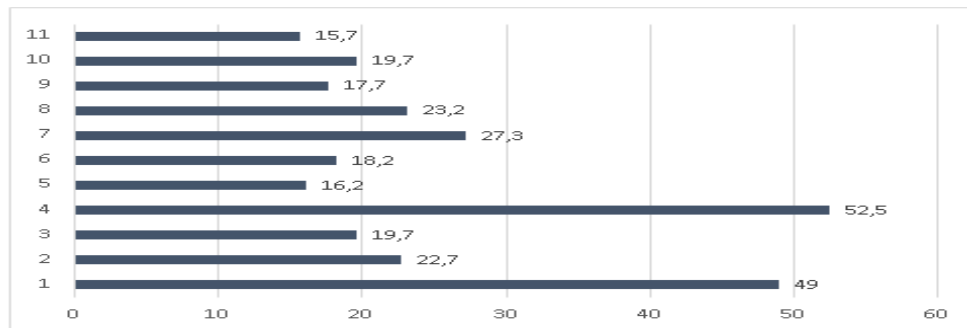
Picture 3. Evaluation of the management of sustainable development processes using communication tools (n=198; per cent)
Remark:

1. I heard/saw it on TV

2. I heard it on the radio

3. I read in books or other publications

4. I read on websites

5. I have participated in training and seminars where the topics of sustainable development were discussed

6. We talk about sustainable development as a family

7. We talk about sustainable development topics with our peers and colleagues

8. We discuss the topics of the implementation of SDGs during classes in an educational institution (school, higher education institution).

9. Knowledge of sustainable development is provided in the organization where I work

10. I am interested in the topics of sustainable development independently

11. Nowhere did I hear/read about the implementation SDGs

After conducting a comparative analysis, it became clear that the assessment of some channels through which one heard about the implementation of SDGs was statistically significantly related to age (see Table 2). The results of the statistical analysis showed that older study participants (36 years old and older), who more often receive

information about the implementation of SDGs by participating in training or seminars (20.9%), as well as in the organization where they work (22.6%) and independently (25.2%).), then it was named by the research participants under the age of 35 (respectively: 9.6%; 10.8%; 12%); using analysis of variance (ANOVA), these variables are statistically significantly related to the age of the subjects (respectively: (F=4.545, p=0.034), (F=4.647, p=0.032) and (F=5.376, p=0.021)). Meanwhile, the analysis of variance (ANOVA) revealed that a larger part of the research participants belonging to the age group under 35, obtained information by reading books or other publications (26.5%) and discussing sustainable development topics during classes at an educational institution (33.7%), than named by research participants aged 36 and older (respectively: 14.8% and 15.7%); these variables are statistically significantly related to the age of the subjects (respectively: (F=4.236, p=0.041) and (F=9158, p=0.003)). In addition, it turned out that the assessment "I have not heard/read anywhere about the implementation of SDGs" is statistically significantly related to age (F=5.773, p=0.017): a higher proportion of research participants belonging to the age group under 35 admitted that they had never heard or read about the implementation of SDGs (22.9%), while only 10.4% older (over 36) age respondents admitted that they had never heard or read about SDGs. Thus, knowing that the role of communication is one of the essential aspects when information is not only transmitted to the public, but at the same time, changes in social, economic or ecological processes can be initiated, fundamental changes in people's mindset including changes in beliefs, attitudes, opinions, values and encouraged engagement to actively participate in the processes of sustainable development, to increase interest in the topics of implementation of SDGs, in providing information and to achieve the efficiency of its reach, it is especially important to choose suitable and effective means of communication, and also take into account individual characteristics, such as age.

Table 2. Evaluation of the management of sustainable development processes using communication tools (in the age group under 35 years (n=83), in the age group over 36 years (n=115); per cent; results of variance analysis of estimates and age, when p< 0.05))

	Age group under 35	Age group over 36	F	p
I heard / saw it on TV	51,8	47,0	0,45	0,503
I heard it on the radio	22,9	22,6	0,002	0,963
I read in books or other publications	26,5	14,8	4,236	**0,041**
I read on websites	51,8	53,0	0,029	0,864
I have participated in training and seminars where the topics of sustainable development were discussed	9,6	20,9	4,545	**0,034**
We talk about sustainable development as a family	19,3	17,4	0,114	0,736
We talk about sustainable development topics with our peers and colleagues	22,9	30,4	1,379	0,242
We discuss the topics of the implementation of SDGs during classes in an educational institution (school, higher education institution).	33,7	15,7	0,9158	**0,003**
Knowledge of sustainable development is provided in the organization where I work	10,8	22,6	4,647	**0,032**
I am interested in the topics of sustainable development independently	12,0	25,2	5,376	**0,021**
Nowhere did I hear/read about the implementation SDGs	22,9	10,4	5,773	**0,017**

Summarizing the results, it can be seen that the chosen channel for providing information about the implementation of SDGs is a unique process based on many factors. Undoubtedly, in the era of information technology and social networks, information delivery channels change user engagement. As the platforms grow, the effect of social networks and traditional channels acquire undoubted importance and significance among users, regardless of their age. As the study results showed, television and websites are the channels from which the majority of younger and older study participants received the most information about the SDGs and their implementation. Meanwhile, the results of the comparative analysis in terms of age revealed that although a larger part of the younger research participants had not heard or read about sustainable development and the implementation of its goals, books or other publications and the topics of sustainable development discussed during classes in educational institutions are more often chosen channels for obtaining information about

management of sustainable development processes than was mentioned by older respondents, most of whom received information about the goals of sustainable development and their implementation in the organization where they work or by being interested in these topics independently. On the other hand, after evaluating the fact that training and seminars, which, although are a great place to communicate, you can hear the opinions of others when discussing the issues of sustainable development goals and their implementation possibilities, but they, according to the research participants, are not the place where they often heard about sustainable development (especially for younger research participants belonging to the age group under 35). Therefore, it would be expedient to organize more training and seminars, which would be attractive to both older and younger people in terms of their content and the topics of management of sustainable development processes. Also, the research results revealed the relevance of the development and implementation of social responsibility in organizations, which, according to the assessment of the research participants, needs to be sufficiently used. In the meantime, encouraging the unified application of sustainable development norms in the organization in all actions of employees, involving members of the organization's community in the formulation of an achievable and rational vision for the implementation of sustainable development goals in the organization, turning the vision into clearly defined goals and providing specific measures for their implementation, as well as motivating employees to foster a deeper sustainable learning about the importance of development through self-education, creating cognitive opportunities to participate in training, initiating inspiring stories and meetings with authoritative persons, creating traditions and rituals in the organization, encouraging sharing of good experiences can be one of the prerequisites for encouraging more active involvement in sustainable development processes and one of the factors that enable to follow the principles of sustainable development in personal life.

Communication is one of the possible essential parts of the decision on the implementation of SDGs, applied not only to familiarize individuals with the goals and principles of sustainable development but also to encourage them to be guided by them in their personal lives. Therefore, it is essential to apply such communication elements and methods of dissemination of SDGs and their implementation, which would draw attention, raise interest and become relevant to users and encourage them to decide to follow the principles of sustainable development. Analyzing the impact of communication on the behaviour of research participants (see Picture 4), the data analysis showed that more than half of the respondents (54%) received information about sustainable development and its implementation that sometimes influenced and encouraged them to follow the principles of sustainable development. Even for almost a quarter of the research participants (24.7%), the information provided significantly influences their behaviour to pursue sustainable development directions. Meanwhile, only 8.1 per cent of respondents admitted that information about sustainable development and its implementation has no influence on their behaviour to guide their lives based on the principles of sustainable development. A comparative analysis of the data in terms of age showed that for almost a third (29.6%) of the older (36 years and older) research participants, information about sustainable development and its implementation has a significant influence on their behaviour to follow the principles of sustainable development, while only for 18.1 per cent of the younger respondents (up to 35 years) information has a significant influence on their behaviour to follow the principles of sustainable development. The results obtained during the research revealed the impact of information on SDGs and their implementation on human behaviour. Based on the latter fact, it can be said that when managing the processes of sustainable development, the appropriate and acceptable selection of information tools and channels can be one of the aspects that enable the message spread by the chosen communication method to form the attitude of users to act following the principles of sustainable development.
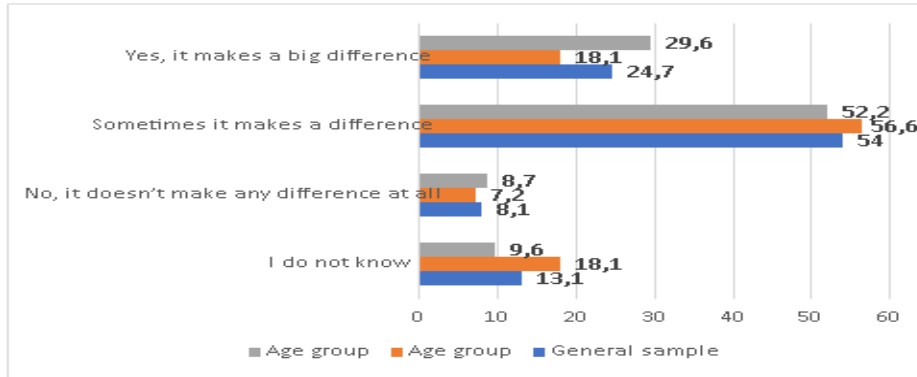
Picture 4. Evaluation of the impact of communication on following the principles of sustainable development (in the total sample (n=198), in the age group under 35 (n=83), in the age group over 36 (n=115); per cent)

Summarizing the results, the communication tools can be used as a prerequisite to constructively orient and transform users' attitudes and value orientations and contribute to a change in mindset and perception by promoting the principles of sustainable development. Communication will be effective and reach the audience and get their response when the methods of disseminating information are appropriately selected and applied. Therefore, when implementing the SDGs, it is necessary to look for the most correct and effective communication solutions, use as many different communication tools as possible, take into account individual characteristics based on values, create innovations, initiate dialogue with interested parties, and also fostering a deeper understanding of the meaning of sustainable development through participation in training, using television and social networks, developing and implementing social responsibility in organizations.

The significance of this research is that theoretical and empirical arguments are based on the assumptions of implementing the SDGs through communication tools. In addition, the possibilities of implementing the goals of sustainable development using the communication system were examined in a complex way, including the channels that provide information about the SDGs and their implementation, communication methods and tools that encourage adherence to the principles of sustainable development, as well as efforts to contribute to the implementation of the SDGs evaluation groups. The research has shown that information on SDGs and their performance through various channels, using the possibilities of both traditional (television) and innovative methods of information dissemination, as well as the Internet and social networks, can be one of the prerequisites for the implementation of sustainable development goals. Meanwhile, the research revealed the relevance of the development and implementation of social responsibility in organizations and the relevance of new opportunities for training and seminars where sustainable development topics would be discussed.

The research results will have lasting value in the scientific discussion about the role of communication and its application possibilities in implementing sustainable development goals, as well as practical significance in providing guidelines for promoting the SDGs by applying a variety of channels and selecting communication tools and methods. When initiating changes in social, economic and ecological processes, predicting the prerequisites for the implementation of sustainable development goals, achieving greater consumer interest in the SDGs and their implementation topics, as well as the effectiveness of the availability of information about the SDGs and their implementation, the data of this research enables reviewing and improving communication tools, selecting appropriate and effective communication methods and tools, using various channels of dissemination of information about the SDGs and their implementation.

A limitation of the research is that it was an online survey by sending questionnaires by e-mail, so feedback was relatively low, and a sufficiently small sample group of respondents was reached. There is also a significant

difference in the number of men and women who participated in the research, which limited the possibility of performing a comparative analysis of the evaluation indicators regarding gender. To achieve greater data validity in the future, it would be appropriate to conduct a study by repeatedly expanding the sample with an equal number of subjects, distinguishing gender and other sociodemographic indicators, which would allow comparing the opinions of different groups of respondents. Also, when analyzing the goals of sustainable development and predicting the prerequisites for their implementation, it is appropriate to supplement the research results with other methods of information gathering, such as, for example, interviewing managers of organizations and organizing focus group discussions.

Discussion

The analysis of scientific research on the topic under consideration showed that communication plays an important role in the implementation of the SDGs, and the conducted research helped in comprehensively clarifying the respondents' attitude towards the goals of sustainable development and the importance of their implementation, as well as evaluating and determining their efforts in contributing to the implementation of the SDGs prerequisites for the application of communication tools in the implementation of SDGs. Since the SDGs and their implementation are addressed in both scientific studies (Kates et al. (2005), Alraja et al. (2022), Arief et al. (2022), Burns (2016), Díaz-López et al. (2018)) and documents, covering categories such as nature, life support systems and community, environment, amongst others, our study aimed to find out respondents' attitudes towards the SDGs and their implementation in the environmental, socio-economic domains. The results of our study revealed that the majority of respondents associate the SDGs and their implementation with reducing air and water pollution and encouraging responsible consumption. The latter results are in line with studies by Kates et al. (2005) and Płonka et al. (2022), which emphasise the importance of a life-support system that defines a clean and friendly environment. On the other hand, our research shows that the majority of respondents identify SDGs with the promotion of economic growth, innovation and the creation of environmentally friendly businesses, as well as the provision of inclusive and quality education and healthy living and health for all age groups. Similarly, other scholars have argued that sustainable development must ensure both economic growth and the compatibility of economic activities with environmental, social and intellectual aspects as essential (Misiūnas et al., 2009), while Papadasa et al. (2020) and Zhanga et al. (2020) emphasize the importance of implementing a sustainable business strategy and environmentally friendly marketing practices, as well as the initiation of the development of new business models and the development of technology. Thus, the results of our research and those of other authors have confirmed that some of the key aspects linked to the SDGs are the provision of responsible production and services and the creation of environmentally friendly businesses, as well as the use of technologically advanced methods and innovations to carry out sustainable activities. Meanwhile, the results of our research show that only a minority of respondents identified gender equality and the development of transport diversity to reduce air pollution as important objectives in managing sustainable development processes. This is inconsistent with the findings of other authors (Fayomi et al., (2018)), who identified the promotion of gender equality and ensuring ecological sustainability among the key objectives of sustainable development. Therefore, the aspects of gender equality and the promotion of sustainable mobility and multimodality in the implementation of the SDGs could be explored in further research.

Depleting natural resources, increasing environmental pollution and other environmental, economic and social problems are a cause for concern, and prompt us to constantly remember and strive for a more responsible implementation of the principles of sustainable development. It is clear that initiatives to manage sustainable development processes will not achieve the desired result without consumer awareness, responsibility for their actions and efforts to follow sustainable development principles. However, the results of our research showed that more than two thirds of the respondents rated their efforts in engaging with the SDGs as moderate (i.e. overall average rating of effort M = 4.81 out of a maximum of 10 possible). These results show the need to look for measures to ensure more effective management of sustainable development processes. Therefore, the use of

communication tools becomes an important aspect in the creation of social, economic and ecological well-being, and can be one of the ways of creating consumer awareness and attitudes towards sustainable development processes. The fact that active and effective communication and the selection of appropriate information tools can be a way of managing sustainable development processes was confirmed by the results of our research, which showed that more than half of the respondents are sometimes influenced and encouraged to act in a sustainable manner by the information they receive about sustainable development and its implementation, and that almost a quarter of the respondents have a strong influence on their behaviour towards sustainable development principles. These findings are supported by research by other authors (Lee, 2016; Galiano-Coronil et al., 2021) showing the important role of communication in the implementation of a consumer-oriented framework that includes sustainability issues, promoting sustainable thinking and sustainable consumption. Nadanyiova et al. (2020) also acknowledge that green marketing, as part of socially responsible communication, can positively influence the attitudes of individual target groups towards responsible consumption and can add value to goods, products and services that are related to environmental aspects and social responsibility towards the environment, while Primožič et al. (2022) point out the importance of a communication strategy related to climate change, global warming, sustainability etc. Other authors (Arief et al., 2022) also emphasise the importance of communication as one of the preconditions for encouraging greater involvement and participation in sustainable development processes and as one of the factors that empower consumers to adopt sustainable development principles in their personal lives.

Thus, communication tools can act as one of the preconditions for initiating changes in social, economic or eclogical processes. Therefore, in order to achieve the objectives of sustainable development, it is necessary to seek the most appropriate and effective communication solutions, as well as to choose appropriate and acceptable means and channels of communication, which can be one of the key elements in enabling the message conveyed by the chosen means of communication to be used to shape consumers' attitudes towards the principles of sustainable development. By analysing the respondents' experience of the most frequent means of communication used to obtain information on the SDGs and their implementation, our research has shown that television, social networks and websites are among the most frequent means of communication used to obtain information on sustainable development processes. This is in line with the findings of other authors' studies, which provide insights into how the media harness the communication potential of the holistic concept of sustainable development (Janoušková et al., 2019), and highlight that in recent years, technological advances have played a very important role in our societies, and that social networks have become an important part of the strategies for managing sustainable development processes (Carrión-Martínez et al., 2020; Moser, 2010). Meanwhile, the results of our study showed that, from the point of view of the respondents, the opportunities for accessing information on the SDGs and their implementation in the organisation where they work or by attending trainings and seminars on sustainable development are not being used. It is therefore necessary to strengthen the social responsibility of organisations by providing the preconditions for disseminating the SDGs and their implementation. This is supported by the findings of Dyma (2015), who argues that more attention should be paid to corporate initiatives to implement the SDGs and to the development and implementation of social responsibility in organisations, while Carrión-Martínez et al. (2020) point out the relevance of education on sustainable development topics in different educational contexts.

In terms of the possibility of implementing the SDGs, this research supports the notion that the use of different communication tools, through the use of television and social networks, as well as the initiation of dialogue with stakeholders and the fostering of a deeper understanding of the meaning of sustainable development through participation in training, can be some of the key prerequisites for the implementation of the SDGs. Our research has complemented some of the results obtained by other authors and the findings have confirmed the importance of the communication tools used in managing sustainable development processes.

Conclusions

1. The analysis of scientific literature showed that communication plays an important role in the implementation of SDGs. Sustainable development initiatives are achieved through active and effective communication. Communication is essential in promoting sustainable consumption. Green marketing, as part of socially responsible communication, can positively influence the attitude of individual target groups towards the brand. Therefore, it is necessary to direct communication to separate target groups, which can be differentiated according to the age of the user. However, there is still a need for a better understanding of how communication and sustainable consumption are conceptualized and linked in the academic literature, despite the growing number of studies on communication in the context of sustainable consumption.

2. The results of the research showed that the majority of respondents associate the SDGs and their implementation with ensuring comprehensive and quality education and healthy life and health for all age groups, reducing air and water pollution and promoting responsible consumption, as well as economic growth, innovation and encouraging the creation of environmentally friendly businesses. Meanwhile, a small part of the research participants identified the design of new laws, the pursuit of gender equality, the promotion of agriculture and the development of the diversity of transport, and encouraging the mix of modes of transport when travelling as essential goals in managing sustainable development processes.

3. The research found that more than two-thirds of the respondents evaluated their efforts in implementing sustainable development goals self-critically, and the overall average of effort evaluation was M = 4.81 out of a maximum of 10 possible.

4. As the research results showed, the information provided employing communication about the SDGs and their implementation sometimes (54%) or very often (24.7%) influenced the research participants' behaviour and encouraged them to follow the principles of sustainable development. According to the respondents' assessment, television, social networks, and websites are the means of communication that most often provide information about sustainable development processes. Meanwhile, from the respondents' point of view, the opportunities to obtain information about the SDGs and their implementation in the organization where they work or by participating in training and seminars where sustainable development topics would be discussed, have yet to be used.

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ANALYTICAL STUDY OF CORRELATION BETWEEN RETAIL STORE IMAGE AND SHOPPING BEHAVIOUR OF SAUDI ARABIAN CONSUMERS

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Abstract. In the fast-moving consumer industry, consumers' behaviour is influenced by the brand's representative character and the first-hand experience after consuming goods. While many studies have been conducted to explore the fundamental characteristics of consumers' behaviour, the industry needs further analysis, which would benefit from formulating business strategies to bridge the gap between managers' imagination about the consumers' buying behaviour and the realities on the ground. This research aims to evaluate Saudi Arabian consumers' behaviour at supermarkets, hypermarkets, wholesale stores and Baqalas (local retail outlets). It identifies the representative character of product selling establishment in the image of consumers, examines differences between expectation and satisfaction and guides to formulate strategies to strengthen the relationship between expectation and consumers' satisfaction with a last objective of making companies financially viable. During the study, 625 consumers were interacted through a structured questionnaire from eight cities in Saudi Arabia, which has a multicultural political environment with a unique theological ambience with the progress of all sections of the society. Four store image criteria were set for examination: services, price, location and atmosphere, and convenience. The study says that a store's representative character varies considerably by the class of customers, i.e. gender, age, ethnicity and social stratification that affect customers' shopping decisions. By exploring the factors affecting consumers' decisions, the findings would play a pivotal role in providing valuable inputs to managers to improve the functional adequacy of supermarket, hypermarkets, wholesalers and even baqalas (local retail outlets) with an ultimate objective to makes their presence felt in the stiff competitive scenario of Saudi Arabia.

Keywords: retail store image; shopping frequency; store choice; supermarket; Baqala; consumer behaviour; retail strategy

1. Introduction

Saudi Arabia has proved itself a robust and resilient aftermath reception in the wake of the severe pandemic. It implemented dynamic financial strategies under Vission-2000 effectively. Its economy got helped by high oil prices and suitable products for its demography. Its inflation remained under reasonable control as well. Its rising oil prices, production, and sound economy have helped strengthen its fiscal position worldwide.

Consumers' perception plays a pivotal role in determining the financial viability of any business establishment. A better study for formulating business strategy has an indelible impact on functional adequacy, which has a ripple effect on consumers' perception. In the present stiff competition, every right or wrong step impacts the health of a business. The store's image in consumers' perception has a significant role in efficiently and effectively achieving the organisation's goal. As a result, it is essential to study the factors that make the store image relevant in the current business environment. Previous research has relatively contributed and advocated that store image has varied characteristics across retail sectors bearing that each retail outlet has a distinctive perception of consumers (Cho & Lee, 2017; Vukadin, Lemoine & Badot, 2019; Trevino, & Trevino, 2021; Ndengane, Mason & Mutize, 2021; Pavlic, Vojvodic & Puh, 2022; Hiremath et al., 2022; de Cosmo et al., 2022).

Shamsher (2014) has identified factors that contribute to the store image, i.e. product and service quality, that impact the consumers' choice. Studies on retail business reflect that service provided to the consumers and internal and external reprehensive character and business executions play a pivotal role in consumer loyalty. In the present scenario of stiff competition, business people in the retail industry need to understand the relationship between products and services and customer satisfaction, thereby suggesting improved sales performance and customer retention (Graciola et al., 2020). Saudi Arabian industry is facing an evolutionary change due to a change in Saudi Arabian consumer behaviour. The industry is coming across the ripple effect of the emergence of a new retail approach, and the fast transformation of the unorganised retail sector into the organised retail industry has resulted in double growth for modern retailing in Saudi Arabia in the era of globalisation.

The role of Baqalas must be addressed. These small outlets prefer to sell both local and foreign products as per consumers' demand. They have a good rapport with local consumers and know well what goods and services their consumers need. Despite the emergence of supermarkets, the Baqalas are intact and trying to offer their consumers better options.

Even with a plethora of research on store image carried out, few pieces of research have been carried out in Middle East countries (e.g. Belwal, & Belwal, 2017; Aji, 2018), which may not represent the actual characteristics of the Saudi Arabian business environment. Saudi Arabia enjoys a vast geographical hemisphere with a unique religious world capital having the prestige of backbone of the economy of Middle East countries.

According to the General Authority for Statistics (GASTAT) (2020, Kingdom of Saudi Arabia), it has a population of 34.81 million, making it the 41st most populous country in the world. As per the General Authority for Statistics (2020), the state's total population is 34.81 million (2020), and directly blessed with a vast base of consumers. According to GASTAT (2022), The Middle East Economy retail trade contributes 12 per cent of Saudi Arabia's GDP. It is expected that the annual growth of e-commerce will reach 18.95 per cent by 2025 in the Kingdom. The supermarket and hypermarket have been experiencing tremendous growth at par with European trends. As per USDA, there is 1360 hypermarkets/supermarket, which accounts for only 2.9% of retail outlets in Saudi Arabia. This accounted for 2.9% of the retail outlets and contributed 37% of the total sales in the Kingdom. The report of the General Authority for Statistics (2022) states that the Saudi economy grew by 9.9% in Q1/2022 on an annual basis achieving the highest growth rate since 2011. The Saudi Arabian GDP and the retail business have been witnessing relentless growth for the last ten years.

As Saudi Arabia is a commercial superpower among GCC countries, it gives Saudi Arabia a hallmark position in the Middle East hemisphere. Therefore, understanding consumers' store choice approach is very important for running retail players and potential supermarket retailers to formulate business strategies to achieve the set goals efficiently and effectively.

Academicians and researchers opine that the Saudi Arabian retail sector will perform positive growth over the next five years. The current retail industry is based on the format of Souqs, Baqalas, high-street, departmental

stores, discount stores, hypermarkets, and malls. As per the Saudi Gazette report (2022), the Saudi Arabian grocery sales by infrastructure consist of supermarkets 26%, hypermarkets 18% and others 56% (including Baqalas). The major retail industry players are Panda Stores, Bin Dawood Stores, Al Othaim Markets, AL Raya Stores, Farm Store, Carrefour and Danube supermarkets. The ripple effects of changing lifestyle and favourable demography have an indelible impact on retail sales of the Kingdom. Online marketing is also making its presence felt in the global era where boundaries between nations are melting away, and the world has become a global village.

As per the Saudi Gazette (Okaz) report (2022), the second quarter of Saudi Arabia's wholesale and retail segments and trade has a silver lining with a growth rate of 6.3%, representing promising growth in 2022. The Small and Medium Enterprises General Authority (Monsha'at) has revealed to Saudi Gazette that implementing proactive government policies to strengthen the private sector has resulted in various commercial sectors, including the retail industry (Monsha'at, n.d.). Further, per the Saudi Gazette (Okaz) report for the 2nd quarter of 2021, the food industry's investment reached SR 221 Billion**.**

2. Literature Review

Undoubtedly, consumers' perception of store image plays a crucial role in creating an indelible impact on the retail industry. Previous research has ascertained that store image attributes and customer satisfaction across different customer profiles within the supermarket sector (Thomas et al., 2018). It has been verified that store image is the main element that influences consumers' purchase decisions (Hanaysha, Al Shaikh, & Alzoubi, 2021). Consumer satisfaction is the ramification of store image, which is considered a significant challenge for management (Andreasen & Lindestad, 1998; Watanabe et al., 2013). Some authors emphasise that businesses need to formulate a retail strategy of identifying potential customers to understand what products they need and decide which forms of advertisement will be highly effective in targeting potential consumers. (Tweni & Tlapana, 2021). Studies have unfolded that the store atmosphere can make customers entertained instead of distracted (Grewal et al., 2003). The highly competitive environment makes retailers realise the ramification of store mechanisms to increase customer retention and loyalty (Theodoridis & Chatzipanagiotou, 2009; Johar & Sharma, 2022).

A plethora of researchers have reflected in their studies that staff attitudes have an indelible impact on the store's image in the mind of consumers. Shoppers' experiences may differ from store to store (Jinfeng & Zhilong, 2009; Hilal, 2020). Customer loyalty is mainly influenced by information about experiences in each outlet (Faria, Carvalho & Vale, 2022). Therefore, the store image is the output of the mind of consumers based on the comparative experience of various stores in different markets (Bolton et al., 2022).

There is no place for doubt that quality products, suitability of location, and value take guarantee of sales performance of retail stores (Alić, Agić & Činjarević, 2017). Maslakci, Yesilada and Yesilada (2021) suggested product quality and professional staff, allied services, availability of parking and petrol and value of money have a stimulus impact on promoting customers to buy products.

Many other studies have facilitated retailers to formulate a strategy to do business in a healthy and secure atmosphere. Previous studies have also analysed the role of the demography of a particular region. The typical approach of studies is concerned with gender and age. Still, most of them ignore to keep in mind the other significant factors like education, occupation, income and family structure. Customer delights have been hallmarked in all studies.

3. Research Methodology

3.1. Aim and originality

Previous research was carried out because Saudi Arabian consumers have covered the behavioural approach of its native citizen, ignoring the multicultural ambience of dwellers in Saudi Arabia, which is essential to consider by retailers and investors for setting business strategies. Thus, the first aim is to identify the factors that result in store image in the eyes of consumers in Saudi Arabia and to correlate the relationship between the store image and customers' delight.

Hypothesis-1: Store image expectations vary considerably by consumer characteristics.

Earlier, researchers have focused on factors attributed to the stores' perception in the eyes of the consumer, but only a few have tried to analyse the nature of shopping frequency.

Hypothesis 2: Shopping frequency depends on the association between the factors contributing to the store image and consumer satisfaction.

Until now, this study dimension has been untouched, which would facilitate the retailers to formulate the right set of strategies for their outlets to be financially viable in this stiffly changing competitive atmosphere. The present study is an analytical study of the correlation between store image and the shopping behaviour of Saudi Arabian consumers.

3.2. Methods

The data is based on interviews with 625 consumers actively shopping from supermarkets and local retail outlets (Baqalas) for daily use. One set of 325 consumers resides in four main cities viz. Makkah, Taif, Madinah and Jeddah, and another group of 300 consumers live in comparatively less active viz. Najran, Jizan, Abha and Khaims.

3.3. Data-collection tools

The consumers were interviewed to survey using a five-part questionnaire. The first part of the questions comprises 27 store image characteristics to classify consumers' expectations from supermarkets and local retail outlets (Baqalas). The consumers were asked to evaluate each feature using a five-point Likert-Type scale from 1(least valuable) to 5(very valuable) in the Saudi Arabian business ambience. In the second part of the questionnaire, consumers were requested to assess the attributes of supermarkets as well as local retail outlets (Baqala) they regularly visit the 27 store image characteristics using a five-point Likert-Type scale from 1 (least delighted) to 5 (most delighted to identify consumers' perceptions). The third part of the questionnaire comprises four informative questions about consumers' shopping behaviour, including shopping frequency and one question related to their overall satisfaction with supermarkets and local retail outlets (Baqala) that they visit in Saudi Arabia. In the fourth part, consumers under research were asked if they would switch to a different shopping floor provided they experienced inconvenience and dissatisfaction keeping in five such criteria. Satisfaction is measured as overall delight, which meets post-purchase satisfaction. In the last part of the specific questionnaire, consumers under study were placed on recognising themselves as per 11 demographic realities. The questionnaire was developed in English to facilitate consumers to respond correctly, but competent professional translators also translated the questionnaire into Arabic. To make the questionnaire more informative, appropriate and relevant, it has gone through an evaluation of experts, including business executives, suppliers of products to business outlets and academics in this specific field.

4. Results

The study reveals that 21.3% of the respondents visit supermarkets and Baqalas outlets daily, 26% visit four to five times a week, 26% visit twice a week, and 19% visit once or twice per month. The study further reveals that out of the respondents, 89% of consumers visit either one supermarket or one outlet regularly. Furthermore, the study says that 57.3% of consumers purchase from a local chain of outlets regularly, 30.7% buy goods from local retail stores (Baqalas) and 12% purchase from a global chain. Characteristics of the used sample are presented below in Table 1.

Table 1. Detailed sample characteristics

Gender	Female: 52.8%, Male: 47.2%
Age Group	Age group: ≤25 years: 17%, 26–35 years: 19%, 36–45 years: 21%, 46–55 years: 18%, 56–65 years: 21%, over 65 years: 4%
Education	Unlettered: 2%, primary: 17%, high secondary: 30%, undergraduate: 44%, graduate: 7%
Residence Location	Makkah: 31 %, Jaddah: 32 %, Taif: 7 %, Jizan: 15%, Najran: 6%, Abha: 4 % and Khaims: 5 %
Ethnicity	Saudi: 68%, Arab: 12%, Asian: 5%, British:1%, other: 10%

It is pertinent to mention that 94.3% of consumers are content with goods purchased from a Saudi Arabian supermarket. In consumers' eyes, cleanliness of the business floor, better value for their money and fresh goods like fruits, dairy products and vegetables are the primary sources of their satisfaction and dissatisfaction with the services and products, which compels them to switch to other business outlets. Table 2 reflects the consumers' shopping behaviour.

Table 2. The shopping behaviour of the consumers

Details of business floor regular visit		Purchasing time	
Local Supermarket Chain	57.3%	Weekdays	66 %
Baqala (local outlets)	30.7%	Weekends	34 %
Global Supermarket Chain	12.0%		
Sub Total	100%		

Satisfaction with purchase		Shopping Partner	
Satisfied	94.3%	Alone	76.9%
Not Satisfied	5.7%	With spouse	2.4%%
Sub Total	100%	With spouse and kids	14.6%
		With parents	5.2%
		With friends	0.9%
		Total	100%

Shopping Frequency		Switching Reason	
Everyday	23.3%	Cleanliness	14.4%
3-4 times a week	29.2%	Freshness of food	13.7%
2-3 times a week	26.8%	Competitive price	9.9
Once a week	13.3%	Variety in products	9.3%
1-2 times a month	7.4%	Product quantity	8.3%
		Value return	7.7%
		Sales promotions	6.7%

The study says one of the main factors is 'Services' comprising attributes like cleanliness and tidiness of shelves, polite behaviour of sales personnel, and hygienic atmosphere of the store. It further speaks of the 'Store environment' represented by style, suitability of colour, the language of music, lighting, capaciousness and interior design. Price competitiveness has some impact on the choice of consumers. It is also important to note that the availability of facilitating facilities like car parking, medical aid centres etc., is a factor influencing consumers' decisions.

The hypothesis is that consumer characteristics vary from retail outlet image expectations. The analysis reflects that males and females are predominantly different in their approach to price, location, convenience, services and value return of their money.

The flowchart mentioned below represents the mechanism of the behaviour of consumers of stores' functional viability and representative character (see Figure 1).
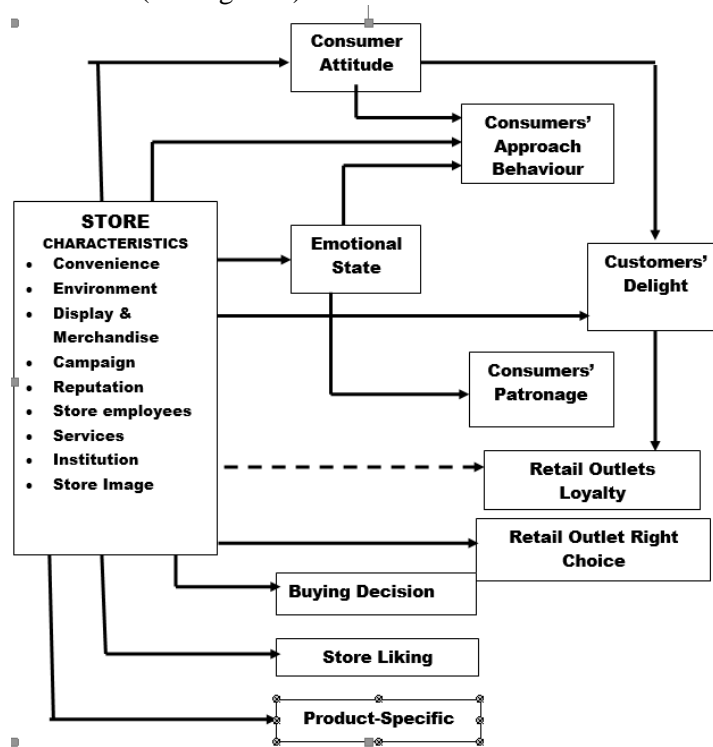
Figure 1. Mechanism of the consumers' behaviour
Source: the author

The results regarding ethnicity and expectations reflect no specific distinction between different sects of Arab origin consumers in their expectations about services, location, and convenience. But there is a significant difference between Arab and non-Arab consumers; choices and preferences regarding services, location and comfort.

To test of the second hypothesis, hierarchical regression analysis was used to examine the moderating role of shopping frequency in the connection between store image perceptions and satisfaction (see Thomas et al., 2018).

In the first step, demography has been made as a variable to conclude. Furthermore, the interface between shopping frequency and service is tested to analyse the hypothesis in the Saudi Arabian context, shown in Table 3.

Table 3. Hierarchical regression analysis: The moderating role of shopping frequency on the relationship between services perception and satisfaction

Step	Variable	Model-1 β	Model-2 β	Model-3 β
1	Gender	0.026	0.004	-0.003
	Age	0.096*	0.048	0.053
	Education	0.088*	0.088*	0.091*
	Ethnicity	-0.045	0.045	0.028
2	Shopping frequency		-0.004	0.013
	Services		0.344*	0.367*
3	Service x Shopping frequency			-0.104*
	Model F	3.916*	15.568*	14.456*
	TotalR^2	0.023	0.129	0.136
	ΔR^2	0.023	0.105	0.009

Note: *$p \leq 0.01$

Table 4. Hierarchical regression analysis: The moderating role of shopping frequency on the relationship between store atmosphere perception and satisfaction

Step	Variable	Model-1 β	Model-2 β	Model-3 β
1	Gender	0.026	0.004	-0.003
	Age	0.096*	0.069	0.072
	Education	0.088*	0.092*	0.091*
	Ethnicity	-0.045	0.013	0.003
2	Shopping frequency		-0.045	-0.054
	Store atmosphere		0.243*	0.248*
3	Store atmosphere x Shopping frequency			-0.094*
	ModelF	3.916*	9.286*	8.893*
	TotalR^2	0.023	0.081	0.088
	ΔR^2	0.023	0.058	0.009

Note: *$p \leq 0.01$

The result is based on variable factors contributing to consumer preference behaviour (Table 4). It would pave the way for retailers to operate their businesses and make them understand the factors that may lead to dissatisfaction in consumers' minds.

5. Discussion and Conclusions

This study has examined the relevant factors contributing to sales of supermarket and Baqala outlets choice criteria of Saudi Arabian consumers and made some steps ahead in the analysis if these expectations vary based on consumer profile. The findings conclude with four attributes: services, store environment & its representative character, price, convenience and location.

The first attribute is 'Services', which consists of clean, humble, well-mannered and enthusiastic employees and the availability of products in a very hygienic atmosphere. The evolution of cheerful staff and consumer relationships can play a pivotal role in creating satisfaction and providing a competitive edge in the market. Healthy interaction between consumers and staff offers the managers first-hand information, which is very helpful in improving the product and services.

According to this study, the second attribute is store 'atmosphere', which was one of four attributes that directly impact the retail store's sales performance. A pleasant store atmosphere strengthens the representative character of the store. A conducive atmosphere results in spending more time and money in the store.

Further, the third important attribute is 'price', which has emerged as an essential variable. The reasonable price may compel consumers to switch to a competitor. It was found that price is more important to women than to men. Besides, women contribute higher than men.

As per this study, the last important factor is 'location and convenience'. It influences consumers' preference decisions. Consumers who have their cars prefer stores with parking facilities.

Shopping frequency is the ramification of the relationship between the perception of services and the store's image and satisfaction. Staff with good communication and etiquette are accommodating to build strong consumer relationships.

However, researchers may replicate this study in other GCC countries such as Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates if Middle East consumers have similar behaviours. Replicating this study in the Saudi Arabian geographical hemisphere would facilitate business people to be adaptive to the need of a competitive environment.

6. Limitation

Despite the rigorous study, the reason behind uncertainties still needs to be discovered about how consumer behaviour affects store preference. This study contributes to the limited research in Saudi Arabia regarding supermarkets, hypermarkets, and baqala helping business people formulate retail strategies. After extensive research, it was found that there are many contradictions in various literature. Thus, it is challenging to make an absolute conclusion. It is a fact that the store image is the output of multi-dimensional realities that have dynamic behaviour with the changing space and times. Therefore, it is challenging to adopt a uniform scale to ascertain the factors attributing to the store's image. This study presents different yardsticks to help retailers formulate the right strategies to thrive in a competitive atmosphere.

7. Scope for Future Study

This study offers a hemisphere with dynamic factors, which are still folded positions, which may bring new insight through future research. To date, the previous studies bring many contradictory approaches, which need to be removed by further investigations to get forth-empirical strategies for the retail industry.

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THE USE OF BIOMETRIC TECHNOLOGIES IN ENSURING THE SECURITY OF CRITICAL INFRASTRUCTURE: THE CONTEXT OF THE PROTECTION OF PERSONAL DATA[*]

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Abstract. The article examines aspects of the use of biometric technologies and the protection of personal data as it relates to the protection of critical infrastructure in the state. The use of biometric technologies for the protection of critical infrastructure is examined in this article through employee identification to establish the identity of employees unequivocally, for example, when entering such infrastructure facilities. The EU General Data Protection Regulation (GDPR) sets specific conditions for processing biometric data. Still, the relevant data controllers often have problems finding the appropriate basis for processing, especially in the context of GDPR Article 9. The authors, having examined the conditions for the processing of biometric data, propose introducing a particular legal framework for the processing of biometric data as far as it relates to the protection of critical infrastructure.

1. Introduction

Acknowledging that any nation's national and economic security depends on the reliable functioning of critical infrastructures (CIs), the CIs are now more at risk than ever. Today's critical infrastructures, including healthcare, government and other essential sectors, are highly digitised and sometimes interconnected, placing them firmly in the sights of threats (Roshanaei, 2021). One of which is cyber threats. Statistics on cyber threats against critical infrastructure show that such attacks are rising (Weinberg, 2021). The dependence of people and society on

critical infrastructure and the probability and potential consequences of this infrastructure being vulnerable are the reasons that encourage individual criminals or criminal groups to attack these infrastructures and test their cyber resilience (Weinberg, 2021).

While there are no universally accepted definitions for the terms critical infrastructure and critical information infrastructure, and governments must consider which entities and services to include based on their national risk assessment (National Cybersecurity Strategy Good Practice), there is still no doubting the importance of protecting critical infrastructure. Critical infrastructure is crucial for any society to survive (Baggott & Santos, 2020; Roshanaei, 2021).

Attempts to affect critical infrastructure are usually made externally. Still, as security systems improve, there may be more and more attempts to affect these infrastructures and cause significant cyber incidents by way of the weakest point – humans. The human element of a system cannot be underestimated or easily understood. Insider human threats, such as those by disgruntled employees, fall within the human head topic (Zimmerman, 2017; Baggott & Santos, 2020). Hence, not only external threats to critical infrastructure should be emphasised – internal threats should be as well. Identifying internal employees or other related persons entering the relevant infrastructure facilities is crucial. And biometric technologies offer a highly effective means of identifying individuals. Biometrics has become part of the landscape of business and organisations (North-Samardzic, 2020). Despite this, the legal framework for personal data regulation strongly limits the use of biometric technologies (Kindt, 2018; Smith & Miller, 2022). Next, this article analyses the relevant legal framework based on the EU General Data Protection Regulation and the possibility of using biometric technologies to protect critical infrastructure.

Several methods were used for the research. An empirical method of analysis of legal documents, case law, and decisions and opinions of the state institutions responsible for data protection was used to determine the relevant legal regulation in force. This method makes it possible to accurately identify and describe the applicable legal regulation of the relationship in question after examining official documents. The authors used the comparison method when analysing the information published by different institutions. For sources of scientific literature, the authors used the deduction method, allowing for sufficiently reliable conclusions. Historical and analytical methods were also used.

2.   The need for critical infrastructure protection

Critical infrastructures are vital for public safety, economic well-being and national security (Maglaras, Janicke & Mohamed, 2022). Researchers from different countries have attempted to look for an effective cyber-security model. In their view, ensuring cooperation on critical infrastructure cyber security is crucial at domestic and international levels. Destruction or malfunctioning due to a specific risk factor could endanger life as well as the operation of the state (Kruszka, Klósak & Muzolf, 2019).

Recently, an increase in cyber-attacks against critical infrastructures, especially power systems, has been reported. It was previously thought that the risk of cyber-attacks on critical infrastructures was low because of the need for specialist knowledge of the control system configuration and administrative operations and the absence of suitable Internet connections. However, cyber-attacks on critical infrastructures are now exerting a significant impact on society (An Analysis of the Actual Status of Recent Cyberattacks on Critical Infrastructures).

Cyber-attacks on critical infrastructures such as power systems have significant economic implications and risk becoming targets in conflicts between nations (An Analysis of the Actual Status of Recent Cyberattacks on Critical Infrastructures). Especially in the context of the military conflict between the Russian Federation and the independent state of Ukraine, the probability of such disputes is increasing even more, particularly in the

neighbouring countries of Eastern Europe. Research shows a massive threat from Russia, with Russian state-sponsored cybercrime groups (Cybersecurity & Infrastructure Security Agency, 2022). The cybercrime groups no longer hide that they are directly controlled and financed by Russian security services. The threat is not only to Ukraine. Some groups are threatening and conducting cyber operations against countries and organisations that provide material or other support to Ukraine (Cybersecurity & Infrastructure Security Agency, 2022). And there are many such countries. In this context, the countries that claim the most outstanding support for Ukraine are most at risk (Economist, 2022). Among these countries are the Baltic States, including Lithuania. Of course, threats to critical infrastructure can and do arise without any connection to the current geopolitical situation. This infrastructure has been the target of many criminals and criminal groups for decades.

Critical infrastructures are complex operating environments that often require special protection and security (Noguchi & Ueda, 2021; Tvaronavičienė et al., 2022). Most countries are amping up critical infrastructure protection. On 15 March 2022, President Biden signed the Cyber Incident Reporting for Critical Infrastructure Act of 2022, which imposes federal reporting requirements for cyber incidents and ransomware attack payments (Cleary Gottlieb Steen & Hamilton LLP, 2022). Critical infrastructure protection is thus becoming one of the most important tasks for every country.

Cyber threats are divided into external and internal. Internal threats, i.e. threats to infrastructure security that originate from within, are often underestimated. Although in terms of consequences, these threats may not be inferior to external threats and may sometimes lead to more severe consequences. One example is the 1992 case at the Ignalina nuclear power plant in Lithuania when an internal employee – a technician – introduced a virus that nearly caused a nuclear disaster (Paganini, 2015). A global survey of security professionals and executives (LogRhythm, 2022) found that identity and access management are the most relevant security measures for organisations looking to close security gaps (Figure 1).
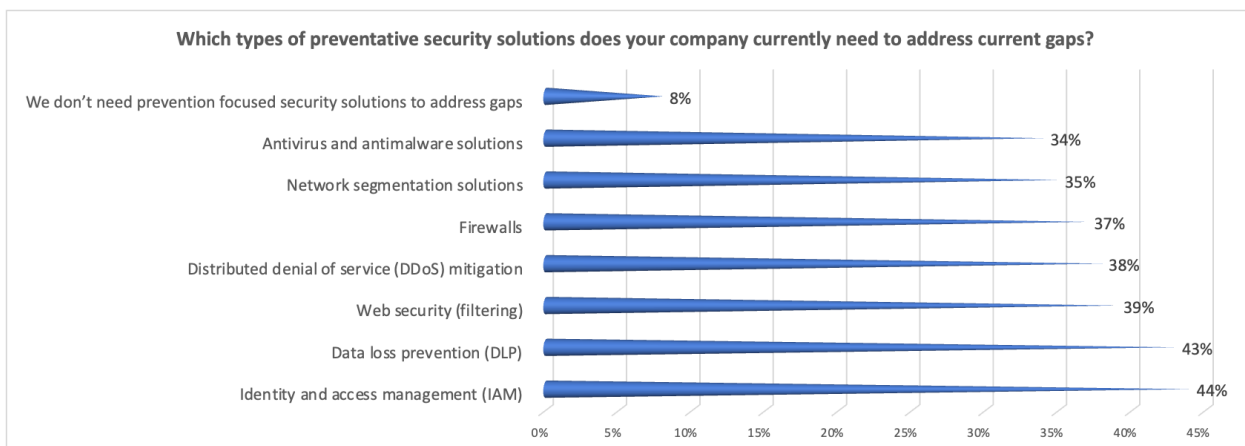
Figure 1. Identity and access management are the most relevant security measures for organisations
Source: LogRhythm, 2022

Biometric technologies offer a highly effective means of authenticating internal employees with access to critical infrastructure. These means could be one solution to protecting this infrastructure from internal cyber threats. However, using sensitive data brings several extra burdens (Quinn, 2021).

3. Market overview of biometric technologies and the need for data protection

The biometric technology market is constantly growing, with 2021 being a turning point in the development of the biometrics and cybersecurity market (Global Biometrics Market Report, 2021). Statista Inc. expects the biometric technology market to continue to grow over the next few years and to reach USD 68.6 billion by 2025 (Global biometric system market revenue in 2020 and 2025). The development and ease of use of biometric technologies and the COVID-19 pandemic, have encouraged financial institutions to use these technologies more actively for customer identification. Despite the limitations mentioned above of the technology and the known shortcomings of facial recognition technologies, companies worldwide are marketing such multimodal biometric technologies as practical tools in the fight against the pandemic. (Van Natta et al., 2020; Pascu, 2020) According to forecasts from Statista Inc., worldwide spending in the identity verification market will grow by more than USD 13 billion (from 4.93 billion in 2017 to over 18 billion in 2027) (Identity verification market, 2022) (Global Biometrics Market Report, 2021). Researchers in computer and technology ethics have made valuable contributions, but the implications of biometrics are not their primary ethical concern. As organisations are a place the development and deployment of biometric technologies and biometrics can present unique ethical challenges, it would be helpful for the community to focus on this topic more attention (North-Samardzic, 2020).

The following fastest-growing biometric technology markets can be singled out:
- The facial recognition market: The bulk of facial recognition on intelligent devices will be software-based rather than hardware-based, with over 1.3 billion devices having this capability by 2024 (i-SCOOP, n.d.). The facial recognition market is projected to grow from USD 5 billion in 2021 to USD 12.67 billion by 2028 (Statista, Facial recognition market size worldwide, 2019). COVID-19 accelerated progress in the facial recognition market – the sudden need to recognise a face partially covered by a mask prompted the development of new face recognition algorithms (Hernández A., 2020).
- The voice recognition market: The global voice recognition market size is forecast to grow to USD 27.16 billion by 2026 (from 10.7 billion in 2020) (Voice recognition market, 2023). The use of these technologies in the automotive industry is rapidly growing, with voice assistants projected to be embedded in nearly 90% of new vehicles sold globally by 2028. Amazon, Google, Nuance and IBM are all pushing hard to become the leading service providers for this industry. How well the in-vehicle systems integrate into smartphones and home automation will be a crucial factor to success (Abuelsamid, 2019).
- The fingerprint recognition market: Of all mobile devices sold in 2018, 96.5% had fingerprint recognition technology installed. Fingerprint hardware will dominate biometric payments, with more than 4.6 billion smartphones estimated to be equipped with fingerprint sensors by 2024 (Market share of smartphone fingerprint, Statistica 2023).
- eIDAS (electronic Identification, Authentication and Trust Services): The global digital signature market size is projected to grow from USD 4.0 billion in 2021 to USD 16.8 billion by 2026. Demand for digital signatures is expected to grow significantly, since e-government services, e-commerce markets, the need for security, and the number of electronic contracts are all increasing worldwide (MarketandMarkets, 2022). Password-based digital signature services are looking for added levels of protection, and biometric technologies are helping to make this happen. New biometric signatures consist of authentication via fingerprints, retinal identification, iris recognition, facial recognition or voice recognition and a record of the will of the person signing.
- Personal data breaches and cybersecurity: Human error and weak passwords (even passwords that are changed frequently can create opportunities for personal data breaches) mean that the latest biometric technologies must replace traditional authentication methods. Consumers are more concerned about the rise of cybercrime but are unable to protect themselves. As many as 92% of people know that reusing the

same passwords across multiple online accounts puts them at risk of password theft, yet 65% of users still do so (Psychology of Passwords, 2022).

Biometric identification and authentication are used in various fields and for multiple purposes. Banks and finance are particularly relevant areas for us. Financial institutions use biometric technology as a multi-factor authentication tool to protect themselves and their customers from fraud attacks. Whether it is the financial institutions themselves or their customers, biometric data benefit everyone in the financial sector – it allows for fast and accurate customer identification, protection from fraud, increased mobile banking security, and lower IT and customer service costs (when identification instruments are lost). In an official response to the question of strong customer authentication and common and secure communication (incl. access) in 2019, the European Banking Authority noted that financial institutions might use biometric data stored at the device level for the application of strong customer authentication, provided that they have ensured that the technology has a sufficient level of security (Relying on vendor mechanisms processing, 2019). The fact is that proper identification of customers in the physical space is becoming almost impossible, and the only means of resisting this type of attack (when foreign identity documents are used in the physical space) is to use biometric identification (Report on existing remote onboarding solutions in the banking sector, 2019). Research shows that services related to biometric sensors will include ATMs, e-mail banking, facial recognition systems, voice recognition services, optical sensors, fingerprint recognition and facial recognition services. Biometric systems will require two forms of authentication, including biometric data along with a personalised security number (PIN) will make designs more robust and secure (Dauda & Lee, 2015). Another new and breakthrough level of identification is EEG-based (electroencephalography) biometric data. EEG identification is a suitable alternative to existing personal identification methods, ensuring a high level of security. Several studies have shown that EEG-based identification and authentication systems can provide high recognition accuracy and stability (Chan et al., 2018).

Another equally important area is healthcare. Biometric identification can help hospitals confirm a patient's identity and ensure that medical staff access the correct medical records. A European Union-funded innovation project called Panacea (Panacea, n.d.) shows biometric access control software tools that would be a part of a healthcare identity management platform. The tool kit for human-to-machine and machine-to-machine interfaces includes software for secure information sharing, dynamic risk assessment, security by design support and compliance. According to market forecasts, by 2024, biometrics in the healthcare sector will generate four times more revenue. E-health systems and Internet of Things-based healthcare solutions will drive the adoption of biometric technologies. Biometric systems such as behavioural biometrics, cognitive recognition and wearables are being developed due to their advantages in remote monitoring and diagnostic healthcare services. Multilayer biometrics will strengthen the implementation of biometric technologies and ensure excellent resistance to personal data theft and falsification in the healthcare sector (Healthcare: Global Market Trends for Biometrics, 2020). As an example, it can be mentioned that the use of biometric solutions at airports will significantly reduce contact with all passenger touchpoints, such as at the check-in desk (including baggage drop), border customs procedures, and boarding process, which will help to apply effective health protection measures at airports during potential health crises (Serrano & Kazda, 2020).

Another critical sector is law enforcement. Law-enforcement authorities use several types of biometric technology for identification. These include fingerprints, facial recognition, voice recognition and DNA. There are many ethical questions regarding using biometric identification methods in the public domain. Questions arise about technologies specifically related to biometrics and those related to large-scale surveillance of individuals. Questions arise about the purposes for which this technology is used and how it is used (Wendehorst & Duller, 2021).

Thus, biometric technologies and their use have developed in some sectors. The question is how these technologies can be used to identify and authenticate critical infrastructure employees.

4. The use of biometric technologies in EU Member States: Legal regulation and practice

The GDPR sets the general rules for processing biometric data in EU Member States. Biometric data are defined in the GDPR as *personal data resulting from specific technical processing relating to the physical, physiological or behavioural characteristics of a natural person, which allow or confirm the unique identification of that natural person, such as facial images or dactyloscopy data* (Article 4(14)). GDPR Article 9(1), which regulates the processing of special categories of personal data, states that *the processing of ... biometric data to identify a natural person uniquely... shall be prohibited*.

When systematically evaluating these provisions of the GDPR, two scenarios for the use of biometric technologies can be distinguished: (1) the use of biometric technology not to identify a natural person uniquely, and, conversely, (2) the use of biometric technology to identify a natural person uniquely. Thus, it seems that the biometric technology chosen will determine which GDPR rules will apply, i.e. if the processing of biometric data will be subject to the conditions of lawful personal data processing set out in GDPR Article 6, or if it will also be subject to the exceptions to the processing of special categories of personal data set out in GDPR Article 9.

This is the approach taken by the European Data Protection Board after interpreting that to qualify as biometric data as defined in the GDPR, the processing of raw data, such as the physical, physiological or behavioural characteristics of a natural person, must imply measurement of these characteristics. Biometric data are the result of such measures. However, video footage in which a person is visible can only be considered biometric data if it has been technically processed to help identify the person. For biometric data to be considered as processing of special categories of personal data, they must be processed "to uniquely identify a natural person" (European Data Protection Board, Guidelines 3/2019).

4.1 Examples of legal regulation on the processing of biometric data in the national law of EU Member States

Various examples of legal regulation on the processing of biometric data in the law of EU Member States. In Hungary, numerous pieces of legislation regulate the processing of biometric data. The Labour Code provides that an employee's biometric data may be processed to prevent unauthorised access to an item or data that could cause severe or massive irreversible harm to the life, physical integrity or health of the employee or others, or to a significant interest protected by law. "Major interests protected by law" include information classified as "Confidential", as well as the safeguarding of weapons, toxic or nuclear materials (Act I of 2012 on the Labour Code). The processing of biometric data related to granting access is also provided for sports events. A sports event organiser can process biometric data using an access control system (Act I of 2004 on the Sport). The General Rules also cover the processing of biometric data for Trust Services and Electronic Payments, which specify that access to government-provided identification services, among other things, identification using video technologies, is permitted (Act CCXXII, 2015).

In Slovakia, the processing of biometric data to grant access is provided for gaining access to nuclear facilities (Act No. 541/2004). Slovakia has also developed a legal regulation for processing biometric voice data to verify the customer's identity when making payments and for other purposes provided for in the legislation (Act No. 483/2001).

Similar to Hungary or Slovakia, Italy permits the processing of biometric data for providing physical or logical access to data, provided that appropriate safeguards are in place (Code regarding the protection of personal data, 2016).

However, the practice of legal regulation for processing biometric data has yet to be widespread in individual EU Member States.

4.2 The practice of GDPR supervisory authorities regarding the processing of biometric data

The supervisory authorities of the EU Member States have repeatedly assessed the compliance of the processing of biometric data with personal data protection rules. In its 2018 annual report, the Bulgarian supervisory authority stated that a bank had approached it regarding the processing of biometric voice data for customer identification purposes. The bank had planned to use biometric voice data with the customer's phone number and the last four digits of the active bank card number. In the opinion of the Bulgarian supervisory authority, this method chosen by the bank for identifying data subjects is only possible with the express written consent of the data subject, giving the option of selecting alternative forms of identification (Commission for Personal Data Protection, Bulgaria).

In 2019, the Swedish supervisory authority imposed an administrative fine on a school for using facial recognition technology for monitoring attendance. In the opinion of the Swedish supervisory authority, the use of such technology was disproportionate concerning the purpose. Furthermore, the consent of students and their parents cannot be collected because they cannot freely choose whether or not to be monitored (Swedish Authority for Privacy Protection, 2019).

In its 2020 annual report, the Irish supervisory authority described a case of biometric data processing at a secondary school. The school sought to process students' facial images for attendance monitoring purposes. According to the Irish supervisory authority, the use of such technologies must have a clear legal basis and justification because otherwise, it can desensitise students to such technology and lead to them ceding their data protection rights in other contexts as well (Data Protection Commission, 2020).

The supervisory authorities of the EU Member States have also investigated possible violations of the legal regulation of personal data protection in processing employees' biometric data. The Romanian supervisory authority investigated a possible violation regarding facial biometric data of employees that were being processed for timekeeping purposes. The Romanian supervisory authority decided that such processing of biometric data is unlawful because it is disproportionate in relation to the purpose. The organisation could have achieved its goals with less privacy-intrusive means (The National Supervisory Authority for Personal Data Processing, 2018).

Several cases were investigated by supervisory authorities that resulted in administrative fines involving using employee fingerprints.

In 2021, the Italian supervisory authority imposed an administrative fine on a data controller for processing employee fingerprints to ensure control of employees' presence at work. In the opinion of the Italian supervisory authority, this processing was disproportionate concerning the purpose. It had no legal basis (Injunction Order against the Provincial Health Authority of Enna, 2021).

The Lithuanian and Spanish supervisory authorities have imposed administrative fines for processing employees' fingerprints for entry control. The decision of the Lithuanian supervisory authority was based on the fact that the data controller did not specify on what legal basis and for what purposes it was processing employees' fingerprints, nor did it assess the necessity and proportionality of such measures (Lithuanian DPA, 2021). Meanwhile, the Spanish supervisory authority based its decision to impose an administrative fine for the processing of employees' fingerprints for admission into premises because these objectives could be achieved by less privacy-intrusive means (Procedimiento Nº: PS/00010/2021).

From the examples given, it can be concluded that using biometric technologies for the authentication and identification of employees is often recognised as excessive or without a legal basis. Providing a legal basis through legal regulation could be a solution in cases identified by the state as significant enough to warrant biometric technologies.

5 Use of biometric technologies outside of the EU: Current practices and trends

5.1 The need for the use of biometric technologies

The need for the use of biometric technologies is common. It can also depend on the industry. For example, fingerprints are considered the most common in financial services and the government. Iris scanning technology is deemed more of a niche biometric tool used in high-security industries. Many workplaces take pictures of people regularly. These photos are then used to create company badges or identification (Robb, 2022). Yes, this method is not related to the use of biometrics. However, it is only a matter of time before employers want to use employee photos for identification, which would already involve using biometric technologies. But how easy will it be for the data controllers to lawfully switch to these technologies in more convenient ways?

Below is an analysis of the permissibility and legalisation of biometric technologies in some non-EU countries. The United States, Canada and Australia were selected for the study. Although GDPR Article 3 provides for the principle of territorial scope and the processing of personal data in these countries may be subject to the GDPR in some instances, these countries do not belong to the EU, and in a general sense, the policies of these countries regarding biometric technologies may differ from the EU. It is, therefore, valuable to analyse the practices of the respective countries regarding the use of biometric technologies, including at the workplace, as well as related trends.

5.2 Pros and cons of using biometric technologies

There is intense debate about the pros and cons of using biometric technologies. Canada is one of the countries where the advantages and disadvantages of using biometric technologies to process personal data are being considered. On the one hand, this is an ideal technology for "not forgetting your password" and the like. But on the other hand, biometric information is unique to each individual and remains relatively immutable. Accordingly, if a security breach results in the theft of the biometric data of one individual or thousands, managing the risk of harm to the said individual or individuals is not as simple as cancelling a credit card or changing a password. Therefore, it is considered that, despite a relatively liberal stance on new technologies, Canadian privacy legislation should be further clarified regarding the application of biometric technologies to manage the risks arising from using these technologies (Backman & Kennedy, n.d.).

The risks that exist were illustrated by a "discovery" made by two Israeli researchers. These researchers managed to access a database with the fingerprints of over one million people and facial recognition data that security company Suprema ordered on behalf of its clients across the globe (including police, defence contractors and banks). These researchers also showed that they could tamper with this data by adding their fingerprints to existing users or adding new users. Although it is uncertain whether the unsecured biometric data was, in fact, maliciously accessed and used, the most significant concern is that, unlike passwords, biometric data cannot be reset following a leak, and it is, therefore, challenging to mitigate the risk (Van Canneyt, 2019; Meden et al., 2021).

The Australian supervisory authority is strict about certain biometric technologies-related issues. After Canada, Australia also found that controversial facial recognition company Clearview AI had violated national privacy laws when it secretly collected facial biometric data from citizens and incorporated them into its AI-powered identity matching service, which it sells to law enforcement agencies and others (Lomas, 2021). In its report, the Australian supervisory authority states: "Clearview AI's facial recognition tool includes a database of more than

three billion images taken from social media platforms and other publicly available websites. The tool allows users to upload a photo of an individual's face and find other facial images of that person collected from the internet. It then links to where the photos appeared for identification purposes." (The Office of the Australian Information Commissioner, 2021) The ruling orders Clearview AI to cease collecting facial images and biometric templates from individuals in Australia and to destroy existing images and templates contained in Australia.

Surveys show that two-thirds (66%) of Australians are reluctant to provide biometric information to a business, organisation or government agency, and a quarter (24%) are more reluctant to provide biometric information than any other type of information. This is higher than an unwillingness to provide medical or health information (60% reluctant and 8% most reluctant) and location data (56% reluctant and 6% most reluctant) (The Office of the Australian Information Commissioner, 2020). Figure 2 below shows that Australian citizens are still largely opposed to the use of biometric information.
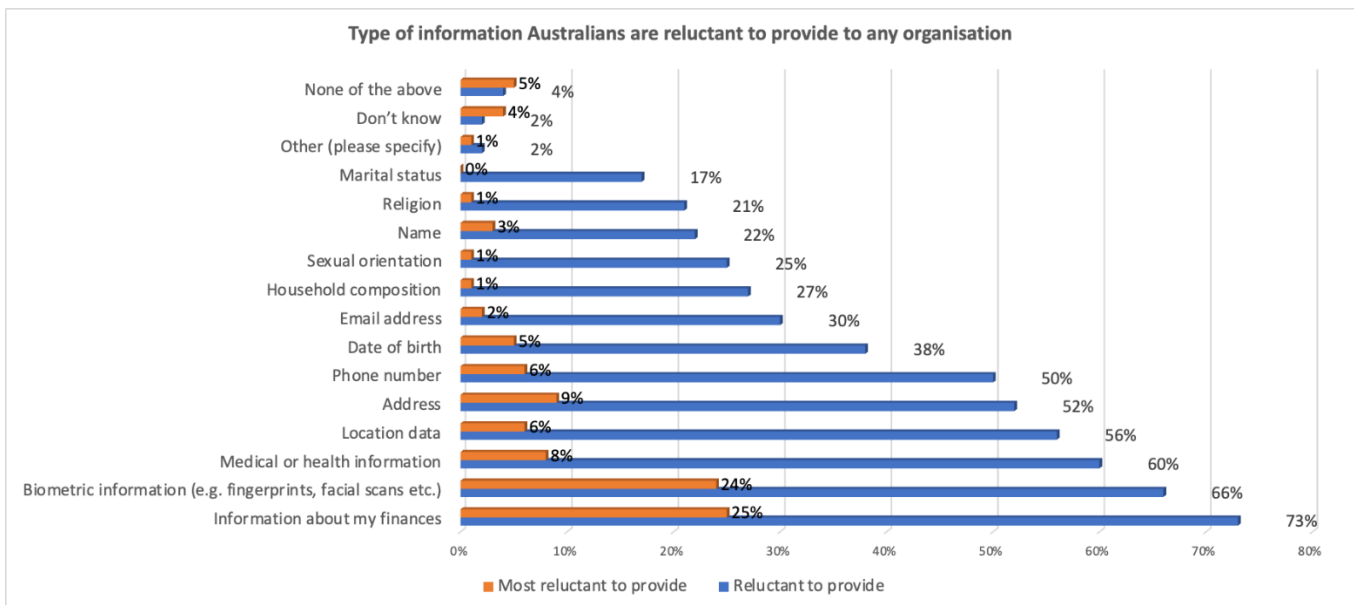
Figure 2. Type of information Australians are reluctant to provide to any organisation
Source: Office of the Australian Information Commissioner

In Canada, the immutability of biometric information is seen as both an advantage[†]; there are disadvantages too. Potential problems include the high risk of unauthorised disclosure, theft or misuse of biometric information. Accordingly, if a security breach results in the theft of the biometric data of one individual or thousands, managing the risk of harm to the said individual or individuals is not as simple as cancelling a credit card or changing a password. This highly sensitive information should be adequately protected from misuse and theft (Backman & Kennedy, n.d.). These problems are considered severe enough to be considered in legal regulation.

Given the risks involved, so-called "untraceable biometrics" has begun to be debated in Canada. In theory, untraceable biometric technologies are secure technologies that allow biometric information to be processed and used so that the biometric data are not linked to an identifiable person because biometric images or a biometric template does not store them. The original biometric data cannot be recovered from the stored information.

[†] There is a widespread belief that biometrics is ideal for identification or authentication purposes

Biometric data are provided in many ways that vary by technology. Personal data are converted in an irreversible and untraceable manner into an otherwise unrelated string of data, personal identification number (PIN) or key. When a person resubmits their biometric information, the unique PIN or key is regenerated and compared to the stored string. In essence, biometric data can be seen as a decoder for a unique PIN that allows a person to be identified (Cavoukian & Snijder, 2009). Untraceable biometrics are recognised as one of the solutions to the risks mentioned above. Nevertheless, this technology has yet to be thoroughly tested, and its use is limited (Backman & Kennedy, n.d.).

Canada is already beginning to see some solid official opinions on biometric technologies. In 2021, the Canadian supervisory authority found that a company that collected images of individuals and used facial recognition software violated privacy requirements. Following its joint investigation, the commissioners determined that Clearview's collection of more than three billion images – millions of which belong to Canadians – took place without the knowledge or consent of citizens. Additionally, the commissioners found that the company did not use and disclose the collected data adequately (IAPP, 2021).

5.3 Legal regulation related to the use of biometric technologies

"Similar sentiments" regarding biometric technologies are also reflected in legal regulation. Although the United States is unique in its structure and has not yet adopted basic federal laws on the use of biometrics, the trends in the practice of individual states can already be seen.

The Illinois Biometric Information Privacy Act (BIPA) was enacted in 2008 as the nation's first state biometric information privacy law. The law requires entities that use and store biometric identifiers to comply with specific requirements and provides a private right of action for recovering statutory damages when they do not. BIPA specifies that "biometrics are unlike other unique identifiers used to access finances or other sensitive information. For example, social security numbers, when compromised, can be changed. Biometrics, however, are biologically unique to the individual; therefore, once compromised, the individual has no recourse, is at heightened risk for identity theft, and is likely to withdraw from biometric-facilitated transactions." BIPA also states that, for the Act, "'biometric identifier' means a retina or iris scan, fingerprint, voiceprint, or scan of hand or face geometry." (Bloomberglaw, 2021)

Texas and Washington also have broad biometric privacy laws, but neither creates a private right of action. Still, other states like Arizona and New York have enacted tailored biometric privacy measures, and many more have enacted a law specifically targeting facial recognition technology (Bloomberglaw, 2021).
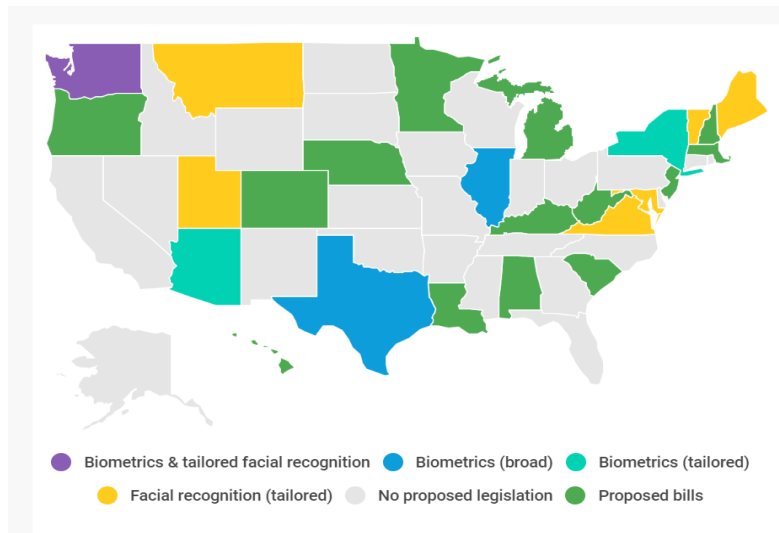
Figure 3. Which other states have biometric privacy laws?
Source: Bloomberglaw, 2021

According to the Privacy Act 1988, (Australian Government, Federal Register of Legislation, n.d.), biometric information is considered sensitive information in Australia. The primary condition for the lawful processing of such personal data is the individual's consent, with some exceptions. Also, data controllers must ensure the highest level of privacy protection in such cases. A person's consent when processing biometric information in the context of employment relations is also possible (provided certain conditions are met). The element of voluntary consent in Australia can be addressed by the employer offering alternative measures for employees to use (Ian Commins, 2021).

The Office of the Australian Information Commissioner, which also oversees the privacy sector, has published general guidelines on the handling of biometric information "Biometric scanning" (OAIC, 2022). According to these guidelines, biometric information scanning is when an organisation or agency takes an electronic copy of your biometric information, which includes any features of your:
- face;
- fingerprints;
- iris;
- palm;
- signature;
- voice.

The guidelines state that an organisation or agency may only scan an individual's biometric information for identification or as part of an automated biometric verification system if the law authorises or requires them to collect it or it is necessary to prevent a serious threat to the life, health or safety of any individual. Hence, Australia seems to be taking a slightly more liberal but controlled path, where the riskiest cases – when a person can be identified using biometric technologies – are only allowed in cases established by law and in certain areas.

In Canada, there are currently no specific legal norms regarding the use of biometric technologies. Data controllers using biometrics are forced to apply general legal norms, which, although technology-neutral, are not considered appropriate for regulating biometrics. This freedom for data controllers to decide on the use of biometrics is deemed not to address the serious risks that arise, especially from the association of biometrics with a specific person. Therefore, additional legal regulation of biometrics is advocated to provide data controllers with clear guidelines regarding in which cases and how to use biometrics (Backman & Kennedy, n.d.). And for now, using biometric technologies in the context of employment relations when processing personal data is permitted in Canada. When an employer decided to use a voiceprint to authenticate employees logging on to a phone system as part of their work, the Privacy Commissioner of Canada said that the use of a voiceprint was legal because the voiceprint could not be used for any other purpose, could not be used to spy on employees, and did not reveal much information about the employee (Privacy Handbook, 2015).

Thus, trends can be seen to regulate individual cases using biometric technologies to identify individuals. In this way, market participants and the data subjects themselves are given greater clarity than leaving situations to be resolved following general data protection legislation.

6   Challenges of using biometric technologies to protect critical information infrastructure

Using biometric technologies that help uniquely authenticate internal employees with access to critical infrastructure for cybersecurity purposes needs to be improved by existing regulations based on the GDPR. The regulation provides general grounds for processing biometric data as a special category of personal data – the processing of these data is subject to a special regime and conditions for lawful processing. Yet at the same time, this means that in protecting critical information infrastructure, these data may only be processed on the basis of the consent of the employee as per GDPR Article 6(1)(a), or if the employee has given explicitly consent as per GDPR Article 9(2)(a). And due to the imbalance between the position of the employer and the employee (imbalance of power (Guidelines 05/2020), such consent is likely to be recognised as not being voluntary unless the employer were to provide alternative systems. However, in the case of giving alternative approaches for the protection of critical infrastructure, it would not be possible to ensure the use of biometric technologies alone for the identification and authentication of infrastructure employees.

The situation could be changed if the EU Member States decided to take legal, regulatory actions establishing a procedure for using biometric technologies in critical infrastructures. In the context of emerging cyber risks and potential harm to society, critical infrastructure could be classified as one of the areas where the use of biometric technologies for employee identification and authentication would be based on GDPR Articles 6(1)(c) and 9(2)(g), i.e. "processing is necessary for reasons of substantial public interest, based on Union or Member State law which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and the interests of the data subject." (Regulation (EU) 2016/679) This would eliminate those curious situations where, due to the limitations of data protection legislation, the relevant infrastructure managers cannot use biometric technologies in the context of employment relations to protect the infrastructure.

Conclusions

The need to protect critical information infrastructure has always been the most pressing. This need has been exacerbated by Russia's invasion of Ukraine, with countries actively supporting Ukraine facing an even greater risk of cyber-attack since the start of the war. It would be wrong to think that in such cases, only external cyber-attacks need to be guarded against. Internal cyber threats also pose a significant danger and can have even greater negative implications. Biometric technologies can help reduce the risk of internal incidents, as they can uniquely authenticate and identify natural persons – employees, especially since using such technologies in individual sectors is spreading.

However, the association of biometric information with a specific person and the resulting risk in the case of loss or theft make this feature of biometrics a severe threat that requires the use of biometrics for identification to be limited. To that end, specific legislation is already emerging or being put forth for ratification that regulates the use of biometrics when the aim is to identify a person.

In terms of its importance and the risks involved, the area of critical infrastructure and the protection of such infrastructure from cyber threats could be classified as a national priority, and the use of biometric technologies for identification and authentication could be regulated in this area.

In some countries, individual cases where biometric technologies are used for personal processing data are already regulated by legislation. The EU Member States could adopt a harmonised and transparent practice of regulating the use of biometric technologies for cybersecurity so that these technologies could be used by critical infrastructure managers that are currently unable to do so since the consent of the employees may be deemed as not being voluntary. The new practice of legal regulation would allow controllers implementing biometric technologies for identification and authentication to follow GDPR Articles 6(1)(c) and 9(2)(g), i.e. established by legal obligation/national legal regulation, and not risk being penalised by national supervisory authorities for processing excessive data and/or processing a special category of data without the proper legal basis.

The corresponding new practice of national legal regulation classifying critical information infrastructure as an area of national importance where biometric technologies can be used to identify individuals could be coordinated at the EU level by issuing relevant guidelines. Such guidelines could lead to a new wave of legal regulation in individual EU Member States allowing data controllers – critical infrastructure managers – to substantiate their use of biometric technologies for identification and authentication as far as cybersecurity is concerned, i.e. the conditions for lawful processing established in GDPR Article 6(1)(c) and the conditions for lawful processing provided for in GDPR Article 9(2)(g).

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FACTORS DETERMINING DROPOUTS FROM HIGHER EDUCATION INSTITUTIONS

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Abstract. Based on the experience of Lithuanian and foreign researchers and practitioners, the article theoretically justifies the reasons for dropping out of studies and provides options for reducing them. *The study* aimed to identify the factors determining dropout and their relationship with students' attitudes towards studies. *Research methods*: a quantitative method (questionnaire survey) was used to investigate students' attitudes toward the reasons for withdrawing from their studies; a statistical analysis method was used to process the data collected during the study. Using the Student's t criterion, indicators and differences in attitudes towards the factors determining withdrawal from studies were examined and compared in two groups of subjects: 1) students who had never thought about dropping out of their studies; 2) students who had thought about dropping out of their studies at least once. The study results will have practical implications for improving the quality of organising the study process in higher education by reducing the number of students who intend to discontinue their studies.

Keywords: factors influencing withdrawal from studies; higher education studies; students; attitude to studies

1. Introduction

Contemporary higher education has been facing challenges related to students' choices to discontinue their studies. An analysis of the scientific literature shows that withdrawal is a relatively different process, which depends on the different motives of each student and even on the period when the choice to withdraw from studies is made. According to Mouton et al. (2020), the latter aspect allows for distinguishing between an early dropout phase and a late dropout phase. Various reasons, not only academic but also non-academic factors (Fourie, 2017, 2020), individual, socioeconomic, academic or institutional determinants of dropout (Guzmán et al., 2021) could be reasons why students decide to discontinue their studies in the early and late phases can be singled out. For example, the authors (Kehm et al., 2019) identify *intrinsic motivation* (e.g. interest in the subject) and associated *personal efforts invested in independent learning*, *extrinsic motivation* related to the possibility of a future job,

student's personal characteristics, for example, younger age of students, as, following Staiculescu and Richiteanu (2018), Adamonienė (2010), Jokštaitė and Pociūtė (2014), such students are characterised by a certain instability, intense self-seeking, lack of vision of the professional environment, lack of self-knowledge, lack of intrinsic motivation, insufficient adaptation efforts or according to the authors Bumbacco and Scharfe (2020), Mostert and Pienaar (2020), Bernardo et al. (2022) – increased burnout and exhaustion between students. *Temporary suspension of studies*, which significantly contributes to dropout, *a socio-demographic environment of the student*, where the educational level and the professional status of the parents contribute to a lower dropout rate, are also seen as reasons for terminating studies in scientific literature. However, refuting this correlation in their work, the authors Behr et al. (2020) argue that students with parents with higher levels of education are more likely to drop out of studies and accept a job offer on the market compared to households with lower levels of education. In contrast, the latter is more likely to be exposed to other factors, such as financial problems, which frequently cause the termination of studies. This is confirmed by the study of the authors Staiculescu and Richiteanu (2018), who attribute to non-payment of tuition fees, i.e., to financial problems, to a frequent reason for dropping out of studies, and Behr et al. (2020) identify it as a personal motive for withdrawing from studies.

In today's context, the problem of dropping out from studies remains relevant and it is a global problem that not only causes significant economic losses at the national level but also affects students' health and career prospects (Nemtcan et al. 2020), reduces a country's productivity and economic competitiveness (Saftaa and Stana, 2020) and encourages leaders and lecturers of higher education institutions to continuously search for ways to reduce the number of dropouts from the study process. To find more effective ways of minimising the problems associated with student withdrawal, it is necessary to delve deeper into the attitudes and dispositions of students towards their studies and to analyse the reasons for terminating studies Lee and Lee (2020) point out that it is important for Higher Education Institutions to identify students who wish to withdraw from their studies in advance, as such information would allow them to develop targeted strategies to stem student attrition. It should be acknowledged that over the past few decades, there has been a rise in research on the phenomenon of student withdrawal from studies, with a particular focus on the causes of dropout. However, in Lithuania, there are few research studies aimed at investigating students' attitudes towards studies. These factors influence withdrawal from studies and their relationships in groups of students who have never intended to terminate studies and have at least once thought about dropping out of studies. The lack of surveys and the uneven implementation of preventive measures in higher education institutions exacerbate the latter problem (State Audit Office's audit report "Is the quality of studies in higher education institutions ensured", 2021). Therefore, it would be essential to identify how the attitudes towards studying differ between students who have never intended to drop out and those who have at least once considered dropping out, and what possible determinants of dropping out and the differences in the relationships between them can. Acevedo (2021), Timbal (2019) and Gairín et al. (2014) believe in the importance of conducting activities to measure dropout rates and analyse related data to use intelligent predictive models for the reduction of dropout. This would provide a better understanding of attitudes toward studies and their relationship with the reasons for dropping out. It would be of long-term value in the academic debate on managing withdrawal from studies to reduce the number of such dropouts. Taking into account the relevance of the topic and the practical significance of the research results, this article reveals the differences in attitudes toward studies and the determinants of dropping out of studies between students who have not intended to dropout and those who have at least once thought about withdrawing, as well as the differences in the factors that determine dropping out of studies and relationships between them.

The research problem is defined by the question: how does the evaluation of the factors that determine the withdrawal from studies and their connections with the attitude of the students differ in the groups of students who do not intend to terminate study and who at least have once thought about dropping out of studies?

The object of the study: the factors that determine dropping out of studies and their relationships with students' attitudes towards studies in groups of students who have no intention of withdrawing and those who have at least once considered dropping out of studies.

The study aims to identify the factors that determine dropping out of studies and their relationships with students' attitudes toward studies.

The objectives of the study:
     1. To analyse the factors influencing the termination of studies from a theoretical point of view.
     2. To investigate and compare students' attitudes toward studies and possible factors that lead to discontinuation of studies in groups of students with no intention of dropping out of their studies and those who have thought about terminating their studies at least once.
     3. To identify the relationships between the factors that predetermine dropping out and students' attitudes towards their studies in the groups of students who do not intend to drop out and those who have at least once thought about withdrawing from studies.

2. Theoretical background

There are various reasons a student decides to drop out, both in the early and late phases of withdrawal. For example, Kehm et al. (2019) identify *intrinsic motivation* (e.g. interest in the subject) and *the associated personal effort for self-directed learning*, and *extrinsic motivation* related to the possibility of getting a job in future. T*he student's personal characteristics*, for example, a younger age of students, are also seen as a cause of withdrawal from studies and, according to Staiculescu and Richiteanu (2018), Adamonienė (2010), Jokštaitė and Pociūtė (2014) younger students are characterised by a certain instability, intense self-seeking, lack of vision of the professional environment, lack of self-knowledge, lack of intrinsic motivation, insufficient adaptation efforts. More reasons include *temporary suspension of studies*, which strongly contributes to dropout, *a socio-demographic environment of the student*, where the parents' educational level and professional status contribute to a lower dropout rate. Jia and Maloney (2015), as an important factor in identifying an individual's nationality, argue that international students are more likely to drop out than domestic students, who make up the majority. However, refuting this correlation in their work, the authors Behr et al. (2020) argue that students with parents with a higher educational background are more likely to drop out of school and change to a job offer on the market compared to those in households with lower levels of education, the latter being more likely to face other problems, such as financial difficulties.

As already mentioned, according to Mouton et al. (2020), dropout is measured in two phases: the early dropout phase and the late dropout phase. These phases of attrition are also highlighted by the authors Behr et al. (2020). In contrast, according to Mouton et al. (2020), Stake and Cisneros-Cohernour (2004), Bobrova et al. (2012), Baranauskienė et al. (2011), Putrienė (2017), the early phase of attrition is attributed to a lack of student engagement, overcrowding, and unfulfilled expectations. For example, Alkan (2014), Liobikienė and Bukauskienė (2014), Trowler (2010), Everett (2015), Senior et al. (2018), Messias et al. (2015), Khe et al. (2018) also highlights the importance of active student involvement in the institution's activities, while Behr et al. (2020) associate dropping out of studies with students' false expectations. To eliminate the gap in students' expectations, it is necessary to provide as much information as possible about the different study programmes, the requirements and organisation of studies, and the career and job prospects in the market (Jokštaitė and Pociūtė, 2014; Liobikienė and Bukauskienė, 2014). Both Mouton et al. (2020) identify the burden of excessive study requirements as a reason for dropping out, which may not match students' existing skills and competencies. Other researchers (Behr et al., 2020; Martišauskienė, 2016; Žibėnienė, 2014; Allan and Pileičikienė, 2010; Richard and Joseph, 2008) cite the study and study organisation conditions as another reason for stopping studying, relating this to the support provided by lecturers and the pedagogical skills they possess, while reasons for stopping

studies that are personal in nature may include incompatibility with the programme of study and high occupational pressure. However, Mouton et al. (2020) see these as late-phase conditions for dropping out, including personal and family problems or illness. Behr et al. (2020) separately identify the late phase of dropping out as receiving an exciting job offer, but they believe this can be addressed by working with the employer and facilitating a better work-study balance, while Mouton et al. (2020) list the following reasons for the late phase of the dropout process as the desire to earn money quickly. Kehm et al. (2019) also refer to working while studying, but they argue that allocating more than 20 hours per week to work leads to a higher dropout rate.

For example, Alkan (2014) adds non-traditional factors, such as *a person's sense of humour* and experienced loneliness, to the motives that influence withdrawal from studies. Based on the findings presented by Alkan (2014), it is noted that having and using a sense of humour makes it easier to cope with problems and challenges, while a higher degree of loneliness of the student also appears to correlate with a lower likelihood of dropping out. Similarly, Alkan (2014) points to the level of academic performance of the student as an important factor in predicting the likelihood of their termination of studies, which is supported by a case study conducted by Staiculescu and Richiteanu (2018), in which not having the required number of credits is considered a common reason for dropping out of studies. This relationship is also supported by the authors (Casanova, et al., 2018), who identify the fact that the decision to discontinue studies is significantly influenced by academic performance. In their opinion, the higher the performance, the more likely the student is to continue studies; however, students with high and top grades may decide not to continue their studies and to change institutions if the higher education institution was not their first choice at the time of admission. According to Casanova, et al. (2018), female students with below-average academic performance are more likely to decide to discontinue their studies than male students. Thus, it is essential to identify students' skills and learning difficulties as early as possible and facilitate their access to learning methodologies, participation in professional project activities and provide them with information on employment opportunities in order to improve their motivation (Tolūtienė, 2012, Tolūtienė & Jovarauskaitė, 2011).

The following discussion of the reasons for dropping out identifies the difference between university and college studies. This is noted by Behr et al. (2020), who point out that *poor study organisation* is a more common reason for dropping out of universities than colleges. Thus, according to the data obtained by the Student Associations (SAs) of higher education institutions, the quality of studies and teaching are highlighted in the first positions. The third most important reason is also *learning resources and infrastructure*, while authors Kehm et al. (2019) analyse this area more broadly, ranging from *the study environment to institutional resources (number of students per lecture or seminar, the composition of the student community, staff skill level, research intensity, overall staff-student ratio, academic costs per student, library costs per student, etc.), which is a key reason for the increase in the number of students attending the university* to *the curriculum, the structure of the course and the organisation of examinations and the learning environment and quality (physical environment, quality of teaching, etc.)*. The assistance provided during the studies in the form of material support, additional seminars, and training, especially in the first year, is also highlighted in the State Audit Office's audit report (2021) by Behr et al. (2020), and by Staiculescu and Richiteanu (2018) and the need for additional individual counselling on career and vocational guidance is seen by Staiculescu and Richiteanu (2018), Pukelis, (2007).

In addition to academic support and the proposal to provide as many additional services to students as possible, thus maximising the assistance provided to students, the document "Description of Actions and Procedures for the Implementation of the Future Economy DNA Plan (Annex 3)" also refers to the reasons for dropping out of studies, which range from the student's readiness for studies to personal characteristics, socio-economic status (of the student and/or family), the specific characteristics of the institution of higher education, factors of a financial nature and the factors and education and employment policies in the country, as well as the labour market situation. However, further results show that dropping out is strongly influenced by insufficient pre-university competences, which is supported by Westrick et al. (2015), Paura and Arhipova (2014) and Kehm et al. (2019),

who argue that better academic preparation and better academic outcomes in higher education institutions are due to the level of academic excellence achieved in the pre-university period and by the results of the study of Kehm et al. (2019), which show that a better academic preparation and academic outcomes in the pre-university period is due to the achievement of a higher level of pre-university academic achievement. Kehm et al. (2019) state that high prior academic achievement is directly related to lower dropout rates unless individuals drop out after a study programme has failed to live up to expectations. Westrick et al. (2015), Paura and Arhipova (2014) and Mouton et al. (2020) integrate the motive of unmet expectations into the early phase of the dropout process, while Behr et al. (2020), Bagdonas and Jankauskienė (2010; 2012), place false expectations related to studies among the leading and most important causes. Another reason mentioned in the document "Description of Actions and Procedures for the Implementation of the Future Economy DNA Plan (Annex 3)" is inadequate information about the studies to be chosen, which is confirmed by Kehm et al. (2019), who also place importance on the availability of information about admission requirements, admission quotas, entrance exams, and other information and its granularity/completeness.

3. The research methodology

Research design. The study was carried out among Lithuanian university students (n = 309): 227 (73.5%) were female respondents, and 82 (26.5%) were male respondents. The most significant number of respondents were first-year students (n=138 (44.7%)) and fourth-year students (n=6 (1.9%)) made up the smallest number of participants. Almost half (n=149 (48%)) of the students who participated in the study had thought about dropping out at least once, while 161 (52%) respondents had never thought about dropping out. The method of distribution of questionnaire form: an online survey. The ethical principle of free choice to participate in the survey was respected. The survey was conducted anonymously, and the results were processed and presented in a summary form. For confidentiality reasons, the name of the higher education institution is not mentioned in the article.

Research methods. The analytical descriptive method was applied in the theoretical aspect of discussing the reasons that can lead to withdrawal from studies and analysing the ways and means of reducing the dropout rate. *Quantitative research method.* A questionnaire survey was used to investigate the factors that lead to dropping out of studies and to identify the possibilities of reducing the dropout rate of students The questionnaire was constructed based on theoretical insights, criteria identified in the scientific literature, which revealed the attitude of the participants to studies, and the identification of the personal and external reasons for dropping out. The validity of the questionnaire was established by calculating Cronbach's alpha values. The results of the statistical analysis of the data show that the overall internal consistency of the questionnaire statements (number of variables = 44) is quite high (Cronbach's alpha = 0.8755) and ranges from 0.8679 to 0.8852. The internal consistency of the variables was also checked for each group of variables in the questionnaire separately. The Cronbach's alpha values for the group of the Attitudes towards studying consisting of 12 statements were calculated and the Cronbach's alpha equalled 0.8652 and it varied from 0.8364 to 0.9261. In defining the main factors that lead to dropping out of studies, the questionnaire identifies several constructs: *personal reasons*, including aspects such as motivation to learn, personality traits, physical health, time management skills, commitment to the chosen profession, etc., and *external reasons*, which are related to the conditions for studying in a higher education institution, the organisation of the study process that also embraces the content of studies, characteristics of teaching, and the role of the surrounding people, and other aspects. The estimated internal consistency of the statements in the group of *Personal Reasons for Dropping Out* (number of variables = 19) has a Cronbach's alpha of 0.8807, ranging from 0.8698 to 0.8858, and the estimated internal consistency of the statements in the group *External Reasons for Dropping Out* (number of variables = 13) has a Cronbach's alpha of 0.8752, ranging from 0.8550 to 0.8784. Taking into consideration the fact that internal consistency should be between 0 and 1 and a Cronbach's alpha of 0.60 is considered appropriate for research (Pakalniškienė, 2012), the coefficients of Cronbach's alpha calculated in this study indicate that the groups of questions are consistent with each other and that the variables included in the constructed questionnaire are representative of the part being investigated and are oriented towards the same subject. *Statistical research method.* Statistical analysis methods were used to

process the data collected during the study: the *Student's t-test* (to compare the means of two independent samples) was used to identify differences between several independent populations. Pearson's correlation coefficient was also used to assess the correlation between external factors that lead to dropping out of studies and students' attitudes toward studies. The results obtained are considered statistically significant when they meet the significance level p. Statistical analysis of the data was performed using the SPSS (Statistical Package for Social Sciences) software package version 17.

4. Research results and analysis

Meeting students' expectations, engaging and motivating study content that meets the needs of the modern labour market, and creating opportunities to acquire practical skills necessary for professional preparation during the study process are among the factors that determine satisfaction with studies, which can lead to students' interest in the chosen study programme and motivation to study. Therefore, the search for more effective ways to reduce the problems associated with students dropping out of studies should include indicators reflecting the factors such as students' perceptions of their studies, the personal and external reasons that may lead to dropout from studies, etc.

The performed comparative analysis of the opinions of students on studying in the groups of students who had no intention of dropping out from their studies and those who at least once had thoughts of dropping out showed (see. Table 1) that students who had never thought about dropping-out of studies had awarded significantly higher mean scores for the *usefulness* (M=5.98, SD=1.06) and *interestingness* (M=5.78, SD=1.08) of their studies than did students who had thought about dropping-out from their studies out at least once (respectively: (M=4.91, SD=1.52), (M=4.62, SD=1.55)). Similarly, students who do not intend to drop out from their studies rated them as *engaging* (M=5.31, SD=1.4), *conducive to career preparation* (M=5.4, SD=1.4), and *providing a high level of practical skills* (M=5.48, SD=1.4) at higher levels in these aspects than students who have at least considered to drop out from their studies (see. Table 1). Meanwhile, the latter group has shown lower mean scores, indicating that they are less likely to *experience success during their studies* (M=5.09, SD=1.44), and are *more passively engaged in the study process* (M=4.1, SD=1.57), and a higher proportion of them are *already disillusioned with their studies* (M=3.15, SD=1.96), compared to those who did not intend to drop out from their studies (correspondingly: (M=5,75, SD=1,09), (M=5,21, SD=1,45), (M=1,59, SD=1,05)).

Table 1. Perceptions of studies by students who have no intention of dropping out from their studies (n=159) and students who have thought about dropping out from their studies at least once (n=148) (averages (M), standard deviations (SD) and level of significance of the differences; Max=7)

Indicators reflecting opinion on studies	No intentions to drop out		Thought about dropping out at least once		t	p
	M	SD	M	SD		
Studying at the VK VVF has met my expectations	5.51	1.18	4.47	1.49	6.755	**0.001**
Studying at the VK VVF is benefitting me	5.98	1.06	4.91	1.52	7.109	**0.001**
Studying at the VK VVF is interesting to me	5.78	1.08	4.62	1.55	7.587	**0.001**
I'm doing well in my studies at the VK VVF	5.75	1.09	5.09	1.44	4.529	**0.001**
I like studying at the VK VVF	5.88	1.16	4.62	1.52	8.047	**0.001**
The study process at the VK VVF engages and motivates me	5.31	1.4	4.03	1.61	7.396	**0.001**
I get a lot of practical skills while studying at the VK VVF	5.48	1.4	4.18	1.82	6.956	**0.001**
Studying at the VK VVF is easier than I expected	4.84	1.78	4.21	1.82	3.051	**0.002**
I am more actively involved in the study process	5.21	1.45	4.1	1.57	6.43	**0.001**
Studying at the VK VVF helps me prepare for my professional activities	5.4	1.4	4.32	1.58	6.289	**0.001**

I would recommend studying at VK VVF to others	5.81	1.34	4.51	1.89	6.813	**0.001**
I am already disappointed with my choice of studying at VK VVF	1.59	1.05	3.15	1.9	-8,743	**0.001**

In summary, one can state that satisfaction with the chosen studies and perceptions of their usefulness in preparing for professional life, meeting students' expectations, increased success in the study process and student involvement in the study process are some of the aspects that are likely to increase students' willingness to continue their studies. Meanwhile, a lack of perception of the usefulness of studies and their relevance for the preparation for a professional career, frustration with studies, low levels of satisfaction with studies, and less frequent success in the study process can all contribute to thoughts about dropping out of studies.

When examining the factors that lead to students' dropping out of their studies, attention should be paid to identifying the personal and external causes of dropping out. External factors that may lead to dropping out from studies relate to the organisation of the study process and include aspects such as the content of the studies, the specifics and nature of teaching, the role of those around the student, etc.

The results of the analysis of the differences in the assessment of external reasons for dropping out from studies between the groups of students who did not intend to drop out from their studies and those who had at least once considered dropping out are presented in Table 2. The significantly higher mean scores in the group of students who have at least once considered to dropout from studies indicate that the external reasons for dropping out from studies include an *excess of unnecessary material presented in lectures* (t=-3.172, p=0.002) and the *boringness of the presentation of material in lectures* (t=-5.019, p=0.001), compared to the reasons given by the students who do not consider quitting their studies (respectively: (M=2.4, SD=1.33) and (M=2.5, SD=1.38)). Students who had at least once had thoughts of dropping out from their studies also rated *inconvenient lecture times and timetables* as one of the reasons for dropping out from their studies at a statistically significant (t=-2.792, p=0.006) higher score (M=2.91, SD=1.45) than those who did not have any intention of dropping-out from their studies (M=2.46, SD=1.4).

Performed comparative analysis of the data showed that there were no statistically significant differences in the assessment of other external reasons for dropping out from studies (see Table 2), suggesting that they are valued at a similar level in the groups of students who have never intended to drop out and those who have at least once considered to drop out from their studies.

Table 2. Assessment of external reasons, which can affect the dropping-out from studies in the groups of students who did not intend to dropout form their studies (n=159) and those who had at least once thought about dropping out from studies (n=148) (means (M), standard deviations (SD) and significance level of the differences; Max=5)

External reasons that may lead to dropping out from studies	No intentions to drop out		Thought about dropping out at least once		t	p
	M	SD	M	SD		
Inconvenient lecture times, timetable	2.46	1.4	2.91	1.45	-2,792	**0.006**
Influence of surrounding people, relatives and friends	1.63	1.01	1.69	1.09	-0,518	0.605
Too difficult studies/programme	2.42	1.31	2.48	1.49	-0,358	0.72
Too much freedom for students	1.32	0.68	1.33	0.75	-0,175	0.861
Lectures contain a lot of unnecessary material	2.4	1.33	2.9	1.41	-3,172	**0.002**
Lectures present material in a boring way	2.5	1.38	3.28	1.34	-5,019	**0.001**
I am not encouraged to be actively involved in the study process	2.01	1.15	2.28	1.31	-1,88	0.061
I do not get the knowledge and skills I need to prepare for my professional career during my studies	2.6	1.46	2.55	1.31	0.307	0.759

The content of studies is outdated and out of step with the needs of today's labour market	2.53	1.47	2.5	1.34	0.213	0.832
Studying at the VK VVF does not provide opportunities to gain valuable experience in preparation for professional activities	2.45	1.44	2.26	1.23	1.251	0.212
The requirements for students are too high	2.37	1.3	2.61	1.4	-1,532	0.126
The evaluation system is unclear	2.25	1.39	2.49	1.35	-1,565	0.119
A part of the people in the group dropped-out	1.43	0.86	1.6	0.95	-1,611	0.108

According to the results, several reasons can be identified for dropping-out from studies: inconvenient lecture times, the peculiarities of the organisation of the study process, where the material is presented in a boring way that is not related to professional activities, and the lack of opportunities for acquiring skills and abilities in the course of studies in preparation for professional career and activities. The latter may be one of the reasons why people think about dropping out of studies.

When looking at the reasons for dropping out from studies, it is important to look beyond the perspective of the higher education institution as an educational institution. It is helpful to look at the problem of dropping out from studies by also specifying personal reasons.

Statistical analysis of the data shows (see. Table 3) that *illness or health problems* (M=3.24, SD=1.62), *moving to another country* (M=2.47, SD=1.51), *financial difficulties while studying as a paying student* (M=3.3, SD=1.62) and *disagreements with lecturers* (M=2.45, SD=1,44) are among the reasons for dropping-out from studies for students who do not intend to quit, compared to the ratings of such reasons by students who have had at least one thought about dropping-out from studies (respectively: (M=2.25, SD=1.54), (M=1.8, SD=1.36), (M=2.24, SD=1.61) and (M=2.02, SD=1.36)). On the other hand, *academic debts accumulated during studies that were not cleared on time* (M=2.24, SD=1.48) and *not knowing where to turn for help with accumulated debts* (M=2.46, SD=1.43) were ranked significantly higher among students who had never thought about dropping-out from studies, compared to the data of students who had at least thought about it once (respectively: (M=2.01, SD=1.43) and (M=1.89, SD=1.32)). Meanwhile, as Table 3 shows, the latter have ranked the personal reasons that may lead to dropping out from studies significantly higher, such as *difficulties in balancing studies and work* (M=3.09, SD=1.58) and *inability to plan time and activities* (M=2.74, SD=1.47), as well as *difficulties in adapting to the environment and new demands* (M=2.79, SD=1.47) and *inability to concentrate and focus while studying* (M=2.68, SD=1.49), compared to the scores provided by students who have not ever intended to drop out from their studies (respectively: (M=2.52, SD=1.47), (M=2.3, SD=1.27), (M=2.18, SD=1.28) and (M=2.21, SD=1.27)). On the other hand, using the *Student's t criteria*, it was found that the *lack of motivation to study* (M=3.55, SD=1.37), the *lack of confidence in their chosen specialisation* (M=3.14, SD=1.54) or the *laziness to study* (M=2.46, SD=1.39) have been ranked significantly higher (in a statistically significant way, See. Table 3) by the students who have at least once thought about dropping-out from studies compared to students who did not intend to drop out from the studies (respectively: (M=2.48, SD=1.36), (M=2.65, SD=1.55) and (M=2.02, SD=1.33)).

Table 3. Assessment of personal reasons, which can affect the dropping-out from studies in the groups of students who did not intend to drop out from their studies (n=159) and those who had at least once thought about dropping out from studies (n=148) (means (M), standard deviations (SD) and significance level of the differences; Max=5)

Personal reasons that may lead to dropping out from studies	No intentions to drop out		Thought about dropping out at least once		t	p
	M	SD	M	SD		
Case of Illness, physical health	3.24	1.62	2.25	1.54	5.511	**0.001**
Hard to combine studies and work	2.52	1.47	3.09	1.58	-3,269	**0.001**
Lack of motivation to study	2.48	1.36	3.55	1.37	-6,876	**0.001**
Failure to plan your time and activities	2.3	1.27	2.74	1.47	-2,8	**0.005**
Doubts about your chosen specialisation	2.65	1.55	3.14	1.54	-2,739	**0.007**
Difficulties adapting to the environment, requirements	2.18	1.28	2.79	1.47	-3,87	**0.001**
Laziness to study	2.02	1.33	2.46	1.39	-2,852	**0.005**
Inability to concentrate and focus while studying	2.21	1.27	2.68	1.49	-2,94	**0.004**
Lack of interest in the subjects being taught	2.4	1.43	2.73	1.45	-1,992	**0.047**
Failure to complete tasks on time	2.39	1.34	2.53	1.44	-0,86	0.39
Disagreements with lecturers	2.45	1.44	2.02	1.36	2.667	**0.008**
Disagreements with course mates	1.8	1.21	1.66	1.11	1.101	0.272
Paid studies during a period of financial hardship	3.3	1.62	2.24	1.61	5.76	**0.001**
Failure to clear academic debts accumulated during studies	2.86	1.48	2.01	1.43	5.129	**0.001**
Not knowing where to go for help with academic debt	2.46	1.43	1.89	1.32	3.667	**0.001**
Lack of understanding of what to do, when and how to do it, lack of clear instructions and deadlines for tasks	2.73	1.47	2.96	1.49	-1,343	0.18
The modular system is unacceptable	2.17	1.35	2.15	1.32	0.125	0.901
Departure to another country	2.47	1.51	1.8	1.36	4.098	**0.001**
Distance learning(s) not acceptable	1.78	1.23	1.67	1.25	0.805	0.421

In summary, the results of the study suggest that the personal reasons that may affect students who do not intend to drop out from their studies are more likely to be related to factors outside the individual's control and the ones that are more difficult to control, such as illness, health problems, financial difficulties, change of residence, etc. Meanwhile, the personal reasons for possible dropping out from studies for students who have at least once thought about dropping out from their studies include a lack of motivation, difficulties adapting to a new environment and requirements, lack of interest in the subjects taught, uncertainty about their chosen career path, or laziness to study.

Correlation connections between external reasons might influence the dropping-out from studies and the evaluation of the studies by students who did not intend to drop out from their studies and those who thought about dropping out at least once. The study investigated how students' attitudes towards their studies and external factors that may lead to dropping out from studies are interrelated. To this end, a Pearson correlation analysis was carried out between the groups of students who did not intend to drop out from their studies and those who had at least once thought about it, the results of which are shown in Table 4.

The relatively strong negative correlations found between external reasons that may influence dropping out from studies and the evaluation of studies show that students who have at least once had thoughts of dropping out from studies perceive their studies as *less valuable* and *less interesting* with *lectures containing a lot of unnecessary material (respectively:* (r=-0.361, p=0.001) and (r=-0.303, p=0.001)) and *it is presented in a boring way* (respectively: (r=-0.334, p=0.001) and (r=-0.346, p=0.001)). Statistical analysis of the data also shows that for

students who have at least once thought about dropping out of studies suffer from *the presentation of unnecessary material* in lectures (r=-0.282, p=0.001) and from the *boringness of the presentation of the material* (r=-0.79, p=0.001) are negatively associated with the perception of *studies that have failed to meet student expectations*. Similar but weaker associations were found between external reasons for dropping out from studies and the evaluation of studies in the group of students who had never considered dropping out (see Table 4).

Quite significant results observed after finding sufficiently strong negative associations in the group of students who have at least once considered to dropout from studies indicate that external reasons that may lead to dropping out from studies, such as *not being encouraged to actively engage in the study process* (r=-0.285, p=0.001), the *content of studies, which is outdated and does not meet the needs of the contemporary labour market* (r=-0.331, p=0.001), the *lack of knowledge and skills acquired during the study process, which are necessary to prepare for professional activity* (r=-0.318, p=0.001), as well as the *lack of opportunities for gaining valuable experience* (r=-0.316, p=0.001), are related to the assessment of *studies as not having met the expectations of students*. On the other hand, the correlation analysis revealed a negative relationship, indicating that participants perceive studying as *less rewarding* and *less interesting* when they are *not encouraged to actively engage in the study process* (respectively (r=-0.215, p=0.009) and (r=-0.227, p=0.006)). In addition, the *content of studies is outdated and does not meet the needs of the contemporary labour market* ((r=-0.327, p=0.001) and (r=-0.355, p=0.001), respectively), and the *lack of opportunities in the study process for gaining valuable experience in preparation for professional activities*)(r=-0.256, p=0.002) and (r=-0.316, p=0.001) respectively) and the *lack of knowledge and skills needed to prepare for professional activities* ((r=-0.322, p=0.001) and (r=-0.338, p=0.001)) are among the external causes of the perception of studies as *unuseful* and *uninteresting*. The slightly weaker, but also statistically significant, negative correlations are found in the group of students who did not intend to drop out from their studies, indicate a *lack of encouragement to actively engage in the study process* (r=-0.206, p=0.01), the *lack of opportunities to gain valuable experience in preparation for a career* (r=-0.203, p=0.01) and the *lack of skills and knowledge needed to prepare for future professional activities* (r=-0.194, p=0.015) are associated with perceiving studies as *less interesting*.

On the other hand, the expectations of students who do not intend to drop out from their studies *are unjustified* when the*y do not provide opportunities to gain valuable experience in preparation for professional activities* (r=-0.174, p=0.028). Thus, the quality of teaching and content, the possibilities of the practical application of theoretical knowledge in professional activities, the constantly updated content of studies in line with the needs of the modern labour market, and the opportunities provided during studies to gain valuable experience in preparation for professional activities are some of the factors that determine the positive attitude of students towards studies, which in turn leads to the formation of a positive attitude of the latter towards studies. Therefore, to reduce the number of students wishing to drop out from their studies, the focus should be on organising the study process in such a way as to provide students with opportunities to gain valuable experience in preparation for their professional careers. Modern, innovation-driven study content that responds to labour market needs and focuses on the practical applicability of acquired knowledge are also among the indicators that reduce dropout rates.

The correlation analysis showed that the group of students who had at least one thought about dropping out from their studies had a relatively strong negative connection, indicating that they perceived their studies as *less enjoyable* when the *lectures cover a lot of unnecessary materials* (r=-0.294, p=0.001), when they *are presented in a boring way* (r=-0.363, p=0.001), and when the *lectures do not provide enough knowledge needed to prepare for future professional activities*(r=-0,283, p=0,001), the *content of studies, which is outdated and does not meet the needs of the contemporary labour market and us outdated* (r=-0,204, p=0,014) and when the *study process does not provide sufficient opportunities for students to gain valuable experience in preparing for professional activities* (r=-0,268, p=0,001) and *students are not actively encouraged to participate in the study process* (r=-0.21, p=0.011). Pearson correlation coefficients were also calculated and significant negative relationships were

observed, showing that when *lectures provide a lot of unnecessary material* (r=-0.225, p=0.006), when lectures are *performed in a boring way*(r=-0.31, p=0.001) and when *lectures do not provide enough knowledge to prepare for professional activities* (r=-0.283, p=0.001), the *content of studies does not meet the needs of the contemporary labour market and is outdated* (r=-0.218, p=0.008), and the *study process does not sufficiently provide students with opportunities to gain valuable experience in preparation for professional activities* (r=-0.287, p=0.001) and *students are not encouraged to actively participate in the study process* (r=-0.233, p=0.005), studies are perceived as *less conducive to the students' acquisition of practical skills.* Therefore, while knowing that activities are an important factor in preparing for professional activities (career), where skills and competencies are only developed through the active participation of a person himself in a range of activities, it is particularly important for the study process to make use of opportunities for activities that broaden and improve skills and competences of its participant, enhance knowledge and provide opportunities for valuable experience, which is likely to reduce the number of students wishing to drop out from their studies.

The performed correlation analysis of the group of students who had at least one dropout thought showed negative correlations with the excess of unnecessary material (r=-0.276, p=0.001) and *boring material* (r=-0.313, p=0.001), as well as with the lack of knowledge (r=-0.262, p=0.001) that was imparted in *lectures* and that *was necessary to prepare for a career in the profession*, *outdated and out-of-date study content that does not meet the needs of the contemporary labour market* (r=-0.253, p=0.002), and *insufficient opportunities for students to gain valuable experience in the process of preparing for their professional career* (r=-0.224, p=0.006), and the *lack of encouragement for students to actively engage in the study process* (r=-0.2, p=0.015), which *makes students less engaged in the study process and less motivated to study*. Thus, the lack of a motivating environment and the lack of encouragement for students to actively engage in the study process may be among the factors that lead to withdrawal from studies and dropping out. Slightly weaker, but also statistically significant, connections found in the group of students who have had at least one thought about dropping-out from studies suggest that *lectures with the material being presented in a boring way* (r=-0.218, p=0.002) and *content that is outdated and irrelevant to the needs of the modern labour market* (r=-0.181, p=0.029) *reduce students' engagement in the study process*. Meanwhile, stronger negative correlations are found between the *abundance of unnecessary information presented during lections* (r=-0.357, p=0.001) and the *lectures with the material being presented in a boring way* (r=-0.364, p=0.001), as well as the *lack of knowledge and skills needed to prepare for professional activities* (r=-0.294, p=0.001), outdated studies content (r=-0.276, p=0.001), *lack of opportunities to gain valuable experience in preparation for professional activities* (r=-0.316, p=0.001) and *lack of encouragement for students to be actively involved in the study process (r=-0.291, p=0.001), does not create opportunities for students to prepare themselves for professional activities.* This means that preparation for professional activities is linked to a clearly managed study process, which provides up-to-date information relevant to the needs of the modern labour market, and enables students to acquire practical skills and apply their knowledge in their professional activities. Meanwhile, the lack of practical training in preparation for professional activities, where the organisation of the study process does not allow students to link theory with practice and gain more experience, and where the content of studies is outdated and is presented in a boring way, may make it difficult for students to successfully prepare for professional activity, which could be one of the reasons for their dropping-out from studies.

On the other hand, after calculating Pearson correlation coefficients, the negative correlations observed indicate that students who have had at least one thought about dropping out from studies evaluate studies that present a *lot of irrelevant material* (r=-0.253, p=0.002) *when the material is presented in a boring way* (r=-0.312, p=0.001) or materials that are *outdated and not in line with the needs of the contemporary labour market* (r=-0,24, p=0.004), as well as when the study process *does not provide opportunities to acquire knowledge and skills in preparation for professional activities* (r=-0.218, p=0.008) and/or to acquire *valuable experience* (r=-0.323, p=0.001) and *students are not involved in the study process* (r=-0.219, p=0.008), would *not recommend the studies to others.* Meanwhile, in the group of students who did not intend to drop out from their studies, weaker but also statistically significant negative correlations were found, indicating that they *would not recommend their studies to others*

when *students are not encouraged to actively engage in the study process* (r=-0.173, p=0.029), are *given too much freedom* (r=-0.185, p=0.02) and are *provided with lecture material in a boring way* (r=-0.19, p=0.016). Consequently, the lack of opportunities for students to prepare for their careers (professional activities), whereas the organisation of the study process is boring, and students are not actively encouraged to engage in their studies, where the teaching material is not clearly laid out, where theory is not linked to the needs of the contemporary labour market, and where students are not given the opportunity to gain valuable experience in their preparation for professional activities (career), or where they are given too much leeway, reduces the dissemination and publicity of the recommendations for the studies. Meanwhile, weaker but positive correlation connections indicate an *excess of irrelevant material presented* during lectures (r=0.215, p=0.009) and its *boring presentation* (r=0.254, p=0.002), and a *lack of knowledge and skills needed for preparation for professional activities* (r=0.175, p=0,035) and the *lack of relevance of the content of studies to the needs of the contemporary labour market* (r=0.191, p=0.021) and the *lack of involvement of students in the study process* (r=0.194, p=0.019) are some of the *factors contributing to the disillusionment* of students who have at least once thought about dropping-out from their studies. Similar results were obtained when Pearson correlation coefficients were calculated for the group of students who did not intend to drop out from their studies (see Table 4). The positive correlations found indicate that it is not only the *overabundance of unnecessary material presented in lectures* (r=0.263, p=0.001) or its *boring presentation* (r=0.248, p=0.002), the *lack of the knowledge and skills required for preparing for professional activities* (r=0.161, p=0.044), and the *lack of involvement of students in the study process* (r=0.239, p=0,002) but also *too much freedom given to students* (r=0.216, p=0.006) and the *lack of opportunities for students to gain valuable experience during their studies* (r=0.208, p=0.009) that may lead to students *becoming disillusioned with their chosen studies*, which could be one of the reasons for dropping-out from studies. The negative correlations also indicate that the *lack of a clear evaluation system* (r=-0.198, p=0.016) and *excessive demands on students* (r=-0.351, p=0.001) are associated with the *perception of the studies as challenging*, which can certainly be one of the reasons for dropping-out from studies. Therefore, in order to reduce the rate of students dropping out from their studies, it is necessary to increase the focus on improving the system for assessing student achievement. On the other hand, rating *studies as less enjoyable* (r=-0.188, p=0.023) and *more challenging than expected* (r=-0.175, p=0.034) is associated with the *reason behind group mates dropping out from studies*, while *convenient lecture times and schedules* are positively related to rating the *study process as motivating and engaging* (r=0.188, p=0.022).

The results of the correlation analysis in the group of students who did not intend to drop out from their studies showed a statistically significant negative relationship (see. Table 4), indicating that *an excess of unnecessary material presented during lectures decreases students' satisfaction with their studies* (r=-0.165, p=0.038), as well as their *motivation and active involvement in the study process* (r=-0.202, p=0,011) and *does not provide opportunities to acquire practical skills* (r=-0.268, p=0.001), while *lecturing material presented in a boring way* related to the evaluation of *the study process as unmotivating* (r=-0.17, p=0.033) and *one that does not provide opportunities to acquire practical skills* (r=-0.235, p=0.033). On the other hand, the negative correlation found in the latter group indicates that *too much freedom for students* is related to their perception of their *studies as less enjoyable* (r=-0.196, p=0.014), which could certainly be one of the reasons for dropping out of studies. *Lack of knowledge and skills needed to prepare for professional activities* (r=-0.177, p=0.026) and *outdated content that does not meet the needs of the contemporary labour market* (r=-0.179, p=0.024) are among the factors that contribute to *passivity and reluctance to engage in the study process*, while *excessive demands placed on students* during the study process are related to the perception of the study process as *more difficult than anticipated* (r=-0.191, p=0.017). Consequently, the lack of learning material that is relevant to the interests of students and meets the needs of the modern labour market, and the lack of opportunities for students to acquire practical skills, leads to a lack of motivation and passivity of students to engage in the study process, which can be one of the reasons for students dropping-out from their studies. Therefore, a created learning environment that encourages students to actively engage in the study process, lecture content that is relevant to the needs of the modern labour market, and opportunities provided for students to develop and improve their skills and abilities, deepen their knowledge,

and gain valuable experience in preparation for their professional career and its activities would be one of the ways to reduce the number of students dropping out or withdrawing from their studies.

The summarised results of the correlation analysis show that, regardless of the group of subjects, certain external reasons that may lead to dropping out from studies are related to students' opinions about studies, which indicates that external factors such as the organisation of the study process, the content of the studies, the opportunities provided by the studies to gain valuable experience in preparation for the professional activities, the requirements presented and the evaluation system, etc., have a significant impact on the formation of the students' attitudes to studies. Discovered statistically significant relationships indicate that students, regardless of whether they had thoughts of dropping-out out from studies or not, when facing an overload of unnecessary material in lectures and the boring organisation of the study process, have a stronger negative attitude towards their studies, perceiving them to be less useful, uninteresting and not fulfilling their expectations of studying. On the other hand, the excess of unnecessary material and its boring presentation reduce students' sense of satisfaction with their studies, their motivation to learn and their active involvement in the study process, and the lack of practical skills they could acquire. In addition, the lack of knowledge and skills needed to prepare for professional activities and to gain valuable experience in the study process reduces students' interest and active involvement in their studies. The correlation analysis also suggests that external factors such as excess material presented during lectures and/or such material being presented in a boring way, as well as the lack of effort to encourage students to actively engage in the study process, and lack of knowledge and skills needed to prepare for professional activities, increase the sense of frustration with the chosen studies, which may be one of the factors that lead to students dropping-out from their studies.

Table 4. Correlation connections between external reasons that might influence the dropping-out from studies and evaluation of the studies by students who did not intend to drop out from their studies (n=159) and those who thought about dropping out from their studies at least once (n=148)

	A-1	B-2	C-3	D-4	E-5	F-6	G-7	H-8	I-9	J-10	K-11	L-12
A						0,188*						
B												
C												
D					-0,196*						-0,185*	0,216**
E	-0,282** / -0,216**	-0,361** / -0,197*	-0,303** / -0,282**		-0,294** / -0,165*	-0,276** / -0,202*	-0,225** / -0,268**			-0,357**	-0,253**	0,215** / 0,263**
F	-0,279** / -0,24**	-0,334** / -0,171*	-0,346** / -0,278**		-0,363**	-0,313** / -0,17*	-0,31** / -0235**		0,218**	-0,364**	-0,312** / -0,19*	0,254** / 0,248**
G	-0,285**	-0,215**	-0,227** / -0,206**		-0,21*	-0,2*	-0,233**			-0,291**	-0,219** / -0,173*	0,194* / 0,239**
H	-0,318**	-0,322**	-0,338** / -0,194*		-0,283**	-0,262**	-0,283**		-0,177*	-0,294**	-0,218**	0,175* / 0,161*
I	-0,331**	-0,327**	-0,355**		-0,204*	-0,253**	-0,218**		-0,181* / -0,179*	-0,276**	-0,24**	0,191*
J	-0,316** / -0,174*	-0,256**	-0,316** / -0,203*		-0,268**	-0,224**	-0,287**			-0,316**	-0,323**	0,208**
K								-0,351** / -0,191*				
1.								-0,198*				
M					-0,188			-0,175*				

Note: Above the diagonal is the group of students who have at least once thought about dropping out from their studies; below the diagonal is the group of students who have had no intention of dropping out from their studies

A Inconvenient lecture times, timetable
B Influence of surrounding people, relatives and friends
Too difficult studies/programme
D Too much freedom for students
E Lectures contain a lot of unnecessary material

A-1 The studies met my expectations
B-2 I benefit from my studies
C -3 Studying is interesting to me
D -4 I'm good at studying
E-5 I like studying

F Lectures present material in a boring way	F -6 The study process engages and motivates me
I am not encouraged to be actively involved in the study process	G-7 I learn a lot of practical skills during my studies
H I do not get the knowledge and skills I need to prepare for my professional career during my studies	H-8 Studying is easier than I expected
I The content of studies is outdated and out of step with the needs of today's labour market	I-9 I am more actively involved in the study process
J Studying at the VK VVF does not provide opportunities to gain valuable experience in preparation for professional activities	J -10 My studies help me prepare for my professional activities
K The requirements for students are too high	K-11 I would recommend the studies to others
L The evaluation system is unclear	L-12 I'm already disappointed with my choice of these studies
M A part of the people in the group dropped-out	

Correlation analyses between the groups of students who did not intend to drop out from their studies and those who had thought about dropping out from their studies at least once revealed markedly different differences in the strength and abundance of the relationships between the external causes of dropping out and the indicators of opinion on studies. The findings show that, for the group of students who have had at least once thought about dropping out from their studies, external reasons for dropping out have a statistically significantly stronger relationship with the participants' expressed views about their studies than for the group of students who have not had any thoughts about dropping out. The results of the correlation analysis showed that the group of students who had at least once had thoughts of dropping out from their studies had a higher number (total of 60 statistically significant) and stronger (0.364 to 0.175) connections, while the group of students who had not thought about dropping-out from their studies had only 28 statistically significant and relatively weak (0.282 to 0.161) connections. The latter results show that for students who have had at least once thought of dropping out from their studies, external reasons are more strongly and more broadly associated with a more pronounced negative attitude towards studies, which may be one of the reasons for dropping out. However, although the results of the study showed that external reasons that may influence dropping out from the studies are correlated and may influence the formation of opinions about studies, the relationships found only represent a more or less probable statistical trend, allowing only a rough prediction of the factors that lead to the dropping-out from studies. Therefore, in the perspective of further research, it would be appropriate to conduct a regression analysis study and to investigate in a regression equation which factors have a statistically significant prognostic value for withdrawal from or dropping out from studies.

Research on the factors that influence the students' decision to drop out and the correlation between dropouts and students' attitudes toward studies has both theoretical and practical value. In this study, the theoretical and empirical arguments have been used to identify the factors that lead to dropping out, the correlation between dropouts and students' attitudes has been established, a comparison between the groups of students who have never considered dropping out and those who have considered dropping out at least once has been drawn, the problematic areas that may be a precondition for reducing the number of students who are thinking of dropping out of their studies have been identified. The study showed that for students who have thought of dropping out at least once, external reasons are more strongly and broadly related to a more negative attitude toward their studies than for students who have never thought of dropping out. Therefore, the findings of this study enable improvements in the quality of the organisation of the study process in higher education institutions by working out methods for managing dropouts and reducing the problems associated therewith. A limitation of the study is that the Pearson correlation coefficient, used to correlate the external factors that lead to dropping out of studies with the students' attitudes towards their studies, only expresses a more or less probable statistical trend, which only allows for a rough prediction of the factors that lead to dropping out of studies. Therefore, it would be useful to carry out a regression analysis study in the future to find out which factors have a statistically significant prognostic value for dropouts or termination of studies. It is also appropriate to complement the study's results

with a qualitative research approach in the future when analysing the factors that lead to dropping out of studies and determining the preconditions for reducing the number of students who intend to drop out.

Conclusions

1. Dropping out from studies among higher education students is identified as a highly topical issue in higher education. It is perceived as a complex and multifaceted phenomenon related to both intrinsic and extrinsic student motivation. In addition, insufficient competencies acquired prior to studying, a student's readiness for studying, and personal qualities majorly impact the situation. The authors also highlight the need to distinguish between the early and late stages of dropping out to understand better and master the factors and causes of dropping out from studies. Lack of student engagement, overcrowded groups/audiences, unfulfilled expectations, excessive study requirements, study organisation conditions (more relevant for universities than for colleges) are some of the most frequently cited reasons for dropping out from studies at an early stage. In contrast, personal and family problems or illness, the desire to earn money quickly, and working while studying are the most common reasons for dropping out of studies in the late stage. In principle, although it is difficult to predict the likely volume of dropping out from studies, a student's level of academic performance and achievement is a factor that weighs heavily in the decision to quit or continue. However, when analysing the data, the most frequent common reasons for dropping out are the quality of studies, the quality of teaching, and the infrastructure and resources for learning. Therefore, to reduce and manage the process of dropping out from studies more effectively, it is necessary to provide as much academic assistance and support as possible, additional individual career and professional guidance counselling, training to increase student engagement, improving access to information, creating a supportive and comfortable environment for studying, and it is recommended to pay particular attention to the first year of study when the dropping-out rate is highest.

2. The specified study investigated the factors leading to dropping out from studies and the differences in their assessment between the groups of students who had no intention to drop out from their studies and those who had at least once considered dropping out:

2.1. The performance of statistical data analysis has made it clear that the students who never thought about dropping out from their studies have evaluated their studies a lot higher as more useful, interesting, engaging and motivating, as well as being more to their liking, easier, helping to prepare for professional activities, as studies during which success is experienced and a lot of practical skills are being acquired, in comparison to the students who have at least thought about dropping-out from their studies; in the latter group, it was discovered that the mean scores are significantly lower, showing that they are already disappointed with their chosen studies that did not fulfil their expectations and that they would not recommend them to others.

2.2. Recorded statistically significantly higher mean scores indicate that, for the group of students who have thought about dropping out from studies at least once, inconvenient timing and timetable of lectures, excess of unnecessary material presented during lectures, and the material being presented in a boring way during lectures are among the external reasons that could lead to them dropping-out from studies, compared to the scores of the students who have not had any thoughts about dropping-out from studies.

2.3. Performed comparative analysis of the data showed that students who had never thought about dropping out from their studies cited personal reasons for dropping out, such as illness or health problems, moving to another country, financial difficulties while studying in a fee-paying position, and disagreements with lecturers, as well as academic debts accumulated during studies that were not cleared in time and not knowing where to turn for help with accumulated academical debts, such were rated

significantly higher than by students in the study who had at least once thought about dropping-out from their studies. Meanwhile, the latter attribute dropping out from their studies to personal reasons that can lead to dropping-out from studies, such as lack of motivation to study, lack of confidence in one's chosen specialisation or laziness to study, as well as difficulties in reconciling studies with work and adapting to the environment and new demands, inability to concentrate and focus while studying, and inability to plan time and activities.

3. The study found correlations and differences between the groups of students who have never considered dropping out from their studies and those who have thought about dropping out from their studies: students who have thought about dropping out from their studies at least once have a stronger and broader range of external reasons for dropping-out from their studies and a more negative attitude towards studies than students who have not thought about dropping-out from their studies.

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SUSTAINABILITY OF ACCOMMODATION BUSINESS IN BALER, NORTHERN PHILIPPINES[*]

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Abstract. This study aims to describe the current situation of the accommodation industry in Baler, Northern Philippines, evaluating it in terms of business and environmental sustainability. The author used the Input-Process-Output (IPO) paradigm for business operations assessment and compliance of performance with environmental laws. The study used descriptive research involving seventy-four (74) Department of Tourism-accredited establishments. A four-point Likert scale method was employed. The study results revealed that facilities for persons with disabilities (PWDs) and senior citizens lack quality; specific equipment is inaccessible, and water filtration systems are unavailable. The accommodation industry makes a significant contribution to the economy of Baler. However, there is a substantial increase in water consumption, energy consumption, and solid waste consumption. Therefore, the accommodation industry still needs changes, which can be implemented via additional investments and technology transfer, enhancing business and environmental sustainability. The LGU-Baler and accommodation industry may adopt the proposed business operational plan. A similar study may be conducted in the whole province of Aurora.

1. Introduction and Literature Review

This study assesses the tourism program of Baler, Aurora, in northern Luzon, Philippines, designed for the accommodation industry to enhance business and environmental sustainability. Baler is the birthplace of surfing in the Philippines, regarded as a favourite destination for surfers. Seventy-seven per cent of the province is covered by thick forests of Sierra Madre on one side and surrounded by the Pacific Ocean on the eastern part. This municipality has been unravelled as a top tourist destination in the Philippines. Baler hosts 1.2 million tourists yearly and stretches 31.66 kilometres of shoreline, an estimated foreshore area of 569.827 square meters. The seashore is possibly contaminated, which is unsafe and harmful for swimming, surfing, and other activities. Unexpected and uncontrolled development along the shoreline will result in environmental deprivation and

depletion of resources. This study may utilize the research results for discussions with Aurora Provincial Tourism Office and Baler Municipal Tourism Office.

Accommodation is a base of the tourism industry, forming a vital and fundamental part of tourism. The accommodation industry needs to find new ways to differentiate itself. One obstacle to sustainable tourism development's success is unclearly defined stakeholders' responsibilities in the destination. Managers of accommodation enterprises consider themselves responsible for protecting and developing the environment (Necati et al., 2021). Rural tourism is currently one of the most dynamic segments of tourism demand, and rustic accommodation is one of the most demanded. The attitude of rural establishment managers has a decisive influence on the behaviour of their clients regarding ecological respect and stewardship of water and energy (Sanchez-Ollero & Mondéjar-Jiménez, 2021). Small accommodation businesses dominate the rural hospitality industry. They provide simple or complex services and seek to be sustainable and competitive. Companies are based in areas where tourist resources abound and must be more efficient. Dimitriadou et al. (2021) claim that the business's size, working days, and various activities affect its efficiency, while the business's age and engagement in agriculture do not influence it.

The study on the sustainability of services shows that the material support required for the provision of services: goods used and processed have to meet the demands of guests, i.e., physical facilities, restaurants, swimming pools, laundry rooms other material systems have to be modernized. The interaction between services and the environment originates from sources of materiality and manifests itself through environmental aspects in the product life cycle stages (Volpi & Paulino, 2018). The study on limitations to sustainable resource management in the global south provides evidence that there are six key challenges: financial and non-financial constraints; service nature of the industry; limiting policy and infrastructure environment; poor employee commitment/buy-in; and skill and knowledge inadequacies. These results provide a holistic foundation for addressing the challenge of low sustainability uptake in context (Idahosa & Ebhuoma, 2020). The accommodation industry controls costs through sustainable practices (Vasanicova et al. 2021). It motivates consumers to choose accommodations that try to protect the environment. The appropriate strategies should be implemented, and the information about the environment and cost-sharing must be measured (Asi, 2019). The accommodation industry is an important sector of tourism. This article establishes a more explicit connection between industry and ecological improvement. It discloses the increasingly widely held resourcefulness to include ecological thoughts in the operation of hotels and the obstacles that may impede ecological concerns among small and medium size hotels (Kasim, 2008). The progress of the accommodation industry had positive results in reducing damaging influences (Molina-Azorin et al., 2017). Accommodation owners are concerned about sustainability and encourage resource protection (Ioannidis et al., 2021).

The accommodation industry is not considered as one of the most sustainability-aware sectors. The lack of awareness is connected to issues related to societal development facets (Cavagnaro, 2009). Challenges arise when tourists and businesses do not pay sufficient attention to the deterioration of their surroundings. The accommodation sector tried to control operational costs continuously through ecological rules preventing water and energy depletion and motivated consumers. Consumers are encouraged to become involved in selecting accommodations that follow locations' security and lessen its damaging effect (Huttche et al., 2002). There is an obvious need for green programs (Kim, Barber & Kim, 2018; Svagzdiene et al., 2020; Wei et al., 2021).

The accommodation industry is becoming more and more intricate, exposed by the increase of information and progressive technologies, ecological degradation, pollution, clients' preferences, demands, and factors generating more considerable instability in the worldwide economy (Javier & Elazigue, 2011). Economic growth fueled by tourism encourages the government to devise public policies aimed at regional development, embracing the economic, social, and environmental aspects (Achmad & Yulianah, 2022). Increasingly stringent environmental regulations and consumer awareness of environmental protection and sustainability affect the hotel industry (Kuo

et al., 2022). The results of studies confirm the importance of sustainable initiatives in resource management with the following rank: food, water, energy, and waste management. The effects of green marketing orientations for increasing the competitive advantage and improving the sustainability of the hospitality industry during the COVID-19 pandemic are receiving more attention. The hospitality industry attempts to assimilate green marketing and move toward sustainable development; administrators pay their efforts to improve the natural environment, save resources, and communicate their brand orientation (Ho et al., 2021).

A study on the role of accommodation enterprises in developing sustainable tourism is expected to contribute significantly to the field. Deficiency of planning, mainly performing ecologically sustainable business practices and the necessity of an effective governance system are among the implications (Celik & Cevirgen, 2021). A sustainability-oriented service innovation model is recommended, recognizing the characteristics of a service industry where innovation can be an organic process led by humans for humans and consequently fuzzier in its progress than the clearly defined steps suggested. This model seeks to assist researchers and practitioners in better measuring the innovative advancement of service firms and develop more relevant strategies to ease transitions towards sustainable business practices (Warren, Becken & Coghlan, 2018). Given the central role of small accommodations in the tourism industry in Australia, this study investigated the drivers and challenges of small accommodation providers engaging in sustainability practices. The main drivers in implementing sustainability were cost reduction, societal legitimization and lifestyle values. Key challenges included personal, financial and operational. Small accommodation providers identified an opportunity to influence guests' sustainable behaviour, but their limited knowledge and concern for a negative impact on guest experience prevented them from implementing strategies. (Hassanli & Ashwell, 2018). The lower-level hotel operators should be more committed to achieving environmental sustainability by conducting specific training programs to increase the ecological awareness of hotel staff and guests' engagement in reducing the hotels' environmental degradation (Abdou, Hassan & El Dief, 2020). The study using SEM (Structural Equation Modeling) findings: (1) absorptive capacity, team culture, and competitive intelligence awareness have a significant impact on learning capability (Hossain et al., 2021). Innovation strategy in the industry emphasizes standardized services, service quality, product introduction readiness and technology usage. Innovation strategy positively relates to economic sustainability performance (Njoroge, Anderson & Mbura, 2019). The study on business model innovation highlights how implementing integrated management practices benefits clients, management, employees, and shareholders. Companies' involvement in corporate social responsibility activities represents a return of these benefits to the local community (Presenza, Petruzzelli & Natalicchio, 2019). The criticality of the hotel sector to its growth and the relationship between a turbulent business environment and sustainability provide the rationale which proposed a new strategy for achieving sustainable business excellence under a harsh climate. The results confirm that leadership excellence positively affects intellectual capital. It is also found that intellectual capital positively affects service quality, supply chain, hotel impact and strategy (Metaxas, Chatzoglou & Koulouriotis, 2019).

Green hotels are ecological buildings in which managers set up programs to save water and energy and reduce solid waste, thereby saving resources and facilitating the preservation of the environment. Green hotels are introducing environmental standards and using environmentally friendly new technologies, thereby significantly protecting habitats and achieving better operational results (Kostić Ratković & Forlani, 2019). The primary reason for entrepreneurs to enter into business is self-enhancement. Some entrepreneurs mention both self-enhancement and self-transcendence motives. Most entrepreneurs do not mention sustainability as part of their business goals. Anyway, they have implemented several corporate social responsibility measures. When referring to sustainability, entrepreneurs mainly explain it as actions that are good for the environment (Vrenegoor, Jong & Cavagnaro, 2020).

Sustainable growth is promoted by lowering staff costs and, to a lesser extent, by the investments made per employed person. For the corporate governance of these companies to recover growth in terms of sustainability,

managerial decisions should be made to increase sales, profitability and added value (Berinde & Corpădean, 2019). Research on employees' and guests' sustainable business attitudes and practices demonstrated that employees and guests experienced a great extent of sustainable business attitudes and highly practised sustainability. When employees were categorized according to their sex, age, and civil status profile, a non-significant result was revealed on the extent of sustainable business attitudes. When guests were grouped according to civil status profile, a highly significant impact was shown on the importance of sustainable business attitudes. Guests significantly differed when grouped according to sex, age, and highest educational attainment. Sustainable attitudes were significantly associated with sustainable business practices. Employees and guests possess the right positive, sustainable business attitude and could translate it into their actions, thus practising sustainability (Alfaras & Alfaras, 2021). Researchers' review of the articles identified the most dominant contributors to academic research and the publications which most prominently feature research on the subjects relevant to hotel sustainability (Kim et al., 2018).

Accommodation owners are mindful of welfare and sustainability and stimulate resource stewardship. Industry owners are taking steps to address ecological problems to implement correct programs. It also showed the immense contribution of clientele. The economic contribution of the accommodation industry gives prominence to public support from policymakers. Challenges to business operations are the financial constraints, marketing strategies, employee management, guests' preferences and stakeholders' interests. New technologies that contribute to sustainable development are achieving better results. The review of related literature shows interventions made by business enterprises, government, and stakeholders have better results regarding business sustainability and the environment. The assessment of business operations and environmental sustainability must still be emphasized, and look into more profound studies for effective and efficient use of resources. More studies of this kind are recommended to improve the accommodation industry while maintaining environmental sustainability for future generations.
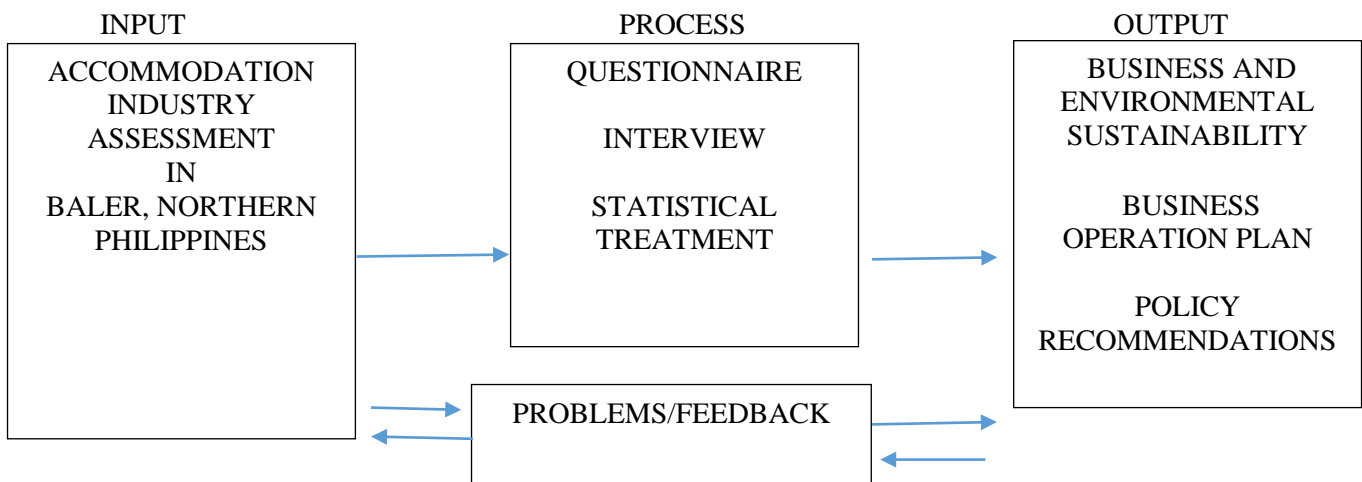
Figure 1. Research Paradigm
Source: Hackman, 1987

The study paradigm used the Input-Process-Output (IPO) model, as shown in Figure 1. The inputs consist of assessing and evaluating the accommodation sector industry in Baler and its existing environmental sustainability. First, characteristics of the accommodation sector industry were described in terms of location, capacity, ownership, type, service/amenities offered, legal requirements, accreditation, affiliation, and waste disposal management. The assessment of the accommodation sector industry for business operation was done in terms of

organization and management, marketing, technical operation, finance, compliance with environmental laws, the impact of the accommodation sector on economic growth, and the positive and negative impact on environmental conservation.

2. Methodology

2.1 Data collection method analysis

The study used descriptive research in Baler, Aurora, as the tourism centre in the northeastern part of the Philippines for January–March 2022. It involved seventy-four (74) respondents as the owners, administrators, managers and senior technical staff of the business establishments of different hotels, resorts, transient houses, inns and Mabuhay accommodations. This survey's participants are exclusive to the Department of Tourism accredited establishments. All of them are complete in legal requirements from the national government and local government unit of the municipality Baler in Aurora Province. It used one set of questionnaires for respondents to gather data. Part one of the survey describes the accommodation sector for location, capacity, ownership, classification, accommodation type, years of operation, services, amenities, legal requirements, affiliation, and waste disposal management. Part 2 includes assessing business operations and compliance with environmental laws. Business operations embrace organization management, marketing, technical and finance. Part 3 is devoted to the impact of economic growth and ecological conservation, classified into positive and negative aspects.

2.2 Instrument validated

The respondents were given a questionnaire and asked to rate each question on the extent to which it was measured and intended for. A four-point Likert scale was used to evaluate its clarity, objectivity, and administrability. Weighted means for each component were utilized. Experts from the Municipal Tourism Office, the Provincial Tourism Office, the members of the Faculty of Tourism and Hospitality Management at Aurora State College of Technology, and an Ecological Expert from the same school validated the instrument. After incorporating suggestions and recommendations, the overall mean of validity is 4.43, described as "Excellent." Weighted means for each component were utilized. In addition, it was tested for reliability on 20 Department of Tourism - accredited accommodation establishments. Finally, Cronbach's alpha was determined to establish the test's internal reliability using SPSS (Table 1).

Table 1. Questionnaire's Cronbach Alpha Scale for Internal Consistency

	Cronbach's Alpha	Internal Consistency
Organization and Management	0.713	Acceptable
Marketing	0.813	Good
Technical	0.815	Good
Finance	0.782	Acceptable
Pandemic Related Problems	0.819	Good
Compliance with Environmental laws	0.869	Good
Economic Growth	0.853	Good
Environmental Conservation (Positive Impact)	0.957	Excellent
Environmental Conservation (Negative Impact)	0.961	Excellent

3. Results

The results are summarized in the tables presented below.

Table 2. The capacity of accommodation establishments

Number of Rooms	Frequency	Percentage	Rank
1-10 Rooms	40	54.00	1
11 – 20 Rooms	21	28.00	2
21 – 30 Rooms	9	12.00	3
31 – 40 Rooms	0	0	
41 – 50 Rooms	2	3.00	4.5
More than 51 Rooms	2	3.00	4.5
Total	74	100.00	

It can be seen from Table 2 above that fifty-four per cent (54%) of accommodation establishments have a 1 – 10 room capacity. The accommodation sector industry in Baler is just starting to grow. Most establishments cannot cater to a significant volume of guests to conduct large conferences and big events. They collaborate with other hotels to accommodate guests for having prominent participants at important events. Only three per cent (3%) of the respondents have more than 51 room capacity in hotels and transient houses. It is a tiny percentage of the need to accommodate the influx of guests going to Baler. There is a shortage of accommodation establishments during Holy Week, and long weekends are the peak tourism season.

Table 3. Ownership and Classification

Ownership and Classification	Frequency	Percentage	Rank
Single Proprietorship	59	80.00	1
Partnership	6	8.00	3
Corporation	9	12.00	2
Total	74	100.00	

The data in Table 3 revealed that eighty per cent (80%) of the type of ownership is a single proprietorship. It is inexpensive and easy to form compared to partnerships and corporations. The necessary licenses and other requirements are simple and minimal. Twelve per cent of the ownership type is the corporation. The corporation can generate more considerable capital through shares of stocks, and it features a limited liability scenario. A corporation also has the unique advantage of adequately separating the owner from the business.

Table 4. Type of Accommodation

Type of Accommodation	Frequency	Percentage	Rank
Resort	21	28.00	1
Inn	17	23.00	2
Hotel	14	19.00	3
Lodge	13	17.00	4
Transient House	5	7.00	5
Others	2	3.00	6
Villas	1	1.50	7.5
Apartel	1	1.50	7.5
Total	74	100.00	

3.1 The general profile of accommodations

Table 4 reveals that twenty-eight per cent (28%) of accommodation types is a resort. Tourists prefer to stay in a resort because the estate is located on the front beach, for which Baler is famous. Resort offers attractions, activities, and entertainment for all ages. Resorts' accommodations are situated in the coastal barangays of Sabang, Zabali, Buhangin and Reserva. The second type of housing is an inn, which comprises twenty-three per cent (23%) of accommodation types. Fifty-four per cent have a 1-10 room capacity, most ownership is a single

proprietorship, and 12% are corporations. 28% is a resort type, 23% is an inn, and 19% are hotels. 50% range from 6-10 years of operation. The service offered is provided in Table 5 below.

Table 5. Services Offered

Services/Amenities Offered	Frequency*	Percentage	Rank
Air-Conditioned Rooms	73	99.00	1
Parking Area	67	91.00	2
Free WIFI	61	82.00	3
Kitchen/s	57	77.00	4
GCash Payment Method	45	61.00	5
CCTV Camera	43	58.00	6
Hot and Cold Showers	36	49.00	7
Fan Rooms	33	45.00	8.5
Function Halls/ Meeting Rooms	33	45.00	8.5
Tour Guide	29	39.00	10
Swimming Pools	26	35.00	11
Surf Guides	25	34.00	13
Free Breakfast	25	34.00	13
Security Guard/s	25	34.00	13
Restaurant	22	30.00	15
Lifeguard/s	21	28.00	16
Laundry Services	18	24.00	17
Surf Shop	16	22.00	18
Safety Cash Vaults	15	20.00	19
Souvenir shop	11	15.00	20
Accept Major Credit Cards	10	14.00	21
Transportation Services	9	12.00	22
Bank Payment	4	5.00	23

3.2   Compliance with services and amenities

Accommodation establishments are integral in promoting tourism, providing quality accommodations that meet or exceed clients' expectations. The accommodation industry is a considerable challenge with the growing number of travellers. Every time clients feel contented with the products and services offered by establishments, the possibility of a repeat visit is evident. Creating lasting relationships leads to customer loyalty and retention. This makes the accommodation sector competitive in giving services, facilities, equipment, and amenities. All the accommodations surveyed comply with basic legal requirements of business operation, like a mayor's permit, environmental compliance certificate, and barangay clearance. They are registered with DTI and BIR. Twelve per cent of them are SEC-registered. The accreditation office of the local government unit helps the DOT monitor each accommodation establishment in complying with the standards set for the industry. This protects the consumers from unreliable or even fly-by-night operations and poor services. They demonstrate commitment to the highest level of duty and care.

Table 6. Assessment of the Accommodation Industry in terms of Business Operation for Organization and Management

Organization and Management	Weighted Mean	Verbal Interpretation	Rank
There are high work ethics of employees	3.38	Strongly Agree	1
There is trustworthiness in employees	3.35	Strongly Agree	2.5
There is a harmonious relationship between employees	3.35	Strongly Agree	2.5
The work function of employees is just proper and well-defined	3.31	Strongly Agree	4
There is capacity building for employees	3.22	Agree	5
There are maintained competencies among employees	3.15	Agree	6
There is easy recruitment of employees	3.08	Agree	7
There is a low replacement of employees	2.50	Disagree	8
Average Weighted Mean	3.17	Agree	

3.3 Accommodation industry for organization and management

Table 6 shows that the average weighted mean of business operation for organization and management is 3.17 with a verbal interpretation of agree. It signifies that the accommodation sector industry prioritizes the welfare of its staff or personnel for the business to maintain its sustainability and expansion. High work ethics score the highest weighted mean in organization and management. It shows that employees derive greater satisfaction from work because they are fully engaged in daily activities. It is a good indication that staff in the accommodation industry are competent in giving services to customers. The second highest score is the trustworthiness of employees. A sign of good morale and motivation for accommodation sector workers in Baler. Above the composite mean score likewise is the work and function of employees are just right and well-defined. It is a good indication of increasing individual and organizational effectiveness toward achieving goals and objectives. The capability of employees in terms of skills and knowledge has a low mean score. Easy recruitment of employees is also a low mean score. It shows a need for more qualified and competent employees suitable for their job functions. The lowest weighted mean score on organization and management is the standard replacement of employees. It shows that there is a high turnover of employees.

Table 7. Assessment of business operation

Business Operation	Weighted Mean	Verbal Interpretation	Rank
Good customer service	3.45	Strongly Agree	2
Available online reviews and social media marketing	3.28	Strongly Agree	3
Compliance with health and safety protocols	3.53	Strongly Agree	1
Competitive marketing strategies	2.47	Disagree	4.5
Friendly facilities for PWDs and senior citizens	2.43	Disagree	8
Water filtration systems for pools and sewerage systems	2.35	Disagree	9
Sufficient cash flow for business expansion	2.46	Disagree	6.5
Available brochures and signages in strategic areas	2.47	Disagree	4.5
Workplace guidance on employees exposed to COVID 19	2.46	Disagree	6.5

3.4 Business operations, organization, and management

Table 7 shows the average weighted mean of business operation for organization and management is 3.17, with a verbal explanation of agreement. It signifies that the accommodation sector industry prioritizes its staff for the business to maintain its sustainability and expansion. Above the weighted mean score is the work and function of employees are just right and well-defined, a good indication of increasing individual and organizational effectiveness towards achieving goals and objectives. The lowest weighted mean score on organization and management is the typical replacement of employees. It shows that there is a high turnover of employees. The highest weighted mean score in business operation for marketing is the maintained good customer service. It shows that there are better customer service programs. The score of enabling to cope with market trends is below the weighted mean score, asserting that most accommodation establishments need to be updated on market developments. The competitiveness of marketing strategies has the lowest weighted mean score.

Table 8. Assessment of the Accommodation Industry in terms of Business Operation for Marketing

Marketing	Weighted Mean	Verbal Interpretation	Rank
There is maintained good customer service	3.45	Strongly Agree	1
There are available online reviews and social media marketing	3.28	Strongly Agree	2
There is an appropriate response to changing guests' preferences and expectations	3.23	Agree	3
Able to keep up with market trends	3.22	Agree	4
Marketing strategies are competitive	2.47	Disagree	5
Average Weighted Mean	3.13	Agree	

Table 8 reveals that the average weighted mean of business operation for marketing is 3.13, with a verbal interpretation of agree. It implies having additional marketing strategies to cope with the trends at the international level to become globally competitive. The highest weighted mean score in business operation for marketing is the maintained good customer service. It shows that there are better customer service programs. The availability of online reviews and social media marketing is also above the composite score. It implies that they are modernized by using the internet and social media for marketing strategies. The weighted score on response to guests' preferences and needs is below the composite score, revealing that skills and competencies in public relations are not competitive. Employees need more than employees level of education to fulfil their functions. The management needs to regularly give training and seminars to staff relative to their work functions. The weighted mean score of enabling to cope with market trends is below the composite score, asserting that most accommodation establishments are not updated on market developments. It costs much more money to gain new clientele than to maintain relationships with existing clientele; prioritizing hotel customer retention is essential. The competitive marketing strategies in the accommodation industry have the lowest weighted mean score. This denotes that having competitive marketing strategies is not their priority. Staying ahead of the competition and remaining relevant within the rapidly changing accommodation industry is crucial to creating a competitive advantage.

Table 9. Assessment of the Accommodation Industry in terms of Business Operation for Technical

Technical	Weighted Mean	Verbal Interpretation	Rank
There are available quality services provided at their highest level.	3.09	Agree	1
There are available facilities that are friendly to PWDs and senior citizens.	2.43	Disagree	5
There are accessible modern equipment and facilities.	2.91	Agree	2
There are available water filtration systems for pools and sewerage systems.	2.35	Disagree	4
There are available transportation services for customers.	2.77	Agree	3
Average Weighted Mean	2.71	Agree	

3.5 Accommodation industry in terms of business for the technical operation
Table 9 shows that the average weighted mean of business operation for technical is 2.71 with a verbal interpretation of agree. It describes that business establishments should provide facilities and amenities that follow the standards required by the government agencies like the Department of Tourism and international organizations to pursue sustainable and green tourism. Regarding business operation problems for technical, the availability of quality services has the highest weighted mean score. Providing low-quality services will fail customers' expectations and make them feel like they do not deserve the worth of money they spend. It boils down to making them think they are disadvantaged and building customers' distrust of the hotel.

3.6 Facilities for PWDs, senior citizens, water filtration system and energy consumption
Included also in Table 9 is that they score disagree as the verbal interpretation of availability of facilities to PWDs accommodation establishments. Access to modern equipment and facilities is below the weighted mean score showing that owners need to prioritize investments. Hotel amenities can make or break a guest's stay and can be the reason they leave positive or negative feedback. The availability of filtration systems for pools and sewerage is below the weighted mean score. They disagree on its verbal interpretation. This equipment is a high cost. Electricity, drinking water, and wastewater account for forty per cent of the operating expenses. The rising inflow of tourists is the main reason for this situation. Overuse of electricity contributes to the scarcity of energy supply, increases overall electricity costs, and causes brownouts. The shortage of electricity and water is felt in the locality. There is a regular occurrence of brownouts and a lack of potable water.

Table 10. Assessment of the Accommodation Sector Industry in terms of Business Operation for Finance

Finance	Weighted Mean	Verbal Interpretation	Rank
Expenses and operating costs are just proper	3.18	Agree	1.5
There is a sufficient fund for the business	3.18	Agree	1.5
There is simplicity in the tax process	3.15	Agree	3
There is an efficient budget management	3.14	Agree	4
It is an effective, clear, and standard accounting system	3.09	Agree	5
There is sufficient cash flow for business expansion	2.46	Disagree	6
Average Weighted Mean	3.03	Agree	

3.7 Accommodation sector industry in terms of business operation for finance

Table 10 shows that the average weighted mean score is 3.03, with a verbal interpretation of agree. Assessment of business operations for finance indicates that the owners and administrators should strengthen and establish the financial system of the business, to make its entire process effective and efficient. The weighted mean score of sufficient funds for business is higher than the composite mean score. It shows this industry's promising business growth in Baler municipality. They can make decisions for business expansion, especially after the pandemic, and help the locality's economy grow. The weighted mean score on efficient budget management is above the composite mean score, which shows that the management and administrators of the businesses allow overseeing and have an enhanced understanding of whether the company has enough revenue to pay its expenses. The weighted mean score on practical, clear, and standard accounting systems is below the mean. It shows that majority of the business establishments need better accounting practices. They need help sourcing records and documents, leading to delayed reporting and analysis. It shows the need for more funds for business expansion. They score disagree on verbal interpretation regarding the sufficiency of cash flow. It offers a need for more funds for capital in the operation of their businesses.

Table 11. Assessment of the Accommodation Sector Industry in terms of compliance with environmental laws

Compliance with environmental laws	Weighted Mean	Verbal Interpretation	Rank
There is compliance with RA 9003 Ecological Solid Waste Management Act of 2000	3.39	Strongly Agree	1
There is compliance with RA 8749 Philippine Clean Air Act of 1999	3.36	Strongly Agree	2
Hotel guests support environmental laws	3.35	Strongly Agree	4.5
Staff are dedicated to the observance of environmental laws and regulations	3.35	Strongly Agree	4.5
There is compliance with RA 9275 Philippine Clean Water Act of 2004	3.35	Strongly Agree	4.5
There is compliance with RA 6969 Toxic Substances, Hazardous and Nuclear Waste Control Act of 1990	3.35	Strongly Agree	4.5
Management and staff have environmental knowledge and skills	3.31	Strongly Agree	7
There are internal environmental programs and policies	2.50	Disagree	8.5
There is a budget allotted for environmental concerns	2.50	Disagree	8.5
There is government assistance in the implementation of environmental policies	2.49	Disagree	10
Average Weighted Mean	3.095	Agree	

3.8 Accommodation sector industry in terms of compliance with environmental laws

Table 11 shows the average weighted mean of compliance with environmental regulations is 3.095, with a verbally agreed interpretation. It means the government should strengthen the enforcement of environmental programs for all stakeholders of the accommodation sector industry. The Republic Act (RA) 9003, or the Ecological Solid Waste Management Act of 2000, has the highest weighted mean score regarding implementation. Compliance with RA 9275 Philippine Clean Air Act 1999 has a high weighted mean score. The score for environmental skills and knowledge of management and employees is above the composite mean score. It describes a high awareness level among the workers in this industry regarding environmental concerns. There should be a continuous information dissemination campaign to all management and employees of the

accommodation sector industry regarding the ecological sustainability of the municipality and the province of Aurora. Internal environmental programs and policies need to be improved in most business establishments. The budget allotted for environmental concern and government assistance to support the implementation of environmental programs have the lowest weighted mean score. There is a presence of many environmental laws. The problem is the need for more performance and enforcement.

Table 12. The positive impact of the accommodation sector industry on the environment

Compliance with environmental laws	Weighted Mean	Verbal Interpretation	Rank
There is compliance with RA 9003 Ecological Solid Waste Management Act of 2000	3.39	Strongly Agree	1
There is compliance with RA 8749 Philippine Clean Air Act of 1999	3.36	Strongly Agree	2
Hotel guests support environmental laws	3.35	Strongly Agree	4.5
Staff are dedicated to the observance of environmental laws and regulations	3.35	Strongly Agree	4.5
There is compliance with RA 9275 Philippine Clean Water Act of 2004	3.35	Strongly Agree	4.5
There is compliance with RA 6969 Toxic Substances, Hazardous and Nuclear Waste Control Act of 1990	3.35	Strongly Agree	4.5
Management and staff have environmental knowledge and skills	3.31	Strongly Agree	7
There are internal environmental programs and policies	2.50	Disagree	8.5
There is a budget allotted for environmental concerns	2.50	Disagree	8.5
There is government assistance in the implementation of environmental policies	2.49	Disagree	10
Average Weighted Mean	3.095	Agree	

3.9 Positive impact of the accommodation sector industry on the environment
Table 12 demonstrated that the average weighted mean score of the positive impact of the accommodation sector industry for environmental concern is 3.226, with a verbal interpretation of moderate impact. Strong coordination with accommodation sector stakeholders is needed. It generates income that often makes it possible to protect and preserve the natural resources that have the highest weighted mean score in terms of positive impact on environmental conservation. There is a presence of environmental awareness among the concerned stakeholders. It is good to understand the ecological understanding of the owners, administrators, and management of the accommodation sector industry in Baler, Aurora. It shows a good indication of the long-term environmental sustainability of the municipality and adjacent areas.

Table 13. Negative impact on the accommodation sector industry

Environmental conservation	Weighted Mean	Verbal Interpretation	Rank
There is an increase in water and energy consumption	3.26	Strong impact	1
There is an increase in solid waste	2.89	Moderate impact	2
There is crowding and congestion	2.73	Moderate impact	3
There is an increase in pollution (air, water, noise, etc.)	2.68	Moderate impact	4
There are disruptions in wildlife behaviour and feeding and breeding patterns	2.53	Moderate impact	5
There are destructions of flora and fauna, deforestation	2.47	Moderate Impact	6
Average Weighted Mean	2.76	Moderate Impact	

3.10 Negative impact of the accommodation sector industry on the environment
Table 13 revealed that the average weighted means score of the negative impact of the accommodation sector industry on the environmental concern is 2.76, with a verbal interpretation of moderate impact. It shows that the sustainability of this industry should be prioritized to make it a long-lasting sector of the municipality for the benefit of many generations to come. They scored strong impact as ranked number one and the highest negative impact of the accommodation sector industry regarding environmental conservation. There is an increase in water and energy consumption. Overall, electricity, drinking water, and wastewater system account for as much as forty

per cent of the operating costs of the accommodation sector. The rising increase of tourists is the main reason for this situation in Baler.

Table 14. Impact of economic growth and environmental conservation

Impact	Weighted Mean	Verbal Interpretation	Rank
Contributes significant income to the municipality	3.43	Strong Impact	1
Gives significant employment to the locality	3.42	Strong Impact	2
Increase investments in business	3.32	Strong Impact	3
Significant improvements in infrastructure	3.31	Strong Impact	4.5
A significant development in telecommunications	3.31	Strong Impact	4.5
Generates income to protect and preserve natural resources	3.28	Strong Impact	6
Presence of environmental awareness	3.26	Strong Impact	7.5
Increase in water and energy consumption	3.26	Strong Impact	7.5

3.11 Economic growth impact

Table 14 shows that the average weighted mean for impact on economic growth is 3.358, with a verbal interpretation of substantial impact. It implies the accommodation industry's significant contribution to Baler's economy. The average weighted mean score of the positive impact of the accommodation sector industry for environmental concern is 3.23, with a verbal interpretation of moderate impact. The Baler Comparative Report on income and employment generation from 2018 until 2021 showed an average of 11% yearly to the total income of the municipality (Table 15). It also generated full employment of 10,704 for the same period.

Table 15. Tourism Industry in Baler, Aurora Comparative Report, 2018-2021

Year	Employment Generated	Income Generated from Tourism (Philippine Peso)	Total LGU Collection (Philippine Peso)	Percentage To Total Income
2018	2,695	4,246,095	43,813,015	10%
2019	2,749	5,977,635	48,403,934	12%
2020	3,100	7,059,841	44,218,151	16%
2021	2,160	2,474,371	41,185,378	6%

Table 16. Proposed business operational plan for the accommodation industry in Baler, Northern Philippines

Goals	Program Activities	Responsible Unit	Budget (Philippine Peso)	Timeline
Effective Employee Retention Program	Competitive compensation Additional benefits Continuous opportunities Performance recognition	Owners Administrators	200,000 or more	Annually
Customer Relationship Management	Competitive adaption Simplified booking Accessibility High tech system	Owners Administrators	50,000 per establishment	Annually
Cash Flow for Business Expansion	Use monthly business budget Access credit line	Owners	10,000 for each training	As need arises
Good Housekeeping Program	Reduce air, water, and noise pollution	Administrators LGUs, DENR	150,000 each	2023
Facilities for PWDs and Senior Citizens	Provide PWDs friendly facilities Well-equipped medical emergencies	Owners Administrators	100,000 to 2 million	Annually
Effective Waste Management Program	Implement the 5 R's program Reduce waste consumption	Owners, LGUs	50,000 or more	2023 onward
Green Program	Use environmentally friendly	Administrators	50,000 or more	2023 onward

	properties	LGUs Department of Tourism		
Water Management Program	Minimize water and energy consumption	Owners, LGUs Community	50,000 or more	2023 – 2026
Water Filtration Efficiency Program	Provide high-quality water Provide a pool safety plan	Administrators	50,000 to 2 million	2024 onward
Water Sewerage Treatment Program	Provide water sewerage treatment facility	LGUs, National Government Agencies	10 million to 100 million	2024 - 2030

Tourism had a very significant contribution to the economy of Baler. There is higher output in production and higher expenditure that circulates within the local economy and adjacent municipalities and provinces like Nueva Ecija and Nueva Vizcaya for the municipality of Castaneda. The proposed business operational plan for the accommodation industry in Baler, Northern Philippines, is presented in Table 16 above.

4. Discussion

Prior studies on this kind of research show that the growing concern about environmental sustainability influences consumer demand and business operations. Clients are more environmentally aware, and they demand friendly products and services. Consequently, the accommodation industry currently faces a growing clientele required to achieve levels of ecological awareness. Thus, businesses strive to implement ecologically friendly and socially responsible practices to gain a good advantage while preserving commercial achievement. There is a need to make a more robust execution of environmental laws and policies by the government. Strong coordination with accommodation sector stakeholders and local government units is needed.

The results of this study revealed the following peculiarities, which may have practical value. Sixty-seven per cent (67%) of accommodation establishments are located along the seashore. Fifty-four per cent (54%) have a 1-10 room capacity. The majority of the ownership is a single proprietorship. Twenty-eight per cent (28%) of accommodation types is a resort. Fifty per cent (50%) range from 6-10 years of operation. All the hotels and resorts comply with the basic legal requirements, such as the Department of Trade and Industry, Business Process Licensing Office of Local Government Unit, and Bureau of Internal Revenue. Forty-five per cent (45%) are registered with the Department of Labor and Employment. Thirty per cent (30%) have insurance packages for employees, equipment, and guests. In addition, all businesses are accredited by the Baler Municipal Tourism Office and the Department of Tourism. Front desk staff of the accommodation industry are competent in their functions.

Marketing using social media and online reviews is accomplished and widely used. The industry is compliant with the safety protocols implemented by the local government unit. They need additional marketing strategies other than the use of the internet. The business establishment needs more facilities and equipment for PWDs and senior citizens. Water filtration systems need to be present for pools and sewerage systems. Business operations need more funds for positive cash flow for working capital. There needs to be more implementation of internal programs and policies for business establishments regarding compliance with environmental laws. The allotment intended for the environmental project of business establishments may be studied. The accommodation industry generates significant income for the municipality, with 11% of the total income of the municipality of Baler for the period 2018 – 2021. This industry increased water, electricity, and pollution in the municipality.

5. Conclusions

The accommodation business in Baler is significantly growing due to increased tourist arrival, especially since the pandemic has ended. This affects the environmentally-related problems, pollution, resources needed, and the local government's budget for supporting this industry. This sector gives the municipality a significant income and is a primary source of livelihood for the locality and even adjacent areas. The tourists prefer to stay on the beachfront, wherein this area is famous for. Regarding business operations, there is a need to improve the marketing strategies of the accommodation businesses. The management should prioritize upgrading the skills and competencies of staff by giving training and seminars. The additional privileges provided to staff would enhance their productivity, loyalty and a lower overall turnover of employees. Although there are some studies on the sustainability of the accommodation industry regarding the involvement and implementation of environmental policies of the local government, there should be more profound attempts focussing on this aspect. Assessment of business operations in terms of management, financial and technical operations still has to be performed. Inefficient use of resources could also affect the further shortage and, ultimately, condition climate change, loss of biodiversity, pollution, and poor health.

This research focused only on Department of Tourism-accredited accommodation business establishments. In the future, a similar study may be conducted in the whole province of Aurora.

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BOUNDARIES OF THE EMPLOYEE'S PRIVACY IN EMPLOYMENT RELATIONSHIP[*]

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Abstract. This article analyses the specifics of implementing employee privacy obligations in employment relationships. In employment relations, the employer has a general duty to make the employee aware of the local legislation governing his or her work. In this context, there is a clash between two legally protected interests: on the one hand, the employer's interest in protecting the business, ensuring business processes, the security of assets and the health and safety of employees, and on the other hand, the obligation not to infringe the employee's right to privacy. Technical means of monitoring employees are one of the simplest ways of collecting data and Information. At the same time, the question of proportionality of using such means is raised - whether all the Information collected by automated means is necessary to justify the specific purpose of data collection. Collecting data solely for personal interest without setting strict rules on the collection of Information and the limits of the Information collected restricts an employee's right to privacy. An employer is not entitled to collect data (monitoring) to control an employee's work process or behaviour but may record specific data if necessary to protect production, health and safety or to ensure the efficient running of an organisation. However, even in such cases, the employer must take additional measures to minimise such monitoring or evaluate its results as much as possible. The author analyses the problem in the context of the employment relationship, and through the implementation of the employer's obligation to establish specific local rules and the commitment to make the employee aware of those rules (transparency principle).

Keywords: Employees' right to privacy; local regulation; limits to the right to privacy; balancing the interests of the employer and employee.

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1. Introduction

Article 8(1) of the European Convention on Human Rights (ECHR) provides that everyone has the right to respect for his private and family life, the inviolability of his home and the secrecy of his correspondence. The exercise of these rights may not be restricted by public authorities, except in cases provided for by law and where such restriction is necessary for a democratic society in the interests of national security, public safety or the economic well-being of the country for the prevention of disorder or crime, or for the protection of human health or morals or the protection of the rights and freedoms of others (Art. 8(2) ECHR). The requirements for properly processing personal data are laid down in the General Data Protection Regulation (GDPR). In employment relations, there is a confrontation between several interests: on the one hand, the employer's business interest and the need to protect it, and on the other hand, the employee's right to privacy and the employer's obligation to guarantee it. Employers are legally required to process specific employee data, even highly sensitive data. Still, in terms of protecting business interests in modern legal relations, the rapid adoption of new information technologies in the workplace, in terms of infrastructure, applications and intelligent devices, allows for new types of systematic and potentially invasive data processing at work, technologies can help detect or prevent the loss of intellectual and material company property, improving the productivity of employees (Petraityte, 2013). Thus, there are several challenges in this case as to how to strike an appropriate balance between the employer's legitimate interest (and in some cases even the fulfilment of a duty, e.g. in the field of occupational safety and health) and the employee's right to privacy, i.e. to ensure that the continuous monitoring of the employee does not create a climate of mistrust in the employment relationship, or create pressure, or otherwise interfere with the employee's personal space including the question of data collection ethics (Vermanen, Rantanen & Koskinen, 2022). Petraityte (2013) relates the legal protection of personal data to the individual's right to private life, pointing out that the legal protection of personal data is intended to ensure the individual's privacy and that the legal protection of personal data is only regulated to the extent necessary to protect the individual's informational privacy (Skendzic et al., 2018).

The right to privacy is enshrined in Article 8 of the European Convention on Human Rights (Convention, 1950) and Article 8 of the Charter of Fundamental Rights of the European Union (Charter, 2016; Syroid et al., 2021). The legal requirements for the protection of personal data are laid down in the General Data Protection Regulation. (GDPR, 2016). In pursuing its interests, the employer must respect the limits of the legal regulation on interference in the employee's private life, including the limits on the processing of personal data. At the same time, however, the employer is interested in the efficient organisation of work, i.e., exercising the right of control over the employees under its authority, which arises from the specific nature of the employment relationship. Companies can exercise this right through local regulations establishing transparent rules for monitoring employees and processing employees' personal data.

The objective of the study is to analyse the case law of the European Court of Human Rights (ECHR) and the Court of Justice of the European Union (CJEU) also national law doctrine in the context of the employer's obligation to ensure the privacy of the employee and explore the legal measures and limits applicable in the employment relationship. Tasks for the objective have been raised: reveal the concept of the balance between the employer's legal interest and employee's privacy; investigate the significance of local legal regulation for the assurance of employee's privacy and data protection as a part of privacy rights; reveal the fundamental principles to be followed establishing the balance between employer's interests and employee's privacy rights. The document analysis method was used to analyse legislation, case law and scientific doctrine; the systemic approach was used when analysing the content of legal norms and concepts. The article refers to case law (ECHR, CJEU, The Constitutional Court of the Republic of Lithuania), scientific research (Petraityte, 2013; Davulis, 2018; Stanev, 2019; Hueso, 2020) and others.

2. Employee's right to privacy in the employment relationship

Article 8(1) of the European Convention on Human Rights (ECHR) states that everyone has the right to respect his private and family life, home and correspondence. There shall be no interference by a public authority with the exercise of this right except such as is following the law and is necessary for a democratic society in the interests of national security, public safety, or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or the protection of the rights and freedoms of others (Art. 8(2) ECHR).

The European Court of Human Rights (the ECtHR) has interpreted the concept of "private life" broadly in its case law, stating that it is neither necessary nor possible to attempt a comprehensive (exhaustive) definition of the notion of "private life", and that it would not be correct to restrict the notion of "private life" to the concept of the "inner circle", in which an employee may live his personal life in complete isolation from the external world. In other words, a person's private life is closely linked to his external (public) activities since, in the employment relationship, the employee benefits from the experience and opportunities in his personal life. Conversely, in his private life, he benefits from the knowledge, social contacts, and opportunities he has acquired at work (*Mircovic* Case). The dividing line between an individual's private life and other social life is narrow. Most of the time, the individual meets his private personal needs through participation in social life, i.e., the individual's private life is intertwined with the individual's social (public) life. In a professional or commercial activity, a person has a certain right to private life, and this is particularly true of people exercising a liberal profession, whose domicile may also be a place of work, i.e. "it is possible to carry out professional or commercial activities at home and to engage in private activities in one's own office or commercial premises" (*Niemetz* Case). The CJEU has taken a similar position in its judgments, also referring to the case law of the ECtHR, explaining in cases that the notion of "private life" must not be interpreted restrictively and that there is no good reason to justify the exclusion of activities of a professional <…> nature from the notion of private life (*Volker und Markus Schecke GbR and Hartmut Eifert* Cases).

Thus, the case law developed by the ECtHR (in the *Niemetz* case and its subsequent jurisprudence) has become particularly relevant and significant because of transformations in employment relations. The ECtHR's position on liberal professions has become acceptable since the significant change in the form of employment relationships, i.e., since the shift towards the concept of teleworking as a normal mode of work (in the context of Covid 19) (Suder, 2021), an ever-growing use of information technologies in work processes and almost no need to use workplaces provided by employers (by working from home or from any other location that is convenient for the employee) and in the context of the labour relationship, not only for self-employed persons.

The constitutional doctrine of the right to respect private life has been shaped broadly similarly in Lithuania. The Constitutional Court of the Republic of Lithuania, in its interpretation of Article 22 of the Constitution of the Republic of Lithuania, has noted that the norms enshrined in the article protect the individual's right to private life. This right includes personal, family and home life; physical and mental integrity; honour and reputation; the confidentiality of personal facts; prohibition to disclose confidential Information received or collected, etc. Arbitrary and unlawful interference in a person's private life also attacks the person's honour and dignity (Constitutional Court's ruling of 21 October 1999). The legal concept of personal life relates to the state of a person's expectation of respect for private life and his legitimate expectation of privacy. If a person performs acts of public nature and is aware of this, or should be and can be aware of this, even if from his own home or other private property, such acts of a public nature will not be granted protection under Article 22 of the Constitution

and Article 8 of the Convention, and the person cannot expect privacy.[†] The author believes that a similar logic can be invoked in employment relations since the basic principle is that the employee must be guaranteed the right to respect for private life and protection of personal data in the first place. The specific nature of employment relationship requires that in the workspace the employee be made aware of the conditions governing his work (i.e., he must be aware of the rules that apply to him and must be kept informed of the conditions of his employment by the employer) (Article 42(4) of the Labour Code of Lithuania).

The principles governing the inviolability of private life and the right to secrecy have been transposed into the legal norms governing civil relations (Article 2.23(1) of the Civil Code of the Republic of Lithuania – privacy of natural person shall be inviolable. Information on person's private life may be made public only with his consent).

Article 27 of the Labour Code of the Republic of Lithuania (hereinafter referred to as the "LC") stipulates that the employer must respect the rights of employees to their private life and the protection of personal data (Article 27(1) of the LC). The employer's exercise of ownership or management rights over information and electronic communication technologies used in the workplace shall not violate the confidentiality of employees' private communications (Article 27(2) of the LC). Thus, the LC of the RoL protects two public goods: the employee's right to respect for private life and the protection of his personal data. The doctrine assumes that the employee's right to protect personal data is derived from the right to respect private life (an integral part of the latter); it may also be regarded as an independent right (Davulis, 2018). Whilst such a position may be seen as pl, the author considers that protecting an employee's data ensures the individual's right to respect for private life. The General Data Protection Regulation provides an extensive definition of personal data: "personal data" means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person (GDPR). For the regulation, the employer is the data controller of the employee's data and is, therefore, under the obligation prescribed by the regulation on the data controller (Article 5 of the Regulation). The employer thus has to process and protect employees' personal data in such a way as to ensure that the employee's right to respect for private life, which constitutes a fundamental constitutional human right, is not infringed. Work arrangements (teleworking, flexible working hours, decreasing the need to work from an office) have a fundamental impact on the employee's right to respect for private life, primarily as a result of the obligation to ensure the protection of the employee's data and the various technical challenges to the implementation of this obligation. Any information from the content of which a person is identifiable or identifiable is considered to be Information containing specific personal data (GDPR). Protecting an employee's data, which is the employer's responsibility, thus also becomes crucial for protecting the employee's right to respect his and his family's private life (Stanev, 2019). In this context, it is also important to note that the right to respect personal life is passive. The exercise depends not on the subject (the employee) but on the employer's efforts to protect the employee's data.

When interpreting the provisions of the General Data Protection Regulation, it has to be acknowledged that the rapid technological progress and various new ways of communication in the employment relationship (also taking into account the atypical forms of working arrangements) create the preconditions for increased control and interference with the employee's private life (Limba et al., 2020; Dvojmoc & Verboten, 2023). For example, control over the activities of a teleworker can be exercised through a variety of means of power (monitoring of the desktop, waiting times, keystrokes on electronic devices, typing commands, the use of audio-visual tools in some

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[†] 8 May 2000 Ruling by the Constitutional Court of the Republic of Lithuania On the compliance of Paragraph 12 of Article 2, Item 3 of Paragraph 2 of Article 7, Paragraph 1 of Article 11 of the Republic of Lithuania's Law on Operational Activities and Paragraphs 1 and 2 of Article 198¹ of the Code of Criminal Procedure of the Republic of Lithuania with the Constitution of the Republic of Lithuania https://lrkt.lt/en/court-acts/search/170/ta1160/content.

instances, monitoring of the network's bandwidth, browsing history and many other means). As a result of market dynamics, changes and technological advances, the changing form of employment relationships, as already mentioned, makes the relationship between employee and employer more akin to a legal relationship between a service provider and a service recipient. However, the legal approach's specificities to regulate employment relationships also make it understandable for the employer to seek to control the employee to give him instructions to give effect to the principle of subordination laid down by the legislation. Article 32 of the Labour Code of the Republic of Lithuania sets out the characteristics of an employment contract (and thus of an employment relationship), which is an agreement under which the employee, as a subordinate to the employer, undertakes to carry out a work function for the benefit of the employer. The employer undertakes to remunerate the employee. Subordination refers to the performance of a work function where the employer has the right to control or instruct the whole or part of the work process and the employee is subject to the employer's instructions or to the rules of the workplace. Thus, the relationship of subordination also means that, in many cases, the employer has more leverage to influence the employee's will and interfere with the employee's private life.

In contrast, the employee can *de facto* waive the rights guaranteed to him to avoid conflict. Valerio di Stefano, in his studies, has called this aspect the "implicit threat mechanism", meaning that the employee, as a subordinate to the employer, to keep his job, deliberately "minimises" his rights in order not be "difficult" (Di Stefano, 2009). For this reason alone, the employee's consent to processing his data in an employment relationship cannot be considered a sufficient legal basis, as the employee is dependent on the employer (Svec, Horecky, Madlenak, 2018). There is a high risk that such consent would not be freely given by the employee but would be forced instead by the specific circumstances of the employment relationship (Article 29 Working Party).

The employer's desire to control the employee, especially by technical means that make it easier to do so, is understandable. The employer has the right to lay down specific rules on the use of information technologies, the breach of which could result in liability for an employee. Such regulations laid down by the employer are generally aimed at protecting the employer's interests (intellectual property, assets, assessment of employee's performance (Vignesh & Prasad, 2022), but the employer's pursuit of such an aim/interest makes it equally important to protect the employee's interest in their private life. This is a perfectly standard working practice (Stanev, 2019). In pursuit of his interests, the employer monitors the employee in the following ways by (1) monitoring and controlling the workplace; (2) monitoring and controlling the employee; and (3) monitoring and controlling Information and communication in the workplace (Tamasauskaite-Janicke, 2016). Information technologies can help to detect and prevent the loss of the company's intellectual and material property, improve employees' productivity and protect the personal data for which the controller is responsible (Asvanyi, 2022). At the same time, they also raise several privacy and data protection issues. It is, therefore, necessary to assess the balance between the employer's legitimate interest to protect its business and the reasonable expectation of respect for the private life of its employees (Article 29 Working Party). Such an assessment is also directly linked to the principles of the genuine intention of the parties and the balancing of their mutual interests recognised in employment relationships (Maciulaitis, 2013).

In addition to the general duty of the employer to respect the rights of employees to private life and the protection of personal data (Art. 27(1) of the LC), the legal framework of employment relations in Lithuania imposes several additional obligations on the employer to ensure the implementation of this duty through effective local regulation and the involvement of employee representatives in decision-making procedures. The employer must inform and consult employee representatives when deciding on local regulations relating to the use of information and communication technologies and the monitoring of employees, the establishment of measures that may interfere with the protection of employees' private life, the policy on the storage of employees' data and the measures for its implementation, and measures to reduce tension at work. Thus, the legal framework provides guidance (albeit not mandatory) on the cases in which the employer must (a) establish a local legal framework and coordinate its

decisions with the employees' representatives. It should also be recalled that the employer is obliged to inform the employees in writing of the labour law rules governing their work (Article 42(4) of the LC of RoL).

The ECtHR, in its jurisprudence in the *Marcx* case, has laid down a three-step test to verify and potentially justify interference in a person's private life: (a) whether the specific acts are carried out following the established legal norms/rules, (b) whether the interference has a legitimate aim, and (c) whether the interference is necessary for a democratic society. Given the specific nature of the employment relationship, the last step could be reformulated as to whether such interference is following the employment relationship's essence and the parties' agreed will to the employment relationship. From the perspective of the legal regulation of the legal protection of personal data, the requirements for the legal protection of personal data are also set out similarly: the processing of personal data must have a specific legitimate purpose, personal data may only be processed with a legal basis, only specific personal data necessary to achieve the goal may be processed and only for the time necessary to achieve the purpose (GDPR, 2016). Thus, both the analysis of the legal framework and the case law lead to the following conclusions: (a) employment relationships must provide for appropriate rules governing an employee's working conditions, including the guarantee of the employee's right to private life; (b) it must be assessed whether the measures taken by the employer are proportionate and can be justified in terms of reconciling the mutual interests of the parties; and (c) whether such interference of the employer into the employee's private life is justified and necessary for the protection of business or employer's economic activity. The employer implements the protection of the employer's business interests in employment relations through local legal regulation – the internal regulations of an undertaking, institution, or organisation.

3. The role of local regulation in employment relations

The Lithuanian labour law, alongside other sources of labour law, establishes local regulation as very specific and from a practical point of view – perhaps one of the more critical forms of regulation (Article 3(7) of the LC of RoL). When organising the work of the employees subordinate to it, the employer must lay down the rules for managing work, which apply to all the employees in general (individual agreements are set out in specific employment contracts with employees). There are several reasons justifying this need. Firstly, the principle of equal treatment in employment relations and non-discrimination between employees must be respected. The judgments of the Court of Justice of the European Union have clarified that discrimination is where similar situations are treated differently, and different conditions are treated equally unless such treatment is objectively justified (*Javier Rosado* Case). Disparate (different) treatment is considered discriminatory if it cannot be objectively and reasonably justified; otherwise put, if it does not pursue a legitimate aim, or if there is no reasonable relationship of proportionality between the means employed and the aim pursued (*Burden, Schalk and Kopf, Vallianatos* Cases). Thus, local regulation in employment relations can ensure equal treatment of employees and, in addition, establish transparent rules for employers vis-à-vis employee relationships. Local regulatory rules protecting the employees' private life are no exception and, as already mentioned, are also governed by the LC. In summary of the above, the legislative mechanism of the rules applicable to employment relations is unique: in addition to the legal regulation of employment relations by the state, the employer has the right to establish legal norms which are valid only in specific employment relations (in a particular undertaking, institution, or organisation). The employer can determine the legal norms applicable to a specific relationship by involving the employees in the local legislative process.

The ECtHR interprets the notion of "legal norm" very broadly, as legal norms are promulgated by different institutions with different levels of application and purpose. In particular, rules of law are formulated in normative legislation, usually issued by legislative bodies, and the courts also lay down rules of application in cases deliberated by them. In addition, in interpreting the concept of a legal norm, the ECtHR also includes written and non-written rules, established practices of organisations, etc., as legal norms. Moreover, the employment

relationship has its own specificity as a source of law: the hierarchy of sources of labour law also includes local legislation, the specific legislative mechanism, with the employer becoming the legislator. Consequently, there is a risk and a possibility that the employer enjoys the right in certain cases to establish local rules that are more in his own rather than in the employee's interest. Such a situation would entail a disproportion between the mutual rights and obligations of the parties to the employment relationship. Thus, the question of possible interference in an employee's private life by the employer to control the employee's work activities cannot be based solely on the criterion of a legal basis or legal norm. Equally important is the quality of the legal framework, which is achieved, on the one hand, by establishing appropriate objectives and proportionate procedures for local legislation and, on the other hand, by adopting such local legislation under local legislative procedures, i.e., by involving employees' representatives in the decision-making process, through information and consultation procedures. In addition, local legislation used in employment relations is subject to other specific requirements: the local legislation must be known to employees (legal obligation to make employees aware of the local legislation governing their work), employees must understand and be aware of the content and scope of the local legislation (the legislation must be actually in force and be used as a reference when organising work processes within the company), the employer must ensure control over the application of, and compliance with, local legislation (the application of local legislation must be real, not notional, where some procedures in the company are carried out "by default"). On the other hand, not all of the only of aid down by local legislation can be regarded as legal norms, as many of them have a regulatory function to ensure the work process rather than a regulatory function meant to establish mutual rights and obligations. Thus, local regulatory action must be qualitatively framed in such a way as to create corresponding rights and responsibilities for employees while at the same time seeking to influence the behaviour of the worker.

4. Principles for balance seeking

The principle of balancing the interests of the employer and the employee in working arrangements by the employer and in the protection of the employer's property and the employee's right to private life was analysed by scholars (Rucker et al., 2022) and on its merits by the ECtHR in *Burbulescu v Romania* (*Burbulescu* Case). In this case, the Court recognised that, in performing their job functions and using the means of work provided by the employer (in this particular case, a work email login), the employee could not expect complete personal privacy. The work tool in question, i.e., the work email account, was developed for work purposes. The employer reasonably expects that the work tool (the work email account) provided will be used exclusively for work purposes. The Court recognised the employee's right to personal private life within an employment relationship. Still, it also realised that certain exceptions to using employer-provided work tools are possible. Seen from the perspective of the employment relationship, as already mentioned, one of the legal requirements is that the employee is made aware of the requirements of the local legislation governing his work. Thus, if there is a clear rule laid down in advance for the employee that a certain measure has to be used exclusively for work purposes, and there are clearly defined rules and conditions for checking certain measures (e.g. correspondence, monitoring, mobility control), such a situation must be regarded as a more appropriate means of safeguarding the employer's interests, that is to say, the employer is entitled to carry out acts of monitoring and control of the employee if there have been clear rules laid down in advance for this activity. Moreover, in the earlier *Copeland* case, where the ECtHR interpreted a similar situation in a slightly different way, one of the essential criteria for monitoring an employee was the aspect of the employee's prior knowledge of certain rules – the essential distinguishing factor in *Copeland* case was that the employee was monitored without his knowledge (*Copland* Case). The Court also acknowledged that the employer's right to monitor employees derives from the specific nature of the regulatory framework of the employment relationship and the right to monitor the performance of the employee's work functions (professional duties). Such control is preventive to protect the employer's information technologies and information and prevent unlawful activities in the information space and social networks or to protect the employer's valuable information. In this case, the Court essentially echoed the basic principles of the processing of an employee's data: (a) the consequences of the monitoring for the employee must be assessed; (2) employees

have the right to have access to the Information collected during the monitoring of their electronic communications; (3) there should be no indiscriminate monitoring of each employee's electronic communications; (4) the employer should inform recipients of emails about the monitoring of employees (for example, it may include warning messages attached to all outgoing messages/emails to this effect and the use of the email address exclusively for work-related purposes); accordingly, measures should be taken to inform the senders of incoming messages/emails; (5) a specific time limit for the retention of the data collected from the monitoring of the employee's electronic communication should be established.

The Grand Chamber of the European Court of Human Rights (ECtHR), in its judgment of 17 October 2019 in *Lopez Ribalda v. Spain*, held that, in certain circumstances, covert video surveillance of employees does not violate their right to respect their private life. The employer's legitimate interest in ensuring the protection of property and the smooth functioning of the company overrode the employees' right to respect their private life in the given circumstances.

Over five months, a cash shortage of more than EUR 82,000 was reported. Employees were informed about the installation of CCTV cameras in their workplace, but some of the cameras were covert. A review of the CCTV footage showed that some cashiers, in collusion with customers, were cancelling cash transactions, and customers were not returning goods. In total, 14 employees were acting in collusion.

The ECtHR noted that in deciding whether there has been an interference with an employee's right to respect their private life, it is necessary to assess whether, in particular circumstances, the employee can reasonably expect to be monitored. Thus, the worker must be aware or at least reasonably expect to be observed in the workplace, as the Court considered. Such a condition is necessary not only for monitoring using video surveillance but also in any other way. Because of the specific nature of the employment relationship, it is necessary, as already mentioned above, to comply with the legal requirements laying down the employer's obligation to inform the employee of his working conditions. Moreover, the Court did not regard this obligation as critical, justifying the employer's legitimate interest as a higher value than personal privacy. In this context, it is also important to consider the employee's conduct. Moreover, regardless of how the employees are monitored, the monitoring of employees should be used as an *ultima ratio* measure when there is no other way to achieve the specific purpose of the monitoring. In other words, using this or that type of employee monitoring must be necessary because there is simply no other way to achieve the required monitoring objective (necessity criterion).

Thus, it can be stated that the restriction of an employee's right to privacy can be justified in cases where the employer suffers or is likely to suffer significant damage (specifically, in this case, financial loss, but such an approach could also be used be in other instances in which there is not yet any direct financial damage, but there is a real risk of such damage occurring, or where there is a critical threat to the business's safety, e.g., in the event of the employee's illegal transfer of important Information of the company to its competitors, or other similar cases). The Court also assessed the duration of the covert surveillance and the number of persons who had access. There were no other means of discovering the shortage of money in the cash register (necessity test). In the case of employee monitoring, the criterion of necessity is also relevant. This means that the employer's mere curiosity or assumption about the alleged purpose of the monitoring may not be a sufficient condition for monitoring employees. There must be a valid justification (necessity) for monitoring measures to achieve a specific objective or to protect a vital business interest, i.e. the potential harm must not be presumed but real. In addition, as mentioned above, it is a necessary condition that the damage cannot be prevented by other means (*ultima ratio*). The Court warned that mere suspicion of misappropriation or any other wrongdoing by employees would not be sufficient to justify the installation of covert video surveillance cameras. An important justification for covert surveillance of employees would be a reasonable suspicion that serious misconduct had been committed and a significant extent of the losses. This is particularly important where the smooth functioning of a company was

endangered not merely by the suspected misbehaviour of one single employee but rather by the suspicion of concerted action by several employees, as that created a general atmosphere of mistrust in the workplace.

The employer must have strong evidence to support a reasonable suspicion of serious wrongdoing. Thus, monitoring an employee by any possible means is only possible when there is a severe risk. An employer could monitor employees for purely preventive purposes only if the prevention is justified by critical necessity, e.g. fragmented employees in the field of monitoring, protection of property, occupational health and safety, and only if such objectives cannot be achieved by other means that are less restrictive of the employees' privacy.

This could include, in particular, local regulation - an appropriate legal environment that sets a certain standard of behaviour for employees. The cases and procedures for monitoring or possible monitoring by any means must be made known to the employees (the employer's obligation to draw up local regulations and to make them known to the employees) (Art. 206 LC RoL). In addition, the purpose of the monitoring must be clearly defined, and the employees must be informed of the monitoring carried out in the company. It could be concluded here that the mere knowledge that local rules protect specific processes or values is preventive. Additional possible monitoring measures, of which employees must be informed and have the right to influence the development of such rules through employee representatives (Art. 206 of the LC), could only be used in exceptional cases where: (a) legal measures alone are no longer sufficient; (b) damage is occurring, or there is a high risk of severe damage; (c) there is sufficiently strong evidence which can only be verified by monitoring measures; and (d) no other means are available to achieve the objective (the necessity criterion). It must always be assessed whether alternative measures less intrusive on the worker's privacy are not feasible to achieve the objective. The employer must determine such alternative measures, document its reasoned assessment in local regulations, and communicate it to employees.

Employee-specific monitoring measures must be the only and last means of achieving a specific objective. Thus, an employer cannot use a combination of several monitoring measures, either: for each very specific objective to be communicated to the employees, a specific and unique method of employee monitoring must be used, without which it is not possible to ensure the achievement of the objective by other means. Moreover, monitoring of employees should not be of a permanent nature (except in specific justified cases where monitoring is necessary for safety reasons or is required by law in the particular nature of the work performed). The employer's method of monitoring workers should last only as long as necessary to achieve the objective. In other cases where monitoring is needed for security, business process or health and safety purposes, the employer must put in place additional measures to ensure the right to privacy of employees:
1) inform employees before the introduction of information systems and technologies enabling the monitoring of their activities. The Information provided should be kept up to date and consider principle 10 of the present recommendation. The Information should include the purpose of the operation, the preservation or backup period, as well as the existence or not of the rights of access and rectification and how those rights may be exercised;
2) take appropriate internal measures relating to the processing of that data and notify employees in advance;
3) consult employees' representatives in accordance with domestic law or practice, before any monitoring system can be introduced or in circumstances where such monitoring may change. Where the consultation procedure reveals a possibility of infringement of employees' right to respect for privacy and human dignity, the agreement of employees' representatives should be obtained;
3) consult, following domestic law, the national supervisory authority on processing personal data (Recommendation 2015).

Combining the requirements of the legal regulation of employment relations and the legal protection of personal data, on the one hand, the obligation to organise work in accordance with the employer's rules and, on the other hand, the responsibility to ensure the employee's privacy, any information relating to the employee in the employment relationship must be accessible only to those persons who have the relevant specific obligations for

the fulfilment of which the processing of personal data is necessary. Thus, where the employer carries out specific monitoring measures, the data should be reviewed and evaluated by the narrowest possible range of authorised personnel. For example, in the Ribalda case, the Court indicated that the material obtained by covert filming would, first of all, be subject to the obligation to be reviewed by a single person, and once sufficient evidence had been gathered, the employees would be informed of the covert video surveillance carried out. And only after the designated person has assessed whether the data may be relevant to further investigations into the duties of the job or possible damage to the employer could the relevant information be made available to the persons entitled to take decisions in the employment relationship or, as the Court considered if there is a need to review the material, the circle of persons should also be pre-determined and extremely limited.

Conclusions

The employer must process the employee's data to protect the employee's right to privacy – one of the fundamental human rights. The challenge to implement this obligation is rapid technological progress that allows an easy way to surveillance employee's performance, actions, and position, which means the possibility to make a significant intervention in employee's private life. As the technical options are almost unmeasurable, the critical problem is how to limit the possible intervention to employee privacy. The employment relationship is specific due to the subordination principle (employer's power to give orders), so the challenge to ensure the employee's right to privacy becomes problematic in this context.

The employer has the right to set local rules that are in the employer's interest rather than the employee's. Such a situation would entail a disproportion between the mutual rights and obligations of the parties to the employment relationship and, therefore, the possible interference in the employee's private life by the employer to control the employee's working activities cannot be based solely on the criterion of a legal basis or a legal rule. Equally important is the quality of the legal framework, which is achieved, on the one hand, by the establishment of appropriate objectives and proportionate procedures for local legislation and, on the other hand, by the adoption of such local legislation following local legislative procedures, i.e. by involving workers' representatives in the decision-making process, through information and consultation procedures.

Regardless of the monitoring method, the monitoring of employees should be used as an *ultima ratio* measure when there is no other way to achieve the specific objective of monitoring. Using this or that type of staff monitoring must be necessary because there is simply no other way to achieve the required monitoring objective (necessity criterion). It should be noted that a restriction on an employee's right to privacy may be justified in cases where the employer is or is likely to be seriously harmed and that the general interest in monitoring employees is not sufficient on its own. Moreover, if the monitoring of employees is carried out and justified by the principles of processing employees' personal data, the processing of the monitoring results must be carried out by the most restricted circle of persons.

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DIGITALIZATION OF CIVIC EDUCATION: RISKS AND CHALLENGES

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Abstract. The passionate debate prevails in Lithuanian public discourse about the results of individuals in subjects such as mathematics, the Lithuanian language, etc., but very rarely about pupils' humanity and readiness to become independent members of society. The educational shift to distance learning (during the pandemic) has changed the whole structure of the educational process almost overnight, and such symbolic elements as the authority, status, order and dignity of the teacher, as well as the sense of community, diminished. It is clear that distance learning has its advantages, but it also has its uncertainties, and the long-term consequences still need to be generally known today. The academic intrigue of this paper stems from the question of how the digitalization of education may affect civic education and its outcomes from a political sociology perspective. Drawing on Kavolis' model of psychological modernization, the paper seeks to identify the potential groups that emerge in the digitalization of education and rationalize their worldviews and civic action features. Framing the process of digitizing schooling within the classical political sociology framework will highlight the likely future profiles of civil society groups.

Keywords: digitalization; civic education; Kavolis; typology; future profiles of civil society groups; political and sociological perspectives

1. Introduction

Progressive ideas are popular in Lithuania. Ambitious strategic goals are linked to technological development. The education sector is where the potential of using technology is widely discussed. The importance of digital technologies in the education sector has been highlighted during the COVID-19 pandemic when the need to ensure continuity of education arose. The move towards distance education has become an inevitable alternative, requiring a specific technological literacy. It soon became apparent that replacing contact teaching with distance education is challenging and natural. The new form of communication has inevitably changed the learning

process. The forced and rapid change has raised the need to consider the digitalization of education (including civic education) and the possible broader implications for the choices of future citizens.

Technological literacy is a "must-have" skill on the eve of the Fourth Industrial Revolution. So the pandemic has only accelerated a process that was already imminent. However, the notion of technological progress as a panacea for solving various problems seems questionable. Such optimism could be linked to the continuing modernistic discourse that technological developments will help to end the world's "enchantment" and to liberate (in this case) humanity from systemic gaps in education, such as inequality, exclusion and inefficiency. Modernization can thus be understood in a Dostoyevskian, hence rather pessimistic, as a mechanism of unbridled power that ignores or contradicts the original human condition. But it can also be seen oppositely, in a Muskian way, that is to say, in a somewhat optimistic manner, as a moment of triumph of human imagination and capacity and as the resultant birth of indispensable helpers – various state-of-the-art technologies.

The academic intrigue of this paper stems from the question of how the digitalization of education can affect civic education and its outcomes from a political sociology perspective. Symbolic elements of social relations, such as the teacher's authority, status, order and dutifulness, the sense of collectivity, and even a certain sense of intimacy, transformed with the transition to distance learning. In Baudrillard's words, the notion of "school", which had been built over the centuries, has collapsed and remained an electronic simulacrum. And while the benefits of distance education are widely talked about (Cook, 2007; Cojocariu et al., 2014; Dhawan, 2020), they are also highlighted by the uncertainties (Sintema, 2020; Lincényi & Mindár, 2021), which suggests that the real long-term consequences may be ambivalent and, therefore, unknown as yet and unrevealed today.

In Lithuanian public discourse, there is ongoing passionate debate about the learning outcomes of individual subjects such as mathematics, the Lithuanian language, etc. Alas, there is rarely any discussion about students' humanity and readiness to become autonomous members of society. While it could be argued that technological innovations do not in themselves change the goals of learning (e.g. to develop a free and independent personality), as the same pandemic has shown, relying on technocratically rationalized regulation of social life inevitably decreases the frequency and importance of qualities such as attentiveness, mindfulness, understanding, and empathy (Latar, 2015; Montal & Reich 2017; van Dijk, 2020). Thus, the trajectory of the rapid rise in the importance of technology and the declining trust in people's social skills prompts a critical discussion of how to assess the (inevitable) impact of widespread technological innovations in education on the moral sensitivity of future societies. The aim is to identify potential groups emerging in the digitalization of education and to rationalize their worldviews and horizons of civic action based on Kavolis' model of psychological modernization. Framing civic education's digitalization process within the classical political sociology framework will allow us to highlight the likely profiles of future civil society groups.

2. Trends in the digitalization of education

The rapid shift towards digital learning in the pandemic era has prompted researchers to explore the impact of technology on educational content. The first attempts at academic reflection have already appeared, and several directions are emerging regarding benefits and challenges. There is consensus about the benefits of digitalizing education in terms of ensuring a seamless educational process due to its wide accessibility, ease of use and interactive nature (Almaiah, Al-Khasawneh & Thunibat, 2020). Reducing social exclusion is also an advantage of distance education (Volchik, Posukhova & Strielkowski, 2021; Ragnedda, Ruiu & Addeo, 2022). Digital technologies and distance education tools play an essential role in managing, planning, delivering and monitoring the learning process (Bida et al., 2021).

Anyway, opinions about the impact of digitalization of education on the content or the education process differ. For example, replacing contact-based learning with distance learning has profound implications for the physical

and psychological health of students and teachers, for student achievement, and the emergence of social differences (von Hippel & Hamrock, 2019; Dehghan et al., 2022). Much of the academic literature focuses on teachers' challenges, particularly technological literacy, with some teachers needing more preparation for distance-only teaching (Moorhouse & Kohnke, 2021).

Another highly relevant area that has received considerable attention in the literature is the challenges students face, mainly due to a lack of socialization, interactivity and engagement, and delayed or inadequate feedback (Pokhrel & Chhetri, 2021). Attention has been drawn to the physical and psychological problems of children's addiction to virtual space and physical and psychological problems (Brooks et al., 2020; Golberstein, Wen & Miller, 2020). Even before the pandemic (when learning was not so massively digitalized), it was stressed that children of early school age are socially unprepared for school if distance learning is used, and that students and young people are deprived of opportunities for growth and development (UNESCO, 2020). Undoubtedly, these problems have been exacerbated in the pandemic and post-pandemic periods. Initial results show uneven student engagement in distance education (Andrew et al., 2020; Dietrich, Patzina & Lerche, 2020; Reimer, Smith, Andersen & Sortkær, 2021), and it is easy to predict that the consequences will be uneven. For example, studies conducted during the pandemic period have observed declining academic performance of learners when only distance education is used due to a lack of contact hours, tutoring, feedback, etc. (Coman et al., 2020; Carrillo & Flores 2020; Engzell, Frey & Verhagen, 2021).

3. Digital civic education

From a political sociology perspective, the critique of civic education is not about the process of education or its effectiveness but about its ability to contribute to the continuity or change of the tradition of citizenship (Janoski et al., 2005; Goodman, 1989). Practitioners speak of the need to shape a particular direction of (desirable) change in society by drawing on that society's authentic cultural and mental habits (Dahrendorf, 1990; Czyzewski, 2020). From a political sociology perspective, civic education is more than just learning basic facts about political institutions and their functioning. It also includes learning virtues, values and attitudes towards social action (Nash, 2010). In this sense, civic education is not an isolated subject in the curriculum but rather one of the fundamental principles that shape the entire curriculum. One of the most important goals of civic education is to convey standards of common civic culture, a specific moral culture (Donskis, 2004).

In the academic literature, digitalization is associated with expanding forms of civic participation (Hasselwander, 2022). It is believed that using digital resources can increase citizens' involvement, reduce inequality and exclusion, and promote civic participation and empowerment of citizens (especially young people) (Cho et al., 2020). Overall, research on digital citizenship still needs to be completed. However, studies linking forms of digital learning and civic education discover positive links at the empirical level (see, for example, Baron, Gomez, Pinkard, & Martin, 2014; Kwon & de los Ríos, 2019; Woodall & Lennon, 2017), and despite these are not large-scale studies, their positive findings can be taken into account.

The ambition for digitalization matured in the pandemic is likely irreversible; the only question is how fast and broadly it will be realized. It is believed (Dwivedi et al., 2019) that milestone processes affecting future generations may be underway in the nearest future: "the trajectory towards increasing applications using AI has the potential to change many aspects of human lives and impact society as a whole. The way forward is not clear, and the potential roadmap is undefined. Numerous benefits could accrue from AI, but there are also significant risks that swathes of society may be disenfranchised from implementing the technology. Decisions made within the next few years on the forward path for AI are likely to have an impact on all our lives and the lives of future generations" (Dwivedi et al., 2019: 42). It is also interesting to note that in Lithuania, a lot of attention is paid to the digitalization of education in terms of form but not in terms of content, i.e. it is about technological literacy, accessibility of tools, but not about the impact of all this on the value orientation of future members of the society,

e.g. empathy development. As mentioned above, from a political sociology point of view, the debate on the digitalization of civic education focuses on the possible consequences, and it is vital to identify a scientifically evidence-based way of rationalizing such considerations.

In Lithuania, the digitalization of education is also gaining some momentum. Digitalization of education is associated with improving the quality of teaching: reducing student achievement gaps, reducing multiple exclusion, equalizing access and engagement, improving the dynamic environment, monitoring psychosocial risks, and faster decision-making (Skaitmeninė transformacija: ateičiai pasirengęs švietimas 2021: 3). However, all the projects are still in the implementation phase, and it is not yet possible to assess their effectiveness.

The paper has no wish to denigrate digital education. Still, it aims to raise a series of critical cautions about future consequences, especially against simplistic and opportunistic claims that digitalization in education is a ready-made remedy for the current crisis. A wave of research has emerged debating and inviting critical reflection on issues related to possible future implications of digitalization (e.g. Williamson, Eynon & Potter, 2020; Hillman, Rensfeldt & Ivarsson, 2020; Knox, 2020; Selwyn et al., 2020).

4. Dimensions and challenges of civic education in the digitalization era

From a political sociology point of view, it is crucial to make a more explicit link between specific cultural contexts and their impact on public behaviour - what are the cultural trends and their direction, and what choices does this lead to in the social sphere? In the face of new realities, such as the rapid digitalization of education, it is crucial to understand the likely cultural vector of citizenship development. To calibrate valid arguments, it is first necessary to outline the methodological framework of such a model. Accordingly, reference is made to the classical neo-Tocquevillian (e.g. Putnam, 2001; Howard, 2003; Hoffmann, 2006) conception of the genesis and functioning of civil society. In this view, society is not a historical inevitability but a historical phenomenon. Accordingly, civil society is those who, "being free, can overcome their selfishness and, together with others, can take up common causes that transcend personal interest and the inter-private interest of the whole group. It is a voluntary act of fellowship by people who associate the meaning of life and personal development with concern for the common good" (Aleksandravičius, 2023: 16). Obviously, the emergence of such a civil society is not a given, but depends on a wide range of social, cultural, political, etc. aspects. With the rapid digitalization of (including civic) education, it is reasonable to consider how this will affect future forms of civil society.

It should be noted that civic education takes different meanings and forms (global, cultural, and national citizenship) depending on the historical period. Therefore it has undergone a specific development in Lithuania (see more in Balčiūnienė, 2007). Today, civic education in Lithuania is understood as a set of personal competencies (social skills, moral attitudes, knowledge, sense of identification with one's own country and cultural environment, and political-social activism).

Today, as mentioned above, education is going through another phase of development linked to increasing technology intervention. Civic education is no exception. A type of digital dimensions of citizenship is emerging in the growing academic literature (e.g. distinguishing between digital engagement learning opportunities (opportunities to learn how to create and share digital media tied to societal issues) and digital consumption learning opportunities (opportunities to learn ways to judge the credibility of online content)). At the same time, empirical studies show that the digitalization of technology and learning impacts learning content and outcomes (Bowyer & Kahne, 2020).

There is a wide variety of conceptions of citizenship in the academic literature (e.g. Dunne, 2003; Kymlicka & Norman, 1994). In summary, citizenship can be seen as a set of personal competencies (social skills, moral attitudes, knowledge, a sense of identification with one's own country and cultural environment, and political-

social activism). Citizenship content is historically variable, taking specific forms depending on the political situation and cultural and social traditions (Jackson, 2004; Stevenson, 2001).

Table 1. Comparison of the dimensions of citizenship and digitalization and the categories of civic education.

Dimensions (according to Gagnon and Page, 1990; Dunne, 2003)	Sub-dimensions (according to Kymlicka and Norman,2000; Diamond, 1997)	General competencies under the NŠA*	Categories of research on digital technologies and civic education	Kavolis's Concept of Citizenship and Categories of Acceptance of Modernization
Identity	Identification with your country, culture, nation and corresponding personal feelings	Cognitive	A system that enables personalized learning, integrating learning outcomes monitoring and management in all environments	Organizational, structural aspects: effectiveness of existingstructures for the expression of citizenship vs, control of the bureaucracy, public participation, dialogical approach
Normative	Attitudes, values, virtues: an essential aspect of citizenship involves the ability to transcend one's self-interest and take responsibility for the well-being of the larger group of which one is a member.	Social and emotional aspects of healthylifestyles	Renewable, progressive technological competencies for educators, transforming education	Values: independence, community, generosity, cooperation, public interest, self-regulation, tolerance, individualism
Capacities	Social skills: teamwork, community, dialogue, leadership, adaptability, communication.	Creativity	A data-driven educational process management infrastructure, including analytics, MM/DI monitoring and solutions	Cognitive abilities: intelligence, autonomy, knowledge, agency, commitment, creativity
	Thinking skills: decision-making, conflict resolution, critical/analytical, and organization.		Standards-driven educational tools, content, processes for quality and interoperability	Acceptance/rejectionof social change: associated with rationalism or, conversely, "impulse relaxation."
Participation	Civic/political participation: linked to conventional participation	Citizenship / Cultural / Communication	Long-term financial instruments to promote dialogue and teacher involvement inthe creative process	
	Public (social) participation: linked to social and symbolic capital			
	Protest: associated with unconventional participation			

Source: made by the author

Civil society and citizenship are historical constructs that have taken different forms, are historically changing and have specific social, cultural and political content. The analysis of the literature has revealed a variety of other

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* Project https://www.nsa.smm.lt/wp-content/uploads/2022/12/Pilietiskumo-PKT.pdf

theoretical treatments and empirical variables. Civic education is not only a purposeful educational activity expressed in terms of knowledge, the aim of developing certain attitudes and virtues and the encouragement of appropriate action, which is realized through the subjects of civic education, but also as an educational process (going beyond the specific subject matter), which involves the acquisition of knowledge, the formation of attitudes and virtues, and the promotion of appropriate activity, all of which have socio-cultural and socio-political implications for the future citizenship of society.

The dimensions highlight the areas of intervention in civic education and the direction of the educational process. Accordingly, the digitalization process also has its patterns. Since the dimensions of the digitalization process are still crystallized, the typology still needs to be established; Table 1 shows some emerging trends. This makes it possible to identify the direction and objectives of the digitalization process. However, to discuss in a reasoned way the potential impact on future forms of citizenship, a methodological framework is needed to link digitalization, civic education and the most likely consequences.

5. Assessing the future impact of digital civic education

To achieve this task, the methodological principles of acknowledged sociologist V. Kavolis help study the impact of digitalization on individual citizenship. In his analysis, Kavolis was concerned with the trajectories of consciousness of Lithuanians and the circumstances influencing them. It is worth mentioning the sociologist's contribution to the study of the formation of the Lithuanian character (Kavolis, 1991) and civic psychology, for example, what happens to a society when their homeland is taken away from them (Kavolis, 1994). Drawing on Kavolis' conceptual and methodological tradition, the impact of digital civic education on future citizens' attitudes, virtues and activism is discussed.

V. Kavolis model is based on the assumption that the tension between the rational and impulsive elements of the personality grows stronger with modernity. Kavolis has identified two main directions: rationalization on the one hand and relaxation of the impulse on the other. According to the sociologist, a person can react to social trends in two ways: to "accept" them or to "reject" them. The personality can be directly shaped by its environment as if becoming a mirror of the changing society (Kavolis called such a person a modernist personality), or it can become the opposite of the tendencies of social change (Kavolis called such a person an underground character). Theorizing from a much later time, Kavolis recognized that this typology of the two extreme poles did not capture the diversity of society and its possible reactions, and he, therefore, identified a third type, the postmodern personality, which he identified as being the most promising and desirable (1970: 76).

Kavolis' typology of the impact of modernization on personality psychology is based on the reaction to change - "accept" or "reject". Thus, the personality can be directly shaped by its environment, as if becoming a mirror of the changing society. Still, it can also become the complete opposite of the tendencies of social change, i.e. what its community is not, to find and take on the qualities that it misses the most in its society (Kavolis, 1970: 68). Accordingly, two primary and markedly opposite personality types emerge (Kavolis, 1970: 74-76):
 • The first type - the modernistic personality - is formed by direct exposure to social trends and imitating them in the psyche. This personality is rationally organized but functions non-emotionally. It is concerned with the application of rules rather than with solving fundamental existential problems. This personality is characterized by internal fragmentation: each function of the soul operates separately. Solutions are organized in systems, like a flight to the moon. Things, events and feelings repeat themselves in a standardized way. What exists to be consumed, and nothing has lasting value. All desires must be immediately satisfied. This personality experiments with what (and those) is the newest because it is the most recent. It is not concerned with the ultimate consequences of its actions or the criteria for its choices. Its life consists of fleeting moments of impermanence.
 • The second type - the underground personality - rejects the social trends of its period, whatever they may be, and shapes itself by rebellious reactions to them. It trusts what is subjective. It is constantly dissolved in

one or another ecstatic chaos, movement, or event. It does not count in precise language. Definitions are only meant to distinguish man from man. Every event, person, image, and sound is disposable (exclusive and soon to disappear) and, therefore, to be cherished. The world of such a person is a fragment of sensations. Nevertheless, he is concerned with producing something tangible in which he can feel a hint of lasting values and a sense of his necessity. He is looking for some nameless home in the fast-moving history and circular universe, for some primitive, archaic, mundane and straightforward things amid constant experimentation. He is terrified that he might become stagnant, silent, and unable to react. He is looking for a connection with the new dogmas and rituals which form the character

Such typology of the two extreme poles does not capture the diversity of society and its possible reactions. Kavolis identifies a third type, the postmodern personality, which is recognized as the most promising and desirable (1970: 76). However, based on the strict conceptual scheme proposed by the author himself, we would suggest that the latter type is more representative of the reactions of a person in a later stage of modernization (variously referred to by different sociologists as late modernity, post-modernity etc.). In other words, it does not arise automatically from merely accepting or rejecting trends of change. The accompanying feature of this type is reflexivity, i.e. the ability to reflect critically not only on the environment but also on one's actions and to determine the degree of responsibility, which in sociological discourse becomes a key feature of late modernity. This latter characteristic allows us to pick out the best parts of the previous two types and to balance the response. Therefore, according to Kavolis (1970: 76):

• The third type of personality feels all these dilemmas. It defines itself through the tension of the dilemmas and the inner necessity to embrace the contradictions of these tensions and resolve them in its way of life and creativity. This is the postmodern man. It has the hint of the creator of a future civilization - technically sophisticated, but "with a human face". Only such a personality can counteract the pathologies inherent in modernist and underground characters. Not so much to neutralize the pathologies, however, as to mediate the values he finds among modernists and undergrounders.

V. Kavolis' theory, in its way, enters the discourse of civic education in Lithuania. As mentioned above, the digitalization process is associated with the potential of technology to expand the horizons of democracy, for example, to increase the participation and effectiveness of future citizens, but there is minimal discussion of the spillover effects, which are increasingly visible in academic literature (Sancho-Gil, Rivera-Vargas & Miño-Puigcercós 2020; Alirezabeigi, Masschelein & Decuypere 2020). It is a truism of political sociology that low public identification with the political community and sluggish engagement with public affairs inevitably lead to an increase in the bureaucratization of public life. Kavolis' theory links the impact of social change to a psychological modernization model, pointing out that combinations of value, virtue and performance characteristics are not necessarily unambiguous.

By elaborating on the dimensions of civic education identified in the scientific literature and rationalizing (in a Kavolian way) the impact of digitalization from a normative perspective, we can identify the more general attitudes, civic virtues and levels of activism expected by different groups.

Table 1. The impact of the dimension of civic education and digitalization on Kavolis types of worldview

Dimensions of civic education and digitalization	V. Kavolis' personality types and the rationalization of their worldview and moralculture		
	Modernists	**Underground**	**Postmodernists**
Embracing social change/digital trends in education	- openly accept and are willing to rely on the promiseof progress - rational reasoning and technological competence to overcome humanity's fundamental challenges, such as liberation from suffering and improving well-being.	- characterized by an *a priori* opposition, not necessarily from specific situations, but rather from a value-based attitude to reject and not accept the imperatives of the changing order - progress. It is a relative niche group.	- are open to the prevailing innovations of the times, as long as it is in line with their values and helps to solve social ills.
Technological literacy	- trust in scientific rationality, embrace innovation and support the innovations of the times largely shape their worldview. Highly receptive to technology.	- do not trust the promise of progress norrational reasoning, and reject any technological innovation or novelty.	- openly critical of the promise of progress to liberate humanity from suffering and improve well-being, understanding that this will not be achieved without engagement and empathy.
Attitudes, values, virtues.	- are more accepting of pragmatic - statistics-based - than value-based arguments,and are therefore more likely than other groups to justify instrumental relations, and consequently prioritize "deeds over talk", "expert knowledge over Socratic debate", and "rational calculation over social dialogue".	- are pragmatic but lacking clarity of values (often conflicting values that do not allow a tangible direction to be proposed), are not acceptable and are more likely than other groups to justify a nostalgia-infused worldview.	- are more accepting of value-based than pragmatic arguments, and are therefore more likely than other groups to justify a dialogical relationship, prioritizing ideas, public interest considerations and the best views that emerge from debate.
Identifying with your country, culture and people	- tend to delegate responsibility for the contentof public life to government and relevant services, whoseeffectiveness is measured byinnovative service delivery, modern communication and technological innovation.	- the majority also tends to delegate responsibility for the content of public life tothe government, while efficiency is associated withconservatism and preserving tradition.	- tend to take personal responsibility for the contentof public life. They are a group of active people who trust each other, are reluctant to withdraw from the organization of social lifeand prefer to take the initiative rather than delegate it to the state.

Self-expression Social skills	- tend to associate the meaning of life with a functional mission (stemming from a profession, hobby or social status) and its effective fulfilment. The success of self-expression is linked more to form (and, presumably, the quantitative and qualitative parameters of its visuality) than to content (its artistic uniqueness or conceptual originality). The value attitudes that are in flux in society are often met with ridicule as a competing domain. Priority for professional leadership. Communication is driven by a specific goal or needs, organized in a targeted way, targeting particular social groups, and dominated by functionality (it is about solving a specific problem or achieving a goal).	- do not trust the dominant innovations of thetime, but tend to rely on various populist claims, steeped in historicity, to restore "order", to prioritize traditional values and "historical justice", and to reject any traces of modernity. They are reluctant to trust people who use scientific knowledge or expert modelling to make their case, even if they have noble goals. Communication is linked to specific values, organized according to socio-political circumstances, not group-specific (the target audience is the public), and dominatedby the attitudes of the represented discourse (it is crucial to make one's position known).	- associate the meaning of life with creation and self-creation, and see the challenges they encounter as challenges to be overcome. Dialogue between groups and public consensus is more important than expert knowledge or rational calculation. Communication is linked to values and needs,organized in a targeted, contextual way, selecting arguments that enable dialogue between differentgroups, and is dominatedby the public interest (it is essential to achieve a broader consensus in society).
Thinking patterns	- innovation will always take precedence over tradition. Any historical or cultural sentiment is secondary to them. Value and fairness of a different approach are closely linked to the effectiveness of the delivery of the underlying objectives. Decisions are based on scientific reasoning. The origin of conflicts lies in the divergence of arguments. It is primarily concerned with efficiency and professional/group interests.	- reject other opinions if it is not in line with their values. Decisions are based on tradition. Conflicts have their origins in emotions. Primarily concerned with the process and exclusively with group interests.	- when faced with a different opinion, they question it, review the arguments and then decide whether to reject or accept it. Whatever their judgement of the other idea is, they tend to get its right to exist because it does not offend their collective feelings. Decisions are taken from a holistic perspective. Conflicts are rooted in the public interest. It is primarily concerned with socialjustice, placing interests in the context of the public interest.
Civic/political participation	- link their civic mission to the dutiful payment of taxes, and see their responsibilities as consumers of public services, not creators. They prioritize material security and tend to develop and continuously improve their competencies but oftenlimit themselves to narrow specialization.	- link their civic mission with a kind of resistance, dissatisfaction with everything happening, but personally - demonstratively - refusing to participate more actively or otherwise contribute to the enrichment of social life. Only a tiny part of this group tries to take personalinitiative.	- are open to change, linking their civic mission to a willingness to experience global trends in practice, making participation in public affairs an inevitable way of life without creating tensions with other groups insociety or with the authorities.

Public (social) participation	- when being convinced of their righteousness (which is based on empiricism), they tend to deny the other view, basingtheir belief on "accidental" or "insufficient" "evidence"or "inference".	- When convinced of their righteousness (based on value-based sentimentality), theyfight for their right to an opinion. They tend to fight against dissent that offends their collective feelings, but in principle, they recognize that friction also has a right to exist.	- When convinced of their righteousness (based on constant modelling and reflection of any situation), they prefer to take responsibility and express leadership in representing the public interest. They prefer environments where they can better serve society and use their talents.
Potential for protest	- relate social order to institutions and their functionality, and see power as a vertical hierarchy of positions.	- relate social order with tradition, and see power as a pyramid of values, supporting hierarchical structures.	- relate social order to self-government, and see power as a mechanism of critical and reflective reasoning for the public interest.

Source: made by the author

The distinguished types are more suitable for academic purposes; in reality, their expression may not be (as usual) so precisely separated. Usually, it is overlapping and not necessarily visible in such apparent forms. However, in this case, it is crucial to recognize its expression's direction and possible trends. Assuming that Kavolis' theory of psychological modernization reveals societal development patterns, it is possible to get a picture of the potential consequences of the digitalization of civic education. Without an empirical study, we cannot demonstrate reliable quantitative expressions of this process. It is important to recognize the likelihood of consequences that are likely to increase with the acceleration of this transition (both quantitatively and qualitatively), and to think about countermeasures to ensure the transmission of the desired civic skills and values to future generations. It is still unclear, which group (be it modernistic, underground or post-modernistic) will become dominant in increasing the digitalization of civic education, and which features will become predominant among future citizens. However, the consequences of digitalization will be complex and produce various aftereffects of civic activity. As mentioned above, research shows mixed evidence for digitalization interventions in education, especially in citizenship education (Williamson, Eynon & Potter, 2020; Selwyn et al., 2020). With a schematic view, we can understand where civic education needs to be directed to increase future empathy and communication in society and what needs to be avoided to reduce the growth of narrow interests and closed emotional groups. This study contributes to the academic literature in two ways: by testing the applicability of Kavolis' theory to the digitalization of civic education and by expanding the range of arguments for the guidance of the digitalization process.

6. Discussion

The study's limitations are related to the need for more application of Kavolis' concept in empirical research, which would allow for improving and validating the methodological approach. On the other hand, exploratory analysis shows that the types developed by Kavolis are recognizable in reality (Genys, 2020). The groups formed based on personality types have indeed undergone some development (depending on the age of the members, they have experienced the modernization of Soviet and Independent Lithuania and rapid global digitalization). Still, the types have neither mellowed nor become more similar. On the contrary, they have crystallized even more, taking on specific features (typical of the post-Soviet reality). It is worth mentioning that the pilot mentioned above study was carried out on the data of Lithuanian migrants, which may impact the answers' quantitative and qualitative characteristics.

On the other hand, the rationality of the groups and the structure of the arguments (not the answers, but the rationalization of the solutions) showed apparent differences: the "underground" group seems to be the most

internalized in terms of the value-oriented typology of Kavolis and thus the most evolved. At the same time, it is the smallest group in terms of numbers. The underground man with strong convictions has drifted towards a type that retains a strong dissatisfaction (often turning into anger), which, instead of basing principled opposition on concrete alternatives, is more likely to affirm its apparent powerlessness and hypertrophied paternalistic expectations. The "modernist" group has an obvious objective, which becomes the basis for further choices. The group is characterized by a transparent, instrumental chain of rationalization - problem, solution, result. Finally, the "postmodernists" take responsibility for the world around them but do not link their activities exclusively to Lithuania. The global world becomes the area of their activity. The members of this group become less dependent on the factors around them and more in search of self-fulfilment, which directly results in a more positive attitude and a more assertive and moderate posture.

To summarize the discussion, Kavolis' theory (whose conceptual framework is rooted in historical processes) is not deterministic but allows us to point out possible consequences. The digitalization of civic education in Lithuania, as in any other country, depends on many aspects: global technological developments, the region's geopolitical situation, socioeconomic situation, etc. Accordingly, this can provoke different consequences for society. It is important to realize here that the results of the digitalization of civic education will inevitably affect the forms of civic activities of future societies. Irrespective of the aims, not civic education content, but the digitalization process (as an ongoing aftereffect of the modernization process) provokes different responses between groups. Therefore, some groups are more likely to exhibit characteristics of "modernistic" personalities, while others are more likely to exhibit characteristics of "underground" or "postmodernistic" characters. From a political sociology perspective, the digitalization process may lead to different trends in the expression of citizenship (values, attitudes, participation, involvement, etc.) and, thus, to other forms of future civil society. This calls for vigilance and a critical appraisal of the process and its possible consequences.

Conclusions

The literature analysis has shown that the digitalization of education (including civic education) is a growing process, the results and final consequences of which still need to be fully known. At this stage, it is still essential to broaden the analytical discourse on digitalization from various angles to better understand the phenomenon and its implications for the future society.

The study shows that Kavolis' model of psychological modernization is promising in the field of education and allows for a critical assessment and prediction of the possible consequences of the digitalization of civic education. The model enables distinguishing different groups affected by digitalization and, most importantly, discussing their worldview systems and models of citizenship. The analysis has revealed significantly other groups with distinctive rationalizations of worldviews and citizenship practices. The impact of digitalization on civic education is likely to have quite different consequences (i.e. not only desirable but also unavoidable and secondary), as it depends on the individuals' intuitive (what Kavolis called psychological modernization) response to the digitalization process. This analytical rationalization of the possible consequences makes it possible to select more precise (valid) arguments to mitigate the consequences of digitalization for the future civil society.

While there is still a lack of research on the digitalization of education (and civic education in particular), the typology of participants into three groups and the diagnosis of their argument structure can reasonably broaden the choices of decision-makers and allow for a more precise and (hopefully) more effective organization of civic education digitalization policies. The description of the dimensions of the digitalization of civic education enables argumentative discussion of specific scenarios and a justification of decisions.

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DIGITAL INNOVATION GOVERNMENT: ORGANIZATIONAL AND ENERGY ANALYSIS IN ITALIAN HOSPITALS[*]

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Abstract. Analyzing the complex structures of 1062 Italian hospitals, the present research aims at evaluating the performance relating to the sustainable energy management. The monitoring activities were carried out both to analyze the building and structural context and to analyze the energy consumption of Italian hospitals during the period 2016-2022. Furthermore, the paper elaborates a comparative analysis the other European countries, highlighting how is possible to improve the energy efficiency of Italian hospitals. The energy analysis concerned the breakdown of electricity consumption, analysis of the consumption of the last six years derived from the monthly bills of hospitals, the consumption now, distribution of electricity consumption, and air conditioning needs; the organizational analysis concerned the plant characteristics of the structure, the age of the building and building maintenance over the last 6 years. In the discussion, possible solutions emerge, operational interventions, to make the energy management of hospitals, more efficient. The presence of different services provided highlight different profiles of energy consumption linked to two main categories: hotel-type consumption for the well-being of patients and staff and consumption more closely related to health functions supported by treatment and diagnosis equipment. In recent years, numerous opportunities for energy upgrading of buildings have not been implemented by creating energy profiles of obsolete and inefficient hospital facilities. In this context, the role of the energy manager and the presence of structures dedicated to energy management emerge as the main bottlenecks for achieving better energy efficiency. After the introduction, the paper elaborates a conceptual background focused on sustainable energy management. The section 3 show the methodology applied, the main results are included in section 4 and the discussion section have been developed in section 5. Finally, the conclusion highlights that the sustainable energy management is an open question and the output of discussion linked to the research suggest that the hospitals' energy efficiency must be seen as under constant development and re-interpretation.

Keywords: energy policy; digital technologies; government; health

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1. Introduction

In recent years, modern society is increasingly interested in the energy issue (Clarke et al, 2015), understood as sources of supply (Russo et al, 2021), consumption (Su et al, 2022), and distribution (Patil et al, 2021) of energy. The comparison concerns the economic systems (Liu et al, 2022), the technological evolution (Wen et al, 2022) and the environmental situation (Alola et al, 2021) of the individual States (Yang et al, 2020) and the entire Planet (Smol, M, 2022). The growing energy demand highlights the need for individual states and the internal Planet to pay attention to the economic and environmental costs arising from the use of different energy carriers, shifting attention to the issue of energy efficiency (Economidou et al, 2022). In this context, the total use of energy in Italy, related to the hospital sector is about 35% of the total (OEDC, 2020). Hospital facilities are a very complex structure (Mavrotas et al, 2008), not only for the size and the different technologies that coexist within it (Baltussen et al, 2019; Zavadil et al., 2020) but above all because it is the only public building (Marino, 2001), that must maintain a constant service every day of the year, 24 hours a day (Ai et al, 2022). Energy is one of the fundamental elements for the functionality of healthcare facilities and the different sources converge and interact with each other to ensure patients, employees and users, a safe, comfortable and continuous service (Szczygielski et al, 2021). Nevertheless, it is one of the contexts where there is the greatest margin of difficulty for the implementation of efficient energy strategies. The difficulties relate to a series of elements such as buildings that do have not modern structures and are difficult to maintain and innovate (Yu et al, 2022). It should also not be forgotten that an improvement in energy efficiency must not necessarily result only in an economic advantage detectable in the bill, but can also be used to increase thermo-hygrometric well-being and the health of the environment, all the more reason given the very purpose of the buildings under consideration and the particular condition in which its users are located. Some studies (Bellini et al, 2020) have thoroughly analyzed the general situation of the Italian health heritage about Europe (Lal et al, 2021), to evaluate investment policies and the definition of appropriate intervention strategies. The monitoring activities were carried out both to analyze the building and structural context (Martinez et al, 2022) and to analyze the energy consumption of Italian hospitals. This comparison with the other realities of Europe, highlights what will be evaluated in our research issue, following this research stream, the research question (RQ) will be: how is it possible to improve the energy efficiency of Italian hospitals? In this work, the introduction is followed by the literature review, after the methodology, we present the results of the research, followed by the discussions, and finally the conclusions of the work. In the next paragraph, concerning the research issue, we highlight the reference literature.

2. Conceptual background

The current pandemic has dramatically highlighted the central role of the hospital structure in terms of the organization and delivery of health for our well-being, as well as that of the multiplicity of different energy services essential to deliver health (Yaps et al., 2021; Santiago et al., 2021; Liang et al., 2019; Castán Broto & Kirshner, 2020). Unfortunately, in Italy, investments in energy efficiency have fallen due to the economic crisis, as underlined by the International Energy Agency in its recent report (IEA 2022). Moreover, in this context the response of the European Union (2022) is not yet clear, unlike other crises, see the pandemic from SARS Covid 19. The role played by the European Government in the implementation of measures to support the energy crisis. Avoiding generating a new economic crisis is fragmented and does not show strong elements of union between the 27 Member States. In this context, the hospital principals (Liang et al., 2019; Weyman-Jones, 2019; Fawcett & Killip, 2019) are involved in a dual strategic path: they deliver health but, to deliver it consumes energy, are energy-intensive structures, therefore, for the hospital principals have set out a challenging process: The European Parliament is calling on the Council and the Commission to ensure that the European Parliament is fully involved in the implementation of the Kyoto Protocol. The hospitals in Europe (Mossialos et al., 2019; Johnson et al., 2019) have evidenced that to withstand this challenge it is necessary to combine adequate normative support (Prada et al., 2020) the collaboration of various subjects, identifying the best projects and the sharing of ideas and

cutting-edge technologies (Grillone et al., 2020). National experiences, in particular Italian ones, confirm the presence of several barriers to the full implementation of energy efficiency potential and, in particular: a market where consumers and businesses still experience long return times, difficult access to investment capital and dispersion of measures, resulting in high transaction costs (Saint Akadiri et al., 2019; Pichler et al., 2019). The role of the individual member countries of the European Union is strategic to build virtuous processes of implementation of operational projects that combine care and energy consumption. Improving the energy performance of Italian hospitals is one of the main objectives to accompany the energy transition of this country and the energy efficiency of the National Health System (Alola et al., 2919; Economidou et al., 2920). It should not be forgotten that energy efficiency is a lever that starts from the bottom up and is transversal to several economic sectors. The energy upgrading of hospitals Fox et al., 2019; Li, et al., 2019) would see its indirect benefits greatly reduced if not supported by the efficiency of the industrial sector associated with it. The health sector, with the peculiarities of the sectors included in it, is affected by redevelopment interventions as well as by interventions to improve the efficiency of its service processes. Efficiency must be supported by emerging technologies (Bygstad et al., 2020; Moro Visconti et al., 2020), such as the predisposition to the intelligence of buildings, technologies for the built environment, heat recovery and solutions for energy communities. Particulalrly, the moment of great changes that we are going through has shown with great evidence the importance of the scientific committee to seek solutions, for our social and economic well-being. Smart Readiness Technologies (Ronaghi, 2022; Sebastian, 2019) is seen by the European Commission as an important tool that can, on the one hand, encourage investment in Smart Ready Technologies (SRT) and, on the other hand, help SRT producers to improve their supply and organize it according to the types of demand (Santiago et al, 2021; Li & Zhang, 2022). Hence the importance of defining the Smart Readiness Indicator to promote the spread of smart building technologies, (Awada et al., 2021; EN ISA, 2022) quantify the level of "smartness" of buildings and certify the benefits that result in terms of energy efficiency and performance Woll et al., 2023; Kumar et al., 2020; Fisher et al., 2020). The role of information and training is strategic, in particular for the type of these structures, hospital facilities, which is very complex because it often combines the typical energy characteristics of a multiplicity of other types of "energy consumers": from the real estate/hotel sector (hospitals) (Ismail et al., 2020; Paparizos et al., 2020; Tavakoli et al., 2020) to the energy generation and transformation sector (large cogeneration/trigeneration plants), to research and sports (rehabilitation). This energy complexity can be broken down into prime factors by using the energy diagnosis (Alzubaidi & Soori, 2012; MacNaughton, 2018) report in the health field, providing an industry-specific data collection methodology, standardizing the technical glossary and defining minimum levels for energy monitoring, which can be an important tool for the definition of energy efficiency actions useful to define reliable reference parameters. Accurately estimating the real energy and economic savings of a building (Pallis et al., 2021; Yun et al., 2020; Giraudet, 2020; Dominguez-Delgado et al., 2020) requires an adequate knowledge of the building-plant system, or the characteristics of the building envelope, but also of the plant components present and how these two systems interact with each other. Enhancing the energy supply chain of Italian hospitals (Moro Visconti et al., 2020; Klemeš et al 2020; Sarkis, 2020; Martiniello et al., 2020) is a strategic priority that requires investment, simplification of authorization procedures and a push to the conversion of traditional buildings in the key of circular economy (Khadim et al., 2022, Marino & Pariso, 2022). In this context, energy efficiency can make an essential contribution to the transition to stimulating economic growth (Khan et al., 2021; Kahouli, 2018; Zhou et al., 2021). The knowledge gaps that the work intends to fill is to evaluate the improvement of the energy efficiency of the 1,062 principals. Bridging this knowledge gap is useful both for operators in the sector and for the theory related to energy management and the adoption of new technologies in public organizations. In the following paragraph, we present the methodology used to improve the energy efficiency of Italian hospitals.

3. Methodology

The methodological approach has been that of a joint evaluation both of organizational type that is energetic. The energy analysis concerned: the breakdown of electricity consumption, analysis of the consumption of the last six years derived from the monthly bills of hospitals, the consumption now, distribution of electricity consumption, and air conditioning needs. In the period between the years 2016 and 2022 using the data source of the Ministry of Health calculated for 1009 of the hospital principals estimated the total of 1062 annual average energy consumption, Using the same source, the average annual energy supply costs of Italian hospitals were calculated. The critical parameters for the Italian hospital principals were compared with those of the hospital principals of the 27 European Member States. The analysis of the energy bills of the 1062 hospitals, in particular, the absorption and equivalent hours show divergent results. The hourly consumption curves provide data that have been ordered and analyzed with MATLAB software to represent significant carpet plots for an energy balance. This analysis was carried out over six years, but the three graphs for the year 2022 are shown. The bottom-up and mouse-down approach to changing energy consumption to climate change has used data from the 20 Regional Environmental Protection Agencies (ARPA) as a source. The organizational analysis concerned: the plant characteristics of the structure, the age of the building and building maintenance over the last 6 years. The 1,062 hospital garrisons (Istat, 2022) are divided into the national territory as follows: 216 in the northwest, 170 northeast, 231 centers, 280 South, and 165 Islands. Of the total of the principals who were contacted, only 5% were not available at the meeting for the proposed organizational and energy analysis. Therefore, 1,009 hospital principals and their documentation were evaluated for the years considered: 2016 - 2022 both in terms of organizational and energy analysis. The 53 missings are divided among the 5 macro areas as follows, northwest 12, northeast 8, center 10, south 13 and islands 10. The Principals' Organisational and Energy Managers met the working group between February and December 2022. The collected data were processed for organizational analysis with the Enterprise Resource Planning method (ERP - Infor visual - Dynamic enterprise performance management/2022). Process mapping is a valuable tool for organizational analysis and the process of reviewing the organizational system. The mapped processes were not only physical but also informative. This analysis tool allows the identification of the activities of each person and - possibly also through a timely survey for a significant period - the relative time load to translate it into the saturation of the resource. The investigation makes to emerge anomalies and criticalities in the allocation of the activities between functions and it is precisely on this that often is based a review of internal procedures to arrive at a king - design of portions of the organization: such as merging into a single dedicated person, a series of activities previously distributed over multiple uncoordinated resources (Marino & Pariso, 2021). The energy analysis and data processing were carried out with the Energy Software for Simplified Audits (SEAS) of National agency, new technologies, energy and sustainable development, (ENEA). The joint analysis, organizational and energy, represent one of the crucial moments in the implementation of a sustainable management system, both because it requires the hospital management an effort of analysis and overall evaluation of the site, both because its results depend on a large part of the choices regarding the organizational structure and characteristics of the energy management system within the hospital. The relationship between the two analyses, organizational and energy, allows us to better evaluate the results presented in the next paragraph.

4. Results

In the period between 2016 and 2022, the average total primary energy consumption for Italian health facilities is 129.5 ktep divided into 62.7 ktep of electricity and 66.8 ktep of thermal energy, as highlighted in Table 1.

Table 1. Average annual consumption of Italian hospital principals

Year	Electricity [Tep]	Thermal Energy [Tep]	TOT	% E.E.	% T.E.
2016	49.650	56.339	105.989	47%	53%
2017	54.019	54.295	108.314	50%	50%
2018	58.032	57.939	115.971	50%	50%
2019	55.126	56.606	111.732	49%	51%
2020	54.045	50.676	104.721	52%	48%
2021	57.536	55.120	112.656	51%	49%
2022	56.802	57.154	113.956	50%	50%
Average	**55.030**	**55.447**	**110.477**	**50%**	**50%**

Source: Ministero della Salute – our elaboration

Table 2 shows the increasing costs of energy supply - average values - of Italian hospitals.

Table 2. Annual average costs energetic supply of the Italian hospitals

Year	Electricity [€]	Thermal Energy [€]	TOT [€]
2016	€ 30.617.263,00	€ 38.863.569,00	€ 69.480.832,00
2017	€ 34.110.712,00	€ 40.525.319,00	€ 74.636.031,00
2018	€ 47.327.137,00	€ 50.402.969,00	€ 97.730.106,00
2019	€ 48.044.675,00	€ 49.420.011,00	€ 97.464.686,00
2020	€ 46.786.558,00	€ 39.684.148,00	€ 86.470.706,00
2021	€ 45.489.397,00	€ 35.121.162,00	€ 80.610.559,00
2022	€ 42.297.572,00	€ 33.676.449,00	€ 75.974.021,00
Average	**€ 42.096.187,71**	**€ 41.099.089,57**	**€ 83.195.277,29**

Source: Ministero della Salute - our elaboration

A comparison between energy consumption and associated costs shows a more marked gap in recent years; this trend is also justified by the recent pandemic and war events involving sources of energy supply. By evaluating the parameters among the various hospitals in the territory, it is possible to verify the widespread difficulty of the Italian Health System in the management of energy supply and distribution sources within the hospital facilities. Specifically, the following parameters are compared and then summarized in Table 3:

- Energy consumption in gross surface area [$Tep/m2$]
- Thermal energy compared to square meters and Degrees Day [$kWh/m2$ DD]
- Electricity per square meter [$kWh/m2$]
- Unit expenditure on electricity supply [$€/kWh$]
- Unit expenditure on methane supply [$€/Sm3$]
- Unit expenditure on the supply of heat from district heating [$€/MWh$]

Table 3. Comparative Analysis

Italian Hospital Principals comparison with the 27 European Countries			
Energy consumption in gross surface area	0,035	Tep/m^2	low energy class
Thermal energy compared to square meters and Degrees Day	0,06	kWh/m^2 DD	low energy class
Electricity per square meter	125	kWh/m^2 DD	Average energy class
Unit expenditure on electricity supply	0,39	€/kWh	Above average Europe (0.16)
Unit expenditure on methane supply	0,44	€/ Sm^3	Under average Europe (0,43)
Unit expenditure on the supply of heat from district heating	92	€/MWh	Above average Europe (70)

Source: Ministero della Salute - Eurostat, ns elaboration (2016 - 2022)

The elaboration of the results of the organizational analysis shows that the 1009 hospital principals had a structure in 1962 and the original body was built between 1959 and 1961. The extensions relate to:
- the building surface to be used for the shelter;
- the surface of the laboratory activities and
- the management of the facilities.

In the '70s 65% of the buildings were enlarged with other pavilions and in the early 90s, other pavilions were built in 70% of the buildings studied. In the case of 320 garrisons, there are enlargement interventions that belong to both the 1970s and 1990s. The management of the plants to the location, expansion and installation of new plants, the various thermal plants, refrigeration units and substations of district heating, is varied within the structure, depending also on the different use of the departments over the years.

In this field, plant engineering, it emerges from the ERP analysis that in the decision-making process there is an overlap of functions for the same decision of 7.5%, other data, in 65% of cases, the absence of structure dedicated to energy management, even if the figure of the energy manager is present in all the hospital principals. The age of buildings, in 87% of cases exceeds 60 years and maintenance over the last 6 years is around 16%.

The energy analysis concerned: the characteristics of the electrical system, in particular, defined the distribution of electricity consumption within the buildings, dividing the energy absorbed by the various types of users. With this method, it will be easy to compare with other average values available in the literature, with the possibility of finding criticalities in the system. In table 4 we report the comparison between consumption and expenditure in the six years considered by the 1009 hospitals analyzed.

Table 4. Comparison of consumption of E.E. in Euro during the analyzed time.

Comparison of consumption and expenditure electricity MT from 2016 to 2022			
Average 2016 - 2022			
Time	**Avg Temperature °C**	**TOT kWh**	**Cost [€] (no VAT)**
2016	4,5	343903,3	46.161,18 €
2017	6,3	312920	42.333,92 €
2018	11,0	343927	46.349,20 €
2019	14,6	349818,7	47.196,57 €
2020	18,1	401758	54.546,98 €
2021	22,8	482275	63.960,49 €
2022	26,3	567570,5	76.385,41 €
Total Cost			**376.933.75 €**

Source: our elaboration

Starting from Table 1 it can be seen that consumption remains similar, even if compared with expenditure in the six reference years, there is a significant additional cost, as show in Table 4, therefore it is possible to suppose a monthly consumption calculated as average in this period but, considering in particular, the analysis of bills, Through the analysis of the distributor measurements and then concludes with the analysis of absorption and equivalent hours shows that energy expenditure in hospitals has increased significantly. After examining the bills of the last six years, to improve the comparison and analysis, electricity suppliers were asked for the hourly curves of consumption. The obtained data were ordered and analyzed with MATLAB software to represent significant carpet plots for an energy balance. This analysis was carried out over six years, but only three graphs are reported for the year 2022. It was done by varying the color bar of the graphs obtained, respectively on full-scale, minimum values (between 0 kWh and 650 kWh) and maximum values (between 650kWh and the maximum value found, 1165.5 kWh). From the tables you can make some considerations: a) the maximum value of energy measured is 1165.5 kWh measured at 15:00 on August 4, while lowering the scale to a minimum, the energy value never falls below 360 kWh; b) the highest consumptions are measured in conjunction with the periods when there is air conditioning, in the hottest hours of the day; c) in the night range between 23:00 and 6:00 consumption is much lower, and during the day you can see how, from 16:00 / 17:00 onwards consumption tends to decrease; d) the difference between public and working days is clear, almost halving. This shows that electricity consumption is particularly dependent on work activities such as offices and clinics; e) almost abnormal behavior is evident in the first half of January. The cooling requirement has been calculated in two different ways: Top-down and bottom-up. Top-down, we studied the trend of electricity consumption compared to the average external temperature; as can be seen from Figure 1, the consumption remains almost constant for temperatures below 14-15, while, for higher temperatures, the trend is increasing. This increase is certainly attributable to the conditioning load, which increases with the increase in the external temperature.
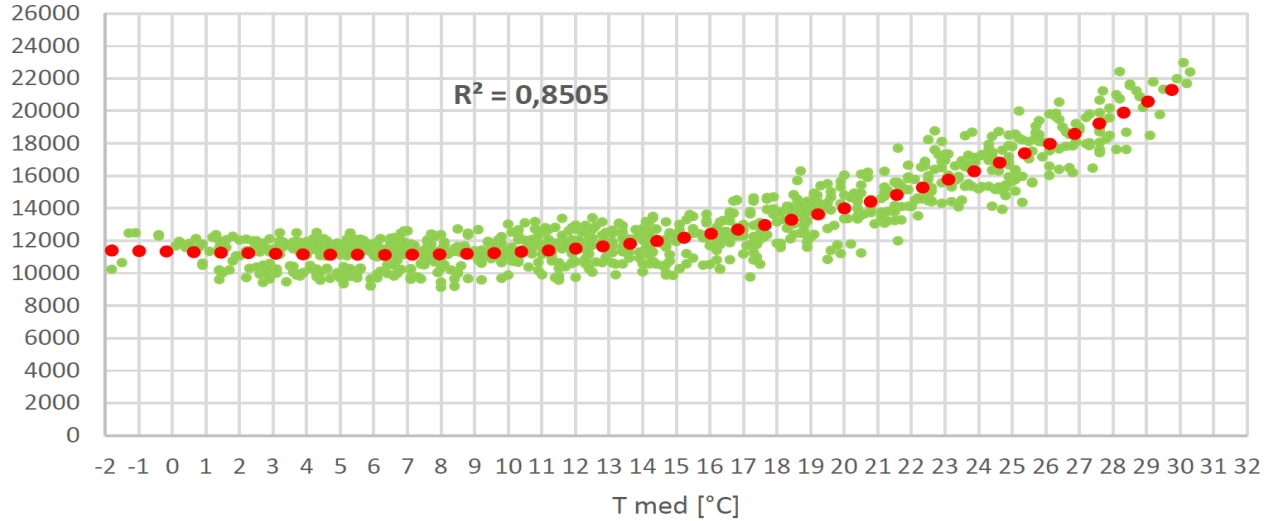
Figure 1. Average temperature vs the Electric daily consumption
Source: our elaboration

It therefore also calculated the standard electricity requirement as the average value of consumption recorded for temperatures less than 15 µc and subtracted this proportion to days when the temperature is higher as in Figure 2.

total electrical energy [kWh] share air conditioners [kwh]
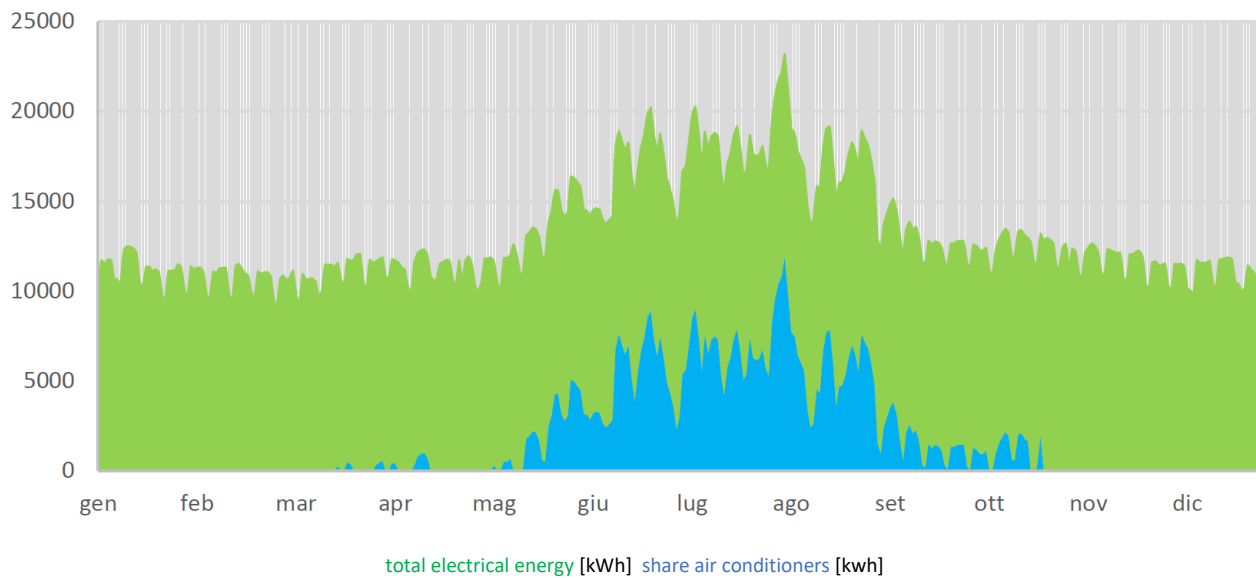
Figure 2. Consumption subdivision with conditioning quota - Electricity consumption 2022
Source: our elaboration

By carrying out this operation for six years the average need for conditioning was obtained at 14.1%.
Bottom-up. From the data of the refrigeration units and of the facilities' split systems, consumption was calculated on an annual basis assuming methods and hours of operation. As in talks with the hospital's technical staff, it was found that the refrigeration units were on average from mid-April to mid-October, in conjunction with the shutdown of the heating systems (except for particular climatic conditions). The assumption used for the

calculation is an average of 12 per day of operation for all days of the period (180 days), except for groups currently undergoing restructuring, not yet operational. The power absorbed is assumed to be 30%, estimated from the characteristic absorption curve of the groups, initial absorption, followed by an exponential decrease. The annual consumption is calculated as:

$$\sum_{n=1}^{GF} Pot_{el,n} * 30\% * h_{funz} \left[\frac{kWh}{year}\right]$$

The results are shown in Table 5.

Table 5. Annual consumption calculated for the refrigeration units of hospitals

Installed Electrical Power [kW]	Electrical Power absorbed [kW]	h equivalent	Consumption [kWh/Year]
66,18	19,85	2160	42882,4
66,18	19,85	2160	42882,4
66,18	19,85	2160	42882,4
62,70	18,81	2160	40629,6
112,50	33,75	2160	72900
86,51	25,95	2160	56058,48
86,51	25,95	2160	56058,48
88,10	26,43	2160	57088,8
19,70	5,91	2160	12765,6
62,70	18,81	2160	40629,6
62,70	18,81	2160	40629,6
62,70	18,81	2160	40629,6
19,70	5,91	2160	12765,6
18,10	5,43	2160	11728,8
270,00	81,00	0	0
270,00	81,00	0	0
		Annual total	**570531,2**

In the same way, obtained the calculation of the split systems present in hospital facilities, the average electricity consumption was calculated, assuming 8 hours of operation for portable systems and 6 hours per day of operation for all the others, for only 122 days of the summer period; the power absorbed was calculated by multiplying by the electrical absorption efficiency η = 97% the electrical power shown on the data sheets of the different models. Annual consumption is shown in Table 6.

Table 6. Annual consumption calculated for split plants

Numbers of Installation Split	Tot. Installed Power [kW]	Power Adsorbed [kW]	h equivalent	Consumption [kWh/Year]
4	3,5	3,395	732	2485,1
1	2	1,94	732	1420,1
11	12	11,64	732	8520,5
10	12,1	11,737	732	8591,5
10	12	11,64	732	8520,5
7	7,1	6,887	732	5041,3
1	1,5	1,455	732	1065,1
1	0,9	0,873	732	639
5	4	3,88	732	2840,2
4	4,15	4,0255	732	2946,7
1	0,9	0,873	732	639
20	18	17,46	732	12780,7
3	2,9	2,813	732	2059,1
1	0,75	0,7275	732	532,5
1	0,9	0,873	732	639
5	5	4,85	732	3550,2
2	1,8	1,746	732	1278,1
8	7,8	7,566	732	5538,3
5	5,7	5,529	732	4047,2
1	0,75	0,7275	732	532,5
3	3,8	3,686	732	2698,2
1	1,3	1,261	732	923,1
1	1,5	1,455	732	1065,1
1	0,9	0,873	732	639
2	1,8	1,746	732	1278,1
1	0,9	0,873	732	639
30	30	29,1	976	28401,6
			Total for the Year	**109310,7**

The joint analysis of the 1009 Italian hospitals, highlights, the criticality and potential that are reported in the following paragraph.

5. Discussion

The processes of organizational and energy management such as health, increasingly have to deal with the stringent requirements of sustainability dictated by the recent economic crisis and subsequent European directives. These require energy redevelopment by combining the high-quality parameters required by citizens and the need for the National Health System to comply with budgetary constraints. The results show that the energy efficiency of Italian hospitals the European average, has structural weaknesses, but energy efficiency for Italian hospitals is also a strategic lever to restart. Healthcare construction is extremely involved in these objectives since it is one of the most energy-intensive sectors because of the many functions it incorporates and the need to operate the services provided, which must be guaranteed, at least for hospital facilities, 24 hours a day 365 days a year, ensuring:
a) continuity in medical services
b) high thermal comfort (in winter and summer) for patients and staff
c) healthy working and hospitalization environments.

In Italy, from the research carried out, it emerges that the patrimony of hospital principals, in most cases, is no longer suitable for current uses, The buildings were built in times when regulatory constraints were not stringent and there was no attention to the issues of efficiency and energy saving. The hospital structures should be adaptable to the continuous evolution of the technologies and the organization of the Services and instead are structures that over the years fall into obsolescence. Over the years there have been no technological innovations to cope with the continuous and increasing use of facilities and adaptation to new regulations (Marino & Pariso, 2021a). This absence is evident in all its difficulties of implementation when, and this is the Italian case, the incidence of costs for energy consumption is predominant in an economic situation dictated by the crisis of supply of energy sources (Vaziri et al., 2020) and relative increase in costs. In addition, no work has been undertaken over time to modernize the old hospital complexes, it is unlikely that these changes will lead to an optimization of energy consumption, but they may lead to partial improvements that do not significantly affect overall consumption. About a third of the energy consumed in Italy is related to the health sector. In this sector, hospital principals have average consumption three times higher than in the residential civil sector in similar climatic conditions (ENEA 2022). These buildings, therefore, have ample energy and economic savings that can be achieved both through more prudent management of energy flows and through energy efficiency interventions of the building-plant systems. In the total budget of the National Health System, the energy, thermal and electricity supply correspond respectively to 5% and 2.2% of the budget share, equal to 27% of total expenditure (ENEA 2022), a significant figure for our country. Attacking this figure, saving a share with the rationalization of consumption has the consequence of freeing economic resources for the entire public sector. Net of a new building for hospital principals, some actions are possible in the short term. It is interesting to note that both at theoretical and practical level, a first action for the reduction of the expense regards the reorganization of the relative management to the energetic efficiency, eliminating the decisional and operating duplication present in the management process is the possible saving of 7%. A second action is to structure energy efficiency units and establish the role of the energy manager. The high potential for energy saving and therefore economics that can be achieved in the field of Health, cannot ignore a key figure, the energy manager (Aoudia et al., 2018) as head of the structure dedicated to energy management. Structure and professional figures can represent in hospital facilities an opportunity for rational use of energy resources of a certain structure, based on data collected by monitoring systems, on the empirical observation of installations and the continuous analysis of energy performance indicators. This figure and structure are necessary to determine the energy performance of each hospital with skills related to the identification and characterization of cost centers and the correct definition of energy efficiency interventions. Third short-term action, the mandate of this structure must make priority

technological investments both to implement the reduction of energy consumption of hospital facilities and for interventions aimed at reducing dispersion and implementation of technologies for the exploitation of renewable energy sources. These three actions can improve the energy efficiency of Italian hospitals. The current energy and economic crisis, requires hospitals the need to support the priority of the health service, therefore clinical - diagnostic, and energy. It's a necessary cultural and organizational change to be achieved quickly. The European Directives from 2012/27/U3, concerning the energy efficiency of energy end-uses and energy services, to reduce emissions and respect the European targets set, has given a strong impetus to the energy upgrading of buildings to achieve minimum energy efficiency standards, Encouraging Member States to support the public sector in the examination of energy service offers by using and managing particular Service Contracts. Italy as emerges from the research presents a strong weakness concerning the energy efficiency of hospital facilities used to provide health services.

Conclusions

The energy management of hospital facilities is complex due to the large amounts of energy used and transformed the performance of all health and non-health activities that take place daily in the 1062 hospitals analyzed. The hospital is the only public building that does not know breaks in its daily activities throughout the year. It is a structure in operation 24 hours and 365 days a year. The different services provided have a multiplicity of energy consumption profiles and can be essentially divided into two main categories: hotel-type consumption for the well-being of patients and staff and consumption more closely related to health functions supported by treatment and diagnosis equipment. In recent years, numerous opportunities for energy upgrading of buildings have not been implemented by creating energy profiles of obsolete and inefficient hospital facilities. Moreover, the obtained financings have regarded interventions centered on the core business of the hospital garrisons, therefore, investments in medical technologies for the diagnosis and the treatment of the pathologies, or more urgent building interventions such as regulatory adaptation in terms of safety of structures. A possible way to obtain financial resources that allow important interventions of requalification and energy efficiency of health facilities, requires a management change, both energy and organizational.

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HOW CAN DISTANCE LEARNING OFFER OPPORTUNITIES FOR DEVELOPING COUNTRIES? CASE OF TURKEY AND KAZAKHSTAN[*]

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Abstract. Many scientific studies highlight emergency distance education's two fundamental problems during the COVID-19 pandemic. The first is the large number of students who need more access to communication technologies, and the second is the digital incompetence of educators and students. This study, which was prepared by Turkish and Kazakh academics working within the scope of the Bolashak scholarship program, aims to question the cooperation potentials for the development of distance education, which will become more critical in the future, and to propose policies to solve the main problems in the pandemic. In this context, the issues in Turkey and Kazakhstan during the pandemic were collected and generalised. SWOT analyses were conducted for the potential of cooperation between the two countries and both countries' exchange/internship programs. The findings show that both countries have intense distance education experiences, cooperation potential, and sufficient opportunities to strengthen weak elements by developing mobility and scholarship programs. Several strategies are suggested for these improvements. These recommendations provide a perspective for these two countries and all countries continuing distance education after the pandemic.

Keywords: pandemic; distance education; digital education; international cooperation; Turkey; Kazakhstan

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1. Introduction and Review of Literature

While distance education was an alternative for employees, etc., in recent years, it has become a global remedy in situations that negatively affect the flow of life, such as pandemics. It is likely to be so in the future. For example, when writing this article, two major earthquakes occurred in Turkey nine hours apart. In the aftermath of this disaster, which was recorded as the second deadliest earthquake in the world (USGS, 2023), higher education was suspended across the country until further notice. If the normalisation process is prolonged, it is also on the agenda to compensate for the lost time with hybrid methods that include distance education. Therefore, the development of distance education systems has considerable public benefits.

Distance education has continued since Caleb Phillips announced education by mail on March 20, 1728 (Bower & Hardy, 2004). The development of communication and information technologies has increased the possibilities of distance education, and the widespread use of the Internet has expanded the scope of distance education. When the Massachusetts Institute of Technology (MIT) made the content of nearly two thousand courses accessible to anyone from anywhere in the world in a network environment in 1999, it added another dimension to the concept of distance education. It provided new opportunities for developing countries to access knowledge (Baysal et al., 2015) (p.467). However, the most critical change in the nearly three-century history of distance education occurred during the COVID-19 pandemic. The problem that the study focuses on is the problems experienced during the pandemic.

According to UNESCO reports, all schools were closed in 195 countries due to the pandemic, and more than 1.5 billion students from preschool to higher education were negatively affected (UNESCO, 2022b). Distance education has been a remedy to solve this problem. UNESCO has presented distance education as a solution to the potential difficulties of education stagnation and published several recommendations for the efficiency of distance education (UNESCO, 2020). Although distance education is considered a solution in this sense, in countries with inadequate technology infrastructure and limited access to computers, smartphones, etc., the existing disadvantageous situations have become even worse.

The introductory text of the Global Education Coalition, created under the UN Secretary-General's leadership with the "Learning Never Stops" slogan, emphasises that there is great inequality in education on a global scale. It is also noted that closures during the COVID-19 pandemic have disproportionately harmed disadvantaged students. Fifty per cent (826 million) of students worldwide do not have a computer, and 43% (706 million) do not have internet access. In Sub-Saharan Africa alone, 56 million students cannot access mobile networks. (UNESCO, 2022b). In the reports published by the Organization for Economic Cooperation and Development, the United Nations Educational, Scientific and Cultural Organization and the World Bank, problems such as being caught unprepared for the pandemic period, access to technology, difficulties in measuring learning outcomes in curriculum deficiencies, and inequality in education were experienced (Nayır & Sarı, 2023). Central Asia, where Kazakhstan, one of the focus countries of the study, is located, is one of the regions where such negativities are experienced.

Kazakhstan, one of the largest states in the Central Asian region, is better than its neighbours. Still, problems have also occurred in this country, access to technological devices, an emergency transition to distance education, educators and parents of students needing to be prepared, etc. Although Turkey has a deep-rooted history in distance education and a widespread education network, the problems experienced on a global scale have also been experienced in this country.

The most crucial factor in alleviating such problems is trained human power. Developing countries encourage their young people to receive education in other countries to close the gap in qualified human resources. These

exchange/internship programs have a high social return when implemented correctly. In many countries worldwide, various student and scientist mobility programs are carried out to benefit from the scientific knowledge of different countries. Governments or organisations such as the European Union, UNICEF and the World Bank often support these programs. As of 2022, approximately 7.5 million students worldwide are studying in a country other than their country of citizenship. This figure is estimated to reach 20 million by 2030 (OECD, 2022). Especially for educationally backward countries, such programs offer various opportunities. The discussion topic of the study is what opportunities student and expert mobility/internship programs can contribute to improving the problems experienced in distance education after the pandemic and whether countries have enough potential for this.

The pandemic period has been a separate test for developing countries. During this period, academic studies were conducted on the efficiency of education and many related issues. However, a literature review reveals very few studies comparing countries (e.g. Srivastava, 2002; Zubcova, 2021; Suárez Lantarón, García-Perales & Elisondo, 2021; Navickas et al., 2022; Wang, Zhan & Liu, 2022).

In the literature, the distance education experience in Kazakhstan and Turkey has been frequently examined at the national scale of both countries. However, there is no study comparing these two countries, which are geographically distant but have similar social and cultural structures. Our study has two main objectives. Firstly, to fill this gap and contribute to the literature by adding data from Turkey and Kazakhstan to distance education research on a global scale; and secondly, to examine whether the international student and expert mobility programs can be a solution to improve these problems after the pandemic. The case study of the research is the Kazakhstan Bolashak program, which brings together researchers under the title of Distance Education Methodologies.

In the first section of the study, data from the literature will be presented about problems experienced in distance education in Turkey and Kazakhstan. In the methodology section, within the research design framework, the pre-pandemic distance education activities of Turkey and Kazakhstan and their current situation will be analysed with SWOT. Then, one more SWOT analysis will be conducted for the potential of scholarship and mobility programs between the two countries to provide cooperation opportunities for the two countries in the post-pandemic period. Both analyses will draw on existing findings and observations of researchers involved with the Bolashak scholarship program. Based on the findings, various strategies will be proposed.

1.1. Emergency Distance Education in Kazakhstan

During the pandemic, the Kazakhstan government switched to distance learning as part of a rapidly implemented social lockdown. This transition occurred during the spring break in the last half of March in Kazakhstan. Teachers were quickly trained during the holiday break. Some TV and YouTube channels were also dedicated to education as an alternative for citizens who might have trouble accessing the Internet, and some open learning platforms were supported (Astana Civil Service Hub, 2022). When the findings of the research on emergency distance education in Kazakhstan are analysed, it is possible to classify the difficulties encountered under two headings: the first is access to modern technologies and internet speed, and the second is the lack of digital skills of teachers (Akhmat Yassawi University Eurasian Research Institute, 2020; Sapargaliyev & Shulenbayeva, 2013; Seilkhan et al., 2022).

According to Bokayev et al. (Bokayev et al., 2021), with 31,300 respondents in Kazakhstan, citizens' access to technological devices is the most critical problem in this process. Only 21% of Kazakhstani students have access to a computer that they can use regularly. Approximately 78% of families primarily use their cell phones as the only access point to online materials, and many families need more smartphones for each child. In addition to the need for more access, the most critical problem is the low rate of slow internet access and speed.

While better off than its neighbours, in 2020, only 79% of Kazakhstan's population had access to the Internet. Active social media users accounted for 51% of the population. Compared to 2019, the proportion of the population with access to the Internet increased slightly by 4.5%. In February 2020, according to WebSiteToolTester reports, Kazakhstan ranked among the 216 countries after Brunei, Brazil, Armenia, and Myanmar (We Are Social & Hootsuite, 18.02.2020). According to the study of Bokayev et al., slow internet speed also harms children's motivation to learn. According to the same study, Kazakhstani parents' satisfaction with the distance education system increases as they age, while their satisfaction decreases as the number of children grow. Parents with high-income levels were more satisfied with the applications than those with low-income groups. Teacher's competence in implementing e-learning techniques directly affected the satisfaction level of parents.

Based on all these findings, the most critical shortcoming of the current situation in Kazakhstan, which has been making tough reforms in the field of education for nearly thirty years, is the lack of trained staff in the area of communication and information technologies and the inadequacy of educators in technology literacy.

1.2. Emergency Distance Education in Turkey

Higher education in Turkey was suspended for three weeks on March 12 2020; one week later, it was decided to continue through distance education to avoid stopping higher education (YÖK, 2020a). Immediately after formal education was suspended, 64% of 189 universities switched to distance education within two weeks. However, virtual classrooms were only available in 29.1% of public universities. In the first semester, exams were held only through homework (YÖK, 2020b).

Although the transition to distance education has been realised quickly and at the institutional level, the adaptation process of educators and academics in Turkey, as in all countries, has also been painful. Some universities that are not experienced in distance education and have yet to invest in this field have experienced various problems related to technological infrastructure. The most critical problem encountered is the inadequacy of many instructors in digital literacy and learning (Alan, 2021; Unluer & Ayhan, 2023). Likewise, this rapid transition was problematic for the students; on social media, many expressed wanting something other than distance education, that summer courses, etc., should compensate for it. Students were mainly reluctant to switch to a new system, but in the process, new opportunities and experiences in new learning techniques were gained in terms of student-educator interaction (Yasemin et al., 2021)(p.229), (Dindar et al., 2022)(p. 1347-1349), (Yazgan, 2022)(p.5358).

As pandemic conditions worsened, suspending education was one of the most essential measures to protect the health system. The Council of Higher Education (YÖK) managed this process dynamically, without breaking away from the grounds of consultation, without leaving any arbitrary loophole for any institution, and in rapid coordination with university rectorates (Ak et al., 2020) (pp.908-910).

The problems experienced in emergency distance education in Turkey can be classified under two headings: administrative (educator/administrator)- and consumption (student)-based. The problems experienced in the administrative dimension can be summarised as the separation between academic units and distance education centres, lack of expert staff, lack of planning, the acceptance of distance education by stakeholders and financial difficulties (Bilgiç & Tüzün, 2015) (p.46-47). For example, according to a study conducted on educators working in primary education, it was observed that educators were not satisfied with distance education in terms of student attendance, classroom management, assessment and evaluation, etc., and had negative attitudes toward distance education (Baloglu & Firat, 2023) (p.1). According to another study, students sometimes have difficulties accessing computers and the Internet; the high internet fees during the pandemic create problems for families (Erzen & Ceylan, 2020)(p.229). In a study conducted with higher education stakeholders, attention was drawn to

digital impossibilities, lack of interaction in distance education and difficulties in the transition to emergency distance education, but it was observed that awareness of the indispensability of distance education increased in terms of not interrupting education (Yaylak, 2023) (p.65).

1.3. Summary of Common Problems

The problems experienced by both countries during the COVID-19 pandemic are very similar. When the findings expressed in dozens of studies conducted in both countries are compiled, the following headings stand out: a) the problem of access to electronic devices, b) inadequate internet infrastructure, c) expensive internet use, d) negative attitudes of a large part of teachers and students towards distance education for socio-economic reasons e) inadequacy of electronic content to be presented in courses. The findings highlighted here are similar to the problems identified in other countries, especially in comparative analyses, as mentioned above. This comparative analysis was conducted on a different scale than Kazakhstan - Turkey (Central Asia - Eurasia). In addition to compiling problems, only a few studies have been found in which solution proposals have been analysed. Our article contributes to the literature regarding collecting problems and analysing solution strategies. These analyses will be included in the material and method section of the study.

2. Research Objective and Method

In response to the abovementioned problems, our paper argues that strengthening inter-state cooperation among countries facing similar problems can significantly improve these problems. This issue, which should be discussed directly within the theoretical framework of international relations, will not be discussed in detail here as it is not the focus of this article. However, numerous studies in the literature, albeit from many different perspectives such as neoliberal institutionalism, structural realism, globalisation, development, etc., provide various findings and approaches to the positive impact of international cooperation (Milner, 1992; Ndou, 2004; Outreville, 1990; Powell, 1991). We focus on strengthening distance education and increasing cooperation between countries to provide more efficient reactive solutions to pandemics, disasters, etc.

The study's research design is planned in two dimensions: analysing the problems and proposing solutions. For solution proposals, the focus was primarily on identifying the issues. The findings of the studies conducted separately in both countries are presented in the previous section under the titles of Kazakhstan and Turkey. To summarise the problems outlined in the previous section and reduce them to main headings for solution strategies, SWOT analysis, which is the most appropriate method for analysing the current situation, was preferred. The main reason is that looking at the issue holistically is more relevant than making a projection based on data obtained from a single study group (survey, interview, etc.).

Using data from the past and present while creating the SWOT analysis and including observations on the content of a cooperation program in which the researchers were also involved can provide us with a more holistic and relevant perspective. SWOT analysis, as in this study, is used to identify an organisation's strengths and weaknesses and plan strategies for solving threats and evaluating opportunities (Teoli et al., 2022). It is frequently used in educational and social sciences, especially in organisation, management, etc. It is also a widely used method in health sciences and engineering sciences (Benzaghta et al., 2021; Giusti et al., 2020). Ghazinoory et al. (Ghazinoory et al., 2011) describe this method as "an examination of the past, a framework for the future". Our study aims to propose policies for the future in the context of the realities we have encountered with the testing of the potential of the past in the COVID-19 pandemic.

SWOT analysis has two dimensions: internal factors and external factors. It has four components: 'strengths', 'weaknesses', 'opportunities', and 'threats'. This method can be applied at different analytical levels - individual, organisational, national, and international. It can be used by educational institutions, nonprofit organisations, countries, governments, and multiculturalism projects (Gürel & Tat, 2017). In our study, each item in the matrix prepared by SWOT analysis will be coded, and the findings of the studies conducted on these items will be presented with the titles of these codes.

2.1. Research Questions

To test our argument, a SWOT analysis will be made to examine the current situation regarding the cooperation potential of both countries. Afterwards, a SWOT analysis will be made for the internship/student mobility applications we recommend. For each finding detected in these analyses, information will be given along with its historical background. Strategies for strengthening the weaknesses will then be determined. In the context of the purpose and scope of the research, the following research questions were designed.

> RQ1: What are the internal and external factors will affect the cooperation of the two countries in the field of distance education?
> RQ2: What are the possible level of student and expert mobility between the two countries for cooperation?

The answers to both research questions were compiled by the SWOT analysis method, utilising data from the literature and the researchers' observations. Each data point obtained is briefly explained under the title of Findings.

2.2. Scope and Limitations

The scope of the research is the human resources for distance education and distance education institutions of the two countries, the main problems encountered during the pandemic, and the potential for post-pandemic cooperation in distance education. The sample is the Bolashak scholarship program. The analysis of the fellowship program is based on available documents and observations. Due to the limited duration and intensity of the fellowship program, the researchers could not conduct in-depth interviews, surveys, etc., with other fellows. This gap was filled with data on the program's focus areas, the support received, and the activities carried out thus far. In this way, it aims to create a particular background for researchers working in the same field with the data obtained.

3. Findings

3.1. Situation Analysis for Cooperation on Distance Education between Two Countries

Studies on distance education in both countries have been analysed, and the following findings have been obtained. The two countries' institutional infrastructures, experiences, advantages, and disadvantages are considered internal factors, while global developments and the general social structure are considered external factors.

Table 1. SWOT Analysis-1 for RQ1

Strengths	Weaknesses
1S1: The fact that distance education has been practised in Turkey and Kazakhstan for thirty years 1S2: Activities of Akhmed Yassawi University 1S3: Cooperation protocols between the two countries to date 1S4: Kazakhstan and Turkey's growing economies 1S5: Historical, ethnic and cultural ties between the two countries	1W1 Internet access problems in both countries 1W2 The problem of digital literacy in both countries 1W3 lack of qualified personnel 1W4: Low trade volume between the two countries
Opportunities	**Threats**
1O1: Awareness of Distance Education with the Pandemic 1O2: Diversification and easily using of distance education software	1T1: Prejudices against distance education 1T2: Rising Global Inflation and the Rise of the Dollar Exchange Rate

The analysis findings based on document analysis and observations are presented below.

3.1.1. Strengths

1S1: Experiences of Kazakhstan and Turkey in distance education

Kazakhstan is a country that has made the fastest and most radical changes in education in the Central Asian region (Gül, 2019) (p. III and 2). Immediately after gaining its independence, reforms were made in education, distance education was regulated by Education Law No. 319-III dated July 27 2007, and distance education programs started to be opened (ZAKON). Founded in 1992, Ahmad Yassawi University is the leading university in Kazakhstan, and distance education is being carried out at the following universities: Kazakhstan University of Engineering and Technology, Karaganda Kazpotrebsoyuz University, Zhansukirov University, Satbayev University, Kazakhstan National Women Teachers University, Esil University, Turan University, and Kazakhstan University of Technology and Management.

The economic situation of teachers has improved since the pandemic. Teachers' salaries, which averaged 250 USD before the pandemic and were well below the average wage level in the country (ISAP, 2021), were increased to 550 USD in 2022 and are expected to increase by 25% in 2023 (Макаров, 2022).

Turkey started distance education studies with the method of learning by mail before 1980. With the establishment of the Anadolu University Open Education Faculty in 1982, distance education became a system covering large student masses at the primary, secondary and higher education levels in the 1980s and 1990s. Since the end of the 1990s, with developments in information and communication technologies, distance education has increased educational opportunities, and millions of students have benefited from distance education (Bozkurt, 2017). According to the web page of the Anadolu University Open Education System, one out of every two higher education students in Turkey is a student of the Anadolu University Open Education Faculty (Anadolu University, 2022).

One of the most critical initiatives that enabled Turkey to strengthen its distance education infrastructure was the establishment of the Digital Transformation Office under the Presidency. Thus, digital transformation activities carried out by different institutions were organised within a single corporation (Presidency Of The Republic Türkiye Digital Transformation Office, 2022). The fact that the highest level of the state led this transformation move was good preparation for the pre-pandemic crisis. Moreover, in 2014, a minimal number of open

educational resources were uploaded to the Council of Higher Education (YÖK) Course Platform with the contributions of only eight out of two hundred universities in Turkey and the Turkish Academy of Sciences as a result of COHE's involvement in the process over time and the rapid work carried out during the pandemic period. This platform includes many open-access lecture notes from universities (Istanbul, Anadolu, Atatürk and METU). This arrangement eased the burden of educators trying to provide lecture notes to their students in a short time during the pandemic (Baysal et al., 2015)(p.491), (YÖK, 2020c).

In summary, distance education programs have been running in both countries for nearly three decades, mainly at the higher education level.

1S2: Activities of Akhmet Yassawi University
In the previous sections of the study, universities in both countries were mentioned. However, Ahmed Yassawi University is different from others. This university was established with the two countries' cooperation and mostly continues higher education through distance education. Ahmet Yassawi University was established in 1992. In 1996, the interactive distance started simultaneously with the connection between the rector's office building in Turkestan and Ankara, where the Board of Trustees is located (Köksoy, 2004). According to the protocol signed in 1999, master's programs were conducted jointly with Gazi University in Turkey through video conferencing. Kazakh-Russian education is provided at the Ahmet Yesevi University Shymkent Distance Education Faculty, while the language of instruction at the Turkistan Distance Education Faculty is Kazakh and Turkish (University, 2022).

1S3: Protocols between the two countries to date
The Republic of Turkey was the first country to recognise the Turkic Republics that declared their independence from the Soviet Union. The Presidency of Economic, Cultural, Educational and Technical Cooperation was established to strengthen cooperation with these countries. More than a hundred agreements have been signed between Kazakhstan and Turkey. One of the most important of these is the Agreement on Cooperation in the Fields of Education, Science, Culture and Sports between the Republic of Turkey and the Republic of Kazakhstan, which entered into force on December 2 1993. Within the scope of the agreement, the development of cooperation between the universities of the parties and the development of direct contacts in this direction are supported. After the expiration of the agreement, many cooperation protocols were signed within the same scope (Republic of Türkiye Ministry of Foreign Affairs, 1994).

1S4: Kazakhstan and Turkey's growing economies
As mentioned in the first chapter, the most critical problems faced by Kazakhstan and Turkey in emergency distance education are inadequate ownership of technological tools by citizens, access to the Internet and qualified internet infrastructure. This is directly related to the economic structure. Therefore, the economic indicators of both countries were also analysed.

Kazakhstan is one of the countries with the world's richest deposits of oil, natural gas and precious metals. The country's economy is based mainly on oil exports. It is the ninth country in the world in terms of area. The estimated growth rate for 2022 is 2.2%. GNI per capita is USD 10,003, and GDP is approximately USD 194 billion. Its young population with an average age of 31.1 years, vast geography, history and culture offer rich opportunities for cultural cooperation (Republic of Türkiye Ministry of Trade, 2022).

According to the latest edition of the World Bank's Turkey Economy Monitor, the Turkish economy has been growing systematically since 2000, exceeding expectations in 2021 (11.4%). However, the current account deficit is high (43.4 billion USD) due to its dependence on energy imports. As in every country, the COVID-19 pandemic has negatively affected the country's economy. One of Turkey's strengths is its investment in R&D activities. In 2021, the total expenditure on R&D activities carried out in 1,257 centres was approximately 8

billion USD (Bank, 2022; Turkish Statistical Institue, 2022; Türkiye Cumhuriyeti Sanayi ve Teknoloji Bakanlığı, 2022).

According to IMF data, regarding gross national product and purchasing power per capita, Turkey ranks 50th in the world, and Kazakhstan ranks 59th, one step above Russia (Ventura, 2022). To summarise, although both countries have strengths and weaknesses in the economic field, they have the potential to support each other with the right policies.

1S5: Historical, ethnic and cultural ties of the two countries
Kazakhstan and Turkey share the exact ethnic origin, i.e., a common origin regarding race, language and culture. However, both geographical remoteness and historical differences in the form of government have led to significant differences in the language and culture of the citizens of both countries. For many years, Kazakhstan was under Soviet Russian hegemony, while Turkey was closer to Europe and, during the Cold War, to the United States. Today, the two countries do not speak a common language. However, Kazakh Turkish and Turkish originate from the same language. These common ties can be an advantage for joint projects.

3.1.2. Weaknesses

The problems encountered in the existing infrastructure of both countries and in the emergency distance education process are listed below.

1W1: Problems accessing the Internet in both countries
Despite the improvements made, the slowness of the internet connection or the expensive access to the Internet is one of the most critical factors that make distance education problematic. Statistics on this are presented in the first section.

1W2: The problem of digital literacy in both countries
Particularly, educators were identified as needing help in adapting the formal curriculum to digital channels (details in Chapter 1). It is also clear that students' limited access to the Internet will reduce their ability to use both devices and the Internet more efficiently.

1W3: Lack of qualified personnel
Qualified software personnel are needed in almost all countries. This deficit is felt more clearly in Kazakhstan and Turkey, which have yet to catch up with the large countries in the field of informatics. Indeed, in addition to the digital literacy competence of educators mentioned in the previous section, there will always be a need for people who will produce the local teaching management system (Para Dergisi, 2022).

1W4: Narrow trade volume between the two countries
In 2021, the foreign trade volume between Turkey and Kazakhstan approached 3 billion dollars. However, Kazakhstan's share in Turkey's exports and imports is 0.6%. Imports from Kazakhstan exceeded Turkey's exports to Kazakhstan (Republic of Türkiye Ministry of Trade, 2022).

3.1.3. Opportunities

1O1: Increasing Awareness of Distance Education on a Global Scale
Due to the COVID-19 pandemic, students reacted negatively to the mandatory transition to distance education (Dindar et al., 2022; Güneş & Fatma, 2022; Markova, 2021; Nilsson, 2021). This is undoubtedly a result of negative prejudices. Its urgent implementation also brought problems and reinforced these negative attitudes, as it was done reluctantly. This negative attitude was also frequently observed by researchers throughout the pandemic period. However, it was also recognised as an important opportunity to ensure the continuity of education. In

addition, it can be expected that individuals will get used to distance education, and their prejudices will soften as they frequently use learning management systems and teleconferencing applications. Already with the pandemic, the fact that most companies emptied their offices and continued their activities on the web and thousands of people continued their working lives with hybrid models inevitably brought distance education to an important place (Caravella et al., 2022; Elmurodov & Pirnazarova, 2022). Therefore, the fact that all citizens now know distance education the world, that prejudices are broken, and that it is understood as an alternative model that can be applied in socially difficult periods is an essential motivation for developing studies on this subject.

1O2: Diversification and easy use of distance education software
Before the pandemic, some software, such as Adobe Connect, Blackboard, Moodle, Google Classroom, etc., dominated the market. Today, nearly nine hundred LMS applications are in use (E-Learning Industry). For example, while a local learning management system program called ALMS was being used at Akdeniz University before the pandemic, it was switched to Microsoft Teams as the number of students suddenly increased to sixty thousand. In the pandemic, after the first exams were held on Microsoft Forms, separate software (ASOS) prepared by the faculty members of the university was used for the exams.

3.1.4. Threats

1T1: prejudices against distance education
As mentioned in the previous sections, resources available for collaborations in this area may be limited. Mandatory distance learning is not generally viewed favourably or is not a priority for governments.

1T2: Rising Global Inflation and the Rise of the Dollar Exchange Rate
The COVID-19 induced economic recession has pushed global public debt to record highs, leading to higher global inflation (Kose et al., 2021). Experts emphasise that this inflation is not temporary (Gharehgozli & Lee, 2022). According to a study analysing inflation rates after previous pandemics, the more prolonged and profound the pandemics, the more persistent the negative impact on inflation (Bonam & Smădu, 2021).

Another problem is the depreciation of national currencies. Against the US dollar (USD), the Kazakhstan Tenge (KZT) has depreciated by 29.28% over the last five years (Google Finans, 2023a), and the Turkish Lira (TRY) depreciated by 80.11% (Google Finans, 2023b). This makes it difficult for citizens of both countries to obtain capable electronic devices, which naturally negatively affects the strengthening of the infrastructure for distance education and access to communication devices.

3.2. Situation Analysis of the Cooperation of Student and Expert Mobility between the Two Countries

To answer the second research question of the study, "What is the potential of student and expert mobility between the two countries for cooperation?", a SWOT analysis was applied based on the data obtained from the literature and the observations of the researchers regarding the student and expert mobility that both countries are currently conducting (Table 2).

Table 2. SWOT Analysis of Student and Expert Mobility Between the Two Countries

Strengths	Weaknesses
2S1 Turkey's Student and Expert Mobility Programs 2S2 Kazakhstan's Mobility Programs 2S3 Two Countries' Joint Student Mobility Experience	1W1 Kazakh and Turkish Students Prefer Different Countries for Internship Programs 1W2 Good Practice Examples are Scarce or Not Known 1W3 Individual Applications, Non-Determination of Common Thematic Programs
Opportunities	**Threats**
2O1 Increasing Online Study Opportunities 2O2 All elements in the strengths category of the SWOT 1 Table	2T1 Increased travel and accommodation costs 2T2 Other pandemics, etc., global/social events

Information on the headings categorised in the table is presented below.

3.2.1. Strengths

2S1 Turkey's International Student and Expert Mobility Programs
The Republic of Turkey has been regularly sending and accepting students from abroad since October 29 1924. In 2021, Turkey broke its record by taking 65 thousand of international students and ranked first among the countries with the most international students. (Türkiye Sholarships, 2022)**.** Turkey has two main programs: Turkey Scholarships and Mevlana Exchange Programs.

The Turkey Scholarship program, run by YTB, first under the Prime Minister's Office and later under the Ministry of Culture and Tourism, first received 42,174 applications in 2012. This number exceeded 165,000 in 2021 from 178 countries around the world. The institution also runs special programs for different regions, such as Albert Einstein German Academic Refugee (DAFI), Higher Education Support Scholarship Program (HESP), Spark, Yemeni, Pioneers, Islamic Development Bank and World Intellectual Property Organization (WIPO). Turkic Republics are not included in these programs.

The Mevlana exchange program is run by the Council of Higher Education (YÖK). In the Mevlana program, students can participate for a maximum of two semesters, and academic staff can join for three months (Türkiye Sholarships, 2022; YÖK, 2022a). In addition to these programs, there are scholarships provided by the Ministry of National Education under Government Scholarships. For the 2022-2023 academic year, agreements have been made with Belgium, Hungary, China, Azerbaijan, Croatia and Morocco. In addition, Brunei, Romania, Uzbekistan and Hungary are also accepting students through the Ministry of Education (Education, 2023).

2S2 Kazakhstan's Student and Expert Mobility Programs
Kazakhstan considered the most reformist country among the Turkic Republics in terms of education, is also the country with the highest international student mobility in Central Asia. In 2010, Kazakhstan joined the Bologna process, increasing student and academic mobility. Other Turkic Republics have not entered the Bologna process (Yalçinkaya & Beşirli, 2022) (p. 366).

According to the National Bureau of Statistics of Kazakhstan (Kazakhstan National Bureau of Statistics), international students increased from 5,982 to 28,194 in 2000. Kazakhstan is a country in the region that accepts more international students than Russia.

Kazakhstani students who go abroad prefer Russia the most in higher education and Turkey the second most. (UNESCO, 2022a).

The most well-known program is the Bolashak State Scholarships. Launched on 5.11.1993 on the instructions of the President of Kazakhstan Nursultan Nazarbayev, the International Bolashak Program aims to strengthen relations with the international community. The program's website states that the rationale for establishing the program is "At the dawn of Kazakhstan's independence, leaders of a new format are needed to establish high-quality relations and communication with the international community". The program is carried out within the 100% state-owned International Programs Center Joint-Stock Company, established by Decree No. 301 of the Government of the Republic of Kazakhstan dated April 4 2005. The program aims to train specialists for priority sectors of the national economy. The program includes both academic training (master's and doctoral studies) and research and production internships in leading companies and universities around the world. Employers also participate in the program. Employing students and graduates from various universities worldwide undoubtedly offers employers many advantages. Bolashak's graduate jobs office inventory includes more than two hundred companies, including transnational corporations. To date, 11.474 people have been trained under the program, and 8.279 have completed their contractual obligations (Bolashak).

The scholarship program covers pursuing a master's or doctoral degree, residence and internship in a foreign country. Civil servants, engineers, workers, farmers, technicians, etc., can apply for internships. Scholars must also obtain an invitation letter from the university to which they will apply. Suppose the scholarship recipient does not return to Kazakhstan or does not work for five years after completing the program. In that case, he/she must repay the entire scholarship amount (Electronic Government of the Republic of Kazakhstan).

Bolashak is significant, as it was the first post-soviet program to allow talented young people to study abroad. The program has become a guarantee of a successful career for its graduates. Over the years, the scope of the program has expanded. The program included only the US, UK, Germany and France in the early years. Later, with the development of cooperation with foreign universities and the revision of the rules, the geography of the study was expanded. The Bolashak 8th International Conference on Global Challenge (Miami/USA) was cited as a model internship mobility program in a report comparing programs from 11 countries (Bolashak, 2022).

According to Perna et al. (Perna et al., 2015), the low unemployment rate among Bolashak users suggests that the program has partially achieved its objectives, as it is perceived as an effective, albeit imperfect, policy tool to meet Kazakhstan's short- and medium-term labour needs. Most employers surveyed state that program beneficiaries have better reasoning, critical thinking and foreign language skills, increasing companies' potential to pursue international partnerships. One of the program's strengths is the requirement to pass various exams and complete the evaluation process to qualify for a scholarship. Applicants must pass the Independent Expert Commission interviews and achieve a minimum evaluation score (Bolashak, 2022).

2S3 Student mobility between two countries

Regular student mobility between the two countries started in 1992 with the Great Student Project. This project was coordinated by the Ministry of State of the Republic of Turkey, the Ministry of National Education, the Ministry of Foreign Affairs, the Ministry of Interior and the Council of Higher Education. It was aimed directly at the Turkic Republic. In the first phase, seven thousand higher education and three thousand secondary education students were brought to Turkey. In a short time, the scope of the project was expanded, and 57 more countries with historical, geographical and religious ties were included in the scholarship program. However, in the face of current developments, the program has not

been efficient due to the inadequacy of the legislation and the units that ensure the execution of the program (Öztürk, 2014)(p.56-63).

In the Bolashak program, which we focus on in our study, according to information from the International Program Center Bolashak (including the information in Table 4 and Table 5.), from the beginning of the program until October 2022, a total of 11,791 experts in 33 countries have studied abroad. Of these, only 36 (3%) interned in Turkey. In 2022, 36 students, academics and teachers are studying at twelve universities in Turkey. The distribution of trainees by field of training is presented in Table 3.

Table 3. Areas of Internship in Turkey under the Bolashak Program

Academic Discipline	Frequency
Distance Education Methodologies	11
Philology	3
History	3
Archaeology	3
Molecular Biology	2
Geography	2
Nanotechnology	2
Chemistry	1
Pediatric Surgery	1
Medieval Monuments	1
Religious Sciences	1
Social Philosophy	1
Culture Theory	1
Technical Aesthetics and Design	1
Urology	1
Law	1
Foreign Language (Turkish in Turkey)	1
TOTAL	36

The distance education methodologies that stand out among the areas where the authors of this study work are the program launched in early 2022 with the protocol signed between the Bolashak Program and Akdeniz University Distance Education Application and Research Center (AKUZEM). In the program in which the academics who signed this article also shared their observations, intensive training was given to academics on the basic principles of artificial intelligence, distance education practices and legislation in Turkey, open education systems, the use of techniques such as photography and film in distance education, the preparation of electronic course content, etc. Scholars also attended Turkish language courses. In this sense, the internship program with the Bolashak scholarship provided an opportunity for academics of both countries to gain in different fields.

Student mobility between the two countries regularly started in 1992 with the Great Student Project. This project is coordinated by the Ministry of State of the Republic of Turkey, the Ministry of National Education, the Ministry of Foreign Affairs, the Ministry of Interior and the Council of Higher Education and is directly aimed at the Turkic Republics. In the first stage, seven thousand higher education and three thousand secondary education students were brought to Turkey. The scope of the project was expanded in a short time, and 57 more countries with historical, geographical and religious ties were included in the scholarship program. However, in the face of current developments, the program could not be efficient due to the inadequacy of the legislation on the scholarship program and the units that ensure the execution of the program.

3.2.2. Weaknesses

2W1 Kazakh and Turkish Students Prefer Different Countries for Internship Programs
When the number of applications is analysed, the application rate of students from Central Asia and South Caucasus countries, including the Central Asian states, is in the middle of the regional distribution (Table 4).

Table 4. Distribution of students applying to the Turkey Scholarships Program by region

Region	N. of Students	Rate (%)
South Asia	42.381	25.6
Middle East	38.576	23.3
Sub-Saharan Africa	36.206	21.9
North Africa	20.010	12.1
Central Asia and South Caucasus	13.658	08.2
Asia Pacific	9.100	05.5
Balkans	2.025	01.2
Europe	2.022	01.2
North and Latin America - Caribbean	1.604	01.0

According to the Council of Higher Education data (YÖK, 2022b), the distribution of students studying in Turkey by nationality for 2021-2022 is presented in Table 5.

Table 5. 2021-2022 Academic Year, number of students by nationality

Country	Man	Woman	Total
Azerbaijan	17.143	6.629	23.772
Turkmenistan	11.206	8.178	19.384
Kazakhstan	1.441	1.468	2.909
Uzbekistan	1.549	874	2.423
Kyrgyzstan	888	761	1.649

As seen in Table 5, Kazakhstan ranks third. According to the data of the Kazakhstan National Bureau of Statistics for 2021, the number of university students in Kazakhstan is 309 thousand. One per cent of university students prefer Turkey for higher education (Kazakhstan National Bureau of Statistics). The distribution of the number of Kazakhstani students studying at universities in Turkey by year is presented in Figure 1.
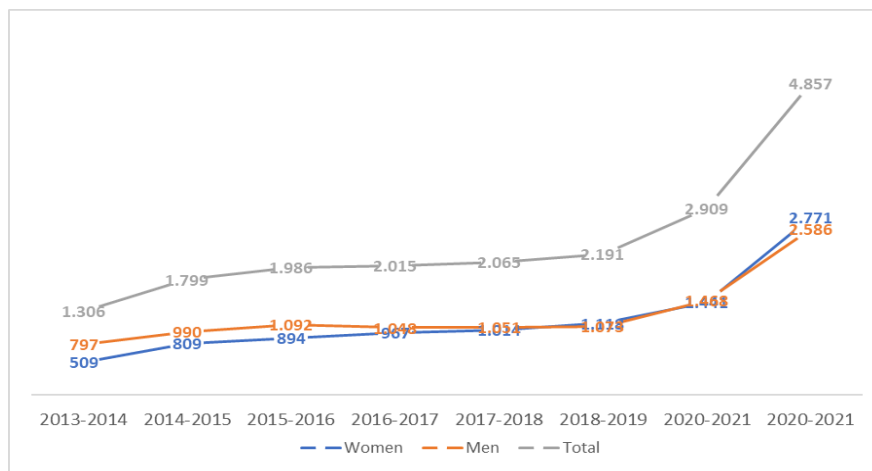
Figure 1. Distribution of the number of Kazakhstani students receiving higher education in Turkey by year (YÖK, 2022b)

Since their independence, the Turkic Republics have moved closer to the West, and many countries have stepped up efforts to capitalise on the region's wealth and improve diplomatic relations. For example, the Russian Mir Foundation and the Confucius Institute in China are investing in attracting students from these countries. Russia's influence on the functioning of higher education in the Turkic Republics is powerful. In particular, Turkmenistan and Uzbekistan receive support from Russian and Chinese funds, and these countries cooperate in higher education programs (Leskina & Sabzalieva, 2021) (p.717).

According to UNESCO data (UNESCO, 2022a), most of Kazakhstan's outgoing students prefer the Russian Federation (71,368 students). However, another striking finding is that Turkey ranks second (2,349 students). The United States ranks fifth (1,974 students), and the United Kingdom ranks sixth (1,288). Students from Turkey prefer Germany (10,862), followed by the USA (8,687) and the UK (4,083).

2W2 Few or No Good Practice Examples
The website of the Bolashak program includes a tiny number of opinions from different students. However, a database of completed projects needs to be shown or known in any internship program. Publishing collective works in a database would increase the interest in these programs and the multiplier effect of scientific studies.

2W3 Individual Applications, Failure to Identify Common Thematic Programs
In the internship programs of students and academics abroad, the prospective student or academician usually creates a working title. The program starts when they receive an acceptance/invitation letter from the partner university. Instead, a specific theme can be determined, and larger teams can produce larger projects. In this way, the development of distance education software, technological device production, infrastructure development, etc., can be approached, which requires significant investments and teams.

3.2.3. Opportunities

2O1 Increased Opportunities to Work Online
Although the geographical distance between Kazakhstan and Turkey necessitates an internship program within a certain period with a particular expenditure, the remote working models detailed in 1O1 can be developed. If the study program is structured under a thematic project, the project's continuity can be ensured when the student returns to his/her country.

2O2 All Aspects in the Opportunities Section of SWOT 1.
All the elements that can make the cooperation between the two countries more efficient can also positively affect student mobility when used correctly.

3.2.4. Threats

Articles 2T1 and 2T2
As detailed in Table 1, increasing costs reduce the amounts transferred to the funds and, thus, the number of beneficiaries.

4. Discussion

In the study, SWOT analysis was conducted for two research questions. The findings for RQ1, "What is the current capacity of the two countries for distance education cooperation?" show that solid elements stand out, and both countries have strong potential to jointly strengthen their distance education infrastructure and human resources post-pandemic (1S1, 1S2, 1S3, 1S4, 1S5).

For other weaknesses, the following strategies can be developed.

4.1. Investment in Human Resources: 1W1-1 W2-1 W3-1 W4 > 2S1 - 2S2 - 2S3

For 1W1 (Internet Access Problems) and 1 W4 (Low trade volume between the two countries), we argue that long-term, for 1 W2 (Digital Literacy) and 1 W3 (Trained Human Resources) immediate and short-term, problems can be improved by investing in human resources, for which student and expert exchange programs can provide an opportunity.

In the context of RQ2, "What is the potential of student and expert mobility between the two countries for cooperation?" (SWOT 2), the conditions seem to be favourable for this (2S1, 2S2, 2S3). However, the exchange programs are currently limited to individual work (2 W3), large project teams must be accommodated, long-term workshops must be added, and existing ones must be multiplied. In this way, this weakness in student mobility programs can be improved.
To strengthen other weaknesses in student and expert mobility programs, the following strategies can be implemented.

4.2. Promotion and Incentives: 2W1-2 W2 > 1S4-1S5

As a result of the analysis, it was determined that the preference rates of Kazakh and Turkish students for each other's countries were low. For this purpose, under 1S4 (Growing Economies of Kazakhstan and Turkey), motivation for preference can be increased by using the opportunities and case studies offered by the advantages of both countries and the historical and cultural ties between the two countries (1S5). At the same time, the number of applications to these programs can be increased by introducing examples of good studies to the scientific world (2 W2).

4.3. Remediation of Damage from Threats: 1T1 > 1O1/1 T2-2T2 > 1 O2

The prejudice toward distance education for collaboration (1T1) can be positivized by using the opportunity to increase experiences and awareness of distance education during the pandemic period. The negative impact of increased travel and accommodation costs of internship programs (1 T2-2T2) due to rising global inflation and declining currency values can be mitigated by improving remote working options.
Aside from weaknesses and threats, policy recommendations for strengthening other topics are as follows:

- As suggested by Bokayev et al. (2021, p.37) and Nurmukhametov et al. (2015, p.18) for Kazakhstan, in both countries (and in all developing countries), the technological infrastructure of rural areas and the support of families in these areas are essential for addressing inequality of opportunity in education. Supporting disadvantaged groups is often highlighted in global and national development programmes, EU grant guidelines, etc. Strengthening internet infrastructure in rural areas, encouraging students to access some open courses in high-quality schools or providing separate courses for students in these areas can play a role in improving the problems caused by general inequalities in education. The necessary funding for this could be provided by combining the technological and economic strengths highlighted in the previous sections.
- The joint higher education and internship programmes between the two countries should be increased. The Bolashak scholarship programme offers favourable conditions to continue the necessary work to prepare for these academic programmes.
- Institutions and organisations established in cooperation with both countries should be strengthened (such as Akhmat Yassawi University)
- Turkish universities should support open-access portals in Kazakhstan, and common course content should be prepared.
- The Bolhasaq programme should be expanded to include more higher education institutions from Turkey. More internship programmes and increased student mobility will strengthen cultural and commercial

relations between the two countries and create a suitable environment for scientific publications, joint R&D projects and production.

- Since the Bolhasaq programme also includes internship practices, this aspect should be evaluated especially well. Remembering that the most important problem encountered during the pandemic is access to communication and information technologies (device and connection speed), both countries should focus primarily on improving their IT infrastructure. There should be more internships and mutual work agreements in the companies located in these zones, which mainly consist of technologies on the campuses of universities than has been realised thus far through Bolhasaq protocols. With internship practices under the supervision and support of the states, qualified personnel who are well aware of the assets and shortcomings of both countries can be trained.

Most studies address the problems countries face during the pandemic, and very few provide comparative analyses across different countries. In our study, we discussed how two countries, which have common problems but have different strengths and weaknesses, face different threats but also have many opportunities and can use their different strengths. We analysed the potential of Turkey and Kazakhstan for cooperation and examined our proposed internship/exchange programs. As a result of our findings, we discovered that both countries have high potential and opportunities for cooperation and that the internship/exchange programs that both countries have been conducting for a long time need to be more utilised.

5. Conclusions

Although there is a widespread and realistic belief that distance education does not constitute an alternative to formal education, education and information are moving away from time/space/social class constraints, especially in today's world, where education and information progress uncontrollably unlimitedly through digital media. Formal education practices must refrain from avoiding communication and information technologies that constitute the basis of distance education.

While the increasing importance of the need for educated people in the information society is a major handicap for countries with limited access to technology, for countries lagging in the education race, the fact that access to information is slightly easier than in the past offers various opportunities to close the gap in this race. The rising cost of living, especially in the aftermath of the pandemic, inflation that has reached disturbing levels even in the economies of developed countries, the impending food crisis, etc., will make formal education even more expensive, forcing millions of students to sustain their lives by working a job during their education.

Social state practices, in which education was provided free of charge and equally to all, lost their former functionality after 1980. In addition, in times when epidemics that threaten humanity change daily life in an instant, when billions of people are forced to stay indoors and when students strive to stay away from education by straining their existing means, it has once again become clear how important it is to have a strong distance education infrastructure.

The negativities experienced during the pandemic express the negative situations in the education system. First, it should not be forgotten that the transition to distance education during the pandemic was very rapid. In the proactive process, social, educational and technological negativities were experienced in distance education as a natural consequence of being unprepared for crises due to inadequate distance education infrastructure, prejudices about distance education, etc.

Situations similar to the problems identified in Kazakhstan were also observed in Turkey. In rural areas where some students return home from schools that were urgently cancelled, there needed to be more internet access, expensive internet packages, insufficient computer ownership, etc. In response to the possibility of outbreaks and

mass lockdowns similar to the COVID-19 pandemic, developing IT infrastructures, reducing the costs of access to the Internet, increasing open education resources, and thus providing an environment where access to communication and information technologies is facilitated and distance education/open access content is enriched for sustainable development are among the issues that developing countries such as Kazakhstan and Turkey should take urgent measures to ensure that they do not fall behind in the competitive education race.

The institutions of both states have reached a certain level of experience in distance education. Despite this, historical, sociological, economic, etc., the problems listed in the weaknesses and threats section emerged due to many factors. These problems, which are more unfavourable in developing countries, can be improved more easily and more permanently through cooperation between countries.

It is undoubtedly crucial for the experiences to take advantage of a challenging process, such as the Covid-19 pandemic, into opportunities and to increase the productivity of distance education systems that can be used as a reactive tool in extraordinary conditions. Investing in communication and information technologies is imperative for developing countries, and these countries can reduce their deficiencies through collective efforts. Distance education prepares a suitable ground for such international studies by eliminating time and space constraints.

This study, which compares the distance education experiences of both countries in the time interval covering the pandemic process and before and suggests strategies to improve the problems, will provide a new perspective for decision-makers and the necessary data for scientists working in this field. Our study covers the specified period and two countries. Scientists can develop cooperation strategies for different countries using a similar method and sample. In the literature, the increase in cross-cultural studies will benefit the implementation of cooperation policies. Internship/exchange programmes, as evaluated in this study within the distance education framework, can also create added value for joint studies that countries can carry out in areas such as trade, culture, R&D projects, etc. Academic studies to be carried out in this field will make essential contributions to the literature and policy making.

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CONFLICTS AND NATURAL DISASTERS AS DRIVERS OF FORCED MIGRATIONS IN A GRAVITY-TYPE APPROACH[*]

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Abstract. The literature identifies three main drivers for forced migration, namely conflict, food insecurity, and natural and man-made disasters, although finds no empirical consensus on the association between climate change and migrations. Aim of this study is to identify the different push and pull factors of forced migration in different regions of the world by means of gravity-type models. Particular attention is devoted to determining the effects of climatic factors and conflicts, while controlling for the economic, political and social relationship between the origin and the destination countries. We model both total forced migration, that includes refugees, asylum seekers, internal displacements, and returnees, and cross-border forced migrations. Finally, we consider a full panel data analysis and estimate both fixed effects and random effects model specifications.

Keywords: Forced migration; internally displaced persons (IDPs); Conflicts; Natural disasters; Climate change; Gravity models

1. Introduction

According to the International Organization for Migration (IOM), forced displacement is the movement of persons who have been forced to flee or leave their habitual residence as a result of armed conflict, situations of

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generalized violence, violations of human rights, natural or human-made disasters.[†] It includes refugees, asylum seekers, and internally displaced persons (IDPs). Refugees, in particular, are persons who, owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion, are outside the country of their nationality and are unwilling to avail of the protection of that country; they are defined and protected under international law by the 1951 United Nations Refugee Convention. Instead, asylum seekers are individuals seeking international protection whose claim has not yet been finally decided on by the host country. Finally, IDPs are persons who have been forced to flee or leave their places of habitual residence who have not crossed an internationally recognized State border, so that they remain under the rule of their government, even if that government is the reason for their displacement.

Notice that between 1990 and 2012 the total number of forced migrants worldwide has remained rather stable, because many displaced people were able to repatriate, built permanent homes in their host communities or relocated in third countries. In the last decade, on the other hand, the situation has changed and the number of refugees, asylum seekers and IDPs has substantially increased. As wars and conflicts continued, refugees and IDPs were not able to return home, host countries started setting limits for the number of refugees that they would accept and started refusing to integrate displaced people.

As of mid-2021, the United Nations High Commissioner for Human Rights (UNHCR) estimated that the number of forcibly displaced people worldwide has surpassed 84 million, of which 50 million were IDPs, 21 million refugees and 4,4 million asylum seekers. In particular, due to the Syrian civil war, Syria had the largest refugee population, with 6,7 million refugees hosted by 126 countries. Turkey was the country that hosted the highest number of Syrian refugees (3,7 million), followed by Lebanon (852.000), Jordan (668.000) and Iraq (246.000); in Europe the main host countries were Germany (616.000) and Sweden (115.000). Syria had also an incredibly high number of IDPs (6,8 million), preceded only by Colombia (8,1 million) and followed by the Democratic Republic of the Congo (5,1 million). Instead, the majority of the asylum seekers were from Venezuela (950.000), Iraq (270.000), Afghanistan (230.000), the main host countries being the United States (1,2 million), Peru (540.000), Turkey (320.000) and Germany (230.000).[‡]

According to literature there are three main reasons that cause forced migration: conflict, food insecurity, and natural and man-made disasters, that interact with each other in a complex way. In fact, as reported in the International Institute for Strategic Studies (IISS) Armed Conflict Survey 2021, the number of conflicts hit a record high in 2020, with more active conflicts than at any time since 1945, especially due to non-state armed groups. Most of the armed conflicts remain internal, although have become increasingly internationalized, with third party interventions and spillovers to neighboring countries (International Institute for Strategic Studies, 2021). The civilian-military casualty ratio of contemporary conflicts shows a high variability; in some cases, as Cambodia (1975-1979) or Rwanda (1994), it reached a 9:1 ratio, while in other cases, as the civil war in Sri Lanka (1983-2009), conflict led to the deaths of more combatants than civilians (Roberts, 2010). Notice that clearly not all conflicts result in migration; in fact, the relationship between conflicts and migration can be a reverse one, with conflict being an outcome of migration due to competition over natural and economic resources, ethnic and socioeconomic tensions, burden on infrastructure and services (Reuveny, 2007). In any case the evidence in the literature on the conflict-migration linkage suggests that countries that experience violent conflicts tend to have higher migration flows (Lozano-Gracia et al. 2010); it is also plausible that the influence of conflict on migration is indirect, with conflicts affecting factors like income loss or institutional failure, that in turn induce migration (Coniglio and Pesce, 2015). It is also important to recall that, because many conflicts are fought in rural areas and target productive agricultural assets, often people dependent on agriculture are the most affected by them, and

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[†]International Organization for Migration (IOM). International Migration Law: Glossary on Migration. Available at: https://publications.iom.int/system/files/pdf/iml_34_glossary.pdf

[‡] UNHCR. Refugee Data Finder. Available at: https://www.unhcr.org/refugee-statistics/

food insecurity turns out to be strongly related to both conflict and migration. Indeed, protracted conflicts can cause both forced migrations and food insecurity, that is driven by sudden food price spikes, dispossession, or loss of agricultural assets. On the other hand, food insecurity can lead to forced migrations, can prevent many who had already migrated to return to their homes, and can increase the likelihood and intensity of armed conflicts. But it is also true that forced migrations and food insecurity may disrupt social cohesion in local communities and fuel conflicts, giving rise to a vicious circle for rural population. Notice that the causal relationships among these factors are never straightforward, and the situation is worsened by the fact that conflicts are often compounded by drought, floods and other climate shocks, that also affect rural food security (FAO-IFPRI, 2017).

Interestingly, climate related migration is one of the most important topics in the disclosure on global warming and its consequences. Indeed, global warming has effects on precipitation, floods, droughts, wildfires, cyclones, and therefore influences substantially the living condition in the affected regions. However, although IOM now officially considers climate risk one of the major causes of displacement, to the extent that it includes natural disasters explicitly among the determinant of forced displacement in its definition, the rights of people migrating because of climate change are still an open problem, especially with respect to cross-border moves (Hartmann, 2010; Suar, 2013; Bettini, 2017; Wiegel et al., 2019). One consequence of this lack of official status for climate-related migrants is that many of them are IDPs.

The main aim of this study is to identify the different push and pull factors of forced migration in different regions of the world by means of gravity-type models. We are going to employ bilateral data from UNHCR on forced migrations from four different regions (covering the whole of Africa, the Middle East and South and South-East Asia) with worldwide destinations in the time span 1990-2016. Particular attention is devoted to determining the effects of climatic factors and conflicts, while controlling for the economic, political and social relationship between the origin and the destination countries. We also distinguish between total forced migrations and cross-border forced migrations in order to isolate the role of internal displacements, which in some regions represent more than 50% of total forced migrations. This last point is worth a few considerations. In fact, gravity models are designed to handle bilateral data from an origin location i and a destination location j, typically with $j \neq i$. When we model total forced migrations, on the other hand, in some cases we observe internal displacements, that are forced migration flows that stay within their country ($j = i$). If we were modelling IDPs only, we would clearly not need a bilateral model; but given that we are modelling IDPs as well as refugee and asylum seeker flows, then the estimation of a bilateral model is crucial, and the destination of IDPs is just regarded as one of the many possible destinations that the model takes into account. A similar application of gravity models can be found in Levine (2010) in the context of estimating crime trips between different zones.

Clearly our data set, that will be illustrated in detail in Section 3, includes a large number of zeroes for the response variable, corresponding to all forced migration routes that have not been travelled. This data characteristic involves some difficulties, as the response variable cannot be treated as a continuous variable. In fact, notice that zeroes could be interpreted as flows too small to report, in which case it would be legitimate to drop them from estimation, or they could be seen as generated from meaningful selection, in which case OLS estimation without accounting for selection would be biased (Anderson, 2011). One solution to deal with the zeroes without automatically discarding them could be to estimate the gravity model in a multiplicative form and to apply the Poisson Pseudo Maximum Likelihood (PPML) estimator; this approach has been advocated for instance in Santos Silva and Tenreyro (2006, 2011) and Shang (2020); in the context of international trade data and has been applied for modelling migration flows in Beine and Parsons (2015).

Another possibility could be to estimate a model in two stages: first, we could fit a model for the probability that the migration flow is not zero and then, conditionally on this event, we could fit a model for positive migration flows. The present work falls within this second approach, although involves only the description and estimation of models to predict the intensity of the flow on a migration route, on condition that the route has been travelled.

The main reason for this lies in the very nature of forced migrations. In fact, UNHCR data on forced migrations report only official forced displacements, that clearly underestimate the real phenomenon; in this context it is quite likely that the zeroes are not true zeroes, but represent routes that did not lead to asylum applications and for which we have no data. For this reason, rather than trying to understand why forced migrants go to some places and not to others, in what follows we will take the aforementioned conditional approach and will focus on models that can identify the characteristics of the origin, of the destination, of the origin-destination pair that explain why certain routes were travelled by larger flows of forced migrants while other routes had much smaller numbers.

The rest of the paper is organized as follows. We first briefly describe gravity models and their main applications in the literature in Section 2. Section 3 describes the bilateral dataset we have obtained by merging data from different sources. Section 4 presents the model and the main results for total forced migrations and cross-border forced migrations. We conclude with final remarks and policy implications in Section 5.

2. Gravity models and migrations

Decisions about migration and forced migration depend on a number of economic, political, social, cultural factors, that can be formalized by an appropriate statistical model. In particular, gravity models allow taking into account the determinants of migration at its origin and destination. Gravity models derive from Newton's law of universal gravitation that in its simplest form states that bodies with mass attract each other with a force that is a direct function of the product of their masses and an inverse function of the square of the distance between them.

Notice that since the work of Tinbergen (1962), gravity models have been employed for modelling trade between two countries as a function of the attractive mass of the two economies and of the distance between them. Given the multiplicative nature of the gravity equation, they are often log-linearized and expanded with an additive error term. Another possibility relies on the Poisson Pseudo-Maximum Likelihood approach (Santos Silva and Tenreyro, 2006, 2011). Despite their simplicity, gravity models have revealed interesting predictive power; moreover, in the context of trade, their use has been justified by generating gravity equations from a general equilibrium framework (Bergstrand, 1985).

Another setting in which gravity models are increasingly applied is that of modelling migration flows (Lee, 1966; Todaro, 1969; Lewer and Van den Berg, 2008; Letouzé et al., 2009; Reuveny and Moore, 2009; Anderson, 2011; Coniglio and Pesce, 2011; Arif, 2020; Freeman and Lewis, 2021). The first suggestion in this sense goes back to the work of Ravenstein (1889) for studying migration patterns in United Kingdom. In the simplest formulation, migration between location i and location j is a direct function of the two population sizes, and an inverse function of the distance between i and j. Since the work of Stouffer (1940), that extended gravity models by introducing the notion of intervening opportunities, many increasingly complex migration models have been suggested in the literature in order to explain migration behavior, both from the point of view of aggregate migration flows and individual migration decision. However, most of these studies concern voluntary migration, rather than forced migration. Even the structural model of migration set out in Anderson (2011), that aims at building a theoretical foundation for it similarly to what has been done in the context of trade, refers to voluntary migration.

One paper that considers a gravity model approach in the context of forced migration is that by Abel et al. (2019), that aims at empirically establish the causal relationship between climate change, conflicts and cross-border migration simultaneously. In fact, the majority of the literature on this subject takes into account the relationship only between any two of these three phenomena, and in particular finds no empirical consensus on the association between climate change and migrations. According to Abel et al. (2019), this lack of consensus is partly due to the complexity of migration processes, that makes climatic impacts on migration be indirectly mediated through social, demographic, economic, political and environmental factors (Black et al. 2011). This remark led the authors to conclude that when studying the relationship between climate and migration, it is fundamental to take

into account the complex interactions among migration drivers. Thus, using bilateral refugee flows data between 2006 to 2015 for 157 countries, Abel et al. (2019) employ sample selection methods for gravity-type models to estimate first the impact of climate on conflicts and then the impact of conflicts on asylum seeking applications. Their results suggest that climatic conditions, by affecting the likelihood of armed conflicts, have a significant effect for explaining forced migrations only for countries that were affected by the Arab Spring.

Notice that our approach differs from that of Abel et al. (2019) in three different ways. First, as explained in the Introduction, because of the nature of UNHCR data on forced migration, we take a conditional approach and consider a gravity-type model that predicts the intensity of the flow on a migration route, on condition that the route has been travelled. For this reason, with respect to the three simultaneous equations in Abel et al. (2019), we estimate a single-equation model; this allows estimating the effect on forced migration of each of its possible drivers (economic, political, demographic, social, environmental) controlling for the others.

Second, while Abel et al. (2019) model solely asylum-seeking flows, since in their opinion refugee figures are prone to be strongly affected by country-specific policies in granting a refugee status, we consider all forced migrations, including IDPs. In fact, by introducing in our model both origin-specific and destination-specific fixed effects, country-specific policies in granting a refugee status (as well as any other country-specific characteristics) are in any case controlled for. Moreover, given that the 1951 Refugee Convention does not recognize environmental factors as criteria to define a refugee, in order to be able to estimate in particular the effect of natural disasters on migration, we find essential to include in the analysis also IDPs.

Third, given the nature of our data, we consider a full panel data analysis and estimate both fixed effects and random effects model specifications. The former offers interesting insights when looking at the most significant country pair (origin-destination) fixed effects; after controlling for natural disasters, conflicts, economic and political factors, these represents the migration routes whose intrinsic characteristics are most relevant for explaining forced migrations. The latter, on the other hand, allows estimating also the effect of time-constant bilateral predictors such as the distance between country of origin and country of destination, the fact that countries share a common language or have a colonial relation, that are controlled for in the fixed effects model without explicitly quantifying their effect.

3. Data

This paper aims at analyzing forced migrations in the time span 1990-2016 for 88 countries divided into four regions, namely South and Southeast Asia, the Middle East and North Africa (MENA), East and Southern Africa, West and Central Africa. For the African regions, in particular, we have used the African Development Bank country subdivisions, and each of them includes two subregions belonging to the same climate zone.[§] MENA, in particular, is a diverse region that is particularly vulnerable to natural hazards due to water scarcity, increasing climate variability and a fast-growing population, which is progressively concentrating in urban areas (Banerjee et al., 2014). Since the Second World War, it has experienced an incredible level of conflict, particularly civil wars; the reasons are diverse, but many of these conflicts have their roots either in the creation of the State of Israel in 1948, or in the revolution in Iran in 1979, that reinforced sectarianism between Sunni and Shia Muslims, or in the siege of Mecca in 1979.[**] East and Southern Africa is a geographically, culturally and economically diverse region boasting some of the world's richest natural resources; South Africa, in particular, is the region's largest economy and is one of the most unequal countries in the world. Grave violations against civilians including conflict-related sexual violence continue to be committed in the region, that has been impacted by below-average

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[§] The African Development Bank country subdivisions is available at https://www.afdb.org/en/countries

[**] Tackling Intersecting Conflicts in the MENA region. Available at: https://www.crisisgroup.org/middle-east-north-africa/tackling-intersecting-conflicts-mena-region

rainy seasons and is experiencing a major food insecurity crisis (Global Humanitarian Overview, 2022a). West and Central Africa is a vast and diverse region that has been experiencing an exceptional population growth and an accelerated urbanization as well as political instability, conflicts, violence, extreme poverty, weak governance, and food insecurity. Climate change has been compounding these issues, with frequent severe droughts and irregular and unpredictable rainfall (Global Humanitarian Overview, 2022b). Finally, South and Southeast Asia are home to one-third of the world's population, and are characterized by a vast cultural diversity in terms of religion and ethnicity; all the countries of this region, with the exceptions of Thailand, Nepal, Afghanistan and Bhutan, have been under the control of European colonial powers in the nineteenth and early twentieth centuries. Unresolved tensions of colonialism, contested border demarcations, contestation over natural resources have been causing many regional conflicts (Avis, 2020); the whole region is also severely affected by climate-related natural disasters.

For each region, we estimate two different gravity-type models, one for total forced migration, that includes the number of refugees, asylum seekers, IDPs, as well as returned refugees and IDPs, and one for cross-border forced migration, that does not take into account IDPs. For both models we assume a fixed effects specification, and when appropriate also a random effects specification.

The response variable of both models consists in the number of forced migrants that in year t moved from origin i to destination j. Bilateral data on forced migration are sourced from the UNHCR database.[††] Notice that this data are provided to UNHCR by host governments or, in least developed countries, by UNHCR field offices and other NGOs.

Similarly to Abel et al. (2019), the main predictors of our gravity-type models concern climatic factors and conflicts. In fact, different kind of climate variables have been considered in the literature for studying the climate change-migration linkage (Beine and Jeusette, 2021; Juhasz and Tempu, 2022); these include both slow onset events, that capture long-run climatic factors measured as levels, deviations, variability of precipitation and temperature, and fast onset events that typically capture natural disasters. Notice that while the decision to migrate as an adaptation strategy could equally depend on short or long-term changes, the magnitude of the migration flow and its duration are substantially affected by the type of events. More precisely, while long-term changes in living conditions leads to constant flows, sudden disruptions might induce massive flows immediately after the event (Vallejo and Mullan, 2017). For this reason, given the nature of forced migrations, here we are focusing on natural disasters, both those that are climate-related (such as drought, floods, storms) and those that are not (such as earthquakes and volcanic eruptions); this is another difference with Abel et al. (2019), that measure climatic factors, and in particular the duration and magnitude of drought conditions with respect to normal conditions, using the Standardised Precipitation-Evapotranspiration Index (SPEI). More specifically, we are including into our models both the number of natural disasters occurred yearly in each origin country and the number of individuals directly affected by them; the former is a measure of hazard's risk, while the latter is a measure of the intensity of exposure (Neumayer et al., 2014). Both predictors are sourced from the Centre for Research on the Epidemiology of Disaster's (CRED) International Disaster Database (EM-DAT)[‡‡], and for both of them we take into account both their simultaneous and their lagged values.

Instead, data on conflicts are sourced from the Uppsala Conflict Data Program (UCDP) Georeferenced Event Dataset (GED) Global version 21.1 (Sundberg and Melander, 2013; Pettersson et al. 2021; Stina, 2021). In particular, we used the unique numeric ID identifying each event in the database to compute the number of conflicts occurred yearly in each origin country and the corresponding number of fatalities; the former is a measure of the frequency of the conflicts, while the latter is a measure of their intensity. Notice that in the models

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[††] UNHCR Data. Available at: https://www.unhcr.org/data.html

[‡‡] Available at: https://www.emdat.be/database

for both predictors we take into account their simultaneous and their lagged values. Moreover, we also include the (simultaneous) number of conflicts occurred yearly in each destination country, in order to establish if forced migration flows head towards safer places.

The remaining predictors of our models include standard variables previously used in the literature for modelling migrations with gravity-type models (Backhaus et al., 2015; Beine and Parsons, 2015; Abel et al, 2019); they capture bilateral and country-specific push and pull factors and are obtained from a number of sources. In particular, from the CEPII database we obtained the distance between the capital cities of the origin and the destination countries, as well as three dummy variables indicating whether the two countries share a common language, have had a colonial relationship, are contiguous.[§§] The remaining predictors pick up either socio-economic or political characteristics of the origin, of the destination, or of both the origin and the destination; as general controls we included the population sizes of the origin and of the destination (in hundreds of thousands of individuals) and a dummy variable indicating migration flows representing IDPs in the model for total forced migration.

Starting from the socio-economic factors, the first controls that we included in the model concern the economic performance of the origin and of the destination countries as approximated by the GDP per capita, that is sourced from the World Development Indicators (WDI) database from World Bank.[***] In particular, the World Bank classifies all countries according to their GDP per capita as *Under the poverty line* (if the GDP per capita is lower than 825$), *Middle-lower income* (if the GDP per capita is between 826$ and 3255$), *Middle-higher income* (if the GDP per capita is between 3256$ and 10065$), *Higher income* (if the GDP per capita is higher than 10066$). Starting from this classification, we focused on the threshold 3255$, and for both the origin and the destination, we created a time-varying indicator that is equal to 1 if in year *t* the country was classified as under the poverty line or as a middle-lower income, and zero otherwise.

Other socio-economic factors sourced from the WDI database that we included in the models with respect to the country of origin are the unemployment rate (on total labor force) and natural resources rents, *i.e.* the percentage of the GDP of the country that comes from natural resources; in fact, one of the most significant aspects in some of the regions we are considering is the so-called *Natural Resource Curse*, that refers to the failure of resource-rich countries to fully benefit from their natural resource wealth because of the fact that they tend to be more authoritarian, more prone to conflict and less economically stable (Frankel, 2012). The last socio-economic predictor included in our model is the bilateral migrant stock in the three decades preceding our analysis (*i.e.* 1960-1989), that is obtained from the Global Bilateral Migration dataset by World Bank;[†††] this represents the potential effect on the choice of a destination of a pre-existing co-ethnic community.

Moving to the political factors, the first two predictors are sourced from *The Global State of Democracy Indices* from The Institute for Democracy and Electoral Assistance (IDEA) (Tufis, 2020). In particular, we used two of the attributes of democracy developed by IDEA, namely Representative Government and Fundamental Rights, that are scaled to range from 0 (the lowest score) to 1 (the highest score), and for each of them we created a time-varying indicator that is equal to 1 if in year *t* the value of the attribute for the destination was higher than that for the origin, and 0 otherwise. These indicators allow verifying if a better political status in the destination represents a pull factor for forced migration.

The two other political predictors that we have included in the analysis concern the lack of democracy and the occurrence of a coup d'état in the country of origin. In particular, for the former we built a time varying indicator

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[§§] Available at: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6

[***] Available at: https://databank.worldbank.org/source/world-development-indicators

[†††] Available at: https://databank.worldbank.org/source/global-bilateral-migration

that is equal 1 if in year *t* the country of origin had a non-democratic regime (and 0 otherwise), and was sourced again from the IDEA dataset. For the latter, we created a time-varying indicator that is equal to 1 if in year *t* the country of origin experienced an attempted coup d'état (and 0 otherwise). In this case the source was the *The Coup D'état Project* (CDP) dataset from the Cline Center of University of Illinois.[‡‡‡] Interestingly, the occurrence of a coup d'état could represent both a push factor and a pull factor for forced migration. In fact, a successful or a failed *coup d'état* can indeed generate political refugees; on the other hand, if the coup d'état represents the end of a dictatorial regime, it could create favorable conditions for the arrival of forced migrants and it could be considered also as a pull factor. The CDP dataset, however, does not specify if a coup d'état has generated a democracy or a dictatorial regime; for this reason, in our empirical analysis we only included the coup d'état indicator with reference to the country of origin, both simultaneous and with one year lag.

Table 1. Summary statistics (mean values and percentages)

Variables	South and Southeast Asia	Middle East and North Africa	West and Central Africa	East and Southern Africa
Migration Variables				
Total Migrants	12468,45	6886,76	3828,46	7123,80
Migrants btw 1960-1989	76509,27	29866,45	12415,46	13131,60
Cross-border Migrants	9411,12	2994,27	1549,10	4280,74
% IDPs on Total Migrants	25,2%	56,8%	59,7%	40,3%
Natural Disasters Variables				
Origin - Number of Disasters	4,31	0,85	0,66	1,11
Origin - Affected	4079790,06	108899,07	116616,01	441379,28
Conflict Variables				
Origin - Number of Conflicts	3,20	1,48	1,94	1,90
Destination - Number of Conflicts	1,30	1,43	1,46	1,50
Origin - Deaths in Conflicts	566,54	475,80	106,13	188,52
Economic Variables				
Origin - GDP per capita	4509,64	11506,45	1362,62	1817,63
Destination - GDP per capita	13925,62	13297,96	11774,39	11804,37
Origin - % Obs. Low GDP per capita	73%	35%	89%	75%
Destination - %Obs. Low GDP per capita	40%	43%	46%	47%
Origin - Unemployment	6,52	8,35	5,14	10,12
Origin - Natural Resources	4,39	16,67	13,60	7,7
Political Variables				
Origin - Representative_Government	0,43	0,32	0,42	0,38
Destination - Representative_Government	0,57	0,56	0,56	0,54
Origin - Fundamental_Rights	0,47	0,49	0,50	0,50
Destination - Fundamental_Rights	0,61	0,60	0,60	0,59

[‡‡‡] Available at: https://clinecenter.illinois.edu/project/research-themes/democracy-and-development/coup-detat-project-cdp

Table 1 shows the mean values of the different variables included in our data set for each region. One point that immediately arise from it is the different size of forced migration flows in the different regions: the yearly mean number of migrants per route reaches its maximum in South and Southeast Asia, and its minimum in West and Central Africa. Moreover, internal displacement represents an important phenomenon in most of the regions taken into account, with a percentage of IDPs on total forced migrants ranging from 25,2% in South and Southeast Asia to 59,7% in West and Central Africa. On average, South and Southeast Asia is the region more affected by natural disasters, both from the point of view of the frequency and of the intensity, and by conflicts, again both from the point of view of the number of events and the number of deaths. Interestingly, on average the Middle East and North Africa is the least affected region in terms of the frequency of the conflicts, but shows a high number of deaths.

From the point of view of the country economies, Table 1 shows that in all the regions on average the GDP per capita of the country of origin is lower than that of the country of destination; the only exception is MENA. Table 1 also shows the percentage of the observations in our dataset that according to their GDP per capita are classified as under the poverty line or as a middle-lower income; with reference to the country of origin, we can see that such percentage reaches 89% in West and Central Africa, where we find the lower mean value of the GDP per capita. Interestingly, in West and Central Africa on average we also find a particularly high value of natural resources rents; this finding is in accordance with the aforementioned *Natural Resource Curse*.

With respect to the political variables, notice that for both Representative Government and Fundamental Rights, the mean value for the country of origin is lower than that of the country of destination. In particular the lowest mean value for the former in found in the MENA region, while for the latter in South and Southeast Asia.

4. A gravity-type approach for modelling forced migrations

4.1 Model specification and estimation methods

In what follows we model bilateral forced migrations with the following functional form:

$$log(Y_{ijt}) = X_{it}^A \beta_A + X_{jt}^B \beta_B + X_{ijt}^C \beta_C + X_{ij}^D \beta_D + \alpha_i + \alpha_j + \tau_t + \varepsilon_{ijt} \qquad (1)$$

where Y_{ijt} represents the number of forced migrants from i to j in year t, X_{it}^A represents the time varying predictors related solely to the country of origin i, X_{jt}^B represents the time varying predictors related solely to the country of destination j, X_{ijt}^C represents the time varying predictors related to both the origin and the destination, X_{ij}^D represents the time constant predictors related to both the origin and the destination, $\alpha_i, \alpha_j, \tau_t$ represent country-specific (origin-specific and destination-specific) and year-specific fixed effects respectively, and ε_{ijt} is the error term.

Notice that the gravity model (1) can be estimated assuming either a fixed effects (FE) or a random effects (RE) specification. Under standard assumptions, FE models leads to unbiased and consistent estimators; however, although all time-constant characteristics are controlled for by the unit-specific fixed effects (country pair-specific fixed effects in our case), FE models do not allow estimating the effect of any time-constant bilateral determinant of the response such as the distance between the origin and the destination. It is worth noting that the inclusion of country pair-specific fixed effects into the FE model leads to the removal of origin-specific and destination-specific fixed effects, as well as of the dummy variable indicating migration flows representing IDPs, as the corresponding information is captured by the country pair-specific fixed effects. On the other hand, RE models require the additional assumption that the unit-specific unobserved heterogeneity is independent of the predictors

of the model, and the failure of this assumption results in biased and inconsistent estimators. In the next section, both for the total number of forced migrants and for the number of cross-border forced migrants, for all regions we will show the results of FE gravity models; only for those regions for which the Hausman test does not reject the additional assumption required by RE models, we will also show the results of RE gravity models, that allow estimating also the effect of time-constant bilateral predictors X_{ij}^D.

It is also worth noting that the literature on trade recommends the use of time-varying importer fixed effects and time-varying exporter fixed effects to control for the unobservable multilateral resistances, and potentially for any other observable and unobservable characteristics that vary over time for each exporter and importer (Anderson and van Wincoop, 2003). Here we decided not to follow this approach as it would make all the time-varying predictors related to the origin or to the destination to disappear from the model. In fact, the aim of our study is to identify what are the characteristics of the origin, of the destination, of the origin-destination pair that mainly affect forced migrations. An alternative to this approach, that will be explored elsewhere, is the random intercept PPML (Prehn et al. 2015).

4.2 Results for total forced migrations under a fixed effects specification

Table 2 shows the estimates and the significance of the parameters of the gravity model (1) with fixed effects for total forced migrations in the different regions, and several points arise from it. First, the number of natural disasters is significant and acts as a push factor for forced migrations only in the MENA region, that as pointed out in Section 3 is the least affected region, and the effect is both simultaneous and lagged. It is interesting to notice that in the MENA region also the (simultaneous) number of people affected by the disasters is significant, showing that that forced migrations in this region are affected by both the frequency and the intensity of the disasters. The number of people affected by the disasters is significant also in East and Southern Africa. Another interesting point is that if we do not control for conflicts, the number of people affected by disasters is significant in all the regions, emphasizing the strong link between these two predictors and the role of conflicts caused by natural disasters.

A second point that emerges clearly from Table 2 is that conflicts represent a significant push factor for forced migrations in all the regions. In fact, with the exception of East and Southern Africa, where it is the number of deaths caused by conflicts that is significant, in all the other regions the number of conflicts is always significant and has the effect of increasing forced migrations. Interestingly, also the number of deaths caused by conflicts (either simultaneous or with one year lag) is significant in all the regions except in South and Southeast Asia, but in West and Central Africa the simultaneous effect has a negative coefficient; this, however, can be possibly explained by noting that, when controlling for the number of conflicts (that is significant and has a positive effect), a particularly high number of deaths can indeed lead to lower migration flows.

Another interesting result is that concerning the number of conflicts in the destination country, that is significant and negative in all regions. It follows that, under the same conditions, forced migrants prefer to move to countries with a lower number of conflicts. From a broader perspective, forced migrants run away from insecure and dangerous areas to find a safer place.

From the point of view of the size and health of the countries' economy, the results of Table 2 show that a low GDP per capita in the country of origin (lower that 3.255$) has the effect of increasing forced migrations in all regions except South and Southeast Asia. Instead, with the exception of the MENA region, where we find that a low GDP per capita in the country of destination discourages forced migrations, in all the other regions forced migrations do not appear to have a specific economic expectation determined by the destination.

Another interesting result from Table 2 concerns the role of unemployment in the country of origin. Controlling for everything else, unemployment does not affect forced migrations in South and Southeast Asia and in East and Southern Africa, while it represents a push factor in the MENA region. Instead, for forced migrations originating in West and Central Africa, unemployment has a negative coefficient; this result seems to confirm migration transition theory, according to which higher levels of economic and human development are associated to higher overall levels of migration, while poor populations of the least developed countries have less capabilities to move (Flahaux and De Haas, 2016).

Table 2. Fixed Effects and Random Effects gravity models estimates for total forced migrations

	South and Southeast Asia	Middle East and North Africa		West and Central Africa	East and Southern Africa	
	FE	FE	RE	FE	FE	RE
O_No disasters $_{it}$	-0,001	**0,036*****	**0,036*****	-0,019	-0,007	-0,009
O_No disasters $_{it-1}$	0,001	**0,035*****	**0,035*****	-0,009	0,004	0,004
O_No Affected $_{it}$	0,003	**0,007****	**0,007***	0,002	**0,006****	**0,007****
O_No Affected $_{it-1}$	0,004	0,001	0,001	0,002	-0,001	-0,001
O_No Conflicts $_{it}$	**0,030*****	**0,036*****	**0,037*****	**0,020***	-0,001	0,000
O_No Conflicts $_{it-1}$	**0,042*****	**0,036*****	**0,036*****	**0,059*****	0,005	0,004
O_No Conflict Deaths $_{it}$	0,000	**0,014***	**0,014***	**-0,012***	**0,016****	**0,015***
O_No Conflict Deaths $_{it-1}$	0,001	**0,022*****	**0,022*****	**0,015***	**0,024*****	**0,024*****
D_No Conflicts $_{jt}$	**-0,039*****	**-0,021*****	**-0,021*****	**-0,074*****	**-0,054*****	**-0,053*****
O_Coup Attempted $_{it}$	-0,009	**0,181*****	**0,178*****	0,011	-0,059	-0,060
O_Coup Attempted $_{it-1}$	0,098	**0,156*****	**0,149****	**0,063***	-0,055	-0,055
O_Low GDPpc $_{it}$	0,067	**0,077***	0,074	**0,487*****	**0,371*****	**0,385*****
D_Low GDPpc $_{jt}$	0,006	**-0,138****	**-0,133****	0,021	-0,026	-0,017
O_Regime Status $_{it}$	**0,265*****	-0,002	0,003	**0,199*****	-0,018	-0,025
O_Unemployment $_{it-1}$	0,002	**0,006***	**0,006***	**-0,020*****	-0,055	-0,005
O_Population $_{it-1}$	**0,000*****	**0,001***	**0,001***	0,000	**-0,001*****	**-0,001*****
D_Population $_{jt-1}$	**-0,000*****	0,000	0,000	**0,001*****	0,000	0,000
O_Natural Resources Rents $_{it}$	-0,009	**-0,003***	**-0,003***	**0,006*****	**0,009*****	**0,009*****
D_O_Representative Gov $_{ijt}$	0,063	-0,080	-0,085	**0,150*****	**0,191*****	**0,162*****
D_O_Fundamental Rights $_{ijt}$	**-0,717*****	**0,176****	**0,122***	0,065	0,002	-0,029
Migrants 1960-1989 $_{ij}$			**0,256*****			**0,126*****
Distance btwn Capitals $_{ij}$			**-0,414*****			**-0,536*****
Colony $_{ij}$			-0,014			-0,006
Common Language $_{ij}$			0,240			**0,319***
Contiguity $_{ij}$			**0,703****			**1,940*****
Dummy IDP $_{it}$			**5,005*****			**5,444*****
Intercept			-0,012			**4,045***
Hausman Test P-Value	6,172e^{-07}	0,9943		1,458e^{-05}	1	

Note: *** p < 0.001; ** p < 0.01; * p < 0.05; the number of people affected, the number of deaths because of conflicts, the number of migrants between 1960 and 1989, the distance between capitals are log-transformed.

The last economic aspect taken into account by our gravity model is natural resources rents, and from this point of view there is a clear division between the MENA region and the rest of Africa. In fact, in MENA it has a negative coefficient, which is expected, while both in West and Central Africa and in East and Southern Africa it has a positive coefficient. One possible explanation for this is the aforementioned *Natural Resource Curse*, *i.e.* the failure of many African resource-rich countries to benefit fully from their natural resource wealth because of the high level of exploitation.

Looking now at the countries' political situation, we can see from Table 2 that there is a lot of variability across regions; most of the times, when the predictors are significant, they have the effect of increasing forced migrations: the lack of a democratic regime in the country of origin is significant both in South and Southeast Asia and in West and Central Africa, the occurrence of a coup d'état is significant both in the MENA region (both simultaneous and with one year lag) and in West and Central Africa, the Representative Government indicator (that measure how inclusive popular elections are in the destination with respect to the origin) is significant both in West and Central Africa and in East and Southern Africa.

One predictor that is particularly interesting to look at is the one representing the respect of fundamental rights. In fact, in the MENA region is significant and has a positive coefficient: controlling for everything else, forced migrants fleeing this region tend to move to countries with a higher respect of human rights. On the other hand, in South and South-East Asia it has a negative coefficient; one possible explanation for this is the fact that one of the major destinations of forced migration originating in this region is China.

4.3 Results for total forced migrations under a random effects specification

Notice that, as mentioned in Section 4.1, the effect of time-constant predictors such as the distance between the origin and the destination or the presence of a pre-existing community of migrants can be estimated only under a RE specification. The Hausman test, however, whose results are also reported in Table 2, allows estimating a RE gravity models only for two regions, namely the Middle East and North Africa and East and Southern Africa. The results are presented in Table 2, and do not differ much from the fixed effects ones with respect to time-varying predictors, but offer interesting indications as far as time-constant predictors are concerned.

A first point that arise from the results of the random effects models for total forced migrations is that the distance between the origin and the destination and the dummy representing contiguity of the two countries are significant in both regions and have opposite signs; this shows that, under the same conditions, forced migrants prefer to move to neighboring (or even bordering) countries. It is interesting to notice that the role of distance is confirmed also by the most significant country pair fixed effects corresponding to the FE gravity models of Table 2. For East and Southern Africa, for instance, among the most significant routes we find either IDPs (involving Sudan, Somalia, Uganda, Tanzania and Angola) or routes between bordering countries. Similarly, for the MENA region among the most significant routes we find either IDPs (involving Iraq, Cyprus, Lebanon, Yemen, Libya) or routes between neighboring countries, the only exceptions being Turkey-Germany, Iraq-Sweden, Iraq-Netherlands and Syria-Germany.

Interestingly, the Turkey-Germany route can be explained in light of the estimate of a different predictor in the RE model for the MENA region, namely the presence of a pre-existing community of migrants in the country of destination. In fact, besides distance, both in the MENA region and in East and Southern Africa also the number of migrants in the time span 1960-1989 is a significant predictor of forced migrations, with a positive coefficient. Notice that Turkish migration to Western Europe began with the signing of the recruitment agreement for labor between Turkey and Germany in 1961. It was originally a temporary measure, but over the time these laborers settled permanently, making up the largest Turkish community in Western Europe (Şen, 2003).

Another time-constant predictor that is significant in the RE model for forced migration originating in East and Southern Africa is the dummy representing common language between origin and destination. Interestingly, this fact is confirmed also by some of the most significant country pair fixed effects corresponding to the FE gravity models of Table 2, namely Eritrea-Sudan, Somalia-Kenya and Somalia-Ethiopia (Venkataraman, 2005). It is important to point out, however, that despite the ethnic, religious and linguistic similarities, Sudan, Kenya and Ethiopia impose significant restrictions on the refugees that they host, so that prospects for local integration are rather limited. §§§

One last point is worth a few considerations. As mentioned earlier, the Hausman test for forced migrations allows estimating a random effect model only for the MENA region and East and Southern Africa. As a consequence, in the remaining regions we cannot verify the significance of time-constant predictors such as the distance, contiguity, common language. However, as the analysis of this section shows, interesting information on these factors can be gathered also by looking at the most significant country pair fixed effects. For total forced migrations originating in South and Southeast Asia, for instance, among the most significant routes we find either IDPs (involving Pakistan, Afghanistan, Sri Lanka, Philippines, Myanmar) or routes between bordering countries, the only exception being Afghanistan-India. Similarly, for total forced migrations originating in West and Central Africa, all the ten most significant fixed effects represent IDPs, pointing out that internal displacement is a massive problem in this region. Thus, controlling for everything else, also in these regions distance is found to discourage migrations. And this finding does not depend on the fact that we have been modelling forced migrations, and forced migrations include IDPs; in fact, as the results of the next sections will show, distance and contiguity remain significant factors even when we model cross-border forced migrations.

4.4 Results for cross-border forced migrations under a fixed effects specification

As pointed out in the Introduction, given the bilateral nature of gravity models, that makes them particularly natural for modelling flows between two different locations, and given the significant share of IDPs among the forced migrations originating in the different regions shown in Table 1, it is interesting to repeat the analysis of the previous section without taking into account internal displacements. Table 3 shows the estimates of the gravity model (1) under a FE and a RE specification for modelling cross-border forced migrations.

The comparison between Table 2 and Table 3 does not point out great differences between the model for total forced migrations and that for cross-border forced migrations. In particular, natural disasters remain a significant push factor for forced migration mainly in the MENA region, and at least some of the predictors related to conflicts are significant in all regions. A low GDP per capita in the country of origin acts as a push factor in all regions except South and Southeast Asia, while a low GDP per capita in the country of destination discourages only forced migrations originating in the MENA region. Different political factors such as the lack of a democratic regime or the occurrence of a coup d'état in the country of origin, or a more representative government in the destination with respect to the origin, have the effect of increasing forced migrations in different regions. As in the case of total forced migrations, the predictor representing respect of fundamental rights has a positive coefficient in MENA, but a negative coefficient in South and Southeast Asia, as a consequence of the fact that one of the major destinations of forced migration originating in this region is China. The predictor representing natural resources rents in sub-Saharan Africa has a positive coefficient and is in accordance with the *Natural Resource Curse*.

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§§§ *Somali refugees in Kenya and Ethiopia.* Available at: https://www.resettlement.eu/page/somali-refugees-kenya-ethiopia.
Eritrean refugees in eastern Sudan. Available at: https://www.resettlement.eu/page/eritrean-refugees-eastern-sudan

4.5 Results for cross-border forced migrations under a random effects specification

Notice that when we focus on cross-border forced migrations, the Hausman test allows estimating RE models only in one region, namely South and Southeast Asia; the corresponding results are also shown in Table 3, and several points arise from it.

Table 3. Fixed Effects and Random Effects gravity models estimates for cross-border forced migrations (no IDPs)

	South and Southeast Asia		Middle East and North Africa	West and Central Africa	East and Southern Africa
	FE	RE	FE	FE	FE
O_No disasters $_{it}$	0,000	0,000	**0,035*****	-0,019	-0,005
O_No disasters $_{it-1}$	0,001	0,000	**0,035*****	-0,010	0,001
O_No Affected $_{it}$	0,002	0,002	**0,007****	0,001	**0,006***
O_No Affected $_{it-1}$	0,004	0,005	0,001	0,002	0,000
O_No Conflicts $_{it}$	**0,028*****	**0,028*****	**0,036*****	**0,018***	-0,002
O_No Conflicts $_{it-1}$	**0,042*****	**0,042*****	**0,036*****	**0,059*****	0,005
O_No Conflict Deaths $_{it}$	0,000	0,001	**0,014***	-0,012	**0,016****
O_No Conflict Deaths $_{it-1}$	-0,002	-0,002	**0,022*****	**0,017****	**0,025*****
D_No Conflicts $_{jt}$	**-0,047*****	**-0,043*****	**-0,023*****	**-0,075*****	**-0,057*****
O_Coup Attempted $_{it}$	-0,007	-0,003	**0,179*****	0,020	-0,061
O_Coup Attempted $_{it-1}$	0,077	0,083	**0,154*****	**0,061***	-0,064
O_Low GDPpc $_{it}$	0,051	0,031	**0,077***	**0,488*****	**0,376*****
D_Low GDPpc $_{jt}$	0,025	-0,015	**-0,134****	0,025	-0,019
O_Regime Status $_{it}$	**0,250*****	**0,245*****	0,000	**0,185*****	-0,056
O_Unemployment $_{it-1}$	0,003	0,004	**0,006***	**-0,020*****	-0,005
O_Population $_{it-1}$	**0,000*****	**0,000*****	**0,001***	0,000	**-0,002*****
D_Population $_{jt-1}$	**-0,000*****	**0,000*****	0,000	**0,001*****	0,000
O_Natural Resources Rents $_{it}$	-0,008	-0,009	**-0,003****	**0,006*****	**0,009*****
D_O_Representative Gov $_{ijt}$	0,065	0,057	-0,081	**0,152*****	**0,199*****
D_O_Fundamental Rights $_{ijt}$	**-0,710*****	**-0,631*****	**0,175****	0,067	0,004
Migrants 1960-1989 $_{ij}$		**0,078***			
Distance btwn Capitals $_{ij}$		**-1,178*****			
Colony $_{ij}$		**1,842*****			
Common Language $_{ij}$		0,122			
Contiguity $_{ij}$		**2,376*****			
Intercept		**0,126*****			
Hausman Test P-Value		0,35	$< 2,2e^{-16}$	$9,785e^{-05}$	$1,079e^{-11}$

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; the number of people affected, the number of deaths because of conflicts, the number of migrants between 1960 and 1989, the distance between capitals are log-transformed.

Again, as in the results for total forced migrations, the distance between the origin and destination and the dummy representing contiguity between the two countries indicate that under the same conditions, forced migrants prefer to move to neighboring countries. This fact is confirmed also by the most significant country pair fixed effects corresponding to the FE gravity models of Table 3, where we find Vietnam-China, Sri-Lanka-India, Afghanistan-Pakistan, Afghanistan-Iran, among many others.

The estimate of the RE model for cross-border forced migrations originating in South and Southeast Asia shows that also the presence of a pre-existing community of migrants in the country of destination is a significant pull factor for forced migration. Interestingly, this finding is confirmed also by the fact that among the most significant country pair-specific fixed effects in the FE specification we find for instance Vietnam-China and Sri Lanka-India; in both cases, prior to the time span of our analysis, the country of destination already hosted a significant community of migrants. The Vietnam-China route, in particular, originated from the so-called *Indochina Refugee Crisis*; indeed, integrating Vietnamese refugees into China has been easier than in other countries because many of them were ethnic Chinese (Lam, 2000).

Finally, the results of Table 3 show that in South and Southeast Asia cross-border forced migration is affected also by the dummy representing a past colonial history. In fact, Portugal, Spain, the Netherlands, England, France and the United States all had colonies in South-East Asia at some stage. Only after World War II there has been a withdrawal of European power from this region, and between 1948 and 1984 the different countries achieved independence. Interestingly, this finding is confirmed also by the fact that among the most significant country pair-specific fixed effects in the FE specification we find for instance Cambodia-France.

It is worth noting that also in the case of cross-border forced migrations, the analysis of the most significant country pair fixed effects in the FE specification provides interesting indications about the effects of time-constant predictors for the regions that do not allow estimating RE models. In fact, while for the two African regions all the most significant routes involve bordering or neighboring countries, for the MENA region we also find routes with a European destination. However, being MENA closer to Europe than any other region in our panel, this finding is in fact in accordance with the discouraging effect of travelling long distances.

5. Conclusions

The literature identifies five categories of factors that affect migration flows: economic, political, demographic, social and environmental drivers (Abel et al. 2019). In particular, voluntary migrations can be considered as the outcome of a utility maximization process, so that distance is not really an issue when choosing a destination. Instead, forced migrations are usually short to medium-distance moves without a specific economic expectation determined by the destination (Conigliani et al. 2022); the main recognized drivers in this case are conflict, food insecurity, and natural and man-made disasters, although the literature finds no empirical consensus on the association between climate change and migrations. According to Abel et al. (2019), this lack of consensus is partly due to the complexity of migration processes and to the complex interactions among migration drivers.

Aim of this study is to identify the different push and pull factors of forced migration in different regions of the world by means of gravity-type models. Particular attention is devoted to determining the effects of climatic factors (as measured by natural disasters) and conflicts, while controlling for the economic, political and social relationship between the origin and the destination countries. Indeed, the relative impact of natural disasters depends on both the strength of the event and on the vulnerability of the affected societies; similarly, the impact of conflicts can be substantially different across regions depending on the characteristics of local communities. Accordingly, both natural disasters and conflicts have the potential to create a vicious cycle of poverty and vulnerability, that could lead to the decision to move. We also distinguish between total forced migrations and cross-border forced migrations in order to isolate the role of internal displacements, which in some regions

represent more than 50% of total forced migrations. In fact, given that the 1951 Refugee Convention does not recognize environmental factors as criteria to define a refugee, we find essential to include IDPs in our analysis in order avoid underestimating in particular the effect of natural disasters on forced migration flow. Finally, we consider a full panel data analysis and estimate both fixed effects and random effects model specifications (when appropriate). The former offers interesting insights when looking at the most significant country pair fixed effects, that after controlling for all the different drivers, represents the migration routes whose intrinsic characteristics are most relevant for explaining forced migrations. The latter, on the other hand, allows estimating also the effect of time-constant bilateral predictors.

A first finding of our analysis is that the link between natural disasters, conflicts and forced migrations depends on the region where the migration flow originates. Natural disasters, for instance, after controlling for everything else and in particular for conflicts, affect forced migration mainly in the MENA region. It is interesting to notice that this result is in accordance with Banerjee et al. (2014), that consider water scarcity, increasing climate variability and a fast-growing population concentrated in urban areas as the main causes of the vulnerability of this region to natural hazards. Another region where we find that natural disasters (and in particular the number of people affected by natural disasters) influence forced migrations is East and Southern Africa. Interestingly, if we do not control for conflicts, the number of people affected by disasters becomes significant in all the regions, emphasizing the strong link between these two predictors and the role of conflicts caused by natural disasters. Conflict, on the other hand, affects forced migration in all the regions; in particular, conflict in the country of origin acts as a push factor, while the lack of conflicts in the country of destination acts as a pull factor.

Notice that also the effects of the predictors related to the socio-economic characteristics of the origin and destination countries are region-specific. In fact, none of them is significant in South and Southeast Asia, both for total and cross-border forced migration. At the opposite end, in the MENA region all the socio-economic predictors are found to affect forced migration: controlling for everything else, a low GDP per capita and unemployment in the origin country act as push factors, while a low GDP per capita in the destination and natural resources rents discourage forced migrations. In between we find the two regions that make up sub-Saharan Africa, where we find that, controlling for everything else, a low GDP per capita in the origin is a significant push factor but forced migrations do not appear to have a specific economic expectation determined by the destination. Moreover, in both regions natural resources rents are found to increase (and not discourage, as in MENA) forced migrations, which is in accordance with the *Natural Resource Curse*. One difference between the two sub-Saharan regions concerns unemployment, that does not affect forced migrations in East and Southern Africa, while discourages them in West and Central Africa, which is in agreement with migration transition theory (Flahaux and De Haas, 2016). Region-specific (and with a lot of variability across regions) are also the effects of the predictors related to the political characteristics of the countries, namely the instability of the origin country (as measured by the occurrence of coups d'état), the presence of a non-democratic regime, the respect of fundamental rights, the representativeness of the government.

Another finding of the present work, that arise both from the analysis of the most significant country pair fixed effects in the FE model specification and from the analysis of the RE model specification (when appropriate), is that when modelling forced migrations distance matters. In fact, controlling for everything else, forced migrants tend to move to neighboring or even bordering countries. Interestingly, distance is found to discourage migrations both when we model total forced migrations, that include IDPs, and when we model cross-border forced migrations. This fact emphasizes once again for instance the role of Europe in the Mediterranean region, where the geographical distance between countries exposed and not exposed to risks of extreme events and conflicts is relatively short, while their economic gap is significant. Other time-constant bilateral factors that are significant in at least some of the regions and that increase force migration include the presence of a pre-existing community of migrants in the country of destination and the fact that the origin and the destination share a common language or a past colonial history.

More in general, our analysis shows that the link between natural disasters, conflicts and forced migrations depends on the affected region, suggesting that a one fits all policy to improve the adaptive capacity to deal with the effects of climate change in developing countries is not appropriate. Instead, site-specific adaptation actions might be more effective in reducing the vulnerability of the societies and therefore forced migration flows. Moreover, given the tremendous share of IDPs on total forced migrations observed in some of the regions, the results of our analysis show that until climate-related migrants obtain the recognition of the status of refugees, all empirical analyses aiming at informing future adaptation and migrations policies cannot disregard IDPs; in fact, they represent a fundamental component of the complex linkage between natural disasters, conflicts and forced migrations.

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SUSTAINABILITY INFORMATION – ANALYSIS OF CURRENT TRENDS IN SUSTAINABILITY MONITORING & REPORTING

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Abstract. Government legislation, investor and stakeholder expectations, as well as international voluntary initiatives have all contributed to the rising demand for high-quality information and reporting on sustainability issues. The scientific community exploring sustainability issues is expanding quickly, and the need for sustainability data has grown significantly in recent years. Sustainability reporting is a fast developing topic with many different monitoring and reporting frameworks, some criteria that overlap, and problems with worldwide consistency. This frequently causes uncertainty on how data and information should be used to produce useful results and science-based resources. The paper ascertains current trends in monitoring and reporting sustainability-related information, including a particular analysis for each relevant level (i.e. country and corporate). The study commences with an updated review of sustainability reporting literature followed by an emphasis on the well-known instruments (i.e. SDGs index and the International Spillover index) used to monitor and report the nations progress toward SDGs. Also, the connections among different international approaches/initiatives for increasing the accountability of companies for sustainability actions were analysed and the improvements were emphasized. Although the worldwide reporting seems to be led by the adoption of the GRI and SASB standards, the range of metrics and disclosure patterns is wide and displays a high variation across industries, sectors, sizes, complexity and location. Through a structured analysis, the paper argued international initiatives (i.e. European Sustainability Reporting Standards and IFRS Sustainability Disclosure Standards) are of valuable importance for counteracting the fragmentation of available sustainability information and assuring the alignment and interoperability between different sustainability information.

Keywords: sustainable development; sustainability disclosure; sustainability information; international initiatives; reporting standards

1. Introduction

The notion of sustainable development serves as a vehicle for expressing widespread concerns about the condition and viability of environmental, economic, and social components of the present and future worlds. It gained particular attention from international institutions, political factors, business sectors, civil society, and the academic and scientific community, seeing that prosperity is possible only with the aid of sustained, inclusive and sustainable economic growth of all countries and regions.

The capacity of society to comprehend knowledge pertaining to sustainable development determines its ability to respond to current challenges and opportunities (Chan et al., 2020). This was duly addressed by the 2030 Agenda with its 17 Sustainable Development Goals (SDGs), indivisible and interconnected that defined an ambitious framework to foster peaceful, just and inclusive societies all over the world (United Nations, 2015). As a result, the governments transformed them into national action plans, programs, and initiatives that reflected the various realities and capabilities that their respective countries have. Also, a significant number of policy documents and provisions, legislations and regulatory instruments have been elaborated to promote sustainability practices in businesses that can contribute conjunctively to the progress of countries toward SDGs and transition towards a more sustainable economy.

The paper aims to ascertain current trends in monitoring and reporting sustainability-related information, including a particular analysis for each relevant level (i.e. country and corporate). To this end, the study commences with an updated literature review on sustainability reporting challenges followed by a particular emphasis on the well-known monitoring and reporting instruments (i.e. SDGs index and International Spillover index) used to quantify the progress of the nations toward SDGs. Also, the connections among different international approaches/initiatives for increasing the accountability of companies for sustainability actions and SDGs were drawn up and improvement needs were emphasized to meet the transition to high-quality sustainability information.

2. Theoretical background

The scientific community for sustainability issues is expanding quickly, and the need for sustainability information has significantly increased in recent years (Backes & Traverso, 2022; Szopik-Depczyńska et al., 2021). Through a bibliometric analysis conducted on the literature in the international databases i.e. Scopus and Clarivate Analytics, former Web of Science Core Collection. Pasko et al. (2021) argued that sustainability matters (e.g. sustainability reporting, corporate social responsibility, and sustainable development disclosure) seem to become the major research directions in the near future. They noted the shift from macro to micro level analysis as more and more studies dealt with companies as opposed to regions as well as the increased degree of studies related to financial reports, companies, and industries in multiple fields. In addition, the latest research in the specific field of public entities confirmed the growing attention being paid to reporting on and encouraging sustainable development (Montalbán-Domingo et al., 2021; Fleaca et al., 2018). The findings delineated the most relevant knowledge areas such as sustainability reporting based on GRI standards and Integrated Reporting as a new tool for communication that may present both financial and non-financial data in a single report (Ștefănescu, 2021).

The sustainability reporting provisions (i.e. Directive 2014/95/EU regulating the disclosure of non-financial information) were also analysed. By focusing on the Integrated Reporting (IR) disclosure (i.e. financial and non-financial information) mainly linked to the corporate value, some studies stressed that there are no significant differences between the amounts of integrated reporting disclosure supplied before and after the introduction of

the EU Directive. Despite of the required aspect, certain institutionalized integrated reporting processes exist more as a result of the adoption of integrated reporting as a consolidated practice able to convey legitimacy than the implementation of Directive 2014/95/EU. The IR is also proving to be a powerful tool for accountability and transparency in the public sector, as pressure from stakeholders to be accountable for non-financial information has expanded significantly. IR was previously thought to be primarily focused on for-profit businesses (Nicolò et al., 2020).

Looking at the consequences of mandatory non-financial disclosure (i.e. sustainability information disclosure) in the particular case of companies operating in Italy and Germany, Mion and Loza Adauni (2019) revealed the significant differences in the quality of reporting before and after the entry into force of Directive 2014/95/EU. The selected variables (e.g. credibility, availability, and strategic facets) varied greatly, causing the strategic approach and credibility dimensions of sustainability reporting to shift more dramatically than the availability dimension in both nations. The results stressed the positive effects of the mandatory provisions toward improving the level of quality information concerning sustainability disclosure.

Other inquiries on the benefits of integrated reporting (IR) methods viewed them more as a cost-producing factor than as a corporate advantage in reporting practices. The findings supported previous studies arguing that the negative effect of assured Integrated Reporting (IR) practices is lower than the effect of lacking them on the market valuation of a company. Also, the need for a clearer scoping of Integrated Reporting was emphasised (Landau et al., 2020). Other scholars, focused on Brazilian financial institutions listed on the B3 stock exchange, acknowledged the high degree of adherence of the Integrated Reporting practices to the sustainability assurance practices. In a similar vein, an independent assessment was viewed as the key procedure that increases the security of the data and information made available to shareholders and shareholders, as well as lowers information asymmetry and conflicts resulting from it (Aigner et al., 2022).

The concern for a principle-based sustainability reporting was also addressed and integrated thinking based on outcomes and impact using the SDG Compass Logic model was considered as a useful framework for reporting (Abeysekera, 2022). Furthermore, the adoption of a materiality matrix for information about relevant sustainability measures was analyzed in the particular case of the tourism industry and the findings reinforced the extensive usage of SDGs as focal points for sustainable development, as well as the overarching application of materiality analysis as reporting practice focused on sustainability monitoring and disclosure (Costa et al., 2022). In addition, for a proper materiality analysis, Calabrese et al. (2017) recommended the consistency of judgments when performing the analysis, multi-stakeholder engagement (i.e. different stakeholders' views trade-off), multidimensionality for each sustainability dimension (i.e. economic, environmental and social dimension) by considering both their impacts on the company and influence on stakeholders' decisions and evaluations, the completeness of report content, as well as avoiding subjectivisms.

The issues of comparability among different sustainability disclosure reports were also researched Moses et al. (2020) and studies on the Polish listed companies mentioned certain degrees of variability in both the number and kind of social disclosure due to the high complexity and multidimensionality elements. Comparability of corporate social disclosures revealed gaps in the disclosing practices due to the low experience in reporting mandatory non-financial information (i.e. sustainability information), the limited scope of non-financial disclosures imposed by the accounting regulation as well as the lack of external attestation bodies aimed to verify the declarative information embedded in the non-financial report (Czaja-Cieszyńska et al., 2021). In addition, Sætra (2022) addressed the problems of variability in the sustainability-related data produced by the requirements to collect and report sustainability-related information, which differ between nations, regions, and sectors. Due to

the complexity of the three sustainability dimensions in the financial and reporting settings, these findings highlighted the chaotic nature of the reporting practices and sustainability information.

Although there is rich scientific literature on a wide range of sustainable development contexts, the need for high-quality and reliable sustainability information is still in place. The complexity of monitoring and reporting sustainability matters needs particular attention due to the critical role in decision-making and related consequences on environmental, economic, and social issues at local, national and international levels (Torkayesh, 2022; García-Muiña et al., 2022). The criteria of relevance, accurateness, completeness, and topicality need to be considered when dealing with sustainability information, and the usage of international trustworthy tools, initiatives and standards, generally recognized as good practices in the domain, gain particular relevance for a better understanding of the challenges of quality data and information for country and corporate levels.

3. Sustainability information – country′s monitoring & reporting

The concern for sustainability information at the country level was addressed by the UN Sustainable Development Solutions Network (UN SDSN) which developed the Sustainable Development Goals Index and Dashboards (SDG Index) as well as the International Spillover Index, firstly introduced in 2020, as a measurement of positive and negative effects on another country ability to achieve SDGs (Sachs et al., 2022). As figure 1 depicts, both sustainability information approaches are intended to assist countries in the pursuit to achieve sustainable development by 2030 and beyond, as the only common understanding of the triple bottom line of sustainable development: economic, social and environmental.
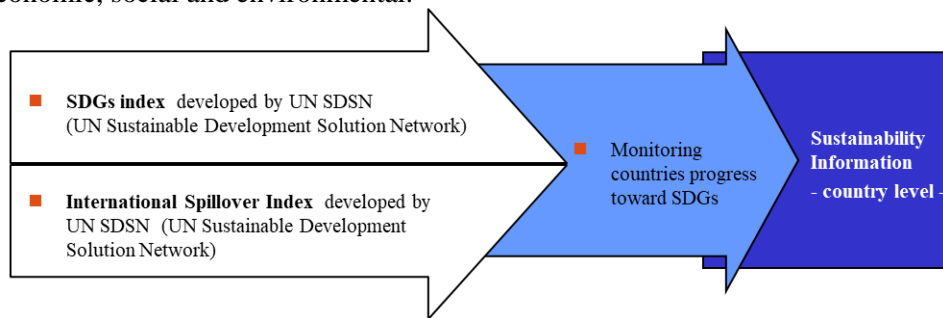
Figure 1. Current approaches for sustainability monitoring & reporting – country level
Source: The authors' own elaboration

The alignment of the SDGs index with the global SDGs framework as outlined in the United Nations 2030 global policy agenda was ensured by aggregating indicators in the 17 goals and thereby assisting countries to measure their baselines and monitor progress in each of the 17 SDGs (United Nations, 2015). Notably, sustainability goals for each criterion were established based on either explicit or implicit SDGs targets, science-based objectives, or the average performance of the best achievers. Additionally, the formulation of the index was not the only factor in its quality and sufficiency; other factors included the acquisition of trustworthy data and sources that was made available to the public by recognized worldwide data providers (e.g. "World Bank", "World Health Organization", "International Labour Organization", etc.) and other international organizations. The SDGs index, which meticulously adheres to the same structure of 17 goals, was recognized by the JRC statistical audit as a significant effort to combine all adopted SDGs into a single figure (European Commission JRC, 2019).

Globally, the SDGs index is no longer being advanced, and in 2021, the average score slightly decreased, in part because of the weak or nonexistent recovery in poor and vulnerable nations. Poorer nations with lower SDG

Index scores advanced more quickly than wealthy nations. Three Nordic countries dominate the 2022 SDG Index: Finland scored 86.51, Denmark scored 85.6, and Sweden scored 85.2. All of the top 10 nations are from Europe, however, even these nations face significant obstacles to reaching several SDGs (e.g. climate action, zero hungry, responsible consumption and production, life below water, life on land) (Sachs et al., 2022).

Having a systemic look, the International Spillover Index considers the complexity of the global value chains which connect production and consumption across countries and continents leading to outsourcing of environmental and social impacts to other countries. It includes four sustainability factors measured through 14 indicators, each of them being included in the total SDG Index score, and also used to generate a stand-alone International Spillover Index. The sustainability concerns that limit other countries' ability to use resources to advance the SDGs include cross-border air and water pollution, unfair tax competition, corruption, banking secrecy, profit shifting, etc., as well as peacekeeping and security effects. They also include international effects related to pollution, the use of natural resources, and social impacts brought on by the consumption of goods and services (Malik et al., 2022).

Notably, wealthy nations tend to provide the greatest adverse spillover effects, impeding efforts made by other nations to fulfil the SDGs. For instance, the consumption of products and services in the European Union accounts for 40% of its carbon footprint; as a result, the EU and wealthy nations must address negative international spillovers, particularly those embodied in unsustainable supply chains. According to Spillover Index, a higher score indicates that a nation has more positive spillover effects and fewer negative ones. For instance, the top three Nordic countries in terms of SDG success obtained lower scores, indicating that they are having more adverse and less beneficial spillover impacts on other nations' capacities to fulfil the SDGs (e.g. Finland is ranked 124th out of 163 countries with an overall score of 73.63, Denmark is 137th with a score of 66.2, and Sweden is 139th with a score of 65.73) (Sustainable Development Report, 2022). As argued by Malik et al. (2022), there is an ethical and practical necessity to take the helm of worldwide initiatives to reduce the negative effects of raw materials, greenhouse gas emissions, workplace accidents, and forced labour that are embodied in global supply chains.

To counteract the negative international spillover effect, the new Directive 2022/0051/EU on Corporate Sustainability Due Diligences is intended to hold businesses accountable for the impacts generated through their whole value chain and put even stricter rules on businesses operating in the EU to identify and overcome environmental, biodiversity, and human rights problems in their worldwide supply chains. Additionally, businesses would have to set up a process for complaints and make available information on how they carry out their due diligence obligations (European Commission, 2022).

4. Sustainability information – corporate ′s monitoring & reporting

Recent years have seen a fast expansion of the market for corporate sustainability data, particularly among the financial community. The growth of investment products that specifically aim to meet certain sustainability standards, the changing nature of business risks and investor awareness of the financial ramifications of those risks due to environmental issues, as well as rapidly evolving consumer preferences, market practices, and public awareness all contribute to this rise in demand.

Figure 2 depicts the main approaches and frameworks used at a worldwide level, which may assist the companies in their attempt to integrate sustainability matters into their business strategies. The blueprint is intended to highlight the wide range of sustainability approaches/initiatives which may guide the businesses having a strong commitment to addressing climate change and social inequality alongside financial returns, in close cooperation

with business partners, including customers, and other stakeholders (e.g. investors, civil society actors, non-governmental organisations and social partners, etc.).

The actual trends in corporate sustainability information show that most of the large companies around the world have resonated strongly with the thematic areas of the SDGs, first introduced by the United Nations in 2015. As current studies argued, 74% of the world's 250 largest companies aligned their sustainability initiatives with the 17 SDGs as well as displaying an increasing trend from 43% in 2017 (KPMG, 2022). These findings seem to be conceptually connected with the underlying values supporting sustainability, which require responsible companies to align their core strategy with the universal UN goals (SDGs) and issues by integrating the set of 10 Global Compact Principles that guide to all companies, irrespective of their size, complexity, or location. In light of this, a principled approach to business requires accountability for basic duties in four areas, including human rights, labour, the environment, and anti-corruption (UN Global Compact, 2014).
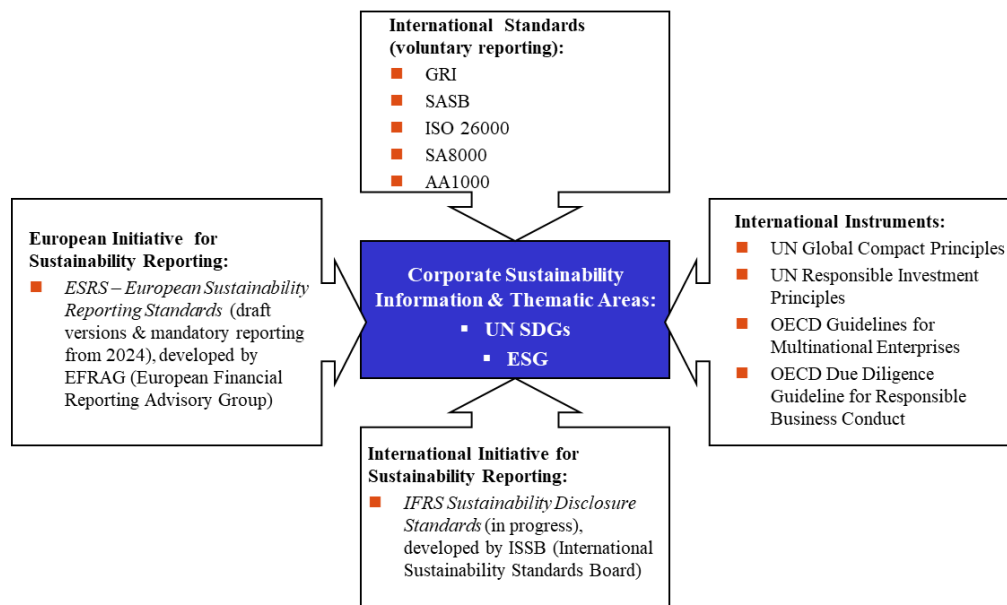
Figure 2. Current approaches for sustainability monitoring & reporting – corporate level
Source: The authors' own elaboration

The need for sustainability data to manage financial risks associated with climate change, resource depletion, environmental degradation, and social challenges, as well as to promote transparency in financial and economic activities, is also growing among investment companies (Bengo et al., 2022; Lingnau et al., 2022). The concept of Environmental, Social, and Governance (ESG) risks has been first introduced in 2006 by the UNEP Finance Initiative and the UN Global Compact which provided a set of 10 voluntary and aspirational responsible investment principles. Developed for institutional investors, these principles promoted the inclusion of ESG factors in investment research and decision-making processes, in ownership policies and practices, in the industry's adoption of the principles, and in ensuring adequate sustainability data disclosure on ESG factors. Worthwhile, these initiatives resulted in the release of the PRI "Principles for Responsible Investments" blueprint in 2017 that outlined future directions and provided a variety of options for incorporating environmental, social, and governance (ESG) issues into investment practice (e.g. making tools available to investors to help them match their investment operations with the SDGs; incorporating the SDGs into the PRI Reporting Framework; reporting

on the contribution towards SDGs as well as engaging policymakers to encourage public policy that supports the SDGs, etc.) (UNEP, 2017).

As the KPMG survey mentioned, there is an increasing global trend in using ESG for sustainability reporting even though there is a significant variation among disclosed information on each E, S, and G factor. For instance, considering the world's 250 largest companies, the disclosure of sustainability information for environmental risks increased from 48% in 2017 to 64% in 2022 and, currently, almost 49% of these companies acknowledge social elements as business risks (e.g. community engagement, safety, and labour issues) whereas only 44% report governance elements as possible risks stemmed from corruption and lobby (KPMG, 2022).

During the last decade, the uptake of corporate sustainability information has continually increased and the concern for sustainability reporting become a rapidly evolving area of interest dealing with a variety of frameworks for monitoring and reporting which varies across sectors, size, complexity and location. In this respect, the most well-known international standards generally recognized as good practices (as presented in figure 2) are led by GRI, SASB, ISO 26000, SA8000, and AA1000.

GRI Sustainability Reporting Standards (GRI Standards) were developed by "Global Sustainability Standards Board" (GSSB) to promote sustainability reporting. The revised 2022 edition of GRI Standards enables companies to publicly disclose the major effects on the economy, environment, and population, as well as how these consequences are addressed. Regarding the company's effects and contribution to sustainable development, the sustainability information provided assists stakeholders in making knowledgeable decisions. Table 1 presents the overall informational structure of the GRI Standards, which support the sustainability reporting process, without taking into consideration goals, targets, thresholds or any other benchmarks for the sustainability performance of the company (GRI, 2022).

Table 1. Sustainability information embedded in the 2022 GRI Standards

The series of standards	Building Blocks & Structure of information
"Universal standards" *(valid for all organisations)*	GRI 1: Foundation 2021 with - key concepts for sustainability reporting - reporting principles and requirements
	GRI 2: General Disclosures 2021 with - the context for comprehending the organization's impacts; - disclosure obligations regarding reporting and other organizational elements (such as activities, governance, and policies)
	GRI 3: Material Topics 2021 with - advice on how to choose relevant topics (i.e. the most significant impacts on the economy, environment, and people, including human rights) - requirements for disclosure of the organization's methodology for selecting material topics, its list of material issues, and how it manages each topic
"Sector standards" *(according to the organisation's operating sector)*	- provide the organization with information on the expected material topics - applicable when deciding what information to present for the material themes and what organizational topics are material
"Topic standards" *(according to the organisation list with material topics)*	- have disclosure requirements that demand the reporting of information concerning organizational impacts related to specific issues

Source: Global Reporting Initiative (GRI, 2022)

The actual and potential negative impact on the economy, the environment and people need to be duly addressed through prevention and/or mitigation. In this regard, the GRI Standards take into full consideration the international instrument's advice (i.e. OECD Guidelines Due Diligence Guidance for Responsible Business Conduct) to identify, prevent, mitigate, and account for real and potential harmful impacts on an organization's operations, supply chain, and other business relationships. This instrument offered businesses useful assistance in their efforts to prevent and manage negative effects that may be connected to their operations, supply chains, and other economic interactions that pertain to employees, human rights, the environment, bribery, customers, and corporate governance (OECD, 2018). Notably, the OECD Guidelines for Multinational Enterprises, the first international document to integrate respect for human rights as a corporate responsibility, first introduced the idea of due diligence. They also recommended integrating risk-based due diligence as an integral part of business decision-making and risk management systems into all areas where business operations intersect with society (OECD, 2011).

Another advanced approach has been introduced by Sustainability Accounting Standards (SASB standards) developed by "the International Sustainability Standards Board" (ISSB) of the IFRS Foundation, aimed to assist companies in disclosing financial materiality, and decision-useful sustainability information to investors. The understanding of sustainability accounting is based on how a firm oversees and manages the environmental and social impacts that result from the creation of its products and services, as well as how it governs the environmental and social capital required to build long-term value. The standards also refer to sustainability as ESG (Environmental, Social, and Governance) issues and depend on the company to decide on the applicable standard, the disclosure topics which are financially material to the business, and the associated metrics to report (SASB, 2018a).

To properly facilitate the sustainability information, the SASB standards offer a unique set of frameworks for a wide range of industries grouped in 11 economic sectors (i.e. consumer goods, food & beverage, resource transformation, extractives & minerals processing, health care, services, etc.) following a fundamental view of their business model, their resource intensity and sustainability impacts, and their sustainability innovation potential. Each industry-specific standard includes a minimum set of disclosure topics specific to that industry, a set of quantitative and/or qualitative accounting performance metrics, instructions on definitions, scope, implementation, and compilation, as well as metrics that measure the size of a company's operations and are intended to be used in conjunction with accounting metrics to normalize data and facilitate analysis (SASB, 2018a; SASB, 2018b).

Worthy, the studies figured out the worldwide adoption of both standards (i.e. GRI Standards and SASB standards) in the practice of reporting sustainability information: 78% of the world's 250 largest companies adopted the GRI Standards for reporting (up from 73% in 2020) while the report against the SASB standards is adopted by more than 50% of companies in the USA and only by 35% from Europe. Also, almost three-quarters of companies surveyed report on the SDGs (KPMG, 2022).

Added to the trustworthy stream of international frameworks that help companies tackle sustainability challenges through their core business, ISO 26000 promotes an integrated view of economic, social and environmental concerns. It complements, but not replaces other existing initiatives and international instruments, promoting a common understanding of social responsibility. The foundation relies on the core subjects of social responsibility such as organizational governance, human rights (e.g. due diligence), labour practices (e.g. employment relationships, health and safety), environment (e.g. pollution and sustainable resource use, climate change), fair operating practices (e.g. anti-corruption, fair competition, social responsibility in the value chain), consumer issues (e.g. fair marketing, factual and unbiased information, sustainable consumption), and community involvement and development (e.g. education and culture, health). The benefits come from incorporating ethical

conduct into the organization's current systems, rules, practices, and procedures in order to evaluate the organization's commitment to sustainability and overall performance (ISO 26000:2010, 2010).

In addition, a narrower approach to sustainability information was brought by the Social Accountability Standard (SA8000), developed by ″Social Accountability International″ (SAI) which provides an auditable, voluntary standard, universally applicable to any type of organisation, regardless of size, location or industry sector. It encourages businesses to operate in a way that is respectable to employees and demonstrates their devotion to the highest ethical standards (SAI, 2014a). The social subjects are addressed by the introduction of normative elements to which the organization need to comply, and a set of nine social accountability requirements used for auditable third-party verification and certification (i.e. child labour, forced or compulsory labour, health and safety, freedom of association & right to collective bargaining, discrimination, disciplinary practices, working hours, remuneration, the management system). Likewise, the framework defines performance expectations that organizations claiming conformance with the normative requirements of SA8000 have to be compliant with, as a minimum. Each performance indicator provides a quantitative or qualitative measure of the performance directly related to one, or more, of the requirements of the standard (SAI, 2014b).

Global voluntary initiatives, governmental legislation, and the expectations of investors and other stakeholders have all contributed to the rising demand for high-quality information and reporting on sustainability issues. In this respect, the **A1000 Series of Standards** developed by the "AccountAbility Standards Board" (ASB) establish frameworks based on principles that are utilized by international public and private organizations to show leadership and excellence in accountability, responsibility, and sustainability (ASB, 2018). The AA1000 Series consists of one set of Guiding Principles for developing, analyzing, and implementing sustainability initiatives and two Standards (i.e. stakeholder engagement strategies related to sustainability; reliability of progress reports on sustainability performance). Applicable to organisations of all types and sizes, the standards advanced the organizations' commitment towards ESG issues and provide requirements and guidance on how to assess adherence to the accountability principles as the basis for managing sustainability performance such as inclusivity (i.e. the involvement of stakeholders in the decisions that affect them), materiality (i.e. decisional factors need to be clear about the sustainability topics that matter), responsiveness (i.e. the need to act transparently on material sustainability topics) and impact (i.e. the organization accountability for monitoring and measuring the impact on the broader eco-system) (ASB, 2020).

Finally, as the world effort is geared to collectively address the issues of climate change and social inequalities, there is an increasing need to have the same referential framework for sustainability-related information, processes, and systems. In this respect, the new Directive 2022/2464/EU on Corporate Sustainability Reporting underlined the significance of trustworthy, comparable, and pertinent data on sustainability risks, opportunities, and consequences relating to economic, social, and environmental elements (European Union, 2022).

As result, the new series of European Sustainability Reporting Standards (ESRS) standards (draft versions), elaborated by the "EFRAG Sustainability Reporting Board" (EFRAG SRB), took into account the alignment process aimed to monitor and disclose sustainability information in a full, coherent, comprehensive, integrated and effective manner. Through more reliance on the sustainability matters assessment process, the ESRS standards considered the series of international instruments (e.g. UN Sustainable Development Goals, UN Global Compact Principles, UN Responsible Investment Principles, GRI standards, OECD Guidelines for Multinational Enterprises, etc.) and ensured coherence with EU legislation and SDGs through the inclusion of data points with adequate metrics and targets. The set of ESRS standards is composed of two building blocks of sustainability information such as cross-cutting standards (i.e. general requirements and general disclosure) and topical standards (i.e. environment, social, and governance issues). The development process is still in progress and the new standards sets are expected to be released next year and contain more sectors specific standards (e.g.

agriculture, energy production, transportation, etc.) as well as standards for SMEs. In the same vein, big-size companies are expected to mandatory report sustainability information from 2024 and listed SMEs will be compelled to report from 2026 with a further possibility of voluntary opt-out until 2028 (EFRAG, 2022).

Undoubtedly, the concern for alignment within international standards is still valid and a further challenging task is to maximize interoperability between ESRS and the proposed IFRS Sustainability Disclosure Standards, developed by the "International Sustainability Reporting Standards Board" (ISSB), and aimed to become the global standard for sustainability disclosures for financial markets. Tackling the investors' views, the IFRS standards establish a thorough baseline of sustainability-related financial data by defining the essential elements of a full set of financial disclosures connected to sustainability. The elaboration process is in progress and is intended to cover relevant disclosures requirements about the company's governance of sustainability-related risks and opportunities, risks strategies, the impact of companies' actions on reputation and performance, as well as effects and reliance on people, the environment, and the economy when they are pertinent to determining the entity's enterprise value (IFRS, 2022).

By summing, there is a growing interest in holding companies accountable for their actions for sustainability linked to the SDGs. The analysis of existing approaches and trends underlines the range of international initiatives and frameworks for monitoring and reporting vast sustainability information which varies by sector, size and complexity as well as location.

Conclusions

The connections between sustainability performance and the progress towards SDGs led to a growing number and diversity of data and information (e.g. conceptual resources, methodologies, tools, frameworks, standards, etc.) developed and used to identify, analyse, measure, verify and report a wide range of sustainability matters. This often leads to confusion with regard to the proper use of data and information to generate actionable outputs and science-based resources. Reliable and comparable sustainability-related information is a prerequisite for having good readiness within the global plan to finance sustainable growth as well as for the corporate/business level which is expected to strengthen its accountability related to actions towards reduction of carbon emissions, diminishing biodiversity loss, and tackling societal inequalities.

Government legislation, investor and stakeholder expectations, as well as international voluntary initiatives have all contributed to the rising demand for high-quality information and reporting on sustainability issues. Sustainability reporting is a fast developing topic with many different monitoring and reporting frameworks, some criteria that overlap, and problems with worldwide consistency. Although the worldwide reporting of sustainability information seems to be led by the adoption of the GRI and SASB standards, the range of metrics and disclosure patterns is wide and displays a high variation across industries, sectors, size, complexity and location.

Seeing that world attempts to collectively tackle the issues of decoupling economic prosperity as far as possible from environmental degradation a need becomes apparent for harmonized approaches and consistent methodologies to monitor the progress toward sustainable development at macro and micro levels (i.e. country and corporate). In this respect, the adoption of both the SDGs index and the Spillover index would bring certain benefits in shaping national action plans and regional policies in the area of sustainable development. Also, from the corporate side, it is extremely important to have the same referential frameworks for sustainability information to ensure the consistency and coherence of monitoring and reporting. The forthcoming international initiatives driven by the new Directive 2022/2464/EU as well as the ISSB (i.e. European Sustainability Reporting Standards and IFRS Sustainability Disclosure Standards) are of valuable importance for counteracting the fragmentation of

available sustainability information and assuring the alignment and interoperability between sustainability information.

The limitation of our research should be noted in terms of conceptual analysis of monitoring and reporting sustainability-related information as well as the limited number of international tools, initiatives and standards selected to be examined. Also, the boundary of the study excluded information about the huge array of data related to tools, approaches, and methodologies employed for measuring metrics, targets, or any other indicators for sustainability performance in the area of economic, environment and social impact (e.g. Life Cycle Assessment-LCA, Life Cycle Costing-LCC, Social LCA, etc.). Further research is needed for a better alignment of assessment methodologies for sustainability performance with the envisaged sustainability reporting standards. In a broader sense, the outcome of this study contributes to the existing literature on sustainability disclosure and the observations may be particularly relevant to those stakeholders (e.g. decisional factors, business professionals, researchers, academics, and other subject matter experts) who ought to improve their understanding and conceptual connections among monitoring and reporting sustainability information at macro and micro levels.

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TOWARDS FINANCIAL LITERACY: A CASE OF SLOVAKIA[*]

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Abstract. The level of financial literacy in the Slovak Republic has long been below the European Union average, which is confirmed by several surveys in recent years. In practice, this creates several problems. Almost a million Slovaks have at least one foreclosure, resulting from buying necessities on credit and then living in ever-increasing debt. Knowledge of finance and business among employees or budding entrepreneurs is also problematic. Conservative Slovaks also keep most of their money in products with zero interest and are afraid to invest and capitalize on their savings. The National Bank of Slovakia and the Slovak Bank Association have been calling for a change in school curricula for a long time because financially illiterate pupils eventually become poorly literate clients. The contribution's primary purpose was to analyze the state of financial education in secondary schools in the Slovak Republic, including a more effective design of the content and method of teaching financial literacy. More effective financial education could help reduce poverty in Slovakia and more effective financial and business literacy in society.

Keywords: financial education; financial literacy; Slovakia

1. Introduction

Financial literacy needs to be more precisely and unambiguously defined, as its content is still evolving and changing. We can find the definition in several international and national official documents. According to the study OECD PISA 2012 Financial literacy assessment framework, "Financial literacy is knowledge and understanding of financial concepts and risks, and the skills, motivation, and confidence to apply such knowledge and understanding to make effective decisions across a range of financial contexts, to improve the financial well-

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being of individuals and society, and to enable participation in economic life." (OECD 2012, p. 13) The national standard of financial literacy in the Slovak Republic defines financial literacy as "the ability to use knowledge, skills and experience to effectively manage one's financial resources to ensure lifelong financial security for oneself and one's household." (MoESRaS SR. 2017)

Other interpretations of financial literacy can be found in dozens of articles in databased journals: As stated by Čaplinska and Danileviča (2022), financial literacy, as a totality of knowledge and skills, provides an opportunity for a person to manage finances successfully, and take rational decisions concerning the choice of various financial services, thus facilitating both individual and public welfare and sustainability. The financial markets have changed along with the financial consumers' awareness.

2. Theoretical background

There is a unanimous agreement that financial literacy is a precondition of sustainable business (Burchi et al., 2021; Clichici & Moagar-Poladian, 2022; Luo & Cheng, 2022).

According to several surveys conducted in recent years, the level of financial literacy of Slovaks could be higher. There are few surveys on financial literacy in Slovakia. In a 2020 survey conducted by the OVB company, 9 out of 10 Slovaks declared that they understood finances. However, the final survey statistics showed otherwise. The average result for Slovaks was only 62 points out of 100. That the level of financial literacy of Slovak students is below average is confirmed by the PISA study from 2018. In it, Slovakia scored 481 points, while the standard of the other countries was at the level of 505 points. Only Chile achieved a lower performance than Slovakia in the study. (Invest in Slovakia, 2022)

Almost one million people in Slovakia have at least one foreclosure. In the case of many, this results from low income, buying life necessities on credit and then living with ever-increasing debt. For other people, the inability to reconcile expenses with revenue, gambling addiction, or poor financial literacy can play a crucial role. (Nejedlý, 2019)

Poor financial literacy was first noticed in 2007, when the Slovak Banking Association presented the results of a financial literacy survey, which showed that financial literacy is lower than expected. Low ability to process information clients due to a need to understand basic concepts. (SBA 2007, 2022) Subsequently, both financial institutions and state authorities began to address the issue.

In 2008, the Government of the Slovak Republic approved the material "Draft Strategy for Education in the Financial Area and Management of Personal Finances" (Resolution of the Government of the Slovak Republic No. 447 of July 2, 2008), based on which the National Standard of Financial Literacy was developed. The manager of the national standard of financial literacy, as well as financial education and its implementation into practice, was the Ministry of Education, Science, Research and Sport of the Slovak Republic, which closely cooperates with the Interdepartmental Expert Group for Financial Literacy, which also includes the Ministry of Finance of the Slovak Republic. (MF SR 2022)

In the case of determining financial literacy in a company, several factors are assessed that have an impact on its level. Kubak et al. (2021), using data on 447 individuals, revealed that men's financial literacy is more dependent on rationality while women's financial literacy is less determined by their rationality.

Several authors pointed to the fact that the Covid-19 pandemic significantly impacted people's decisions about personal financial management. (Fujiki, 2021; Chhatwani & Mishra, 2021)

Financial literacy experts are not yet united on where and how to start increasing financial literacy (Alekam, Salleh & Mokhtar, 2018; Zhu, 2021; Kawamura et al., 2021; Pearson & Korankye, 2022; Wiagustini, Ramantha & Putra, 2023).

The national financial literacy standard in the Slovak Republic proposes financial literacy for three levels: The first level is intended for students in the first grade of elementary school. The second level represents the requirements for students in the second grade of elementary school, the first to the fourth year of a grammar school with eight years of study, the first year of a bilingual grammar school, lower secondary vocational education, and secondary vocational education. The third level is intended for students of fields of study who complete secondary general education (gymnasium) or secondary vocational education (secondary vocational school). (MŠVVaŠ SR. 2017) As the authors, Janáková and Fabová (2017) state, in primary and secondary schools, financial education is provided as such. Still, in universities with a non-economic focus, no attention is paid to this issue. However, our experience with higher education shows that financial education is also essential in non-economic faculties of universities, where financial issues are not part of the study programs but are necessary for the daily life of students. Experts also discuss that the National Standard of Financial Literacy in the Slovak Republic sufficiently addresses the mentioned issue.

3. Research objective and methodology

The authors decided on a qualitative research strategy for the research part. The main research goal of the paper was to analyze the state of teaching financial literacy at secondary schools in the education system in the Slovak Republic.

The secondary research goal was to propose the content and methods of teaching financial literacy to students in secondary education in the Slovak Republic.

In case of further development of the proposal of the research part, the authors further identified five research questions (RQ):
RQ1: How and when to start teaching students in secondary schools in the Slovak Republic financial literacy?
RQ2: What information should students in secondary education know to understand finances?
RQ3: What teaching aids and didactic games are the most optimal for teaching financial literacy in secondary schools?
RQ4: How should parents teach a child to save money to raise him to be a successful and financially independent person?
RQ5: What is the optimal amount of pocket money parents should give their children?

As part of the processing of the practical part, the method of analysis and synthesis was used as basic general logical methods, as well as discursive analysis.

4. Results and discussion

In secondary schools, there is no separate subject about financial literacy. However, financial education is provided cross-sectionally within the Civics subject, where students learn with selected knowledge from the fields of psychology, sociology, political science, law, economics, the world of work and philosophy, which lead them to get to know themselves and others, to understand personal, interpersonal, social and economic relations between individuals and society. According to the framework curricula and educational standards of education for the subject Civics within the State Educational Program in the academic field of Man and Society (ISCED 3A), students have the following thematic units: fundamental economic problems and their solution, market

mechanism, labour market, unemployment and its socio-economic impact, the world of work, or the role of money and financial institutions. (Lincényi, 2020)

Answer to RQ1
For understanding, it is crucial to choose a suitable dictionary for understanding the basic principles of *financial literacy*, or spending and saving money - a skill that can be understood by children aged 3-5 years. The use of simple language and simple examples is essential. For preschoolers, an important aspect is a behaviour in the family and the parents' habits in this regard because children also learn by observation, which means that parents should avoid irresponsibility in managing *finances*. If a child sees that before the end of the month, it is necessary to borrow money to spend the budget on frivolities, he may consider it normal as an adult. If the child sees that you make a monthly *budget*, i.e. you plan your *income and expenses*, the child will take it for granted when managing their own money.
How to manage the *family budget*:
- save, i.e. try to save at least 10% of your income every month;
- get rid of debts – first, get rid of any debts, e.g. refinancing;
- plan regularly, which will help forecast future expenses;
- Household savings are possible, e.g. in the consumption of electricity for all appliances and their use in the home, searching for more favourable alternatives for financial products, and expenses of all kinds by comparing different alternatives; do not pay for a bank account and search in the offer of free accounts.

Answer to RQ2
What you need to know to understand *finance*:
- understand banks and the banking system,
- loans and deposits in banks,
- the functioning of the labour market to ensure regular income and assets,
- insurance,
- evaluation of savings and investment,
- saving for retirement and the pension system in mutual contexts. (PARTNERS Foundation. 2021)

The *financial decision* affects the standard of living of individuals and households. Therefore it is crucial to how money is used to achieve *financial freedom*, defined as a state when *passive income* (it is income that is not related to wages, but, e.g. income from a rented property, interest or income from investments, etc.) exceeds *total expenses*. With passive income, there is no need to perform any activity.
How to achieve *financial freedom* - we see it as a process that must start as soon as possible; it is necessary to think about the future and expand your knowledge:
- Set a *financial plan*; (Chovancová, 2021)
- if an individual gets a job and receives a *regular income*, it is necessary to create a *financial reserve* and not go into debt in the event of a loss of income;
- you need to secure your income and prepare *for retirement*;
- the income must bring additional income through *regular investment*.

Financial plan as a result of *financial planning*, i.e. the process of establishing a course of action to achieve one's goals. A financial plan is a map for achieving short-term and long-term goals. It is necessary to set *concrete - realistic financial* goals and a time horizon (short-term goals - vacation, clothes, gifts; medium-term - buying a car; long-term - e.g. housing). It is not a one-time process but needs to be constantly adapted to the new situation and, at the same time, controlled.
It is important to define goals to avoid quick loans through e.g. consumer credit, overdraft on a credit card or a loan from a non-bank entity, which could jeopardize the financial future.
Four steps to a financial plan:

1. *Financial analysis* (Dluhošová, 2021) helps reveal and realistically consider time, income, expenditure and property options and their changes.
2. *Setting goals* from the most important to the least important and setting *priorities*:
   - the basis is the creation of a reserve for unexpected events; this money must be quickly available,
   - protection of income (in case of failure – unemployment, illness) and property damage,
   - preparing for the future and housing planning, preparing for retirement or setting aside funds for children,
   - after securing these priorities, we can think about improving income for the future - by investing (one-time or regularly.
3. *Observance of discipline* - during the year so that we monitor the fulfilment of goals.
4. *Control of the plan* - regularly check compliance with the financial plan.

Ideal financial measures are based on the optimal setting of four attributes of healthy financial management: the *creation of a financial reserve, the result of long-term assets, the number of loans (liabilities) and the amount of household economic consumption.*

Assets are everything that directly or indirectly brings profit - most often, it is income from work, i.e. regular income such as salary, profit, annuity, etc. For unexpected money, e.g. reward, sale of real estate, inheritance, winning - suitable for increasing the reserve and only a part for increasing current consumption. *Liabilities* (the opposite of assets) are everything that produces costs and does not generate profit - payments, e.g. rent, energy, repayment of mortgages, loans and all regular instalments. Liabilities bring other benefits but are associated with recurring expenses.

The *ideal income distribution* rule means that:
- 10% goes to the creation of a financial reserve, i.e. regular postponement for unanticipated expenses - the optimal size of the reserve should be in the amount of 6 monthly household incomes. When it is minute, it is necessary to supplement it;
- 20% for the creation of long-term assets, intended for protection in case of income loss (unemployment, long-term incapacity for work, etc.) – the first way is to set up appropriate insurance that protects the individual and his family. The second way is saving for a pension, which is beyond the scope of mandatory pension insurance and must be chosen while still at a productive age, e.g. also by regular investing;
- 30% for loan repayments is the maximum amount, exceeding which threatens the family's everyday life. These are loans related to housing financing and not consumer loans, non-bank loans and others, which are high-risk and should be zero;
- 40% of the maximum consumption consists of food, clothing, travel, leisure expenses, etc. It is essential to accurately plan your monthly expenses and ensure they are not exceeded in the long term. Reducing current consumption is often the key to better financial health.

Maintaining financial well-being and achieving financial freedom is only possible if finances are constantly under control.

A good financial plan is preceded by a detailed financial analysis, which includes all the finances that come and go in the household. It is a constant cycle of *cash flow*. *Cash flow* is the flow of money that represents the difference between income and expenses over a certain period. It is essential to carefully plan and monitor it to avoid imbalances and financial problems.

Household income is both regular and irregular income. Ordinary, which flow into the household *regularly and at recurring intervals*. These are income from employment, business and rental. We also include social incomes in this group or benefits intended for the unemployed or residents with meagre incomes, e.g. parental allowance,

child benefits, benefits in material need, etc. Irregular income that comes to the household in bursts, at different times and in different amounts. These are rewards at work, income from temporary work, and commission from the mediation of a service or product. This group also includes one-time incomes that arise randomly, e.g. income from inheritance, winnings, income from the sale of property, donations, etc. Income can also be divided into *active and passive*. Actively arise from vigorous activity, e.g. from employment or business. Passive income is generated without action, e.g. rental income, investments, interest, income from sales, etc.

Household expenses flow out and serve to secure various goods and services. They are divided into, e.g. according to the purpose into current and capital or according to how often they are repeated into fixed and variable. *Fixed expenses* are regularly repeated, and their amount does not change, e.g. rent, advance payments, loan or mortgage repayment. *Variable costs* are variable, the amount of which is not precisely determined, it changes, etc. This group also includes one-time expenses, e.g. for buying Christmas presents and holidays that can be planned. There are also one-time expenses that cannot be planned - unexpected, e.g. repair of appliances, cars, etc.

Considering our income, expenses, or cash flow, we can draw up our budget. It is a comparison and summarization of income and expenses, based on which we will determine whether our income is sufficient to cover the costs. Three cases can occur in a *balanced budget* (revenues equal expenditures). A deficit budget can be in surplus (gains are more significant than expenditures) and generate excess revenue that can be used to build reserves. Or a deficit budget if income is lower than expenditure, which can lead to debt. It is necessary to correct expenses and ensure higher revenues to bring the budget into balance.

An overview of *assets and liabilities* is also part of the financial analysis. Property is everything owned by an individual, serves to satisfy needs, and can bring benefits in the future. As a rule, it is considered an asset and can be sold, rented, loaned, etc. We divide it into several groups, e.g. financial (cash, money in accounts, in funds) and non-financial (goods, durable goods, etc.). For tangible (material goods) and intangible (software, copyrights, etc.). For movable (car, furniture) and immovable (buildings, land). Long-term (buildings, apartments, land) and short-term (clothing, food, services). Liabilities are debts incurred in the past that need to be repaid or gradually paid off. Their division, e.g. according to the maturity date, are short-term (maturity within a year), medium-term maturity (up to 5 years) and long-term (maturity over five years). Depending on the form, these are bank credits and loans, financial assistance, etc. To determine the size of the property, the so-called balance sheet compares assets and liabilities, i.e. it compares the asset's market price and the liability's value. This means that in a comprehensive financial analysis, the balance sheet is also considered to determine the household's actual financial status in addition to cash flow.

Salary (Táncošová et al., 2015) as income from employment is often the basis of household income. It is a monetary reward for work done and several forms. The most common form is *an economic wage* paid in cash or to the employee's account, to which the employer can pay bonuses, commissions, rewards, etc. Wages in kind are delivered in the form of products and services. It can also be a mixed wage created by combining the previous arrangements. We also consider the prices of goods and services for wages, i.e. what we can buy with our salaries. It is the *nominal wage*, a certain amount of monetary units regardless of what we can buy, and the actual pay, which expresses the number of goods and services we can buy with our nominal salary. It, therefore, represents the purchasing power of money. The wage amount is precisely agreed upon in the employment contract and is part of a permanent employment relationship. When we talk about the number of wages, we are talking about the gross (amount of money specified in the employment contract), and net wages, which are the money paid, net of fees that are delivered to the state (fees to the social security, health insurance, income tax, etc. Mathematically, we can express *Net wages = gross wages – income tax – contributions*. Contributions are paid by the employee and the employer, who pays contributions to insurance companies and some other insurance companies. These

increase his costs and increase the price of the employee's work. We refer to the total work price as super gross salary, i.e. total salary costs for a specific employee.

Payments to the *social insurance* company are, e.g. sickness, old-age, disability, accident or guarantee insurance. The contribution amount is determined as a percentage and calculated from the gross salary. To determine the amount of the net wage, it is necessary to deduct from the gross salary the income tax advance, which is set at 19%.

Taxes and the tax system (Táncošová et al., 2015) are essential for the financial world. The amount of taxes is income to the state budget and affects the development of the economy and individual economic entities. Tax is a mandatory, legally established payment that every natural or legal person must pay at a specified time and amount. It serves the functioning of state departments, e.g. education, healthcare, transport and security, etc. It accounts for up to 90% of all state revenues. We divide them into direct and indirect taxes. Direct taxes are taxes on the income of natural and legal persons, property tax and tax on motor vehicles and local taxes, respectively. Indirect taxes are included in product prices and are not paid directly but indirectly. They are, e.g. value added tax (VAT as the largest source of income for the state budget) and consumption taxes, e.g. from alcohol, tobacco products, electricity, coal and natural gas. A summary of paid income tax is made once a year, i.e. tax return as of March 31 of the following year and annual accounting. In some instances, this period can be extended.

Financial institutions are entities that regulate and control the financial market and must have the necessary licenses and permits to perform their activities. The main body of supervision and regulation of the financial world in Slovakia is Národná banka Slovenska (NBS). It is a central bank that supervises the financial market and commercial banks, registers the number of financial institutions, controls financial intermediaries, keeps statistics and is at the top of the banking system.

Insurance (Horáková, Páleš & Slaninka, 2015) is a way of ensuring and protecting income and assets in case of an unexpected event. The main rule of security is the creation of a financial reserve and protecting of property and health. Insurance is a legal relationship implemented based on an insurance contract between the insurer (insurance company) and the insured (policyholder). The essence of this relationship is the assumption of responsibility for damage as a result of an insurance event. The insurance and the insurance premium amount are specified in the insurance contract, based on which the insurance company will pay the insurance benefit as compensation for damage. Insurance aims to mitigate the financial consequences of an unexpected event according to the principle of solidarity.

You can divide the *insurance* according to the legal form (Adamko, 2018):
- *voluntary contractual insurance* – life, accident, accident insurance of motor vehicles, etc.,
- *mandatory contractual insurance* – e.g. cars, statutory, contractual liability insurance for the damage caused by the operation of a motor vehicle,
- *statutory insurance*, which has the conditions of social insurance established by law, which is implemented in the Social Insurance Company (SP). *Social insurance* includes health insurance, e.g. maternity and nursing allowances; pension insurance, which can be old-age insurance and the payment of an old-age pension or disability and the provision of a disability pension; accident insurance, i.e. compensation in the event of a work accident, guarantee insurance and unemployment insurance. *Health insurance* (regulated by law) is related to the free provision of health care by health insurance companies (Dôvera, Union, Všeobecná zdravotná poisťovňa).

Contractual insurance is implemented based on a contract between the policyholder and the insurance company voluntarily, and it is possible to insure anything, e.g. life, property, children, liability for damage, etc.

In general, we divide insurance into life and non-life insurance. *Life insurance* (LI) is associated with personal insurance and covers the risk of death, disability, accident, etc. The sum insured (in case of an event to be paid out), the amount of the insurance premium (as a regular payment) and the insurance term (period of payment of the insurance premium) are determined. The principle of insurance is to cover accidental and unexpected events. There are three basic types of life insurance, namely capital (in case of death or survival and includes a guaranteed income), investment (in a chance of death or survival and is a combination of life insurance and long-term investment in mutual funds), and risk life insurance (in case of death, which when does not occur within the agreed period, the insurance premium will not be paid). All types cover selected insurance risks. In the case of capital and investment, a savings and appreciation component is also included.

In this connection with LI, supplementary insurances are available, e.g. incapacity for work, disability, death, serious illness, permanent consequences, etc. Risks in LI are divided into three groups: accident, disease and combined. Accident insurance covers the results caused by accident, sickness insurance covers the consequences caused by an illness, and combined insurance covers the effects of both an accident and a disease.

Non-life insurance (NLI) ensures non-living things, i.e. property, against adverse events, e.g. accidents, natural disasters, thefts, etc. The insurance premium thus covers the costs associated with damage removal and repair. There are several types of NLI concerning real estate, home, car, etc. insurance.

Banks and banking products. There is a two-tier banking system in the Slovak Republic, namely the NBS and commercial banks that provide various financial products, e.g. account management, payment transactions, loans, savings and at the same time, finances are under control. The main product of banks is keeping a current account, i.e. operations such as deposit and withdrawal of money, settlement of payments, direct debits, and payments by payment card, for which a certain fee is paid. Products and conditions are determined by each bank individually. A payment card is part of a current account and can be debit (the owner has his funds) or credit (it involves borrowing the bank's funds). Several operations can be carried out using internet banking, mobile phones or smartwatches.

Credit or loans can finance expenses. A loan is a financial product in which the financial institution provides the client with funds (principal), which the client then repays with a pre-agreed increase - interest. If we take a loan from the bank, we become the debtor, and the bank becomes the creditor. Interest is a reward for the bank for lending funds, expressed as an interest rate, i.e. a percentage of the amount owed. The interest rate is pre-agreed and stated in the loan agreement, which also displays the repayment period and interest periodicity - interest charged by the bank (monthly, quarterly, annually). The NBS determines the interest rate. It can be fixed (fixing the interest for a particular time) or variable depending on the development in the banking market. The risk with loans is the inability to repay one's obligations. Several possible solutions exist, e.g. permission to defer instalments for a particular time. Another option is extending the repayment period, i.e., reducing the repayment amount, refinancing or consolidating loans (combining several loans into one to reduce the interest rate). If the solutions are not sufficient, the bank can confiscate the property in the form of execution. If household indebtedness exceeds tolerable, clients declare personal bankruptcy, which is a borderline solution and will affect the entire future.

A *mortgage loan* is a long-term loan intended for the purchase of the real estate, e.g. house, land, apartment, etc., the maturity of which is from 4 to 30 years. The advantage of this loan is the possibility of obtaining a relatively large amount of funds for housing at relatively low-interest rates. There are conditions associated with the mortgage that must be met, namely:
  • establish real estate, which must be insured, and the insurance payment must be in the amount of the unpaid part of the loan and paid to the bank; this is the so-called vinculation;

- the maximum indebtedness of the applicant is set at eight times the net annual income, that is, the maximum amount of the loan;
- the amount of the loan depends on the ratio of the amount of the loan to the value of the mortgaged property (the so-called LTV), and the value is determined based on an expert opinion, and the bank provides a loan of up to 80% of the value of the property;
- an important aspect is the amount of the applicant's disposable income, and the sum of all instalments must be at most 60% of this income after deducting the subsistence minimum. 40% of the income must be left for current expenses.

Another way of acquiring funds is a ***consumer loan***, i.e. lending funds for various goods and services. It is a type of short-term loan without collateral and can be purposeful or non-purposeful. The ***maximum amount*** of such a loan or the sum of all individual loans is ***EUR 40,000***. Its advantage is quick and easy access to funds, and its disadvantage is the high-interest rate, so you need to consider what the loan is intended for.

A specific way of drawing a loan is a ***credit payment card***, on which there are no own funds, but the bank's funds are drawn. The advantage is the interest-free period, i.e. if the funds are returned within the specified period, no interest is paid. It is necessary to be careful because if the maturity date is not met, the interest charged by the bank is high and can lead to indebtedness.

Another option is the ***instalment sale***, a type of product when purchasing, e.g. e-shops and many non-bank entities provide it. It is often used when buying consumer goods and belongs to the quick acquisition of money, but also with a high-interest rate. You will pay less once, but overall the original price is reimbursed. These are short-term loans, and their repayment is within two years; they are relatively expensive.

Leasing is a type of financing expense most often associated with the purchase of a car or machinery. First, it is necessary to pay the so-called down payment as the initial amount, and the rest of the amount is divided into further instalments and administration fees, increasing the product's price. In leasing, the owner is, e.g. cars during repayment by the leasing company, i.e. it is paid for the rental of the property in question. We distinguish between financial (ownership of the object passes to you after repayment of a specified amount) and operational leasing (the lease of an object with the possibility of purchase after reimbursement).

Non-bank entities are financial institutions that provide short-term credits and loans quickly but very expensively. This means the funds are highly repaid and among the most expensive on the financial market.

The ***financial market*** provides a wide range of options for accessing money and financing our expenses if we do not have enough funds or enough financial reserves. However, the basic rule of economic health is "***the best credit is no credit***." The most significant risk with loans is insolvency, i.e. inability to pay their obligations and loans. Non-payment can lead to indebtedness, personal bankruptcy, or execution.

The priority in financial planning is ***creating and evaluating reserves*** in the event of an unexpected event or a budget for the future. Risk, yield and liquidity are related to form***ing resources and appreciation***.

The ***return*** is the difference between the initial and the value after a certain period. By income, we mean all revenue and profits that investments will bring. It is a reward for the investor influenced by risk and liquidity. ***Risk*** is the uncertainty of future returns, i.e. the value of assets may decrease and not bring a profit but a loss. The rule is that the greater the risk, the greater the yield and vice versa. It is the possibility of an unfavourable situation or the threat that there will be a loss in connection with the fluctuation of the markets and a reduction in the value of the investment. Liquidity is the ability to turn an investment into money, preferably without a loss. So it is the

speed of conversion of investment into money - cash. The most liquid are, e.g. securities and real estate have the lowest.

Valorization in the form of *savings and investments* is most often used (Táncošová et al., 2015). Their difference lies in who takes the risk in the event of a decline in yield or profit from the investment. When saving, the bank guarantees the return amount, which is agreed upon in advance. However, it is usually below inflation and at a relatively low level. When investing, it is a higher return, but the investor assumes the risk in the event of a decrease in the return. It is difficult to predict how the investment will be evaluated. Consumption can be understood as deferred consumption, which we spend anyway. At the same time, the investment brings passive income. Savings and assets can be perceived as creating a financial reserve, and when saving, for example, through a savings account. Investing in the future is a better choice.

A *savings account* is a short-term product for storing and appreciating funds, albeit with low interest. It is a combination of a current account and a term deposit. The advantage is a guaranteed and precisely determined return, quick access to saved funds and protection of deposits. The disadvantage is the currently low rate of appreciation of 0.01 to 0.5% per year.

Answer to RQ3

What does financial literacy mean for children - it is an abstract concept; therefore it is necessary to start gradually and in accordance with the age and form of games. For example, to distinguish between individual banknotes and coins - children can master it relatively early, already in preschool age (various imitations of money can help in games - playing at the store, the market, etc.).
The trade game helps to understand:
- the principle of "something for something" and that we always have a limited amount of money;
- where the money comes from, i.e. having money means going to work because "without work, there is no cake".

Answer to RQ4

The child receives money on various occasions (not only pocket money), so it is necessary to teach the *principle of saving and saving money*. It is essential to explain why it is crucial to saving money, i.e. it is required to show the destination for which the funds will be saved (trip, toy, phone, etc.). He must understand that saving does not mean spending more at once, but creating a *financial reserve* or savings for the purpose of unexpected expenses, i.e. for worse times. It is possible to open a student *account* and teach him to use a *payment card* (retain partial control over the budget and expenses). Teach the child that money is first spent on necessary things, and only after basic needs are satisfied can it be spent, e.g. for toys, entertainment, etc. (Fekete, 2022) He must understand the difference between a need and a want.

Answer to RQ5

By starting school and mastering the basics of mathematics, children can learn to handle real money in everyday life as *pocket money*. It is the amount of money that you regularly give to the child that is appropriate for the child's age. It is essential to establish clear rules, i.e. how much and when he will receive the money, and explain how he will spend it because it is for the whole month - *expediency*, which implies the *limitation of the amount of money*. He will learn to understand the consequences of his decisions, and in case he misses them earlier, it must lead him to caution and responsibility.

It should be noted that financial literacy is essential not only for households (whole families and their members) but also for business entities - small and medium-sized enterprises (from now on SMEs), which make up more than 90% of all enterprises in every economy. Knowledge and insights from financial literacy and critical economic categories related to business activities can help these subjects precisely under challenging periods. An

example can be the development of established and defunct SMEs. According to available statistics, the number of defunct entities was 1,891 in 2017, 1,903 in 2018, 1,312 in 2019, 1,504 in 2020 and 383 in 2021 (OECD Economic Surveys Slovak Republic, 2022). Generally, the number of established and closed SMEs is comparable each year. In addition to other causes of extinction, it is essential to point out, e.g. the liquidity indicator, payment discipline, indebtedness of enterprises, and provision of loans. In this context, it is possible to consider low profitability as the leading cause of their demise. From the point of view of the investigated financial literacy, it is possible that better orientation, even in these associations, could at least reduce the number of defunct entities.

Conclusions

The paper presents the current state of financial literacy teaching in secondary schools in the education system in the Slovak Republic, including the commercial sector's efforts and state officials' activities. The authors believe that financial literacy is crucial in sustainable business development; therefore, teaching starting from the early stages of life can not be overestimated.

Based on the research results presented above, the authors offer the content and methods of teaching financial literacy to students in secondary education in the Slovak Republic, from which the following insights are the most important:
- Financial literacy is not only a matter of secondary education but the basic principles of financial education should already be observed by children of preschool age.
- Primary school graduates should be responsible in the area of managing finances.
- High school graduates should understand managing finances, including products of the banking and insurance system, the functioning of the labour market, and the evaluation of savings and investments.
- Real coins and banknotes are the most optimal didactic aids for teaching financial literacy.
- Parents can teach their children to handle money correctly in everyday life in the form of a perfectly set pocketbook appropriate for the child's age and by correctly observing habits of managing finances within the family.
- Business entities also need to use knowledge and be financially literate for their activities directly related to this area's content and education methods. Teaching financial literacy and educating primary, secondary and higher school graduates will also be high-quality entrepreneurs.

In conclusion, research does not exhaust the topic of increasing financial literacy. The mentioned topic is so current and necessary that it is essential to continue efforts to increase financial education with the support of representatives of the commercial sector and state officials. The authors plan to continue researching financial literacy in Slovak education. The authors want to extend the research to research financial literacy in small and medium-sized businesses.

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IMPACT OF COVID-19 ON LABOUR FORCE AND RECOVERY PECULIARITIES IN SELECTED COUNTRIES OF EUROPE[*]

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Abstract. In this paper, we have examined the impact of COVID-19 on labour force and recovery peculiarities in selected countries of Europe. Our goal has been to reach patients with post-COVID-19 or long-COVID-19 symptoms who were treated since 2020 and latest 2021 in different medical spas around Europe. Our research focused on whether work affects any aspect of life during illness and whether complaints experienced during post-COVID-19 treatments affect any aspect of life during illness. To achieve our results, we used quantitative research and tested two hypotheses. Our primary survey was conducted in May-June 2022. A total of 110 valid responses were received. The data collected through the questionnaire was examined using statistical analysis and calculations – descriptive statistics, one-way ANOVA, linear regression analysis. All the respondents had COVID-19 positive test results in their life and attended post-COVID treatments in different medical spas in Europe. The results showed that coronavirus symptoms (post- or long-COVID-19 syndrome) were most likely to interfere with social and leisure activities and work. Well-being and pain need improvement. Improvement is possible with spa rehabilitation packages offering complex interventions such as balneotherapy (which uses local natural resources such as natural healing water, peloids, mofette), climatotherapy, physiotherapy, occupational therapy, and physiotherapy. Working during illness has a significant impact on quality of life. It also has an impact on daily activities, mobility, and pain. Working during illness (COVID-19 infection) affected all aspects of life, and patients perceived that illness-related disturbances mainly affected work performance.

Keywords: Post-COVID-19; health; local natural remedies; medical spa; work; employee; therapy; Italy; France, Czech Republic, Slovak Republic; Lithuania; Slovenia; Germany; Hungary; Serbia; Croatia; Latvia; Romania

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JEL Classifications: I10, I31, J50, M54

Additional disciplines: healthcare, HRM, medical spas

1. Introduction

During the intensive period of COVID-19 and afterward, we have seen an increase in the number of people who had several symptoms after the infection, which lasted for weeks and months. More and more people complained of prolonged COVID-19 symptoms after contracting the virus. As of 20 April 2022, more than 504.4 million confirmed COVID-19 cases and over 6.2 million related deaths had been reported to WHO (WHO 2022). Patients were no longer just knocking on the doors of doctors' surgeries or hospitals but also on the spa. Demand has led European health resort with hydrotherapy centers and medical spas to develop different treatments (packages of treatments) for each condition some with specialization on respiratory, cardiovascular, neurology, musculoskeletal, mental problems. In the context of COVID-19 disease, the issue of not only the end-stage condition but also changes in work and performance at work and return to work has become a hot topic. In our research, we linked illness and work. How did the illness and subsequent recovery affect work and other aspects of life? Does work affect any aspects of life during illness (having COVID-19 infection or post-COVID)? Do complaints experienced during the post-COVID treatments affect any aspects of life while being ill (having COVID-19 infection or post-COVID)? We focused on patients and spa therapies mainly from the Central European region and some other European countries. To understand the topic, let us summarise the long-COVID-19 and post-acute COVID-19 definitions, symptoms, and treatments, and also, we looked at the labour market situation.

2. Theoretical background

Long-COVID-19 and Post-Acute COVID-19
Patients are experiencing prolonged multiorgan symptoms and complications beyond the initial period of acute infection and illness. The list of persisting and new symptoms reported by patients is extensive, including chronic cough, shortness of breath, chest tightness, cognitive dysfunction, and extreme fatigue (Venkatesan, 2021). Acute COVID-19 lasts up to 4 weeks. The term post-acute COVID-19 syndrome (PACS) refers to the combination of symptoms and impairments that persist beyond 4 weeks after the onset of symptoms of the symptoms and impairments (Szekanecz & Vályi-Nagy, 2021) (see Figure 1 below).
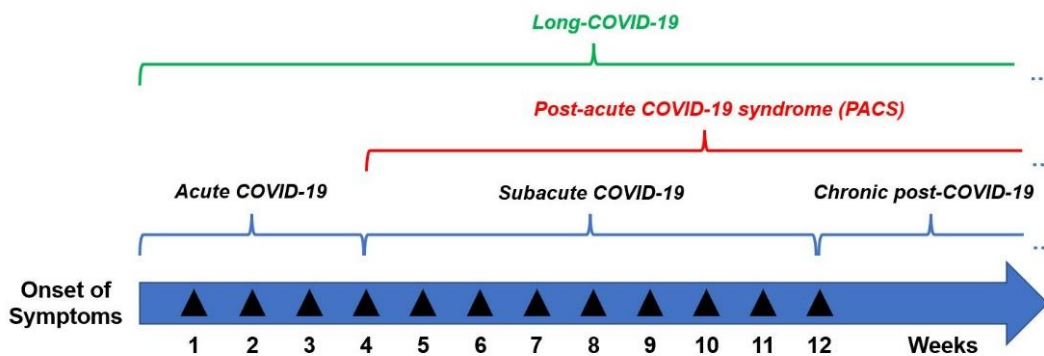
Figure 1. Nomenclature: acute-, subacute-, chronic post-, post-acute- and long-COVID-19

Source: Szekanecz & Vályi-Nagy (2021)

"Long COVID-19 is a term used to describe the condition presented by individuals who have recovered from the acute phase of COVID-19 but are still reporting lasting effects of the infection or having had the usual clinical picture for much longer than expected or have new symptoms and signs" (Cabrera Martimbianco et al., 2021, p.2). The proper duration of long COVID-19 is still uncertain. The main signs and symptoms of long COVID-19

are respiratory manifestations, chest pain, fatigue, dyspnea, cough, cognitive and memory impairment, arthralgia, sleep disorders, and myalgia.

The most prevalent aspects of persistent symptoms were old age, female sex, severe clinical status at the acute phase, high number of comorbidities, hospital admission, and oxygen supplementation at the acute phase (Cabrera Martimbianco et al., 2021).

Post-acute COVID-19 syndrome (PCS) is defined as an ongoing symptomatic illness in patients who have recovered from their initial COVID-19 infection (Malik et al., 2022); this condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of the acute phase of COVID-19 with symptoms (Cabrera Martimbianco et al., 2021) that last for at least 2 months and cannot be explained by an alternative diagnosis (Soriano et al., 2022).

Table 1. Comparison between acute COVID-19 and post-acute COVID-19

Features	Acute COVID-19	Post-acute COVID-19
Initiation of symptoms	2 to 14 days after exposure	4 weeks after the initial response
Common symptoms	Fever, dry cough, and shortness of breath >50% of patients	Fatigue, pneumonia, myalgias, headache, thromboembolic conditions
Systems commonly involved	Respiratory, renal, hematological	Respiratory, cardiovascular, neurologic, multisystem inflammatory syndrome, hematological

Source: Joshee et al. (2022)

Persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection beyond 4 weeks from the onset of symptoms (Nalbandian et al., 2022) or ongoing symptomatic COVID-19 for people who still have symptoms between 4 and 12 weeks after the start of acute symptoms; and (2) post-COVID-19 syndrome or chronic COVID-19 beyond 12 weeks after the start of acute COVID-19 (Venkatesan, 2021, Shah et al., 2021, Cabrera Martimbianco et al., 2021, Szekanecz & Vályi-Nagy, 2021). Table 1 shows a comparison between acute COVID-19 and post-acute COVID-19.

According to the literature, there seems to be a trend of older people experiencing PCS (Mandal et al., 2021), for example, the weakened immune system (Malik et al., 2022). Older adults are also more vulnerable to social isolation and loneliness (Hwang et al., 2020, Stefan et al., 2020), and research has shown that both are independent risk factors for higher all-cause mortality (Yu et al., 2020). Table 2 summarizes the main findings and diagnoses of post-acute COVID-19.

58% of the post-COVID-19 patients had reported poor quality of life (41.5% had pain/discomfort, 37.5% had anxiety/depression, followed by 36% problems with mobility, 28% problems with usual activities) (Malik et al., 2022).

Table 2. Persistent symptoms: post-acute COVID-19

System	Main findings and diagnoses
General	Decreased quality of life Muscle pain and weakness, joint pain, general pain
Mental health	Depression, anxiety
Pulmonary	Breathlessness, cough, fatigue, dyspnea, chest pain, decreased exercise capacity, and hypoxia
Cardiovascular	Heart palpitations, dyspnea, chest pain, arrhythmias, tachycardia, and autonomic dysfunction
Gastrointestinal	Diarrhea, vomiting, loss of appetite, nausea
Neuropsychological	Fatigue, pain, myalgia, headache, concentration problems, cognitive impairment (brain fog), memory deficits, anxiety, depression, sleep disturbances, insomnia, anosmia (loss of smell), ageusia, dysgeusia (loss or distortion of taste)
Functional mobility impairment	Mobility decline reduced exercise tolerance

Source: Halpin et al. (2021), Groff et al. (2021), Nalbandian et al. (2022), Soriano et al. (2022), Malik et al. (2022), Joshee et al. (2022)

Almost half of the study patients reported having a financial impact due to COVID-19 hospitalization. Nearly 10% reported that they had used their savings and had to ration food, heat, housing, and other medications. Furthermore, the persistent symptoms forced the patients to reduce working hours or quit – this may increase their financial distress (Chopra, 2021). In addition, many patients who return from the hospital and have ongoing symptoms may have faced prolonged social isolation, which negatively impacts their mental health and perceived quality of life (Hwang et al., 2020). It is important for healthcare institutions (including spas) to represent quality and equity as well as profitability, but it is also important that patients feel safe, trusted and empathic when using their services (Szigeti, 2023).

Spa therapy and post-COVID-19
Post-hospitalization pulmonary spa rehabilitation should be considered in all patients with post-COVID-19 (Sumbalová et al., 2022). More and more people are complaining of prolonged symptoms after contracting the virus. European health resort with medical spa or climate health resorts developed different treatments for each condition to alleviate these. Therefore, the indication list for spa medicine care in Slovakia was expanded in 2021 to include new indications related to treating conditions after overcoming COVID-19. In these indication groups, 1 535 patients residing in Slovakia were treated in spas after overcoming COVID-19 (for them, the social insurance system paid the treatments). Most of the patients (1 246 persons) are due to the persistence of respiratory problems after the treatment of the infection with a severe course in the hospital. According to the patients' diagnosis and irrespective of the indication group of the post-COVID-19 disease, 2 084 patients were treated in 2021 at spas in Slovakia (NCZI, 2022). In Germany, a cohort study summarized the evidence on post-COVID-19 conditions in younger age groups and confirmed previous findings in adults (Roessler et al., 2022).

Every day during the cure, the post-COVID-19 spa guests' physical and mental well-being is improved with repeated thermal water treatments and using local natural remedies. The physiotherapy sessions work on patients with long Covid and consist of manual massage underwater or with water jets on muscle contractures, but also include manual massage of the lumbar and neck muscles before respiratory physiotherapy is practiced allowing for better breathing. Results observed thanks to these treatments: (1) relieves all muscle, respiratory and joint disorders; (2) restores confidence in the body's physical abilities; (3) improves sleep; (4) reduces physical and mental fatigue; (5) reduces shortness of breath; (6) improves mobility (sante.journaldesfemmes.fr, 2022, online).

COVID-19 leaves many people with long-term health problems that need to be addressed as soon as possible. One way to help post-covid patients is through rehabilitative aging at a medical spa. Spa care for post-COVID-19 syndrome is follow-up medical care. Usually, 8-12 weeks after the acute phase of COVID-19 has ended and when severe health problems persist that limit even normal daily activities (ASK, 2022, online). Spa care is always comprehensive inpatient health care using methodologies: balneotherapy, climatotherapy, physiotherapy, occupational therapy, physical therapy (thermotherapy, hydrotherapy, electrotherapy, mechanotherapy, electrotherapy, light therapy, oxygen therapy, and others), patient/relative education, diet therapy and nutritional counseling, psychotherapy, and psychological counseling are always part of the treatment in natural health spas (ASK, 2022, online).

Labour market

A study shows that six to twelve months after acute SARS-CoV-2 acute infection, even among young and middle-aged adults with a mild infection, there is a significant burden of post-acute symptom sequelae, with a significant impact on general health and work performance (Peter et al., 2022). This has a major effect on the labour market, that has been characterized by uncertainty and volatility – the situation has been affected by innovation and technological innovation, as well as demographic changes and the pandemic. The aging of society applies to all Member States of the European Union, while the proportion of people in active employment is steadily decreasing, the number of older people is increasing. Jobs are lost, and new jobs are created (Grenčíková et al., 2022). Gender roles within households and the division of labour will also change (Hedvičáková & Kozubíková, 2021). In their research, Rožman et al. (2021) investigate the consequences of the coronavirus epidemic in Slovenia, focusing on gender differences in employment. At the time of the pandemic, women working while raising children were more likely to have their working hours interrupted. Family responsibilities, and caring for elderly sick relatives and children had a significant impact on women's job satisfaction and work efficiency. Abendroth et al. (2022) discuss gender differences in German employment, finding that women faced greater barriers to teleworking than men, made more difficult by household management and child-raising. The labour market outlook due to the pandemic is uncertain. Recovery from the virus occurs in different ways and at different times in the market (Enfield, 2021). In post-Covid Europe, the situation varies from country to country due to different economic and social developments (Bieszk-Stolorz & Dmytrów, 2022). Research analyzing the labour market in the aftermath of the pandemic shows that companies are experiencing a downward trend in supply and a shortage of highly qualified workers. Southern Europe and France are in a more vulnerable employment situation than the countries of Eastern, Central, and Northern Europe (Raimo et al., 2021). Barrot et al. (2020) analyzed the causes of employment loss in France, and their results show that the highest employment losses are in agriculture, food, hospitality, and construction, while the lowest are in industries covering information and communication technologies. In their research, Radulescu et al. (2021) highlighted the increase in the Romanian unemployment rate, with the pandemic having a significant impact on the mentality of workers. Health and proper working conditions in the workplace have been prioritized. Employment was in a precarious situation, and the fate of workers was not clear (Stuart et al., 2021). The further spread of the virus would have been curbed if infected workers had stayed at home, but not everyone had the option of paid sick leave. Many countries worldwide do not provide paid sick leave for workers from the first day of illness. In many countries, social security covers part or all of this financial burden, shared between the government, the employer, and the employee (Heymann et al., 2020). The severing of employment links will limit the economy's recovery once the crisis is over. Employers and workers will continue to face several challenges as demand in some industries will be depressed, affecting organizational productivity and work organization (Dias et al., 2020). The coronavirus epidemic transformed organizational policy and practice, requiring adaptation to a rapidly changing social situation. The possibility of working from home has been promoted not only as a benefit for people with disabilities but also as an equal opportunity for people living in areas with high unemployment rates. After the pandemic, economic progress and sustainability can be achieved by correcting inequalities (Holland, 2021). In the future, the structure of the economy and the business environment will change. Digital ways of working will come to the fore, with the possibility to telework in more workplaces, allowing cost savings, increased productivity, and work-life balance.

Companies must learn to adapt to new ways of managing and training employees (Findlay et al., 2021). The virus most affected the Romanian labor market through unemployment, underemployment, access to wages, and social protection. In the wake of the virus, 18.4% of workers started teleworking (Davidescu et al., 2021). In German employment, the introduction of teleworking was initially limited by many factors, notably a shortage of skilled workers and an attitude to innovation. The share of teleworkers has increased by more than 20%. A significant percentage of workers would retain the option of working from home in the future. According to research by the German Institute for Employment Research, work tasks, cooperation with co-workers, job control, privacy concerns, and the home environment were the biggest challenges in teleworking (Hartig-Merkel, 2022). In dealing with the pandemic, it has been the solution for increasing companies, with varying impacts on workers' physical and mental health (Lange & Kayser, 2022). Following the outbreak of the health epidemic in France, more than 30% of workers were working in a home environment, mostly affecting higher-paid workers and women. However, more than 40% of workers were more satisfied with their work on the premises (Foucault & Galasso, 2020). Čok et al. (2022) state concerning Slovenian employment that a reinterpretation of the place of work is expected after the epidemic. A shared workplace is currently envisaged, where workers work in different locations (on-site, at home, other locations). The share of teleworkers has also increased in Latvia, with 43% of companies offering the option to work from home to protect workers' health (Bikse et al., 2021). Karácsony (2021) found in his study that the proportion of teleworkers in Slovak employment increased sevenfold due to the coronavirus epidemic. A significant proportion of workers would also like to see the possibility of teleworking. In their study, Skýpalová et al. (2021) focus on the changing Czech employment relationship and workload, which focused on the possibility of working from home. Workers perceived little change in the number of hours worked but teleworking proved to be a fairly productive solution for part of the working week. In addition to ensuring safety at work, workers' mental health and well-being must also be taken into account. The issue of flexibility in the workplace calls for a four-day working week and hybrid employment (Gavin et al., 2022). The epidemic's impact on the labour market manifests in sectoral, occupational, and organizational approaches. The gradual emergence of vaccination programs has reduced people's sense of insecurity, which is crucial for the rehabilitation of the economy and trade (Zielinski, 2022). In the future, there will be a strong focus on job creation in the health sector and the industries that serve it (Basso et al., 2022). The world is currently experiencing a period of Post-Covid Syndrome, which is also affecting European culture's existence and sense of security (Tóth & Kajanová, 2022). The rapid increase in infected people during the coronavirus epidemic affected labour market mechanisms. In the aftermath of the pandemic, hiring, job search and wage subsidies for the unemployed could be a solution to reorganize working families. European governments aim to reduce unemployment, even by increasing the number of job vacancies (Su et al., 2021).

People complain of prolonged symptoms following COVID-19 virus infection, and many patients after the acute phase, or those who return from hospital, experience ongoing, prolonged symptoms. They may therefore face prolonged social isolation, which negatively affects their mental health and perceived quality of life. In our research, we sought to answer whether work affects any aspect of life during/after COVID-19 or post-CovID-19 illness. Furthermore, if these patients receive individual treatments at medical spa providers, do these complaints improve, to what extent do they affect any aspect of life being studied, or do they experience any change? This research is devoted to filling in the indicated gap.

3. Research objective and methodology

As the research focuses on the impact of COVID-19 on labour force and recovery peculiarities in some countries of Europe, our goal has been to reach patients with post-COVID-19 or long-COVID-19 symptoms and treated in different medical spas around Europe. Therefore, our research focused on the following: does work affect any aspect of life during illness, and do complaints experienced post-COVID-19 treatments affect any aspect of life during illness? To achieve our results, we decided to use quantitative research.

The following research questions and hypotheses were proposed:

RQ1: Does work affect any aspects of life during illness (having COVID-19 infection or post-COVID-19)?

H1: Working during illness (COVID-19 infection) has affected all aspects of life.

RQ2: Do complaints experienced during the post-COVID-19 treatments affect any aspects of life while being ill (having COVID-19 infection or post-COVID-19)?

H2: The complaints experienced at the end of treatment affect all aspects of life.

Our primary survey was conducted in May-June 2022 using a digital online questionnaire (Google Forms) and a paper-based questionnaire. The questionnaires were available in 12 different languages - English in all cases and in addition also in the languages of the target countries (Italian, French, Czech-Slovak, Lithuanian, Slovenian, German, Hungarian, Serbian, Croatian, and Latvian). Out of 12 types of questionnaires six languages were answered. Therefore, the sample is not representative, but trends can be identified by examining the results. The research was realized in cooperation with the European Spas Association (Interreg InnovaSPA project). A total of 110 valid responses were received. All the respondents had COVID-19 positive test results in their life and attended post-COVID-19 treatments in different medical spas in Europe. The questionnaires were filled out at the end of their stay. At the beginning of the questionnaire, respondents answered general demographic questions, followed by questions on health status, then a series of questions on symptoms of COVID-19 that disrupted them, and finally, questions on the effectiveness of therapies were asked. Closed, open, and Likert scale questions (ranging from 1 to 6, 1 to 7, and 1 to 10). The data collected through the questionnaire was examined using statistical analysis and calculations. The data were organized in a single excel file to facilitate our analysis and were analyzed using IBM SPSS Statistics 23 software for statistical tests. Results were considered significant at a p-value of 0.05 and a p-value of 0.001. As a first step, a normality test was performed to determine whether our data were from a normal distribution. The results of this test allowed us to decide whether we could then carry out parametric or non-parametric statistical tests to test the hypotheses we formulated.

The demographic data were analyzed using general descriptive statistical methods (frequency analysis). The distribution of the sample is summarised in Table 3.

Table 3. The Structure of the Sample Distribution, N=110

N=110, Total=100 % Missing=0	Factors	n	Percent
Language of the questionnaire	**CZECH-SLOVAK**	49	44.5 %
	FRENCH	19	17.3 %
	GERMAN	8	7.3 %
	LATVIAN	16	14.5 %
	ROMANIAN	4	3.6 %
	SLOVENIAN	14	12.7 %
Gender	**MALE**	51	46.4 %
	FEMALE	59	53.6 %
Age group	**25-34 years old**	3	2.7 %
	35-44 years old	11	10.0 %
	45-54 years old	28	25.5 %
	55-64 years old	29	26.4 %
	65-74 years old	23	20.9 %
	75 years or older	16	14.5 %

Source: primary research

In the questionnaire survey, we recorded some respondents' demographic data, illustrated in Table 1. As demographic data, we asked for the language spoken by the respondent, his/her gender, and age, thus ensuring the total anonymity of the respondents. For the analysis of demographic data, simple descriptive statistics are used, i.e., frequency and percentage distribution are quantified. In total, we used a valid sample size of N=110, which was treated as 100 % for all results. We had no missing data or incorrect completions, so no filtering or cleaning of the data was necessary. Judging by the quality of the data, we worked with a representative sample. The table shows that we could construct a total of 5 groups in terms of ethnicity. The first group comprises respondents of Czech and Slovak nationality combined, representing 44.5 % of respondents. Furthermore, 17.3 % of respondents are French, 14.5 % Latvian, 12.7 % Slovenian, 7.3 % German, and 3.6 % Romanian. 53.6 % of respondents are women, and 46.4 % are men. The distribution by age was as follows: 2.7 % of respondents aged 25-34, 10.0 % of respondents aged 35-44, 25.5 % of respondents aged 45-54, 26.4 % of respondents aged 55-64, 20.9 % of respondents aged 65-74 and 14.5 % of respondents aged 75 and over.

4. Results

All the respondents had COVID-19 infection and were patients with post- or long-COVID-19 symptoms (and also treated for this disease). Table 4 shows the impact of coronavirus symptoms in our three domains: social life and leisure activities, work (paid, unpaid voluntary, training), and family life and household tasks. The data are presented using simple descriptive statistics, but the values of several indicators are quantified. The question was answered on a Likert scale of 1 to 10, with 1 being not bothered and 10 being very bothered.

The first column of the table indicates the most frequently indicated values on the scale, the frequency, percentage distribution, variance measure variance, the sample mean, median and standard deviation. Coronavirus symptoms were most disturbing to respondents in the areas of social and leisure activities and work, as both factors were rated with a maximum score of 10.

Table 4. Impact of coronavirus symptoms, N=110

N=110, Total=100 % Missing=0	Most common value	Frequency	Percent	Variance	Mean	Median	Std. Deviation
Social life and leisure activities	10	19	17.3 %	7.151	6.491	7	2.674
Work (paid, unpaid volunteer, training)	10	21	19.1 %	528.220	1.982	7	22.983
Family life and household tasks	7	19	17.3 %	7.063	6.236	7	2.657

Source: primary research

Family life and household tasks combined were the most frequently rated at 7. However, when looking at the mean and median scores, it can be seen that the symptoms of coronavirus bothered respondents to a similar extent, more than the average, in the areas of social life and leisure activities (Mean=6.491; Median=7) and family life and household tasks (Mean=6.236; Median=7). In addition, the sample mean indicates an even more significant disturbance for work (Mean=11.982; Median=7).

Table 5 shows the distribution of the seven areas where improvements in quality of life are needed after the illness. Respondents were asked to rate each area on a Likert scale of 0 to 10, with 0 being options not at all necessary, 5 being moderately necessary, and 10 being options completely necessary. Each variable in the table is analyzed using descriptive statistics. Respondents believe that their social relationships (Mean=4.627; Mode=0) need not be improved. However, their well-being (Mean=5.427; Mode=8) and pain (Mean=5.036; Mode=10) need to be improved based on the mode and sample mean. All other areas require moderate improvement.

Table 5. Distribution of areas where improvements are needed after illness

N=110, Total=100 % Missing=0	Mean	Std. Deviation	Variance	Median	Mode
My daily activities	5.118	2.998	8.986	5	6
My mobility	5.164	3.135	9.826	5	5
My social contacts	4.627	3.156	9.961	5	0
My efficiency	5.218	3.078	9.475	5	5
My well-being	5.427	3.036	9.219	5.5	8
My quality of life	5.482	3.040	9.243	5.5	5
My pain	5.036	3.200	10.237	5	10

Source: primary research

H1: Working during illness (COVID-19 infection) has affected all aspects of life.
H0: Work during illness (COVID-19 infection) has no effect on all aspects of life.

The data collected and organized in the questionnaire survey are from a normal distribution. A parametric statistical test is used to test the hypotheses. To test the first hypothesis, a one-way analysis of variance, including a one-way ANOVA, will be used to determine whether a statistically significant difference exists between the means of the groups under study. According to the homogeneity test, the results of the Levene Test show that the variances for the variables daily activities (3.578), mobility (2.825), quality of life (2.643), and pain (2.245) are homogeneous so that the value of the ANOVA can be tested. The variances are not homogeneous for all other variables and, therefore, irrelevant to this study. In the ANOVA table, daily activities (p=0.026), mobility (p=0.057), quality of life (0.002), and pain (p=0.016) are represented as satisfying the p<0.05 condition. A significant relationship is found between the variables under study. Following the significance of the relationship, the strength of the effect, i.e., the r value, is quantified. The following formula is used:

$$r_{(my\ daily\ activities)} = \frac{\sqrt{Sum\ of\ Squares\ (between\ groups)}}{\sqrt{Sum\ of\ Squares\ (total)}} = \frac{\sqrt{175.848}}{\sqrt{979.464}} = 2.37 = 23.7\ \%$$

$$r_{(my\ mobility)} = \frac{\sqrt{170.739}}{\sqrt{1071.055}} = 2.28 = 22.8\ \%$$

$$r_{(my\ quality\ of\ life)} = \frac{\sqrt{234.323}}{\sqrt{1007.464}} = 2.71 = 27.1\%$$

$$r_{(my\ pain)} = \frac{\sqrt{212.891}}{\sqrt{1115.855}} = 2.52 = 25.2\%$$

The r value for the quality of life (27.1 %) is the highest, indicating a strong impact. Working during illness has a significant impact on quality of life. However, it also affects daily activities (r=23.7 %), mobility (22.8 %), and pain (25.2 %). Hypothesis H1 is confirmed, and alternative hypothesis H0 is rejected.

Table 6. Statistical results (H1 testing)

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.	
My daily activities		3.578	10	99	0.000	
My mobility		2.825	10	99	0.004	
My quality of life		2.643	10	99	0.007	
My pain		2.245	10	99	0.021	
My social contacts		1.342	10	99	0.219	
My efficiency		1.474	10	99	0.160	
My well-being		1.569	10	99	0.127	
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
My daily activities	Between Groups	175.848	10	17.585	2.166	0.026
	Within Groups	803.616	99	8.117		
	Total	979.464	109			
My mobility	Between Groups	170.739	10	17.074	1.877	0.057
	Within Groups	900.316	99	9.094		
	Total	1071.055	109			
My quality of life	Between Groups	234.323	10	23.432	3.000	0.002
	Within Groups	773.141	99	7.81		
	Total	1007.464	109			
My pain	Between Groups	212.891	10	21.289	2.334	0.016
	Within Groups	902.963	99	9.121		
	Total	1115.855	109			

Source: primary research

H2: The complaints experienced at the end of treatment affect all aspects of life.
H0: Complaints at the end of treatment have no impact on all aspects of life.

A linear regression analysis is performed to examine the relationship between two or more variables to test the second hypothesis. In formulating the hypothesis, we have assumed that one variable is dependent on three other variables that influence it.

Table 7. Statistical results (H2 testing)

Model Summary	R	R Square		Adjusted R Square		Std. Error of the Estimate	
	0.513	0.263		0.242		2.5238	
ANOVA		**Sum of Square**	**df**	**Mean Square**	**F**	**Sig.**	
	Regression	240.686	3	80.229	12.596	0.000	
	Residual	675.177	106	6.37			
	Total	915.864	109				

Coefficients	Un-standardized Coefficients		Standardized Coefficients	t	Sig.	95,0 % Confidence Interval for B	
	B	*Std. Error*	*Beta*			*Lower Bound*	*Upper Bound*
(Constant)	0.565	0.679		0.832	0.407	-0.782	1.912
Work (paid, unpaid volunteer, training)		0.005	0.011	0.042	0.504	0.616	-0.016
Social life/leisure activities:	0.133	0.124	0.123	1.070	0.287	-0.113	0.379
Family life/home respon-sibilities	0.453	0.125	0.415	3.612	0.000	0.204	0.702

Source: primary research

Based on the regression model, the R value is 0.513, i.e., a value closer to 1. This suggests a strong relationship between the variables. The coefficient of determination is $R^2=0.263$ (26.3 %), so the model explains a significant proportion of the variance of the dependent variable, 26.3 %. The values in the ANOVA table provide information on how well the regression model describes the data. $F=12.596$ and $p=0.000$, which satisfies the $p<0.05$ condition. The Coefficients table quantifies the coefficients that make up the regression equation. The table shows whether each variable has a significant independent effect on the dependent variable. The results of the t-test indicate that only the variable work (paid, unpaid voluntary, training) satisfies the $p<0.05$ condition, i.e., the variable is significantly related to the dependent variable. For the variable work (paid, unpaid volunteer, training), $t=0.042$ is less than 0.05. This correlation is partial, the effect of the other variables in the model is filtered out. The value determines the magnitude and direction of the effect in column B. The value associated with the variable work (paid, unpaid volunteer, training) is 0.011, which means that if someone experienced a complaint at the end of treatment, the disturbance experienced during work increases by 0.011 points. In the survey, disturbance experienced during work (paid, unpaid volunteer, training) was given a score of 10. This gives the following equation:

Complaints during treatment=0.565 (intercept) + (0.011*10) + e (standard error of measurement) = 0.675+e

The result can be used to estimate 1 point by rounding up the correlation plus all the errors for each estimate. Hypothesis H2 is partially confirmed in hypothesis testing, and alternative hypothesis H0 is rejected. Disruptions in treatment are most likely to affect work performance.

Conclusions

The research gives an excellent basis and overview of the current care situation for post-COVID-19 patients in Europe. According to the results, working during illness (COVID-19 infection) has affected all aspects of life (the patients' daily activities, mobility, social contacts, efficiency, well-being, quality of life, and pain). It is partially confirmed that the complaints experienced at the end of treatment affect all aspects of life. Disruptions in treatment are most likely to affect work performance.

The world is currently experiencing a period of post-COVID-19 syndrome, affecting the livelihoods and sense of security of European culture (Tóth & Kajanová, 2022). In addition to ensuring safety at work, workers' mental health and well-being must also be considered (Gavin et al., 2022). The rapid increase in the number of infected people during the coronavirus epidemic has impacted labour market mechanisms. Following the epidemic, hiring, job search, and wage subsidies for the unemployed may provide a solution to reorganize working families. European governments aim to reduce unemployment, even by increasing the number of job vacancies (Su et al., 2021).

The literature review summarized showed that patients with COVID-19 infection who also had post-COVID symptoms several weeks after viral infection reported that 58% had poor quality of life after illness (41.5% had pain/discomfort, 37.5% anxiety/depression, followed by 36% mobility problems, 28% problems with usual activities) (Malik et al., 2022). Nearly half of the patients reported that COVID-19 treatment had a financial impact. Nearly 10% reported that they had used up all their savings due to the illness (and sometimes lost time from work). Persistent symptoms forced patients to reduce their working hours or quit - this may have increased financial hardship (Chopra, 2021). In addition, many patients who returned from hospital with persistent symptoms may have faced prolonged social isolation, which negatively impacts their mental health and perceived quality of life (Hwang et al, 2020). One way to treat post- or long-COVID-19 patients is rehabilitation in a medical spa. Spa and this sub-sector of the health care industry have realized first that there is a demand for these types of therapies and started to treat patient since 2020. Spa treatment for post-COVID syndrome is a follow-up treatment, usually 8-12 weeks after the acute phase of COVID-19 has ended, and when severe health problems persist that limit even normal daily activities (ASK, 2022, online).

The results of our primary research also showed that the symptoms caused by the coronavirus (and post- or long-COVID-19 syndrome) were most disturbing to respondents in social and leisure activities and at work. Family life and household tasks together were the most frequently rated 7. The disorder also causes psychological problems in the long term, so mental treatment is needed in addition to physical treatment. This has been correctly implemented by rehabilitation centers in their programs.

According to the respondents, their wellbeing and pain need improvement, based on the mode and sample averages. They need moderate improvement in all other areas. Improvement is possible with spa rehabilitation packages that offer complex interventions: balneotherapy, climatotherapy, physiotherapy, occupational therapy, physical therapy (thermotherapy, hydrotherapy, electrotherapy, mechanotherapy, electrotherapy, light therapy, oxygen therapy, and others), patient/relative education, diet therapy and nutritional counseling, psychotherapy, and psychological counseling are always part of the treatment in climate health resorts and medical spas (ASK, 2022, online). Were fully paid for by the Slovak state health insurance from April 14, 2021 in 5 indication groups according to the most dominant symptomatology. Also in Luxembourg, Domain Thermal Mondorf launched a successful Post/Long-Covid recovery program fully covered by the Ministry of Health. One of the first pioneer in this filed was Heilsustofnun health centre in Iceland. Working during illness has a significant impact on quality of life. However, it also has an impact on daily activities (r=23.7%), mobility (22.8%), and pain (25.2%). Hypothesis H1 is confirmed, i.e., working during illness (Covid-19 infection) affected all aspects of life. These results strongly suggest that work cessation is advisable after prolonged COVID-19 disease. Complex rehabilitation

treatments can promote the return to work. However, this may also require (1) out-of-pocket payments by individuals (patients); (2) funding by health insurers; (3) funding support from employers. Employers may wish to consider such forms of support for the recovery of employees diagnosed with post- or long-COVID-19 syndrome. This will enable them to return to work in a much better state, which may be associated with a more positive quality of life. In the survey, disturbance at work (paid, unpaid volunteering, training) scored 10 points. This provides clear evidence (partial confirmation of hypothesis H2) that perceived disruption is most likely to affect work performance.

There were some limitations in the research:
Not all relevant providers (in the first phase of the study 46 qualified medical spas were involved) and contacts completed the patient questionnaires in our quantitative questionnaire survey. Hence, the results only reflect the views of about half of the target population and patients' views. Furthermore, a limitation of the survey was the smaller sample size. In the future, we should aim for as large a sample size as possible, which is also homogeneously distributed across countries. This is also achievable for a longer interval survey so that all spa providers can complete the research questionnaire with patients at the end of a treatment period of several weeks. Another limitation of our research is that we did not have patient data, which was severe. However, the results may be related to chronic diseases and health determinants.

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WATER, ENERGY AND HUMAN DEVELOPMENT IN THE BRAZILIAN AMAZON: A MUNICIPAL HUMAN DEVELOPMENT INDEX ADJUSTED FOR ACCESSES[*]

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Abstract. Thanks to its enormous untapped water potential, Brazil provides its electricity matrix with more than 60% hydroelectric power. This technology has had controversial impacts, which questioned its sustainability and stressed its likelihood to jeopardize the development of affected areas. We analyze here one of the main electricity producers: the state of Pará. By using a human development perspective, we integrate the Municipal Human Development Index (MHDI) with indicators of water and energy access through a principal components analysis. The comparison between the achievements of the municipalities affected and not affected by hydroelectric projects advocates policy makers to improve accesses in order to convey development, not just growth.

Keywords: energy access; Amazônia Legal; human development; Principal Component Analysis

1. Introduction

Hydroelectric power stations in Brazil meet roughly 60% of energy needs and 80% of electricity matrix (ANEEL, 2019). In recent years the enormous endowment of water (and therefore electricity) fuelled a significant economic growth, and Brazil became one of the major contributors to the global GDP (OECD, 2021). However, the level of development achieved by Brazil is still not comparable with that of the developed countries (UNDP, 2020; UNDP, IPEA, FJP, 2016 and 2019), and the gap between growth and development is significant also in Federal States that are great energy producers, such as the state of Pará (de Miranda Rocha, 2020).

Notice that various authors investigating economic development stress the need to go beyond the 'economic growth-energy consumption' nexus and to empirically studying the relationship between human development and access to energy, especially in less developed areas (Brand-Correa & Steinberger, 2017; Magnani & Vaona, 2016, Rus et al., 2020). In fact, although the economic development is driven by the increase in energy consumption, which has a positive and significant effect on economic growth (Apergis & Payne, 2012; Ohler & Fetters, 2014), access to energy heavily affects fields related to human development like education and health (Kumar, 2018; United Nations, 2015). In fact, in particular where energy production is from hydro power, access to water as a primary commodity should also be taken into account for its effects on relevant fields like health (United Nations, 2015). Moreover, the exploitation of water resources aimed at increasing the production of energy may impact directly local reality, especially in presence of inadequate local development policies (Becker, 2005; Bielschowsky & Mussi, 2012; Lipscomb et al., 2013; Chehabeddine, Grabowska, Adekola, 2022). In fact, it might rise conflicts of use and force the adjustment of economic activities, thus creating an issue of access to water (Manyari & de Carvalho, 2007; Fearnside, 2016; Ioris, 2020) .

In the light of the above, the case of Brazil and of the Federal State of Pará is particularly interesting (Iorio & Monni, 2019). In fact, since the late 80s, when Brazil started shifting from fossils to renewable sources, its energy strategy has led to the intensive exploitation of areas like Pará for energy purposes of national interest (Iorio & Monni, 2018; 2021). This approach has been blamed to endanger environmental conservation and threaten local culture and economic activities (Costantini & Monni, 2008). Aim of this paper is to give empirical evidence of the role played by accesses to both energy and water on development. In particular, we discuss whether the Municipal Human Development Index (MHDI) provided by the Atlas of Human Development in Brazil (UNDP, IPEA, FJP, 2013) is an adequate measure of the human development at the municipal level in Pará (Alkire & Foster, 2011; Booysen, 2002). Notice that the MHDI is based on the same three dimensions of the global Human Development Index for countries (UNDP, 1990), namely income, education and health, but its calculation requires alternative specific indicators that better fits local reality (Sen, 1988).[†] After discussing the characteristics of the case study and the rationale behind its choice in Section 2, in Section 3 we consider the formulation of an alternative and more comprehensive municipal HDI that takes into account also other aspects of human life as suggested by the UN's Sustainable Development Goals (United Nations, 2015), such as the access to water (Goal 6) and the access to energy (Goal 7). The analysis involves all 143 municipalities of Pará and three census years (1991, 2000, 2010). The analysis reinforces the conclusion that energy production cannot be considered as an indicator of development, since production does not necessarily drag access (UNDP, IPEA, FJP, 2013). Section 4 is dedicated to concluding remarks and ideas for future reflections.

2. Regional background: the State of Pará

Pará is one of the largest States in the Brazilian Amazon and it is located between two huge catchment areas, the Amazonas and the Tocantins. Because of this, it has great amount of water resources, almost all its municipalities are located near harbours (at present, river transport is a key part of the logistics of the State), and its hydroelectric potential corresponds to about 40% of the total potential of the area (Monni, Iorio, Realini, 2018; Eletrobras, 2017). However, in all the census years that we took into account, the human development of Pará has been unsatisfactory, and did not show much improvement over time: if in 1991 it had the seventeenth MHDI out of 27 Brazilian states, in 2010 it became the twenty-fourth (Iorio, de Miranda Rocha, Monni, 2021). In this sense, the

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[†] To evaluate education, in particular, the MHDI uses schooling of the adult population (*i.e.* the percentage of adults that concluded primary school) and school flow of young people (*i.e.* the percentage of young people that, depending on their age group, is attending or has completed primary school or secondary school), while the global HDI uses mean years of schooling and expected years of schooling.

State of Pará represents an interesting case study from the point of view of its economic and human development (Iorio & Monni, 2019).

In fact, according to the five development bands‡ defined by the *Atlas of Human Development in Brazil* (UNDP, IPEA, FJP, 2013), in 2010 Pará achieved an intermediate level of human development, with a MHDI equal to 0.646, having gained 0.233 points since 1991. This improvement, however, did not led the Federal State to reach the development level of Brazil as a whole, that went from having a very low (0.493) to a medium (0.612) MHDI in the decade 1991-2000, and reached a high (0.727) MHDI in 2010. Interestingly, this occurred despite Pará's economic growth (+56%) being greater than that of Brazil (+47%) in the period under consideration. Thus, the interest in understanding the role of accesses in shaping the level of human development in this region. In this sense it is interesting to look at Table 1, that for each census year shows the median, the minimum and the maximum for the percentage of population living in households with piped water and sanitation, that hereafter represents the access to water in the municipality, and for the percentage of population living in households with electricity, that hereafter represents the access to electricity in the municipality. The results, especially as far as access to water is concerned, are appalling: in 2010 still in half of the municipalities of Pará the percentage of population with access to water and sanitation did not reach 45%.

Table 1. Access to water and energy in the municipalities of Pará: descriptive statistics.

	Access to water			Access to electricity		
	min	**max**	**median**	**min**	**max**	**median**
1991	0,00	68,29	10,99	3,02	98,96	40,21
2000	1,26	73,68	15,39	22,44	99,50	61,05
2010	6,68	86,84	44,83	62,55	99,97	90,35

Source: Personal elaboration from UNDP, FJP and IPEA, 2013.

Looking in particular at the ten municipalities of Pará with the highest MHDI in 2010, we find that eight of them belong to large cities or metropolises with at least 51.000 inhabitants (IBGE, 2017), such as Belém (0.746) and Ananindeua (0.718), which have a MHDI comparable to that of the rest of the country. Not surprisingly, for all the municipalities in this subset, in 2010 the access to water and to electricity were at least 80% and 90% respectively. It is also interesting to notice that out of the three components that enter the MHDI, the lower one in most cases is that related to education. For example, in 2010 Belém scored 0.751 in MHDI-income, 0.822 in MHDI-health, and just 0.673 in MHDI-education. Similarly, Ananindeua scored 0.684 in MHDI-income, 0.821 in MHDI-health and just 0.658 in MHDI-education.

Conversely, focusing on the ten municipalities of Pará with the lowest MHDI in 2010, we find that only two of them are large cities, while the majority have less than 27.000 inhabitants (IBGE, 2017). The municipality of Melgaço, for instance, was the least developed of the whole country, with a MHDI equal to 0.418. Again, it is

‡ *Very low* - below 0.5; *low* – between 0.5 and 0.599; *medium* – between 0.599 and 0.699; *high* – between 0.699 and 0.799; *very high* - 0.8 and over (UNDP, FJP, & IPEA, 2013).

interesting to notice that this bad result is determined in particular by MHDI-education (0.207) rather than by MHDI-income (0.454) or MHDI-health (0.776). However, it is also striking to point out that in Melgaço, in 2010, the access to water and to electricity did not reach 22% and 65% respectively.

This discussion suggests that the increase of energy production and growth observed at the national level in the last decades has not resulted in a structural development of the local context, with a few exceptions regarding large cities (Almeida Prado et al., 2016; Tundisi et al., 2014; Van Els et al., 2012). Moreover, it stresses the strong relationship between human development and accesses that motivates the interest in a more comprehensive indicator of human development.

3. A Principal Component Analysis for the formulation of a new municipal HDI

Principal Component Analysis (PCA) is a statistical technique that can be used to synthetize a set of (possibly correlated) observed variables into a smaller set of uncorrelated artificial variables that retain most of the information (i.e. the variability) contained in the original set. Here, in order to obtain a more comprehensive municipal HDI, we are going to apply PCA to a set of variables that includes both the usual dimensions of human development and new dimensions such as the accesses to electricity and water.

More in details, the variables included in our analysis are income per capita (Income_pc), life expectancy at birth (Life_exp), a human development index of education (HDEdu), computed as the geometric mean of the percentage of schooled adult population and the school flow of young population, as well as the aforementioned accesses to water and electricity.

The results are presented in Table 2 for the three census years 1991, 2000, 2010, and two points emerge clearly from it. First, in all three analyses the first principal component (PC1) resumes at least 61% of the total variability, and well accounts for both the original dimensions of the MHDI and the additional access variables. Moreover, looking at the correlation coefficients between the first principal component and the original variables, we can see that in all census years PC1 can be regarded as a direct measure of municipal human development adjusted for accesses, that in the following will be referred to as the adjusted MHDI.

Table 2. Correlation between PC1 and the original variables.

1991	Access to water	Access to electricity	Income_pc	HDEdu	Life_exp	% Variability
	0,876	0,846	0,740	0,903	0,520	0,63
2000	Access to water	Access to electricity	Income_pc	HDEdu	Life_exp	% Variability
	0,899	0,859	0,708	0,891	0,565	0,63
2010	Access to water	Access to electricity	Income_pc	HDEdu	Life_exp	% Variability
	0,777	0,840	0,826	0,875	0,523	0,61

Source: Personal elaboration from UNDP, FJP, IPEA, 2013.

Then it is interesting to compare the distribution of the standard MHDI and that of the adjusted MHDI in order to verify to what extent taking into account the accesses modify the measurement of the human development. Figure 1 shows the relative position of each municipality in terms of both the MHDI and the adjusted MHDI and points out that for all census years the two rankings are significantly related. However especially in 1991, when accesses

in Pará were often limited, for some of the municipalities they differ significantly, with the MHDI displaying a higher human development with respect to the adjusted MHDI. Similar conclusions are reached when looking at the Spearman rank correlation coefficient, that for the three census years was equal to 0.9, 0.92, 0.95, thus showing that the strength of the relationship has been increasing over time (together with the accesses). This is an important point: on the one hand, the fact that the differences in the two rankings have reduced in the two decades is an indication that accesses in Pará have become more widespread, as it is confirmed by the median and the minimum of the two distributions shown in Table 1. On the other hand, it shows that when the accesses are limited, as in 1991, not taking them into account when measuring the human development can lead to misleading results.
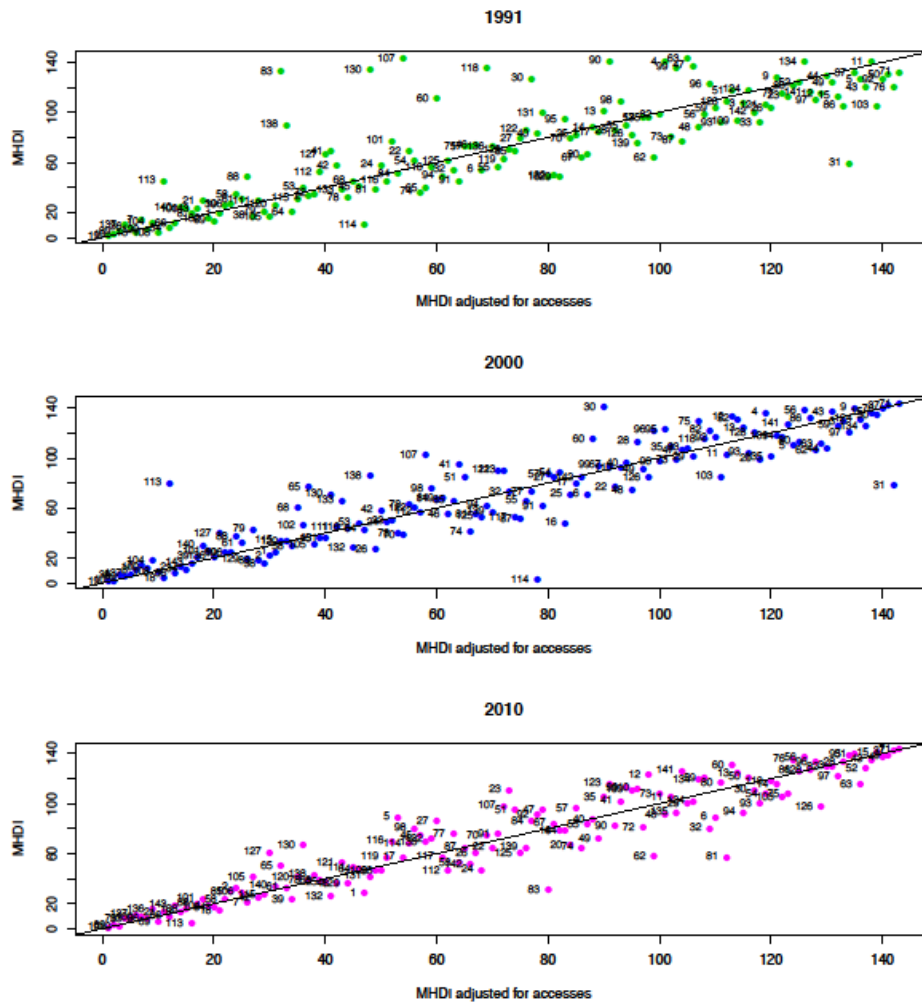
Figure 1. Comparing the rankings obtained with the MHDI and the adjusted MHDI
Source: Personal elaboration from UNDP, FJP, IPEA, 2013

Evidence from the micro-region of Tucuruí
The focus on the micro-region of Tucuruí, shown in the map in Figure 2, allows the observation of the socio-economic achievements of the area surrounding the biggest hydroelectric plant in Brazil in terms of production, that was built in 1984 (La Rovere and Mendes, 2000; Sudo, 2006). The relevance of this case study is even greater if we consider that the brand-new hydroelectric power plant of Belo Monte, which was built in 2016, is likely to reproduce the same development pattern (Fearnside, 2001; Pinto, 2012).

In fact, if the enormous amount of water in the surroundings of Tucuruí allows the production of the electricity that supports the economic growth of the whole country, the 12 municipalities belonging to this area show a particularly low level of human development compared to the rest of the State, especially if this is measured by taking into account the accesses. In fact, looking in particular at 1991, which out of the three census year is the most critical from the point of view of accesses, we find that the maximum value of the adjusted MHDI in the micro-region of Tucuruí is less than half the corresponding value for the whole of Pará; interestingly, the same is not perceived by the standard MHDI, that in 1991 in the micro-region of Tucuruí is only slightly lower than the corresponding value for Pará.
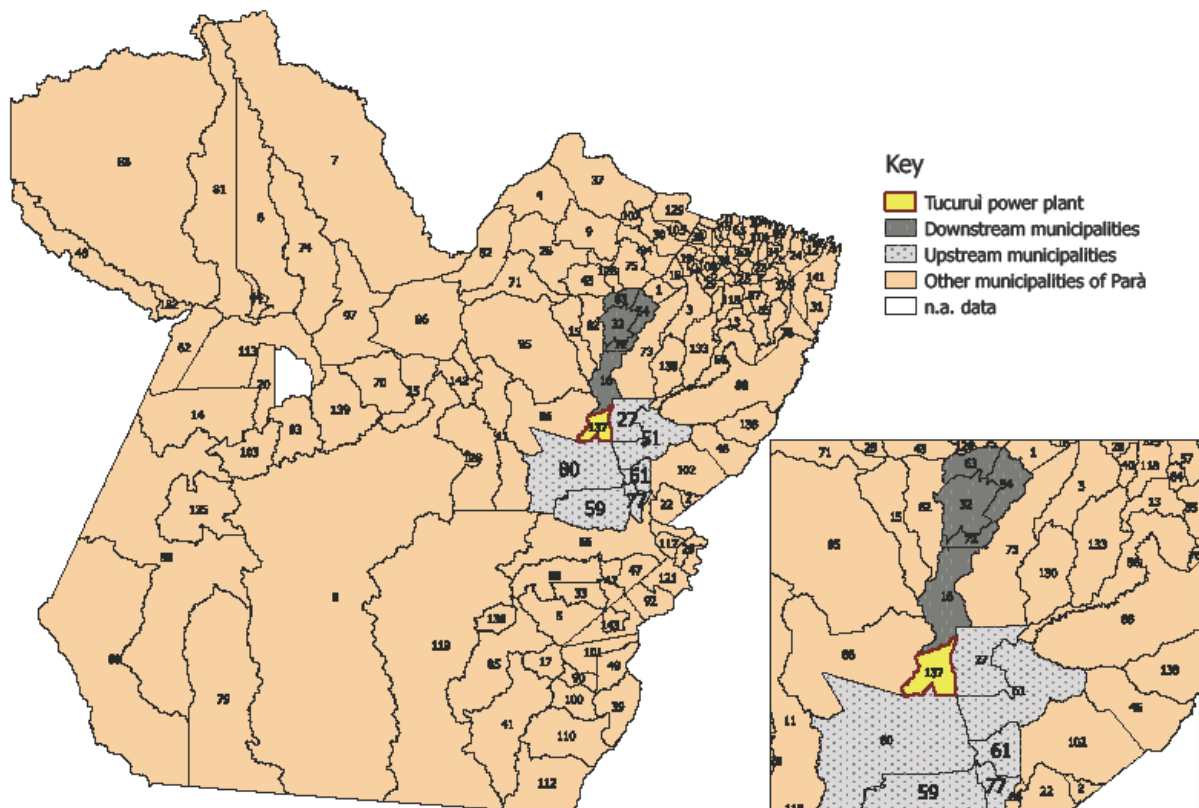
Figure 2. Contiguity map of Pará
Source: Personal elaboration from IBGE, 2017

It is also important to notice that in general, according to the literature, the social and environmental impacts of a hydroelectric power plant reach the municipalities both upstream and downstream the dam, with those located downstream suffering the most (Manyari & de Carvalho, 2007; Richter et al., 2010). This point is confirmed by the analysis of the adjusted MHDI in micro-region of Tucuruí. In fact, looking at the five municipalities located downstream[§], we find that only Baião was able to improve its adjusted MHDI in both decades (1991-2000 and 2000-2010), while Cametá showed an improvement only in the second one. Instead, looking at the six

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[§] Baião, Cametá, Igarapé-Miri, Limoeiro do Ajurú, Mocajuba.

municipalities located upstream[**], in both decades we find that half of them improved their adjusted MHDI. It is also worth mentioning that Tucuruí itself in both decades was not able to improve its adjusted MHDI.

The analysis of the performance of the municipalities situated upstream and downstream the dam can also be strengthen by taking into account other aspects of human development that neither the standard MHDI or the adjusted MHDI consider. One example is inequality, that is typically measured by the Gini index. In fact, it is interesting to note that during the entire reference period, the value of the Gini index for the municipalities in the Tucuruí area was between 0.44 (in 1991) and 0.62 (in 2010), so that none of them achieved an *efficient inequality range* (Cornia & Court, 2001). In particular, looking at both the adjusted MHDI and the municipal Gini index, we find that in the first decade (1991-2000) there are no municipalities that were able to reduce the level of inequality, while four municipalities (Breu Branco, Goianésia do Pará, Nova Ipixuna, Baião) were capable of improving at least their adjusted MHDI, with only Baião being downstream. The remaining municipalities, that had a bad performance from the point of view of both dimensions, are equally divided between upstream and downstream. The second decade (2000-2010) shows an overall improvement, in that we find three municipalities (Breu Branco, Novo Repartimento, Baião) that over time achieved a gain in both dimensions, two of which are upstream. We also find four municipalities (Igarapé-Miri, Limoeiro do Ajuru, Mocajuba, Tucuruí) that had a bad performance from the point of view of both dimensions, three of which are downstream. Of the remaining municipalities, with the sole improvement of access conditions or inequality, one is downstream and four are upstream.

Thus, in spite of the improvements registered in the second decade, the joint analysis of the adjusted MHDI and the Gini index of inequality seem to confirm previous insights: the municipalities located downstream the dam end up suffering more from the impacts of hydropower than those upstream.

4. Discussion and conclusions

As pointed out in the Introduction, aim of the present work was to investigate the existence of a 'development-access' nexus. Our analysis shows that accesses are indeed important for economic development. In fact, the case of Pará, in the Brazilian Amazon, reveal that the accesses to water and electricity are not widespread, so that it is necessary to adjust the standard MHDI in order to get a more suitable and comprehensive measure of human development. This has been attempted in Section 3 through the use of a Principal Component Analysis.

The analysis of the micro-region of Tucuruí, in particular, that highlighted the strong spatial correlation between accesses and human development, suggests further investigating this relationship within a spatial regression model. This will be object of future research.

Focusing specifically on the issue of access to energy, it is worth recalling the taxonomy proposed by Magnani & Vaona (2016), who draw attention to the *energy justice* problem, which is threefold in terms of distribution, procedure and reconnaissance. First of all, there is no *distribution justice* if there is no proper sharing of costs and benefits deriving from the application of technologies for energy production, which mainly represents the opportunity cost for the use of water. This is for example the case of the displacement of people due to the diversion of the river, or the case of the depletion of the local biodiversity, in addition to the inadequate compensation allocated to compensate losses in traditional economic activities (Caravaggio et al., 2017). Secondly, there is no *procedural justice* (which requires the use of fair and transparent decision-making procedures for the sake of the inclusion of all possible stakeholders) whenever indigenous reserves or protected areas are directly or indirectly involved by the unilateral decision that is neither shared nor duly discussed (Herrera, 2019). Finally, there is no *recognition justice* when the heterogeneity of the needs of the beneficiaries is

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[**] Breu Branco, Goianêsia do Pará, Itupiranga, Jacundá, Nova Ipixuna and Novo Repartimento.

not recognized neither taken into account, as in the case of lack of rural electrification (Van Els et al., 2012). According to Fearnside (1999), in the process of building the Tucuruí power plant, that is the main hydroelectric plant in the State, all the above described injustices occurred. It follows that policies aiming at increasing human development in this area should be oriented towards restoring energy justice, bearing in mind that allocating a valuable asset such as water for energy purposes can have a very high opportunity cost, especially in the presence of huge infrastructures. Measures such as adapting compensation to the real needs arising from social and environmental changes or limiting the increase in the cost of energy for end users may be useful to re-establish a *distribution justice* (ABRADEE, 2018). Otherwise, the enlargement of the low-voltage electrical network, i.e. the one linked to domestic consumption, is pivotal to boost development in rural areas, especially when these surround large power plants as in the micro-region of Tucuruí. This kind of intervention could re-establish *recognition justice*, making rural electrification an effective driver of development (ONS, 2020). Finally, from the point of view of *procedural justice*, adopting a participatory process rather than a top-down approach could enhance both the economic and the human development of areas like Pará. Hence the pivotal role of education in human development processes, that arise both from our results and from those of Barufi et al. (2012). In fact, education it is not important just for human capital accumulation, but it can also have a role in terms of boosting the participatory approach within a *capacity building* framework (James, 2017).

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OIL PRICE AND STOCK RETURNS IN EUROPE [*]

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Abstract. In this paper we examine the relationship between oil price changes and of European oil and gas companies. We use all the widely known equilibrium models and extend them with the oil price factor as well. We classify the companies according to their location into Western European (WE), Central and Eastern European (CEE) and South Eastern European region (SE). Our results show that oil is a significant factor for most of the Western European, but less than the half of the CEE and SE companies. These results suggest that Western European oil and gas companies have high exposure to oil price changes, while the returns of their CEE and SE counterparts are less influenced by the oil price. When we incorporate oil price changes the explaining power of the models increases substantially for Western European companies but we can detect only a slight change for CEE and South Eastern European oil and gas companies. We also detect regional differences in the sign of the HML factor, which is usually negative for Western European and positive for CEE and South Eastern European companies.

Keywords: asset pricing; oil price; regional differences

1 Introduction

The relationship between oil price changes and stock returns has been investigated thoroughly (e.g., Chen, Roll and Ross 1986, Basher and Sadorsky 2006, Nandha and Hammoudeh 2007, Fang and You 2014; Masood et al., 2019; Šubová et al., 2021). The results were highly dependent on countries, regions, industries and even periods

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examined. Aloui et al. (2013) show positive (however varying) dependence between oil price changes and returns of Central and Eastern European stock market indexes. Asteriou and Bashmakova (2013) find that the reaction of CEE stock returns to oil price changes is more significant when oil prices are low. Articles examining stock returns on sectoral level find that oil and gas industry of Australia (Faff and Brailsford, 1999), Canada (Boyer and Filion, 2007), Europe (Arouri and Nguyen, 2010; Mura et al., 2015) and the UK (El-Sharif et al., 2005) has all significant sensitivity to oil price changes. Nandha and Faff (2008) detect a negative impact of oil price increases on returns for all of the examined 35 global sectors except mining, and oil and gas industries. Ramos and Veiga (2011) show that oil price has a positive impact on global oil and gas industry returns, however oil price is a more important factor in developed countries than in emerging markets. Nandha and Brooks (2009) also document substantial differences in the role of oil price changes in determining transport sector returns between developed and emerging countries. Oberndorfer (2009) shows that oil price changes positively related to returns of oil and gas stock returns in the Eurozone. Mohanty et al. (2010) find no significant relation between oil prices and returns of CEE oil and gas companies. Narayan and Sharma (2011) report positive relation between oil price changes and returns of US energy and transportation companies.

We examine the effects of oil price changes on returns of shares of European oil and gas companies. We use the constituents of EUROPE-DS Integrated Oil & Gas and EMERGING EUROPE-DS Integrated Oil & Gas indexes, provided by Reuters. We use monthly total returns measured in US dollars for the period January 2002 and April 2022. For the oil price changes we use the total return of Crude Oil-WTI Spot Cushing measured in US dollars.

2 Methodology and Data

We apply different equilibrium models to capture the excess returns of the examined shares and to calculate the explanatory power of the different models. We run ordinary least squares regressions with different set of explanatory variables.

The first equilibrium model we use is the standard Capital Asset Pricing Model (CAPM) proposed by Sharpe (1964), Treynor (1961), Lintner (1965), and Mossin (1966), and is in the following form, where r_i represents the return of the index; α represents the constant term of the regression, i.e., the abnormal return; represents β a relevant risk parameter that is estimated as the independent variable of the regression; r_M represents the market return; and ε represents the error term of the regression:

$$r_i = \alpha + \beta r_M + \varepsilon \tag{1}$$

The second equilibrium model is the Fama and French (1992, 1993, 1996) three-factor model. The authors extend the explanatory variable using the *SMB* (small minus big) and *HML* (high minus low) factors respectively, to capture the size premium and the value over growth premium. The model is written as follows, where the β variables represent the regression coefficients and r_M, *SMB* and *HML* are the market, size, and value premiums, respectively:

$$r_i = \alpha + \beta_M r_M + \beta_{SMB} SMB + \beta_{HML} HML + \varepsilon \tag{2}$$

Carhart (1997) extends the three-factor model using a momentum (MOM) parameter that measures the tendency for the share price to continue increasing if it was previously increasing and its tendency to continue decreasing if it was previously decreasing. Therefore, the model can be written in the following form, where β_{MOM} captures the excess return gained by the persistency of the previous month's return and *MOM* stands for the momentum factor:

$$r_i = \alpha + \beta_M r_M + \beta_{SMB} SMB + \beta_{HML} HML + \beta_{MOM} MOM + \varepsilon \tag{3}$$

Pastor and Stambaugh (2003) used liquidity measure as a new factor and extended the model used by Carhart (1997) using market, size, value and momentum factors:

$$r_i = \alpha + \beta_M r_M + \beta_{SMB} SMB + \beta_{HML} HML + \beta_{MOM} MOM + \beta_{LIQ} LIQ + \varepsilon \qquad (4)$$

We also use Fama and French (2015) five-factor model, they extend their three-factor model with profitability (robust minus weak) and investment style (conservative minus aggressive) factors.

We extend all aforementioned capital market equilibrium models by the oil price factor.

We use monthly total return data (in USD) of the examined shares for the period January 2002 and April 2022. The descriptive statistics of the monthly returns are summarized in Table 1.

The oil price is represented by the WTI USD per barrel price (from Reuters). The market, size, value, profitability, investment style and momentum factors are the European factors from Kenneth R. French's data library while as the liquidity factor we use traded liquidity from the website of Pastor Stambaugh.

3 Results

We run the equilibrium linear regression models for the monthly returns of the sample period of January 2002 and April 2022. We use different equilibrium models extended by the oil factor. We divide the examined companies into three different geographic regions: Western (or developed) Europe (Austria, Finland, France, Italy, Norway, Portugal, Spain, United Kingdom); South-East Europe (Cyprus, Greece and Turkey) and Central and Eastern Europe (Croatia, Hungary, Poland, Romania, Slovenia).

If we use CAPM the average determination coefficient (adjusted R^2) for Western European companies is 0.3876, for CEE companies 0.3425 and for South-East European companies 0.2919, while the market factor is significant for all the shares except one company from Turkey. If we extend the standard CAPM by the oil factor we receive average adjusted R^2 s of 0.4358, 0.3506 and 0.2940 respectively, while the oil factor is significant for 9 (out of 11) Western European, for 3 (out of 8) CEE and 2 (out of 5) SE companies.

Table 1. R^2 in Western Europe

MARKET	United Kingdom	Italy	Norway	France	Austria	Spain	France	Finland	United Kingdom	Italy	Portugal
Company	BP	ENI	EQUINOR	ESSO	OMV	REPSOL	TOTAL	NESTE	SHELL	SARAS	GALP
CAPM	0.3685	0.5207	0.3935	0.2418	0.4413	0.4862	0.5102	0.3564	0.4038	0.2300	0.3413
CAPM+Oil	0.4254	0.5916	0.5166	0.2804	0.5152	0.5279	0.5564	0.3573	0.4665	0.2305	0.3827
FF-3	0.4192	0.5964	0.4217	0.3396	0.4700	0.5896	0.5685	0.3634	0.4750	0.2584	0.3756
Carhart	0.4238	0.5997	0.4378	0.3412	0.4743	0.5897	0.5756	0.3673	0.4795	0.2596	0.3858
FF-3+Oil	0.4752	0.6575	0.5218	0.3521	0.5245	0.6173	0.6191	0.3638	0.5370	0.2585	0.4048
FF-5	0.4630	0.6311	0.4515	0.3436	0.4977	0.5946	0.5985	0.3693	0.5234	0.2617	0.3760
FF-5+Oil	0.5023	0.6783	0.5322	0.3534	0.5368	0.6185	0.6374	0.3705	0.5729	0.2619	0.4053
Allfactors+Oil	0.5241	0.6920	0.6017	0.4051	0.5725	0.6344	0.6571	0.3835	0.6238	0.3082	0.4448

Table 2. R^2 in Central and Eastern Europe

MARKET	Hungary	Romania OMV	Slovenia	Poland	Romania ROMPETROL	Poland	Poland POLISH O&G	Croatia
Company	MOL	PETROM	PETROL	ORLEN		LOTOS		INA
CAPM	0.4640	0.3484	0.2932	0.4175	0.2792	0.4084	0.3046	0.2492
CAPM+Oil	0.4833	0.3751	0.3277	0.4177	0.2793	0.4099	0.3046	0.2556
FF-3	0.4986	0.3855	0.3509	0.4354	0.3439	0.4161	0.3061	0.2760
Carhart	0.5023	0.3915	0.3629	0.4361	0.3442	0.4162	0.3099	0.2764
FF-3+Oil	0.5076	0.3987	0.3663	0.4354	0.3469	0.4170	0.3061	0.2783
FF-5	0.5138	0.4280	0.3679	0.4476	0.3589	0.4247	0.3105	0.2869
FF-5+Oil	0.5181	0.4321	0.3776	0.4486	0.3623	0.4249	0.3105	0.2908
All factors+Oil	0.5363	0.4466	0.3849	0.4557	0.3691	0.4358	0.3384	0.2959

Table 3. R^2 in South-East Europe

MARKET	Greece	Turkey	Greece	Cyprus	Turkey
Company	HELLENIC	KOC	MOTOR OIL	PETROLINA	TUPRAS
CAPM	0.3191	0.2563	0.4283	0.2255	0.2450
CAPM+Oil	0.3230	0.2571	0.4355	0.2348	0.2489
FF-3	0.3429	0.2623	0.4712	0.2476	0.2568
Carhart	0.3472	0.2735	0.4737	0.2478	0.2706
FF-3+Oil	0.3434	0.2627	0.4722	0.2507	0.2588
FF-5	0.3446	0.2735	0.4715	0.2536	0.2658
FF-5+Oil	0.3450	0.2735	0.4723	0.2575	0.2691
All factors+Oil	0.3481	0.2998	0.4804	0.2645	0.3001

Table 4. Average R^2 in three Regions

MARKET	WE	CEE	SEE
CAPM	0.3903	0.3456	0.2948
CAPM+Oil	0.4410	0.3567	0.2999
FF-3	0.4434	0.3766	0.3162
Carhart	0.4486	0.3799	0.3225
FF-3+Oil	0.4847	0.3820	0.3176
FF-5	0.4646	0.3923	0.3218
FF-5+Oil	0.4972	0.3956	0.3235
All factors+Oil	0.5316	0.4078	0.3386

The average determination coefficients of the Fama-French 3 factor model are 0.4357, 0.3678 and 0.3076 for Western European, CEE and SE shares, when we involve the oil price change as well we receive 0.4751, 0.3703 and 0.3061 average adjusted R^2s respectively. In the latter case oil factor is significant for 9 (out of 11) Western European, for 3 (out of 8) CEE and 0 SE shares (see Table 1, 2, 3, 4). So, the return of oil price is relevant for most of the Western European companies, while the return of shares of CEE and SE oil companies is not sensitive to oil price.

In FF3+oil model market is a significant factor for 11 Western, 8 CEE and 4 SE European companies. SMB factor is significant for 6 WE, 4 CEE and 2 SE companies, it is significantly positive for only 1 WE and 4 CEE and 2 SE companies. HML is a significant factor for 9 WE, 2 CEE and 3 SE companies, and it is positive in all the aforementioned cases.

The average determination coefficients of Fama-French 5 factor model are 0.4520, 0.3778 and 0.3075, when the oil factor is taken into consideration the average adjusted R^2s are 0.4830, 0.3783 and 0.3063 for Western, CEE and SE companies. Oil is a significant factor for 9 Western European, 2 CEE and 0 SE oil companies.

In FF5+oil model SMB factor is significant for 6 WE (for 5 of them negatively), 4 CEE and 2 SE companies (all positively). HML factor is significant for 8 WE, 4 CEE and 1 SE, while RMW factor is significant for 6 WE, 4 CEE and 0 SE companies. Both HML and RMW factors are positively significant in all the previous cases. CMA factor is significant only for 3 Western European and 2 CEE companies, and it is not significant for any SE companies, but while in case of WE companies it is positively for CEE companies it is negatively significant.

The average adjusted R^2s of the model that involves market, size, value, profitability, investment style, momentum and liquidity factors and the oil factor as well are 0.5123 for Western European, 0.3831 for CEE and 0.3144 for South Eastern European companies. In this setting oil factor is significant for 8 out of 11 Western European oil companies and none CEE and SE companies.

Market factor is significant and positive for all but one (SE, Turkey) companies.
SMB factor is significant for 6 Western European, 3 CEE and 2 SE companies, but while for most of the cases (5 out of 6) it is significantly negative for Western European companies it is significantly positive for all 3 CEE and 2 SE companies. HML factor is significant for 8 Western European, 4 CEE and 1 SE companies and all in these cases it is significantly positive (see Table 5,6,7).

Table 5. Parameter Estimation for Western European Oil Companies in Different Model Settings

Market Company	United Kingdom BP	Italy ENI	Norway EQUINOR	France ESSO	Austria OMV	Spain REPSOL	France TOTAL	Finland NESTE	United Kingdom SHELL	Italy SARAS	Portugal GALP
□	-0.3292	-0.0527	0.4543	-0.5852	0.2122	-0.3767	0.0297	0.5241	-0.0547	-1.3868*	0.0540
Mkt-RF	0.8758***	0.9524***	0.9993***	0.9493***	1.2688***	1.1662***	0.8909***	1.1512***	0.8307***	1.0406***	1.0755***
□	-0.3392	-0.0629	0.4381	-0.5962	0.1971	-0.3867	0.0219	0.5336	0.0115	-1.3766*	0.1002
Mkt-RF	0.7052***	0.7782***	0.7225***	0.7615***	1.0116***	0.9971***	0.7581***	1.1150***	0.6260***	1.0086***	0.8399***
WTI	0.1764***	0.1800***	0.2863***	0.1942***	0.2659***	0.1749***	0.1373***	0.0306	0.1734***	0.0274	0.1996***
□	-0.2265	0.0114	0.3116	-0.8927	0.0444	-0.3290	0.1636	0.4292	0.1694	-1.2669*	0.1908
Mkt-RF	0.7481***	0.8024***	0.9234***	0.7704***	1.1747***	0.9416***	0.7830***	1.1749***	0.6889***	0.8728***	0.9135***
SMB	-0.3808*	-0.2423	0.5133**	1.1049***	0.6033**	-0.1875	-0.4928***	0.4127	-0.3785*	0.5753	0.4216
HML	0.6782***	0.8006***	0.4174**	0.9822***	0.5169**	1.2030***	0.5701***	-0.1643	0.7084***	0.7186**	0.7094***
□	-0.3776	-0.1058	-0.0007	-0.7738	-0.1511	-0.3009	0.0006	0.2604	0.0522	-1.1697	0.4260
Mkt-RF	0.7902***	0.8351***	1.0104***	0.7373***	1.2291***	0.9337***	0.8283***	1.2107***	0.7149***	0.8472***	0.8512***
SMB	-0.4204**	-0.2730*	0.4315*	1.1360***	0.5521**	-0.1802	-0.5354***	0.4158	-0.3758*	0.5655	0.3958
HML	0.7504***	0.8566***	0.5668***	0.9254***	0.6104***	1.1896***	0.6480***	-0.0227	0.8129***	0.6247*	0.4806*
WML	0.1547	0.1201	0.3198***	-0.1217	0.2001	-0.0288	0.1669**	0.2133	0.1554	-0.1392	-0.3377*
□	-0.1695	0.0659	0.3957	-0.8566	0.1188	-0.2825	0.2104	0.4370	0.2444	-1.2726*	0.2320
Mkt-RF	0.5937***	0.6549***	0.6956***	0.6728***	0.9730***	0.8156***	0.6561***	1.1525***	0.5065***	0.8886***	0.7363***
SMB	-0.6240***	-0.4747***	0.1544	0.9512***	0.2857	-0.3859**	-0.6926***	0.3866	-0.5924***	0.5942	0.2096
HML	0.5516***	0.6796***	0.2305	0.9022***	0.3515*	1.0998***	0.4661***	-0.1768	0.6093***	0.7277**	0.6058**
WTI	0.1831***	0.1750***	0.2702***	0.1157**	0.2392***	0.1494***	0.1504***	0.0218	0.1776***	-0.0156	0.1729***
□	-0.7612*	-0.4275	-0.1478	-1.0288*	-0.3406	-0.5286	-0.2222	0.6999	-0.3201	-1.4158*	0.1774
Mkt-RF	0.8443***	0.8931***	0.9748***	0.7533***	1.1438***	0.9641***	0.8640***	1.1698***	0.7916***	0.9526***	0.8901***
SMB	-0.4655**	-0.2963*	0.3993*	1.0286***	0.4104	-0.2367	-0.5384***	0.3484	-0.1614	0.6860	0.4009
HML	1.0972***	1.0874***	0.9296***	1.2913***	1.3061***	1.4243***	0.8153***	-0.5187	1.0136***	0.6124	0.8190*
RMW	1.3017***	1.0340***	1.2106***	0.4541	1.2325	0.5252*	0.9046***	-0.8304	1.3395	0.2781	0.0948
CMA	0.2760	0.3326	-0.0451	-0.3049	-0.7054*	-0.0173	0.3049	-0.1078	0.8663***	0.6078	-0.1644
□	-0.6078	-0.2739	0.0949	-0.9262	-0.1382	-0.3901	-0.0904	0.7335	-0.1636	-1.4324*	0.3158
Mkt-RF	0.7120***	0.7606***	0.7655***	0.6648***	0.9692***	0.8446***	0.7503***	1.1332***	0.6307***	0.9704***	0.7186***
SMB	-0.6332***	-0.4643***	0.1340	0.9164***	0.1891	-0.3882*	-0.6826***	0.3010	-0.3712*	0.7095	0.1731
HML	0.8075***	0.7970***	0.4712*	1.0975***	0.9237***	1.1626***	0.5662***	-0.5724	0.7826***	0.6401	0.5511
RMW	0.9889***	0.7206***	0.7157**	0.2449	0.8198**	0.2427	0.6357***	-0.8961	1.0526***	0.3099	-0.2130
CMA	0.4050	0.4620**	0.1592	-0.2186	-0.5351	0.0994	0.4159*	-0.1048	0.8762***	0.6032	-0.1232
WTI	0.1587***	0.1590***	0.2511***	0.1062*	0.2095***	0.1434***	0.1365***	0.0368	0.1613***	-0.0185	0.1761***
□	-0.8328**	-0.3790	-0.4193	-1.2632**	-0.3321	-0.3729	-0.2308	0.8560	-0.4475	-1.5517*	0.5155
Mkt-RF	0.7868***	0.7888***	0.8621***	0.7249***	1.0093***	0.8950***	0.8153***	1.0823***	0.7460***	1.0618***	0.7725***
SMB	-0.6565***	-0.4641***	0.0222	1.1095***	0.1241	-0.3996**	-0.6734***	0.1245	-0.4583**	0.4800	0.0774
HML	0.7219***	0.6985***	0.4730*	0.7364**	0.8398***	1.1015***	0.4865**	-0.0706	0.6496**	0.1679	-0.3859
RMW	1.3409***	0.8459***	0.7982**	0.6592	0.9563**	0.5542*	0.8300***	-0.5531	1.2639***	0.6625	-0.2223
CMA	0.5804*	0.5819**	0.1935	0.0730	-0.4019	0.0660	0.4312*	-0.2031	1.2204***	1.1921	0.5208
WTI	0.1170***	0.1384***	0.2044***	0.0322	0.1566***	0.1345***	0.1067***	0.0016	0.0842**	-0.0812	0.1694***
WML	-0.0578	-0.0488	0.1661	-0.2696*	0.0832	-0.1150	0.0106	0.1443	-0.0134	-0.3304	-0.5413**
LIQ	0.1734	0.1335	0.3186***	0.3318**	0.4145***	-0.1037	0.1127	0.2407	0.3955***	0.3743	0.2049

Table 6. Parameter Estimation for Central and Eastern European Oil Companies in Different Model Settings

Market	Hungary	Romania OMV PETROM	Slovenia PETROL	Poland ORLEN	Romania ROMPETROL	Poland LOTOS	Poland POLISH O&G	Croatia INA
Company	**MOL**	**M**	**L**	**ORLEN**	**L**	**LOTOS**	**H O&G**	**INA**
α	-0.0917	0.2923	0.5315	-0.0815	-1.0386	-0.5722	-0.1593	-0.1805 **
Mkt-RF	1.3239 ***	1.3885 ***	0.7743 ***	1.3066 ***	1.1476 ***	1.6403 ***	0.9801 ***	0.8663 *
α	-0.0995	0.2812	0.5237	-0.0824	-1.0411	-0.5526	-0.1607	-0.1650 **
Mkt-RF	1.1905 ***	1.1981 ***	0.6427 ***	1.2916 ***	1.1592 ***	1.5772 ***	0.9842 ***	0.7792 *
WTI	0.1380 ***	0.1968 ***	0.1361 ***	0.0155	-0.0101	0.0534	-0.0035	0.0736
α	-0.2147	-0.0471	0.2758	-0.0559	-1.3405 **	-0.4570	-0.1764	-0.2922 **
Mkt-RF	1.1930 ***	1.3505 ***	0.7422 ***	1.1936 ***	1.1317 ***	1.5308 ***	1.0116 ***	0.8527 *
SMB	0.4383 *	1.2297 ***	0.9262 ***	-0.1002	1.6233 ***	0.0258	-0.1082	0.8585 **
HML	0.7118 ***	0.2280	0.1903	0.6050 ***	-0.1514	0.5048	-0.1324	-0.0174
α	-0.3986	-0.3272	0.0344	-0.1364	-1.2870 *	-0.4810	-0.3225	-0.3328 **
Mkt-RF	1.2442 ***	1.4284 ***	0.8094 ***	1.2160 ***	1.1213 ***	1.5360 ***	1.0449 ***	0.8640 *
SMB	0.3902	1.1564 ***	0.8630 ***	-0.1213	1.6236 ***	0.0263	-0.1028	0.8638 **
HML	0.7998 ***	0.3619	0.3058 *	0.6435 ***	-0.1935	0.5259	-0.0018	0.0237
WML	0.1883	0.2868	0.2471 **	0.0825	-0.0642	0.0314	0.1952	0.0606
α	-0.1839	-0.0020	0.3053	-0.0571	-1.3611 **	-0.4403	-0.1746	-0.2831 **
Mkt-RF	1.1096 ***	1.2284 ***	0.6622 ***	1.1969 ***	1.1946 ***	1.4891 ***	1.0071 ***	0.8057 *
SMB	0.3070	1.0375 ***	0.8002 ***	-0.0950	1.6966 ***	-0.0232	-0.1133	0.8020 **
HML	0.6435 ***	0.1279	0.1247	0.6078 ***	-0.1141	0.4821	-0.1349	-0.0449
WTI	0.0989 **	0.1448 **	0.0949 **	-0.0040	-0.0636	0.0406	0.0044	0.0457
α	-0.5147	-0.6608	-0.0530	-0.3056	-1.1344 *	-0.7112	-0.2809	0.0536 **
Mkt-RF	1.1746 ***	1.3163 ***	0.7992 ***	1.1631 ***	0.9620 ***	1.4167 ***	1.0891 ***	0.7957 *
SMB	0.2954	0.9421 ***	0.8714 ***	-0.2392	1.4039 ***	-0.0324	-0.0030	0.7245 **
HML	1.2993 ***	1.4125 ***	0.4582 *	1.1681 ***	0.1907	1.2778 **	-0.2728	-0.2528
RMW	0.9438 **	1.9203 ***	0.8066 **	0.8305 *	-0.3404	1.0105	0.1784	-0.8984
CMA	-0.4987	-0.9879 *	0.1507	-0.5523	-1.3132 **	-0.7487	0.5824	-0.4872
α	-0.4464	-0.5800	0.0226	-0.3410	-1.1953 *	-0.6889	-0.2783	0.0989 **
Mkt-RF	1.1157 ***	1.2467 ***	0.7340 ***	1.1936 ***	1.0242 ***	1.3935 ***	1.0864 ***	0.7363 *
SMB	0.2208	0.8538 **	0.7887 ***	-0.2005	1.4844 ***	-0.0626	-0.0065	0.6455 *
HML	1.1704 ***	1.2599 ***	0.3154	1.2349 ***	0.3020	1.2445 **	-0.2768	-0.3456
RMW	0.8046 **	1.7557 ***	0.6524 *	0.9026 **	-0.2158	0.9692	0.1735	-1.0044
CMA	-0.4412	-0.9200 *	0.2144	-0.5821	-1.3452 **	-0.7472	0.5827	-0.4721
WTI	0.0706	0.0836	0.0783 *	-0.0366	-0.0684	0.0232	0.0028	0.0608
α	-0.6074	-0.7998	-0.2482	-0.3822	-1.3738 *	-0.8346	-0.4445	-0.0168 **
Mkt-RF	1.1935 ***	1.3020 ***	0.7621 ***	1.1948 ***	1.0715 ***	1.3451 ***	1.0562 ***	0.7687 *
SMB	0.2237	0.7839 **	0.7663 ***	-0.2805	1.5409 ***	-0.0456	-0.0011	0.6063
HML	1.2441 ***	1.5432 ***	0.2977	1.4001 ***	0.3622	2.0227 ***	0.4452	-0.3838
RMW	0.9343 **	1.8593 ***	0.5519	1.0593 **	-0.2059	1.4779 *	0.6066	-1.1158
CMA	-0.6240	-1.2737 **	0.2171	-0.7636	-1.7619 **	-1.4693 *	-0.2083	-0.3657
WTI	0.0511	0.0457	0.0560	-0.0615	-0.0861	0.0398	0.0358	0.0477
WML	0.1217	0.2209	0.1405	0.0403	0.1250	0.2181	0.2415	0.0945
LIQ	-0.0001	0.1011	0.1442	0.0047	-0.0651	-0.4270 *	-0.5021 ***	0.1586

Table 7. Parameter Estimation for South-Eastern European Oil Companies in Different Model Settings

Market	Greece	Turkey	Greece MOTOR	Cyprus	Turkey
Company	HELLENIC	KOC	OIL	PETROLINA	TUPRAS
□	-0.1956	-0.3913	-0.0291	0.4542	0.1354
Mkt-RF	1.0877 ***	1.2935	1.3066 ***	0.8058 ***	1.1560 ***
□	-0.1991	-0.3933	-0.0341	0.4494	0.1312
Mkt-RF	1.0278 ***	1.2583	1.2223 ***	0.7250 ***	1.0840 ***
WTI	0.0620	0.0364	0.0872 *	0.0836 *	0.0744
□	-0.3127	-0.3589	-0.1892	0.2728	0.1265
Mkt-RF	0.9852 ***	1.2121	1.1628 ***	0.7724 ***	1.0503 ***
SMB	0.4184	-0.1227	0.5720 **	0.6564 **	0.0256
HML	0.5587 **	0.4347	0.7835 ***	0.1923	0.5679 *
□	-0.5069	0.0594	-0.3435	0.3054	0.5487
Mkt-RF	1.0393 ***	1.0957	1.2057 ***	0.7633 ***	0.9328 ***
SMB	0.3675	-0.0132	0.5316 **	0.6650 **	0.1362
HML	0.6516 ***	0.2347	0.8573 ***	0.1766	0.3660
WML	0.1989	-0.4283	0.1580	-0.0335	-0.4323 **
□	-0.3055	-0.3504	-0.1788	0.2886	0.1439
Mkt-RF	0.9657 ***	1.1890	1.1345 ***	0.7296 ***	1.0032 ***
SMB	0.3876	-0.1591	0.5275 *	0.5891 **	-0.0487
HML	0.5427 **	0.4158	0.7603 ***	0.1572	0.5293 *
WTI	0.0232	0.0274	0.0335	0.0507	0.0559
□	-0.4290	-0.2798	-0.2199	0.4589	0.4855
Mkt-RF	1.0326 ***	1.0666	1.1559 ***	0.6940 ***	0.9293 ***
SMB	0.4349	-0.2833	0.5508 **	0.6267 **	0.0080
HML	0.5210	1.0122	0.8680 ***	0.2652	0.5616
RMW	0.2050	0.1948	0.1114	-0.3206	-0.7074
CMA	0.2989	-1.2266	-0.0962	-0.5018	-0.6952
□	-0.4078	-0.2712	-0.1897	0.5154	0.5568
Mkt-RF	1.0143 ***	1.0592	1.1298 ***	0.6453 ***	0.8678 ***
SMB	0.4117	-0.2926	0.5178 *	0.5650 **	-0.0699
HML	0.4810	0.9960	0.8109 **	0.1585	0.4269
RMW	0.1618	0.1773	0.0498	-0.4357	-0.8528
CMA	0.3167	-1.2194	-0.0707	-0.4542	-0.6352
WTI	0.0219	0.0089	0.0313	0.0584	0.0738
□	-0.5868	-0.0539	-0.2415	0.4378	0.7405
Mkt-RF	1.0635 ***	1.0639	1.1463 ***	0.6820 ***	0.8046 ***
SMB	0.3995	-0.2834	0.5347 *	0.5819 *	-0.0777
HML	0.5740	0.8668	0.9597 **	0.1464	0.3442
RMW	0.0537	0.8105	-0.1154	-0.4581	-0.2963
CMA	0.0519	-0.8517	-0.3394	-0.5233	-0.2790
WTI	0.0156	-0.0089	0.0335	0.0395	0.0135
WML	0.1834	-0.4233	0.1884	0.0637	-0.4273 *
LIQ	-0.0536	0.0487	-0.0470	0.0900	0.3938 *

RMW factor is significant (and positive) for 7 Western European, 4 CEE shares and it is not significant for any SE companies. CMA factor is significant for 4 Western and 3 Central Eastern European companies, but while it is significantly positive for all the former it is significantly negative for all the latter cases.

Momentum (WML) factor is significant only for 2 Western European and 1 SE companies, while traded liquidity is significant for 4 Western European, 2 CEE and 1 SE shares, and it is positive for all the 4 Western European and for the 1 SE companies it is negative for the 2 CEE companies.

4 Conclusions

The regression results for the standard CAPM-model and its extended version with the oil price factor show that for Western European oil and gas companies the explanatory power significantly increases when the oil price is taken into consideration, while for CEE and SE companies there is only a slight difference in the R^2s. Oil is a significant factor for most of the Western European, but less than the half of the CEE and SE companies. These results suggest that Western European oil and gas companies have high exposure to oil price changes, while the returns of their CEE and SE counterparts are less influenced by the oil price.

Other model settings give the same result, when we extend the equilibrium model with the oil price factor the average adjusted R2 increases substantially for Western European companies but we can detect only a slight change for CEE and South East European oil and gas companies,

Our results also show that HML factor influences differently the examined Western European oil and gas companies and their CEE and SE counterparts, for WE companies when it is significant it is usually negative, while for CEE and SE companies it is positive (in all the significant cases). We can not detect such differences for other factors.

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ANALYSIS OF FACTORS INFLUENCING CAR PURCHASES ON THE INTERNET BY AUTOMOTIVE CUSTOMERS IN GERMANY[*]

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Abstract. This research aims to investigate various factors influencing the decision of automotive customers in Germany to buy a car on the Internet. The empirical study conducted mainly examines the influence of multiple factors such as employment status, gender, desire for advice when buying a car, price sensitivity, previous online vehicle purchasing experience, familiarity with online vehicle platforms, the intensity of general online shopping and age of the respondents on the degree of online vehicle purchasing behaviour. The scientific literature has produced only a few concrete studies in this regard. It is still being determined which factors are decisive for customers to buy their car online. Online vehicle purchasing behaviour was approximated using a Likert scale. Over 250 participants were surveyed in this process. The results were analysed by contrasting each influencing factor with online vehicle buying behaviour as part of a simple linear regression model. The T-test was then used to test each hypothesis for significance. A multivariate linear regression model was then constructed and retested with the significant influencing factors obtained. This showed that employment status, desire for advice when buying a car, having already made an online vehicle purchase, knowledge of online vehicle platforms, and general online shopping are (highly) significant and, therefore, strongly influence the online purchase decision of automotive customers in Germany. Future research should focus on comparing the results of this study for Germany and other more digital countries.

Keywords: automotive industry; automotive retail; digital transformation; customer behavior

1. Introduction

The topic of online vehicle purchasing has become increasingly important in recent years. Yet the automotive industry is still considered a rather traditional sector and has always relied on an indirect sales channel via economically independent dealers. German automotive brands such as Audi, BMW, Mercedes-Benz and

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Volkswagen, in particular, are known for relying on an established dealer network. However, since the increase in digitalisation in all areas of life, it has become increasingly apparent that the automotive industry's business model needs some innovations anyway (Winkelhake, 2021). Above all, digitisation and connectivity must be incorporated into the car. Autonomous driving, shared mobility, and electromobility will continue to change the business model significantly anyway (Budde et al., 2020; Koroth et al., 2019). In the meantime, manufacturers have considerably expanded their digital offerings in cars.

Nevertheless, sales remain very traditional and are almost wholly separated between analogue and digital at initiating and concluding a purchase. Information and purchase initiation are now almost wholly online. On the other hand, the investment is almost entirely analogue when the purchase contract is signed at the retailer's premises. Customers buying behaviour, in particular, has changed fundamentally in recent years so that customers now expect a digital buying experience and the conclusion of the contract online (Bruhn & Hadwich, 2022a; Budde et al., 2020).

2. Theoretical background

The sale of vehicles is part of the automotive value chain and, in this context, is to be regarded as the part that ultimately covers the entire first areas of value creation since sales generate revenues. This insight already indicates the priority that is given to sales. Manufacturers and dealers have worked to sell as many vehicles as possible for years. In the context of the Corona pandemic and the worldwide shortage of microchips, this changed for the first time, focusing no longer on the pure number of vehicles sold and sales but profit margins. In the process, the pandemic also once again increased the utility value of the car. Overall, this shows that the car as a means of transport is still significant in practice, despite challenging political debates regarding new mobility concepts and the issue of sustainability (Bruhn & Hadwich, 2022a; Dispan, 2021).

In Winkelhake's opinion, the automotive industry is relatively slow and sluggish. The development cycles of new vehicle models are around 4-6 years. The car is becoming increasingly unimportant as a status symbol for young customers. In parallel, the increase in Internet use, particularly in online vehicle configurators and information procurement, is increasing among young customers (Dispan, 2021). Only now, the barriers to market entry have been very high for new competitors due to the high development costs of new vehicle models, complicated technology and costly maintenance. The homogenisation of vehicles and their technology, particularly in electromobility, reduces the complexity of the product and the after-sales challenges. At the same time, this simplification makes it easier for new competitors to enter the market. New competitors have the primary advantage of independent of established manufacturers' existing sales networks and channels. According to Dudenhöffer, indirect sales are one of the most expensive sales channels and account for around 10% of the price of new cars. According to Stenner's analysis, the costs of online vehicle sales are only around 3-4% of the purchase price (Stenner, 2015). The advantages of indirect sales are manageable and lie primarily in reducing purchase risks for the customer, handling the purchase and sale of vehicles, and handling warranties and workshop visits. Stirzel and di Nisio also confirm the customers' desire for risk minimisation in their work (Stirzel & Di Nisio, 2021). The first new sales models and usage models, such as car subscriptions or Tesla's direct sales, clearly show that a complex and expensive indirect sales network is no longer necessary and that vehicles can also be purchased digitally (Jannsen et al., 2019; Kim et al., 2021; Winkelhake, 2021). Incumbent manufacturers have switched to an agency model, especially for electric car sales, to reduce challenges for retailers (Dispan, 2021). If electromobility continues to grow, direct sales via manufacturers will also increase and become more critical. According to Winkelhake, it can also be assumed that new technologies will account for around 30% of total sales by 2030 (Winkelhake, 2021). According to Bartczak's study, any digital change in existing business models increases companies' competitiveness (Bartczak, 2022).

In their theses, Becker and Völsgen also address that all-around carefree packages are gaining importance, which is why actual vehicle ownership is also becoming increasingly unimportant. Ceranic et al. and Dudenhöffer and Paul also confirm this in their studies (Ceranic et al., 2018; Dudenhöfer & Paul, 2022). The declining desire for vehicle ownership is at odds with the advantages mentioned above of purchasing a vehicle through a car dealer, which reduces them and makes the role of the dealer less important (Binckebanck, 2011). Dudenhöffer and Paul, Winkelhake, Birk et al., Dudenhöffer, Birk et al., and Inampudi et al. all independently confirm that the number of dealers will continue to decline (Birk et al., 2020; Dudenhöfer & Paul, 2022; Inampudi et al., 2019; Jannsen et al., 2019; Winkelhake, 2021). According to the analysis by Dudenhöffer and Paul from 2022, it also shows that car subscriptions, in particular, can be a perfect transition solution from previous offline sales to digital online sales (Dudenhöfer & Paul, 2022). According to Reindl, these subscriptions also clarify that new car customers must be mobile and flexible (Reindl, 2017). Winkelhake and Dispan also confirm this growing trend toward flexibility in vehicle purchasing and see those cars must fit more with people's life needs (Dispan, 2021; Winkelhake, 2021).

Large Internet portals have so far conducted vehicle sales online as a referral to the dealer. However, the actual conclusion of the sales contract still takes place offline. In the last two years or so, and the wake of the Corona pandemic, manufacturers have established their own initial online sales channels through which customers can now purchase their vehicles almost entirely online. Dispan adds to this the aspect that manufacturers should also demonstrate system leadership (Dispan, 2021). In parallel, the pandemic has once again highlighted the utility of the car as an individual means of transport (Dudenhöfer & Paul, 2022). This contrasts with Reindl's 2016 findings that the vehicle will increasingly become part of multimodal mobility, or intermodal mobility, according to Ceranic et al., as a result of which customers will tend to become mobility customers, and the automobile will become part of this mobility mix (Ceranic et al., 2018; Reindl, 2017).

Concerning actual online vehicle purchases, Budde, Schmacke and Terstiege (2020) addressed the fact that digital purchasing is particularly relevant for younger customers and that they are the leading target group for this. Today's younger customers are the future car customers and therefore have a changed expectation of the vehicle purchasing process at its core. In this context, Bacher explains that the vehicle purchase should be as simple as buying a book (Bacher, 2020; Budde et al., 2020). According to Reindl, past studies have shown that the number of digital options, vehicle equipment and information available on the Internet has often overwhelmed customers, resulting in many inquiries. It is, therefore, necessary to also narrow down the model variety and quantity of equipment, as online advice is significantly less than in stationary car dealerships. This is independent of deciding on a vehicle purchase, leasing or a car subscription (Reindl, 2017). According to the study by Fau Dudenhöffer, however, it is also apparent that as customers' desire for advice increases, the discount on the Internet must increase to decide to buy a vehicle over the Internet. Enterprises encounter challenges related to new and modern consultation (Chen et al., 2022). Ms. Dudenhöffer's 2012 study analysed that a discount level of 8% is sufficient for customers switching to the Internet (Dudenhöffer, 2012). Dispan ads in his analysis that Internet platforms, in particular, also significantly increase transparency in vehicle purchasing. Bacher adds that pricing should be uniform across all channels (Bacher, 2020). According to Dispan, manufacturers' share of direct sales has intensified significantly in the past two years, with omnichannel sales also being essential (Dispan, 2021). In Becker's view, the growing importance of customer data should also be addressed in this context, with future revenues dependent on customer data (Becker, 2021). According to Bacher, customer data should first be obtained and used in the first place (Bacher, 2020).

Concerning the actual online purchasing behaviour of customers, there are already some studies on the basic assessment of customers wanting to buy their car online. The first studies and surveys on this are from 2012 to 2014. A study from 2014/2015 by the management consultancy Capgemini clarified that around 44% of customers are prepared to buy their car online in principle. The results were compared with a previous study from 2008/2009, where the proportion was just as high (Parment, 2016). Birk et al. also assume that the proportion of customers who want to buy their vehicles online will continue to rise in the coming years (Birk et al., 2020). The

current literature and science reflect that the willingness of customers to buy their cars online is there. However, there is still a predominant need for possible online purchasing options. Traditional stationary sales predominate, and manufacturers see dealers as an essential sales channel, especially concerning the high sales targets in pure unit numbers. As a result of the Corona pandemic and the shift, as mentioned above by manufacturers from sales targets to strongly profit-oriented corporate management, Internet sales are becoming much more of a focus, as the manufacturers themselves can then obtain customer data in particular, sales costs can be significantly reduced, and the manufacturers themselves can completely control pricing for vehicle sales (Berger & Rechenbach, 2015; Börjesson, 2021; Dudenhöfer & Paul, 2022; Inampudi et al., 2019). Therefore, the main objective of this research is to determine which factors are decisive for customers to buy their cars online.

Key factors for online car buying

According to scientific studies, customers' decision to buy their car online correlates with several factors. However, only one concrete study has analysed which factors are decisive for online vehicle purchases. This is the study by the author Dudenhöffer from 2010, which analysed which factors are decisive for the Internet purchase of a car. She published the results of the survey in both 2012 and 2014. The factors that emerged from this study and also from further findings in the course of the literature research for this thesis are those listed below, which will be further updated in the course of this research work (Dudenhöffer & Dudenhöffer, 2014; Dudenhöffer, 2012):

(1) Employment status: According to the findings, employment status is a decisive factor in whether customers would buy their car online or not. It can generally be assumed that people who decide to buy a car also usually work and have a corresponding income or otherwise have savings they can live off of (Dudenhöffer, 2012).

(2) Gender: According to the findings, men, in particular, are still intensely interested in an emotional vehicle buy. The factors of engine performance and image continue to play an important role. This study showed that women take a much more rational view of cars than men. More than half of men are therefore prepared to spend more money on a vehicle with an extremely high image, whereas this figure is only around 40% for women. This shows that gender does make a difference when it comes to buying a car. (Bratzel, 2014). Nevertheless, Dudenhöffer's study concludes that men are more likely to migrate to the Internet than women, as women generally want more advice (Dudenhöffer, 2012).

(3) Desire for advice when buying a car: According to Reindl from 2017 and Diez from 2015, the high level of recommendation required for automobiles as a product must be considered in the context of sales. As a rule, a vehicle purchase is often associated with a vehicle sale as a trade-in. Therefore, the mobility solution for the customers by the car dealerships is currently almost a continuing intensive consulting process. In this context, it is crucial to note how essential customers consider the aspect of advice to assess whether direct purchase via the Internet is possible and reasonable for customers (Reindl, 2017). Another study showed that to improve digitisation within the company, greater emphasis must be placed on novel digital technologies (Sliwa et al., 2021).

(4) Favorable price or good offer: The basic approach of customers is always to pursue a favourable purchase price. In doing so, homo economicus always strives for an optimal relationship between price and performance. As previously mentioned, the Internet has significantly increased transparency in vehicle purchasing. As a result, the digital comparison of offers has become very important for many customers, leading them to compare offers and prices much more effectively. This makes it increasingly difficult for dealers to enforce their high prices, which they need to cover their costs. Given the above aspects, the question arises about how customers' price sensitivity and online buying correlate (Reindl, 2017). According to Dudenhöffer and Dispan, the major purchasing platforms are taking advantage of the new purchasing options such as leasing, financing or car

subscriptions in terms of lower purchase prices and better cost planning (Dispan, 2021; Dudenhöfer & Paul, 2022).

(5) Online vehicle purchases already made: The proportion of customers who bought their last vehicle online and thus gained substantial purchasing experience remains low but is growing steadily. The study, as mentioned above by Dudenhöffer concluded in 2010 that 7.7% of respondents had already bought a car over the Internet. The decisive factor here was that a first-time online vehicle purchase also leads to further online purchases (Dudenhöffer, 2012).

(6) Knowledge of online vehicle purchasing platforms: In her study, Dudenhöffer assumes that the influence of online vehicle brokerage platforms has an impact on whether customers decide to buy a vehicle online or not. In this context, the platforms pursue the goal of either carrying out sales for the dealer so that the dealer only has to carry out the physical handover of the car. Alternatively, the purpose of the platforms is to establish contact between the dealers and the customers. In the long term, however, the platforms will change their business model to become even more customer-focused and tap into a more extensive process of value creation in sales. According to Kollmann, the marketplaces skim off the generated added value via various sources of revenue (Dudenhöffer, 2012; Kollmann, 2022). Kim et al. confirmed in their Automotive Retail Study in 2022 that today's omnichannel distribution, in particular, affects customers who are already using convenient solutions to continue to be willing to use suitable solutions for shopping and purchasing, thus maximising their convenience and benefit (Kim et al., 2022). In their analysis, Mosler et al. point out that the automotive industry has followed the same business model for years, which now requires a radical rethink (Meinhardt & Pflaum, 2019).

(7) Intensity of general online shopping: In her study, Dudenhöffer also concluded that purchasing a car via the Internet depends at a 95% level on whether the customer also generally uses online shopping a lot. This means that available online shopping also influences the willingness to buy a car over the Internet (K. Dudenhöffer, 2012). According to the study by Kim et al. from 2021, the changes in digitisation and the upcoming disruptions in online sales will not stop in the automotive industry. Therefore, the new options and possibilities will also affect the automotive retail sector. Kim et al. also conclude that a systematic business foresight process should be developed to improve the survival of organisations in a rapidly adapting environment (Kim et al., 2021). Deges describes in his analysis that the blending of online and offline activities of retailers and manufacturers has also been increasing for years, with online retailers entering the offline business and offline sales shifting heavily to digital anyway. In parallel, online shopping and transparent digital price comparison have become ubiquitous and almost cross-sectoral (Deges, 2020).

Particularly concerning the study by author Dudenhöffer from 2010, this article will again go into detail and compare it (Dudenhöffer, 2012).

The decision to car buying online or offline

Whether to buy a vehicle online or via a conventional dealer depends at least on the factors mentioned above. At the same time, there is no standardised measurement methodology or standardised catalogue of questions to evaluate what the purchase decision for or against an online purchase depends on. It is, therefore, also difficult to draw comparisons with other studies, although it should be noted that this research compares with the study and research by Dudenhöffer from 2010 (Dudenhöffer, 2012). The measurement of the decision of a car purchase is thereby dependent on many personal choices of the customer. Nevertheless, some correlations and dependencies are decisive for how the customer buys. These are investigated in the context of this research work.

3. Research objective and methodology

The research objective is to identify which factors greatly influence or are highly significant for customers when buying a vehicle online. The following approach was used to achieve the research objective. In the following, the hypotheses that have emerged from the literature review and influence customers' online vehicle purchase behaviour according to the research and research conducted so far are first formulated. Based on the formulation of the research hypotheses, the questionnaire for the online survey was then constructed. In this process, Likert scales with the values 1-7 were elaborated to answer the questions. The questionnaire was then distributed and mailed to thus reach the most significant number of participants. The results were then contrasted concerning each hypothesis in a simple linear regression model to the stated online vehicle purchasing behaviour. Each hypothesis was then tested for significance. The resulting significant influencing factors were then contrasted into a multivariate linear regression model and tested again. The obtained significant results were then incorporated into the final results.

Hypotheses
Concerning the factors influencing online vehicle purchases mentioned in Chapter 2 and the further state of research, the seven individual factors will now be examined. The following hypotheses will be formulated and tested:

Employment status
Hypothesis 1 (H1): People with an employment relationship are likelier to buy their car online than those without an employment relationship. This hypothesis assumes that people with an employment relationship are more likely to use online media or obtain a company car that they put together online than people who do not have an employment relationship. It also assumes that people with an employment relationship use the advantages of online shopping in terms of time savings (Gehrckens et al., 2013).

Gender
Hypothesis 2 (H2): Men are likelier to buy their cars online than women. This hypothesis examines the influence of gender on purchasing behaviour. Kempe also confirmed this in his study and concluded that men are more likely to buy online and spend more money online than women (Kempe, 2011). It should also be noted that gender diversity was not examined here, as no one indicated that he or she was diverse during the survey.

Car purchase advice
Hypothesis 3 (H3): The more important advice is to customers when buying a car, the less likely they are to buy it online. This hypothesis examines the relationship between advice and online purchasing. One of the main problems in online purchasing is still the provision of a high and excellent level of recommendation. However, according to Möhlenbruch et al., this is still generally the case in stationary retailing (Möhlenbruch et al., 2016). Customers who want a high level of advice are more likely to buy at a static location or a car dealership. In their studies, Dudenhöffer and Del Don conclude that good advice usually occurs on-site (Dudenhöffer, 2012; Seidel, 2015).

Car price
Hypothesis 4 (H4): The more price-sensitive customers are concerned about vehicle prices, the more likely they are to buy online. This hypothesis examines the connection between online vehicle purchasing behaviour and customers' price sensitivity. Both the studies by Dudenhöffer and Ternès et al. conclude that customers are more likely to buy on the Internet if they are price-sensitive, as customers generally perceive prices on the Internet as being more favourable (Dudenhöffer, 2012; Ternès et al., 2015).

Already bought online
Hypothesis 5 (H5): Customers who have made a one-time purchase online will continue to buy their car online. The hypothesis states that customers who have switched from brick-and-mortar retail to online vehicle purchasing for the first time will no longer be returned to brick-and-mortar retail (Dudenhöffer, 2012).

Knowing online car platforms
Hypothesis 6 (H6): The more customers are aware of online vehicle platforms, the more likely they are to purchase their vehicle online. This hypothesis assumes a positive relationship between online vehicle platforms and online vehicle purchases. In this context, it can be considered that the platforms reduce uncertainty in online vehicle purchasing (Dudenhöffer, 2012).

General online shopping
Hypothesis 7 (H7): The more likely customers are to store online in general, the more likely they are to buy their car online. This hypothesis states that the intensity or affinity for available online shopping positively influences purchasing a vehicle online (Dudenhöffer, 2012).

Age
Hypothesis 8 (H8): The younger customers are, the more likely they are to buy their car online. This hypothesis states that younger customers would likely buy their vehicles online (Ternès et al., 2015).

Data collection
A questionnaire with 34 questions was prepared for data collection, although only 19 of the 34 questions were relevant to this study. These questions were answered predominantly in the form of a seven-point Likert scale. A separate question was asked for each of the hypotheses to be tested. This question relates to the one about the willingness to buy a car online as part of the methodological procedure. The questions to answer the hypotheses were always mandatory. The questionnaire was conducted with the online software "empiric - surveys for students" and was published there and was available from 22.11.2022 to 10.01.2023. A total of 253 people participated in the study and completed the questionnaire.

Data cleansing
Within the scope of the study, the data sets were checked for plausibility according to this study's requirements and determined whether an adjustment was necessary. There is no restriction in the investigation concerning age or other aspects. The questions on age, occupation, employment relationship, marital status, educational attainment, income or gender were mandatory, so they always had to be answered. During the plausibility check, it was also checked that no one had given an age below 17 or an unrealistic age above 100. In Germany, accompanied driving is already permitted from 17, so this age limit was chosen. The youngest respondent was 17 years old, and the oldest respondent was 73 years old. In addition, the questions used to answer the hypotheses were all mandatory. The gender "diverse" was not indicated by any participant.

The questions to answer the hypotheses were responded to as a 7-point Likert scale. The possible answers to the questions on the hypotheses are as follows:

Table 1. 7-level Likert scale

Question	Response options
Issue…	1 = fully agree
Issue …	2 = agree
Issue …	3 = rather agree
Issue …	4 = undecided
Issue …	5 = rather not agree
Issue …	6 = do not agree
Issue …	7 = do not agree at all

Source: Own survey

Descriptive statistics

In the context of descriptive statistics, the survey results are examined regarding the online purchasing behaviour of German automotive customers. In the context of the study, it is interesting to distinguish between the age of the respondents to see how the differences between the age groups are presented. Younger customers tend to have a greater affinity for online shopping. For this reason, the respondents are divided into two age groups for the descriptive statistics, one up to 30 and one over 30. Within the Likert scale, answers 1 to 3 are considered as agreement and 5 to 7 as disagreement. Answer 4 = undecided is accordingly not taken into account. Table 2 below shows the presentation of the data:

Table 2. The online purchasing behaviour of age groups

| Age of Respondents	Online car buying Yes Quantity	%	Online car buying No Quantity	%	Online car buying undecided Quantity	%	Total numbers Quantity	%
17-30 years	85	50,00%	58	34,12%	27	15,88%	170	100,00%
>30 years	43	51,81%	35	42,17%	5	6,02%	83	100,00%
Sum of all ages	128	50,59%	93	36,76%	32	12,65%	253	100,00%

Source: Own survey

The results of the presentation in Table 2 make it clear that around 50% of all respondents are prepared to buy their next car online. Contrary to expectations, however, younger and older customers' online buying behaviour is the same. The average age of respondents is 32.24 years, while the median is 26 years. This also reflects the more significant proportion of younger respondents in the study. The standard deviation of age is 12.26 years (sd=12.6261), and the number of participants is 253 people (n=253). It also shows that the proportion of respondents up to 30 years old is 67.19%, about twice as large as that of respondents over 30.

In the context of the survey, the distribution of net income must also be considered once again. Automobiles tend to be high-priced products, so customers must have high incomes. The following figure shows the net revenues of the respondents:

**Figure 1.** Representation of educational qualifications
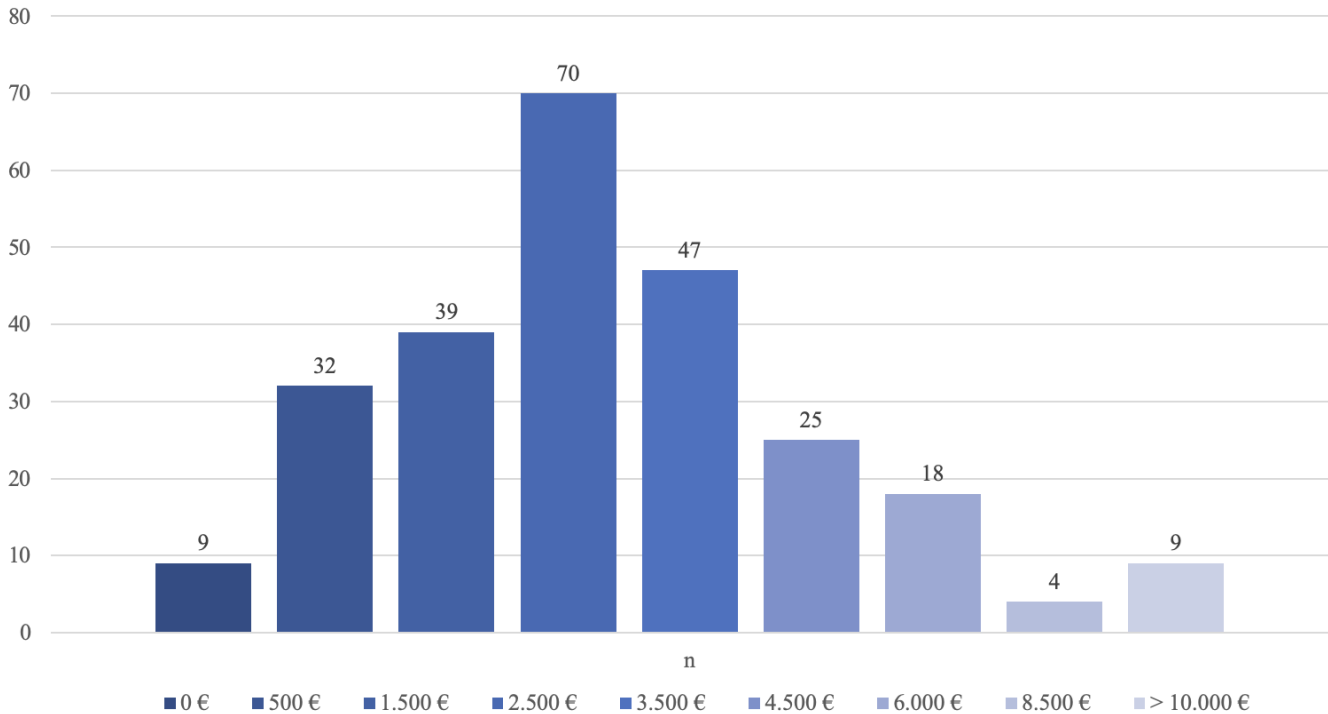
Source: Own survey

The distribution of net income in Figure 1 approximates a normal distribution. The average income of the respondents is 2.998,02 €, the median is 2.500,00 €, and the standard deviation is 2.158,03 € (sd=2.158,03€). It should also be noted that the income of the respondents was asked in intervals. In each case, the mean value of the interval was assumed for the evaluation. Only in the case of no income (0,00 €) and revenue of 10.000,00 € and more were the corresponding values of 0.00 € and 10.000,00 € selected.

It should be noted that the average net pay of German employees is around €2.131,92 per month (Bundesministerium der Finanzen, 2023). This means that the net income in the study is somewhat higher than the German average. In the context of descriptive statistics, it should also be mentioned that an income above €6,000.00 is seen as an outlier, which is why there are also 13 outliers in the study context. Figure 2 below shows the outliers graphically as a boxplot:

Figure 2. Representation of the outliers in the form of a boxplot
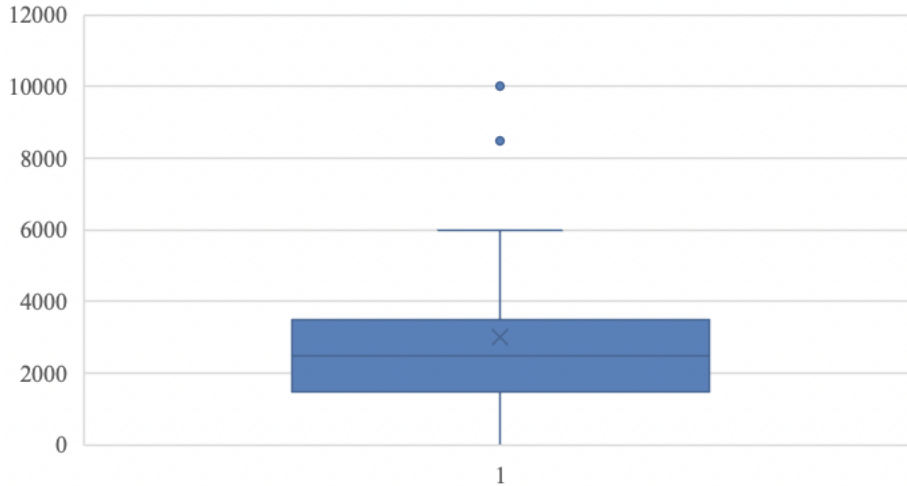
Source: Own survey

The gender distribution of the respondents should also be briefly discussed. At 59%, the proportion of male respondents is slightly higher than that of female respondents at 41%. There were no persons who indicated diversity as their gender in the survey. Figure 3 shows the distribution of gender:

Figure 2. Gender distribution

104; 41% 149; 59%

■ Male ■ Female
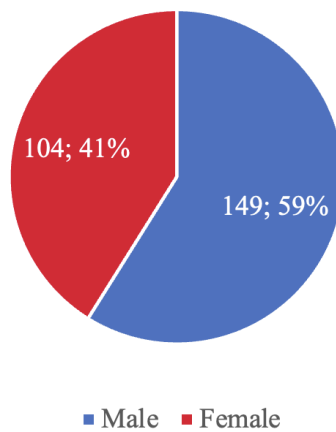
Source: Own survey

The following is a brief descriptive illustration of how age and online purchasing behaviour compare regarding gender. There were no respondents who indicated a diverse gender in the survey. Figure 3 shows the distribution of gender:

**Figure 3.** Comparison of the online vehicle purchase propensity and age distributed between men and women.
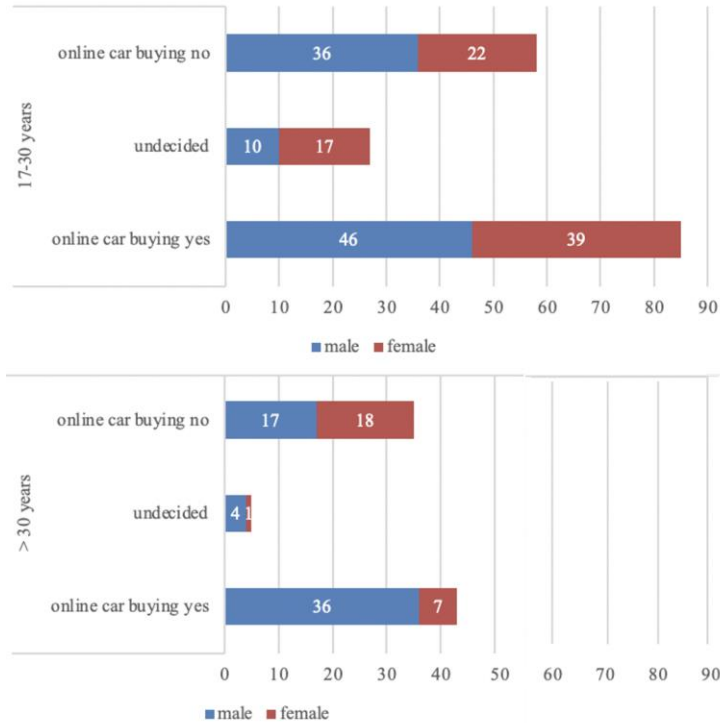
Source: Own survey

Data analysis shows that men are more willing to buy their next car online. Of the 149 men surveyed, 82 (55.04%) are eager to buy their next vehicle online. This proportion is only 41.35% for women or 43 out of 104 respondents. Furthermore, it is noticeable that the proportion of undecided buyers regarding online or offline vehicle purchases among the younger respondents is 27 out of 170 (15.88%). In comparison, the older respondents have a more precise opinion here, and only 5 out of 83 older respondents (6.02%) are undecided regarding this decision.

Finally, the average salary between men and women should also be discussed. Thereby it shows up in the context of the study the average net income of the men with approximately 3.493,00 € lies, while that of the female asked ones amounts to only 2.288,00 €. It can also be deduced from this that spending disposable income is made much more deliberately for those with a lower income than those with a significant disposable income. Figure 4 shows the average income of men and women in the study:

Figure 4. Average net income between men and women
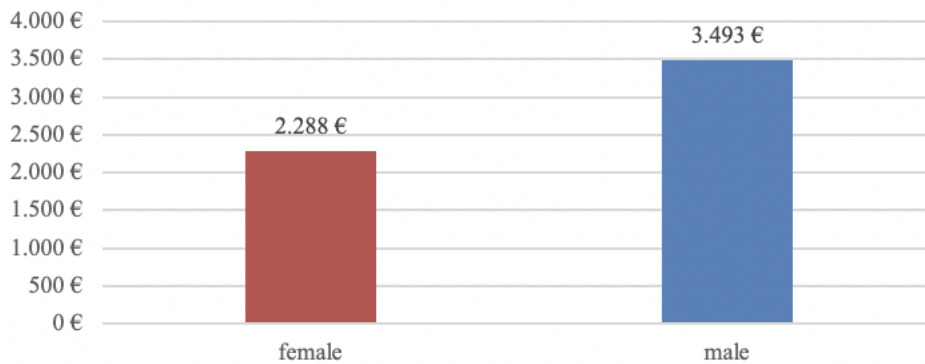
Source: Own survey

It has already been shown here that there are differences between the online purchasing behaviour of men and women concerning a car. In addition, the age of the respondents and the financial possibilities also influence this purchase decision.

4. Results and analysis

As part of this research, a simple linear regression model was first established and tested for each hypothesis. This study's significance level is 5% (=0.05). If the results are significant, they are included in the final overall model as multiple linear regression.

Employment status
The results regarding the hypothesis that customers with an employment status are more willing to buy their next car online can be seen in the presentation of Table 3, where it should be noted that the employment status could also be indicated as a Likert scale with the values 1 (definitely working) to 7 (not working) by the respondents. This has the advantage that respondents can choose between employment and, at the same time, the intensity of their employment:

Table 3. Results H1 – Employment status

	Estimate	Standard Error	T-Statistics	P(>IItII)	
Constant = Online car buying	2,90886	0,19720	14,751	< 2e-16	***
Employment status	0,42509	0,09558	4,448	1,31e-05	***

n=253	Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1

Source: Own survey

The results of testing the hypothesis, the effect is highly significant. Thus, the hypothesis is confirmed that working people want to buy their cars online. The adjusted coefficient of determination is 6.94%.

Gender
The results regarding the hypothesis that gender influences the decision to buy a car online are presented in Table 4:

Table 4. Results H2 – Gender

	Estimate	Standard Error	T-Statistics	P(>I*t*I)
Constant = Online car buying	3,8750	0,2088	14,563	< 2e-16 ***
Gender	-0,5193	0,2720	-1,909	0,0574
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1	

Source: Own survey

Within the results of the hypothesis testing, it is shown that the result is not significant. Thus, the null hypothesis is not refuted. Gender, male or female, does not influence the decision to buy a car online or not. The adjusted coefficient of determination is 1.04%.

Advice on buying a car
The results for testing the hypothesis that the desire for advice when buying a car influences the decision to buy a car online are presented in Table 5:

Table 5. Results H3 – Advice on buying a car

	Estimate	Standard Error	T-Statistics	P(>II*t*II)
Constant = Online car buying	6,08450	0,17220	35,53	< 2e-16 ***
Advice on buying a car	-0,71263	0,04137	-17,23	< 2e-16 ***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1	

Source: Own survey

The results of the hypothesis test show that the result is highly significant. Customers for whom advice is crucial are more likely to buy their car at a fixed location, and those for whom advice on purchasing a vehicle is less critical may also want to buy their car online. There is a negative correlation. The adjusted coefficient of determination is 53.99%. Thus, just under 54% of the variance in online car buying behaviour can be explained by the importance of advice when buying a car.

Car price
The results for testing the hypothesis that the importance of the vehicle price or the desire for a low vehicle price influences the decision to buy a car online are presented in Table 6:

Table 6. Results H4 – Cheap price is important

	Estimate	Standard Error	T-Statistics	P(>I*t*I)	
Constant = Online car buying	2,67799	0,26569	10,080	< 2e-16	***
Cheap price is important	0,26096	0,06769	3,855	0,000147	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in the form of linear regression shows that the correlation between the importance of a low vehicle price and car purchases on the Internet is highly significant. This confirms the hypothesis that customers looking for a favourable vehicle price migrate to the Internet and leave the stationary trade.

Already bought a car online

Table 7 shows the results of hypothesis testing for hypothesis H5. H5 assumes that customers who bought a car online would also buy their next vehicle online. In the context of the survey, both the online purchase that has already taken place and the almost exclusive information gathering by customers online were evaluated as corresponding online purchases since the option to purchase vehicles entirely online has only existed for a few years. The results are presented below:

Table 7. Results H5 – Already bought a car online

	Estimate	Standard Error	T-Statistics	P(>I*t*I)	
Constant = Online car buying	1,37575	0,24177	5,69	< 3,52e-08	***
Already bought a car online	0,51863	0,05052	10,27	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

The hypothesis test in the form of linear regression shows that the correlation between the online vehicle purchase already made or the predominant online information procurement and the future online vehicle purchase is highly significant. This confirms the hypothesis that customers who have once purchased their vehicle online will continue to do so and leave the stationary trade. The adjusted coefficient of determination is 29.29%. Thus, around 29% of the variance in online vehicle purchasing behaviour can be explained by the online purchase that has already taken place or the most recent predominant information online when purchasing a car.

Knowledge about online car platforms

Table 8 shows the results of hypothesis testing for hypothesis H6. Here, H6 assumes that customers who know online vehicle purchasing platforms well will also tend to buy their next car online. The results are presented below:

Table 8. Results H6 – Knowledge about online car platforms

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	0,84937	0,15887	5,346	2,02e-07	***
Knowledge about online car platforms	0,84847	0,04218	20,115	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in the form of linear regression shows that the relationship between knowledge of online vehicle purchasing platforms and future online vehicle purchases is highly significant. This confirms the hypothesis that online vehicle purchasing platforms are well-known among customers and thus significantly influence customers' future online vehicle purchases. The adjusted coefficient of determination is 61.56%. Therefore, almost 62% of the variance in online vehicle purchase behaviour can be explained by customers' knowledge of online vehicle purchase platforms.

General online shopping

Table 9 shows the results of the hypothesis test for hypothesis H7. Here, H7 assumes that customers who generally shop online will also tend to buy their next car online. The results are presented below:

Table 9. Results H7 – General online shopping

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	0,57655	0,13762	4,189	3,87e-06	***
General online shopping	0,88761	0,03491	25,424	< 2e-16	***
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1		

Source: Own survey

Hypothesis testing in linear regression shows a highly significant correlation between general online shopping and future online vehicle purchases. This confirms the hypothesis that customers familiar with available online retailing and who use it a lot are also likely to buy their next car online. A highly significant influence on customers' future online vehicle purchases is confirmed. The adjusted coefficient of determination is 71.92%. Thus, nearly 72% of the variance in online vehicle purchase behaviour can be explained by respondents' use of general online shopping.

Age

Table 10 shows the results of hypothesis testing for hypothesis H6. Here, H6 assumes that customers who know online vehicle purchasing platforms well will also tend to buy their next car online. The results are presented below:

Table 10. Results H8 – Age

	Estimate	Standard Error	T-Statistics	P(>ItI)	
Constant = Online car buying	2,84028	0,36641	7,752	2,26e-13	***
Age	0,02260	0,01058	2,136	0,0336	*
n=253		Level of Significance: `***0,001 `**0,01 `*`0,05 `.0,1			

Source: Own survey

Hypothesis testing in linear regression shows a significant correlation between customer age and future online vehicle purchases.

This confirms the hypothesis that customers are more likely to reject buying a vehicle online as they get older or that they are more likely to buy their car online at a younger age. However, the adjusted coefficient of determination is only 1.40%. Thus, only about 1% of the variance in online vehicle purchase behaviour can be explained by customer age.

Consolidated view

In the context of the previous individual hypothesis tests, the effect of the "omitted variable bias" indeed emerges. The significant influencing factors identified are now compared again as part of multiple linear regression to reduce this effect.

The significant influencing factors of employment status, advice on buying a car, importance of a low price, already purchased a car online, knowledge about online car platforms, age and general online shopping is related to the respondents' online car buying behaviour. The results of the multiple linear regression are shown in Table 11 below:

Table 11. Results Multiple linear regression of significant variables

	Estimate	Standard Error	T-Statistics	P(>I*t*I)	
Constant = Online car buying	1,652957	0,287318	5,753	2,6e-08	***
Employment status	0,122483	0,040582	3,018	0,00281	**
Advice on buying a car	-0,314232	0,030644	-10,254	< 2e-16	***
Low price is important	0,015266	0,030998	0,492	0,62282	
Already bought a car online	0,102488	0,028265	3,626	0,00035	***
Knowledge about online car platforms	0,177122	0,047219	3,751	0,00022	***
General online shopping	0,485600	0,045553	10,660	< 2e-16	***
Age	0,004482	0,004623	0,969	0,33332	
n=253			Level of Significance: `***0,001 `**0,01 `*`0,05 `.`0,1		

Source: Own survey

In the OLS estimation, the abovementioned significant factors were compared again using multiple linear regression. The result is that favourable prices and age are no longer critical for buying a car online. Highly effective factors for purchasing a car online are the respondent's existing employment relationship, the low or non-existent need for advice on the part of the respondent, the fact that in the best case scenario, the respondent has already purchased a car online before, the existing knowledge about online car purchase platforms, and the respondent's generally intensive online shopping. The regression analysis in the present consolidated study does not provide any clear indications for the two parameters of a favourable price and age.

Summary

Evaluating the factors mentioned above as part of the survey revealed several significant aspects that can be decisive for buying a vehicle online. In addition, it must be noted that purchasing a car is still one of the most expensive financial decisions for most customers, next to buying a house. Therefore, it must also be remembered that vehicle costs in maintenance still need to be revised in many places nowadays. With the advent of electromobility, it can be assumed that the cost of maintaining a car will decrease as maintenance intervals and fuel costs will be reduced. Therefore, if electromobility continues to increase, the survey will be conducted again to see if respondents' interest in purchasing vehicles online continues to grow, considering the abovementioned aspects. It should also be noted that for many customers, personal contact continues to be essential to have a personal contact in the event of such difficulties or maintenance costs arising, including in the form of possible warranty and maintenance costs; if the maintenance costs and thus the risk for customers after purchasing a vehicle fall, a further increase in online purchasing and its popularity among customers can be assumed (Reindl, 2017).

5. Discussion

The results presented here are based on selected questions on the purchasing behaviour of automotive customers. The questions and topics are based on results from other surveys and studies on this subject area. The answers given by respondents depend heavily on the question's wording in the questionnaire. It was not possible to influence the respondents when answering the questionnaire. Therefore, it cannot be said with certainty that all respondents answered the questionnaire correctly. In particular, the questionnaire was intended to compare with the study by Dudenhöffer from 2012 (K. Dudenhöffer, 2012). To obtain even more precise answers and to be able to produce an even more accurate evaluation of the corresponding results, it would be necessary to interview the participants themselves on-site accordingly and conduct a confidential survey.

Furthermore, it must be considered that the automotive industry, in particular, is currently undergoing one of its most vital processes of change for decades. Therefore, the survey topic is still a very new field. It is only in the last few years that customers have been able to find out about their next car predominantly online and then buy it completely online accordingly. It will therefore be necessary to repeatedly query the findings obtained in this study at regular intervals in the medium term. This will ensure that the results obtained fit the relevant framework conditions. The aspects of electromobility and online vehicle sales are particularly worthy of mention here (Bussmann, 2011). In addition, in the context of demographic change, it should also be noted that the number of older customers will continue to increase sharply in the coming years and that there will also be a generational shift, so that here, too, some of the loyal, stationary automotive customers will prioritise their vehicle purchases via the Internet (Pompe, 2011).

In the context of this work, the findings already available in the scientific community on online vehicle acquisition, in particular, were reviewed in terms of additional factors and up-to-dateness. This showed that the data situation still needs improvement due to the topic's novelty and that further research will be necessary. Future research should focus on addressing and advising older customers and investigating the proper target group selection for digital vehicle sales.

6. Conclusions

This research paper examined various factors to see if they impact a customer's vehicle purchase online. This was predominantly broken down into employment status, car buying advice, gender, age, the importance of vehicle price, previous use of online vehicle purchases, knowledge of online vehicle exchanges, and general online shopping. Eight hypotheses were formed to investigate these factors and tested in an online survey. More than 250 people were surveyed in the process. The purchasing behaviour of automotive customers is widely known in science. However, no recent study in the German market investigates which factors are decisive for customers to purchase online or in a traditional stationary store. A simple linear regression model was then formulated for each hypothesis individually, which was then tested for significance in a T-test. The significant results were then transformed into a multiple linear regression model. The influencing factors were again tested for significance. The characteristics of an employment relationship, desire for advice on a car purchase, previous online vehicle purchase or predominant online information in the last vehicle purchase, knowledge of online vehicle platforms, and use of general online shopping were highly significant. A favourable vehicle price and age could not be confirmed as substantial factors in the multiple linear regression.

This paper provides a good overview of which factors are decisive for customers to buy their vehicle online or stationary. A change in the customer structure can be expected in the coming years, with the proportion of customers in Germany who want to buy their vehicle online continuing to increase. In parallel, the proportion of older customers will continue to grow strongly due to demographic change. Future research should also consider the components of demographic change in this context and differentiate the survey more strongly between young

and old customers. Further research in this area is essential because the existing retail structure and the current distribution network of manufacturers are facing significant change. It is, therefore, important that manufacturers and dealers know their automotive customers as well as possible to tailor their sales processes to customers optimally. This is the only way to ensure the optimal customer approach (Graf, 2008).

The research results also make it clear that customers want more flexibility and, above all, digital offerings in the area of vehicle acquisition. Only with the proper knowledge of customers and their expectations will it be possible to continue to retain customers and provide them with optimum service in the future. In this context, intelligent and intermodal mobility offers will also become a risk for established automotive sales (Bruhn & Hadwich, 2022b). At the same time, demand for vehicles in Germany continues to grow, which will undoubtedly result in further sales options (Dudenhöfer & Paul, 2022).

This study critically examined existing results, and new findings were obtained. Concerning the limitations of the work, it must be mentioned that the study refers to the effects on the behaviour of German automotive customers. The findings can, therefore, only be transferred to other countries to a limited extent since cultures differ from country to country, mainly concerning consumer behaviour. It should also be noted that the survey results depend on the wording of the questions. Future research could start here, transfer the results to other countries, and critically examine them. In addition, purchasing behaviour and usage patterns, especially in the automotive sector, will change significantly due to constantly changing offers and the speed of the digital environment.

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ENTERPRISE RISK ANALYSIS IN AN ENGINEERING COMPANY WITH A FOCUS ON CUSTOM MANUFACTURING[*]

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Abstract. The study details the outcomes of a scientific experiment analyzing enterprise risks in business processes. Examining and getting rid of enterprise risks is one of the most important management tools when it comes to reaching corporate goals. The new proposed strategy is based on the idea of process risk as a part of putting business processes or operations into action to get results that add value. The actual solution algorithm consists of the quantification of the difference between the level of risk and the enterprise's cost, the development of added value, and the operating profit. The experiment focused on a medium-sized engineering company that specializes in piece production. The principal outcomes of the technique are the realization that a smaller proportion of value added connected with the process results in a reduced degree of risk that is proportional to the cost ratio of the various production process activities. The hypothesis that manufacturing automation reduces risk has not been confirmed. It is advised that businesses document and review the time and cost components of each process on a regular basis. The outputs obtained from the solution demonstrate the suitability of the proposed process, with the outputs' validity demonstrated by repeating the analytical activities and comparing them to the actual occurrence of process risks identified by the model enterprise's managers during the execution of a real contract. The newly proposed method is expected to be appropriate for mass production.

Keywords: production process; business objectives; business process; process risks; risk prediction; risk analysis; added value

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1. Introduction

Risk management is a vital aspect of the daily job and the strategic management and decision-making of managers (Rahman, Adnan 2020; Wei et al., 2021; Shipanga, Roux & Dubihlela, 2022). This topic will become even more important during an economic downturn exacerbated by the coronavirus pandemic. Strategic risk management is one of the activities permanently performed in an enterprise as a part of its process management (Giraldo & Nunez 2020). The need for risk analysis is not limited to production processes or service processes (Szalucki & Fryca-Knop 2017), but it is important also for other corporate activities, such as administration, financial management, marketing, human resources management, etc. From the above, in addition to monitoring risks in production, i.e., productive processes, it is also necessary to monitor risks in supporting processes, without which effective and efficient processes would not be productive (Nasteckiene 2021). This means that analyzed risks should include all areas of the enterprise that need to be addressed comprehensively in an integrated organizational and management corporate system. The importance of this topic is emphasized by the very character of corporate risks: one part of them are predictable risks, which can be effectively prevented, and the other part are unpredictable risks, which need to be monitored, signaled, identified, analyzed, and evaluated with subsequent proposals of measures for their elimination (Ghaeli 2018). This study presents a scientific experiment that focuses on the systematic daily control of production hazards by managers. The article consists of two primary parts. In the theoretical part, the main attributes devoted to enterprise risk analysis in relation to value added are presented along with the paper's objective. In the second part of the article, the source of information and the methodology of the established calculations for determining the riskiness of the production process are presented. The results and their discussion are presented in the third section. The report finishes with business advice based on the experimental findings and a suggestion for future research.

2. Theoretical background

The current business environment, which can be described as highly turbulent, changing, and volatile, means increasing requirements for the management of enterprises (Raghunath, Devi 2018). Haviernikova, Okreglicka and Lemanska-Majdzik (2016) and Kumar et al. (2018) note that more attention should be paid to the management of risks, proper risk identification and evaluation; their articles focus particularly on production risks and related supplier risks, which may strongly interfere with and influence the production process of an enterprise. Strategic risk analysis is addressed in the global business environment, while in the national context, the perceived risks and their probabilities differ in the individual production processes and in the individual enterprises (Olie, Rao-Nicholson 2018; Trypolska et al. 2022). Knowledge and management of strategic risks are two of the critical factors that make it possible for the enterprise to keep its competitive advantage (Dang & Yeo 2017). An important component of the strategic risk analysis is a strategic economic analysis, which evaluates the performance or prosperity of business entities and the effect of risks on invested financial means (Sotnyk et al. 2022; Prodanova et al. 2019). Management of enterprises should be able to monitor and identify risks with potential negative effects, concentrate on them, and based on an analysis, specify the severity of their impacts on the production process or on the company (Senova et al. 2017; Kumar, Park 2019). It is necessary to realize that without knowing the risks, it is not possible to develop a strategic plan (Wallis 2020). Analysis of strategic risks works only if it is supported by strategic management; a properly performed analysis improves management of corporate processes and minimizes negative effects on labor efficiency and other corporate activities (Walaszczyk 2016; Virglerova et al. 2020; Godany, Mura 2021). Man, Radu and Tabor (2015) and Pour et al. (2019) state that there are many factors affecting strategic risk analysis, and they believe that factors associated with the highest risk include particularly human resources. Blocisz and Hadas (2019) see the highest risk in the very preparation of the production process. In the context of identifying risks associated with the manufacturing process, Pakocs and Lupulescu (2017) highlight risks associated with trademarks, patents, production know-how, falsification risks, disclosure of business secrets, and so on. Identification of risks in the production process is supported by structuring the risks into ISO categories, such as occupational safety, work quality, production process continuity,

etc. (Jaime et al. 2016; Stanik, Kiedrowicz, Waszkowski 2019). Other risk factors in the production include injuries caused by an incorrectly implemented system of occupational safety or incorrect use of PPE (Chi et al. 2015). Also, the value chain contributes to correct strategic risk analysis as one of the basic tools for the formulation of a successful competitive strategy (Straková et al. 2020). An analysis of strategic risks and their elimination also depends on the size categorization of enterprises and on a specific industrial branch because the intensity of the production process and the related risks are highly differentiated according to the mentioned categorizations (size and sector) (Váchal, Pártlová & Straková 2017).

As mentioned above, risk management depends on the management of enterprises, which indicates the directions to be followed by the enterprise. The directions will depend on risk aversion in strategic decision making (Benischke, Martin & Glaser 2019). When analyzing strategic risks, it is necessary to achieve an effective interaction between the internal and external environments of the enterprise because it may ensure the sustainable development of the enterprise (Kasych & Vochozka 2017). If managers of an enterprise do not perceive potential risks, they will fail to adapt to future risks (Meinel & Schüle 2018). Soon, the elimination of risks may be supported by the use of artificial intelligence, particularly in the production processes associated with digitalization; some enterprises have already been using AI, which significantly reduces their risks in the production process (Vrbka & Rowland 2020). Efficient enterprises manage their risks to ensure the needed production output and reliable operations (Klober-Koch, Braunreuther & Reinhart 2017; Shobayo 2017).

The objective of this paper is to perform a risk analysis for a selected production enterprise in the context of ongoing corporate processes, to identify and evaluate the risks, and to propose their elimination.

We've come up with two hypotheses based on the literature review we've already done and the main focus of our research:
H1: A lower share of process value generates a lower level of risk.
H2: Partially automated activities in the production process generate a lower level of risk.

It is assumed that these hypotheses should be valid for both manufacturing and services, as well as for all size categories of enterprises.

3. Research objective and methodology

The strategic risk analysis will be done on a made-up medium-sized engineering company that focuses mostly on making things to order. This company now evaluates risks based on the error rate of specific tasks. The newly presented method implies the analysis of risks inside the business processes (operations) in relation to the production of value addition. Actual risk analysis presupposes that the production process be subdivided into several sub-operations. Two metrics will be monitored: cost ratio and value added to the process. On the basis of the proportion of production operations in the production process, the two selected parameters will be disproportionally diversified. The process value added will be derived from the sub-processes using a customer card that defines all internal production process information. This covers the product's invoice price, the materials used, and the production or non-production time required by the sub-activities in the process (sales, planning, logistics, purchasing, cooperation, and production).

On a single order, the relevant process only adds value if the invoice price of the order is higher than the total operating costs of the order. To figure out how much value the process adds, it will be necessary to know how much each part of the process costs. By adding up the costs of each step in the process and the length of time it takes to complete it, one can calculate the overall costs of manufacturing processes that are time-based. For tasks that can't be measured in time, only the reported costs should be used. This is an entirely novel procedure with a

novel theoretical foundation. According to the exhaustive investigation, this novel procedure has never been discussed.

The analysis of strategic risks shown in this paper hasn't been used in business before, so it's a new method that's being proposed. From a theoretical point of view, it is used to look at the relationship between value added, or the creation of value, and the cost and time of the business process in question. According to the research conducted, this principle has not been applied so far.

The calculation of total costs for the processes that cannot be measured with time:

$$\sum_{C_{work(other)}} = Process\ A + Process\ B + \cdots Process\ Z$$

(1)

For data protection reasons, the calculation of total costs of processes that can be measured with time based on a price list of processes or operations has been multiplied by a corrective coefficient.

Table 1. Price list of partial working operations in the enterprise

Machine	Price (Cost price)	Machine	Price (Cost price)
Laser	2400	Saw	838
Scissors	1130	Drill	838
Press brake	1232	Press Dunkes	838
Milling machine CNC	953	Welding non-certified	838
Milling machine Horizontal	1803	Welding robot	838
Lathe classical	838	Painting shop	838
Lathe CNC	838	Installation other	838
Lathe CNC ecoturm	1308	Dispatching	838
Fitter	838		

Source: Own

The calculation of total costs of work for the processes measured with time:

$$\sum_{C_{work\ (manufacturing)}} = Process\ in\ CZK\ (A \rightarrow Z) \times number\ of\ hours\ (i)_{A \rightarrow Z} \quad (2)$$

$$\sum_{C_{work\ (manufacturing)}} = \left[Process\ in\ CZK\ (A) \times i_{(A)}\right] + \left[Process\ in\ CZK\ (B) \times i_{(B)}\right] + \dots \left[Procesd\ in\ CZK(Z) \times i_{(Z)}\right]$$

(3)

Total costs of the production process:

$$\sum_{Total\ costs\ of\ processes} = C_{work(other)} + C_{work(manufacturing)}$$

(4)

The calculation of the process added value for the partial production operations:

$$Process\ added\ value\ _{partial\ process}$$
$$= \left[\left(\frac{Cost\ price}{Sum\ for\ manufacturing} + \frac{Hours\ worked}{Total\ hours\ worked}\right) \div 2\right] \times \left(\frac{Sum\ for\ manufacturing}{Total\ sum}\right)$$
$$\times Planned\ operating\ profit$$

$$(5)$$

The calculation of the share on the process added value for partial production operations:

$$Share\ on\ the\ process\ added\ value_{partial\ process}$$
$$= \left[\left(\frac{Cost\ price}{Sum\ for\ manufacturing} + \frac{Hours\ worked}{Total\ hours\ worked}\right) \div 2\right] \times \left(\frac{Sum\ for\ manufacturing}{Total\ sum}\right)$$

$$(6)$$

The level of risk associated with the production process will be determined based on the planned job card and the implemented job card received after the production is complete. The level of risk of the processes will be monitored for the operations as follows:
The level of risk in the production process will be monitored from two viewpoints (cost ratio of operations and profit).

Cost ratios are used to figure out how risky each manufacturing operation is:

$$Level\ of\ process\ risk\ (cost\ ratio)_{(A \to Z)} = \frac{Costs\ of\ a\ partial\ process}{Total\ costs} \times 100$$

$$(7)$$

Determination of the level of risk for the individual production operations from the viewpoint of process added value:

$$Risk\ level\ of\ the\ process\ (process\ added\ value\ )_{(A \to Z)} = \frac{Process\ added\ value_{(A \to Z)}}{Total\ sum\ of\ the\ process\ added\ value} \times 100$$

$$(8)$$

Subsequently, the level of risk will be evaluated (based on Table 2 below) while respecting the determined level of risk of the manufacturing operation. The level of risk of the individual production operation will be monitored based on the difference between the levels of risk of the process added value and the risk of the cost ratio:

$$Level\ of\ risk\ = Level\ of\ risk\ of\ the\ process\ (process\ added\ value) - Level\ of\ risk\ of\ the\ process\ (cost\ ratio)$$

$$(9)$$

Table 2. Classification of the level of risk for the production process

Risk size	Interval of values (in %)
Small risk	From 1.01 to 100
Medium small	From 0.01 to 1.00
Medium risk	From -1.00 to 0.00
Medium big risk	From -2.00 to -1.01
Big risk	From -100 to -2.01

Source: Own

Based on the acquired results, it will be possible to determine which production operations contribute most to the level of risk of the entire production process. This will create an effective tool for the indication of risks in the production process of the selected enterprise.

The analysis used data from a one-off job card. Initially, an analysis of the total costs of the production process was performed for the partial production operations. This was followed by an analysis of the process value of the production process. These two analyses were used for an analysis of the level of risk of partial production operations.

4. Results and discussion

Table 3 contains calculated data imported from MS Excel. Table 3 includes the calculated cost ratio of partial processes based on the planned job card and the operations created based on the card that characterize the planned and implemented job. The numbers of hours worked on the partial production operations were obtained from the information system of the enterprise (completed work).

Table 3 defines the partial operations of the production process and their cost ratio, showing a comparison of the planned and the actual profit. This table shows that the company's most expensive production operation within the measurable production processes is "Laser" with a value of CZK 28,800 when the plan is created, and the most expensive production operation when the order is realized is "Scissors" with a value of CZK 16,950. Within the non-measurable production operations is the item 'Technical preparations', which is the costliest both in the plan created, in which it reaches a value of CZK 5,000, and in the execution of the order, in which it reaches a value of CZK 7,050. Table 3, in agreement with Table 1, also demonstrates that automated activities in the production process, such as "laser, press brake, milling machine CNC, milling machine horizontal, lathe CNC ecoturm," carry higher costs than the remaining processes that are mostly non-automated, e.g., "fitter, saw, drill, weld, installation, dispatching, etc."

Table 3. Total costs of the individual work operations based on the job card

Production operations	Cost ratio			
	Plan		Actual (profit)	
	CZK	Number of hours	CZK	Number of hours
Laser	28800	12	16800	7
Scissors	2260	2	16950	15
Press brake	12320	10	8624	7
Milling machine CNC	7624	8	9530	10
Milling machine Horizontal	5409	3	3606	2
Lathe classical	5028	6	4190	5
Lathe CNC	4190	5	3352	4
Lathe CNC ecoturm	6540	5	7848	6
Fitter	10056	12	3352	4
Saw	4190	5	4190	5
Drill	4190	5	1676	2
Press Dunkes	4190	5	6704	8
Welding non-certified	8380	10	3352	4
Welding robot	3352	4	2514	3
Painting shop	4190	5	8380	10
Installation other	10056	12	6704	8
Dispatching	5866	7	10056	12
SUMA for manufacturing	126641	116	117828	112
SALES	5000	x	5000	x
COOPERATION	2500	x	3780	x
OVERHEADS	4500	x	4120	x
TECHNICAL PREPARATION	5000	x	7050	x
INSPECTION	2000	x	1100	x
TOTAL SUM	145641	x	138878	x

Source: Own

The calculation of the total costs, i.e., the cost ratio of the work for processes that cannot be measured with time, was performed as follows:

$$\sum_{C_{work\,(other)}} = Sales + Cooperation + Overheads + Technical\,preparation + Inspection$$

(10)

$$Plan \sum_{C_{work\,(other)}} = 5000 + 2500 + 4500 + 5000 + 2000 = 19000\ CZK$$

(11)

$$Actual\,(profit) \sum_{C_{work(other}} = 5000 + 3780 + 4120 + 7050 + 1100 = 21050\ CZK$$

(12)

In the above calculations, steps that can't be described by time are defined by the amount on the job card. The sum of the partial processes is provided as the total amount of processes that cannot be measured with time and is necessary for the total expended costs for the production process.

The calculation of total costs of work for processes that can be measured with time was performed as follows (based on the job card and price list of the enterprise); the following is a sample calculation for "Laser":

$$\sum_{C_{work\,(manufacturing)}} = Process\ in\ CZK\ (A \rightarrow Z)\ \times\ number\ of\ hours\ (i)_{A \rightarrow Z}$$

(13)

$$Plan \sum_{C_{work\,(manufacturing)}} = 2400\ \times\ 12 = 28800\ CZK$$

(14)

$$Actual\ (profit) \sum_{C_{work\,(manufacturing)}} = 2400\ \times\ 7 = 16800\ CZK$$

(15)

The calculation of total costs of work for processes that can be measured with time is based on the processes provided in the price list of partial activities of the enterprise and the job card indicating the number of hours needed for a particular partial process. By multiplying, we can determine the total costs of the processes that can be measured over time.
The total costs of the production process are calculated as follows:

$$\sum_{Total\ costs\ of\ processes} = C_{work(other)} +\ C_{work\,(manufacturing)}$$

(16)

$$Plan \sum_{Total\ costs\ of\ processes} = 19000 + 126641\ = 145641\ CZK$$

(17)

$$Actual\ (profit) \sum_{Total\ costs\ of\ processes} = 21050 +\ 117828 = 138878\ CZK$$

(18)

The demonstrated calculations of the total costs (cost ratio) for the production process are a sum of both types of processes (measured and not measured with time). The sum of the total costs of the production process is then used for the calculation of the level of risk from the viewpoint of the cost ratio.

Table 4 contains data imported from MS Excel. Table 4 includes the process added values of the partial processes based on the plan and the actual result. It also shows the share of the process added value.

Table 4. Process added value of partial processes for tested operations

Production operations	Process added value (CZK) and the share on the process added value (%)			
	Plan		Actual (profit)	
Laser	4 439 CZK	14,38 %	3 099 CZK	8,70 %
Scissors	471 CZK	1,53 %	4 198 CZK	11,78 %
Press brake	2 462 CZK	7,98 %	2 050 CZK	5,76 %
Milling machine CNC	1 733 CZK	5,62 %	2 571 CZK	7,22 %
Milling machine Horizontal	920 CZK	2,98 %	732 CZK	2,06 %
Lathe classical	1 227 CZK	3,97 %	1 212 CZK	3,40 %
Lathe CNC	1 022 CZK	3,31 %	970 CZK	2,72 %
Lathe CNC ecoturm	1 271 CZK	4,12 %	1 816 CZK	5,10 %
Fitter	2 453 CZK	7,95 %	970 CZK	2,72 %
Saw	1 022 CZK	3,31 %	1 212 CZK	3,40 %
Drill	1 022 CZK	3,31 %	485 CZK	1,36 %
Press Dunkes	1 022 CZK	3,31 %	1 939 CZK	5,44 %
Welding non-certified	2 044 CZK	6,62 %	970 CZK	2,72 %
Welding robot	818 CZK	2,65 %	727 CZK	2,04 %
Painting shop	1 022 CZK	3,31 %	2 424 CZK	6,80 %
Installation other	2 453 CZK	7,95 %	1 939 CZK	5,44 %
Dispatching	1 431 CZK	4,64 %	2 909 CZK	8,17 %
SUM for manufacturing	26 833 CZK	86,95 %	30 223 CZK	84,84 %
SALES	1 059 CZK	3,43 %	1 282 CZK	3,60 %
COOPERATION	530 CZK	1,72 %	970 CZK	2,72 %
OVERHEADS	953 CZK	3,09 %	1 057 CZK	2,97 %
TECHNICAL PREPARATION	1 059 CZK	3,43 %	1 808 CZK	5,08 %
INSPECTION	424 CZK	1,37 %	282 CZK	0,79 %
TOTAL SUM	30 859 CZK	100 %	35 622 CZK	100 %

Source: Own

This is how the process added value for the partial production steps was calculated. Here's an example calculation for the production process "Laser":

$$
\begin{aligned}
Process\ added\ value_{partial\ process} \\
= \left[\left(\frac{Cost\ price}{Sum\ for\ manufacturing} + \frac{Hours\ worked}{Total\ hours\ worked}\right) \div 2\right] \times \left(\frac{Sum\ for\ manufacturing}{Total\ sum}\right) \\
\times Planned\ operating\ profit
\end{aligned}
\tag{19}
$$

$$
Plan \rightarrow Process\ added\ value_{partial\ process} = \left[\left(\frac{28800}{126641} + \frac{12}{116}\right) \div 2\right] \times \left(\frac{126641}{145641}\right) \times 30859 = 4439\ CZK
\tag{20}
$$

$$
Actual\ (profit) \rightarrow Process\ added\ value_{partial\ process} = \left[\left(\frac{16800}{117828} + \frac{7}{112}\right) \div 2\right] \times \left(\frac{117828}{138878}\right) \times 35622 = 3099\ CZK
\tag{21}
$$

This is how the share of process added value for the partial production operations was calculated. Here's an example for the production process "Laser":

$$\textit{Share of process added value }_{partial\ process}$$

$$= \left[\left(\frac{Cost\ price}{Sum\ for\ manufacturing} + \frac{Hours\ worked}{Total\ hours\ worked}\right) \div 2\right] \times \left(\frac{Sum\ for\ manufacturing}{Total\ sum}\right)$$

(22)

$$Plan \rightarrow Process\ added\ value\ _{partial\ process} = \left[\left(\frac{28800}{126641} + \frac{12}{116}\right) \div 2\right] \times \left(\frac{126641}{145641}\right) = 14,38\ \%$$

(23)

$$Actual\ (profit) \rightarrow Process\ added\ value\ _{partial\ process} = \left[\left(\frac{16800}{117828} + \frac{7}{112}\right) \div 2\right] \times \left(\frac{117828}{138878}\right) = 8,70\%$$

(24)

Table 4 contains the results of the added value and the share of added value for the planned and actual results of a particular job. The highest added value and the highest share have been found for "Laser," and this activity is on average the most significant for the production process. On the contrary, the lowest added values and their lowest shares have been found for "Drill and Inspection".
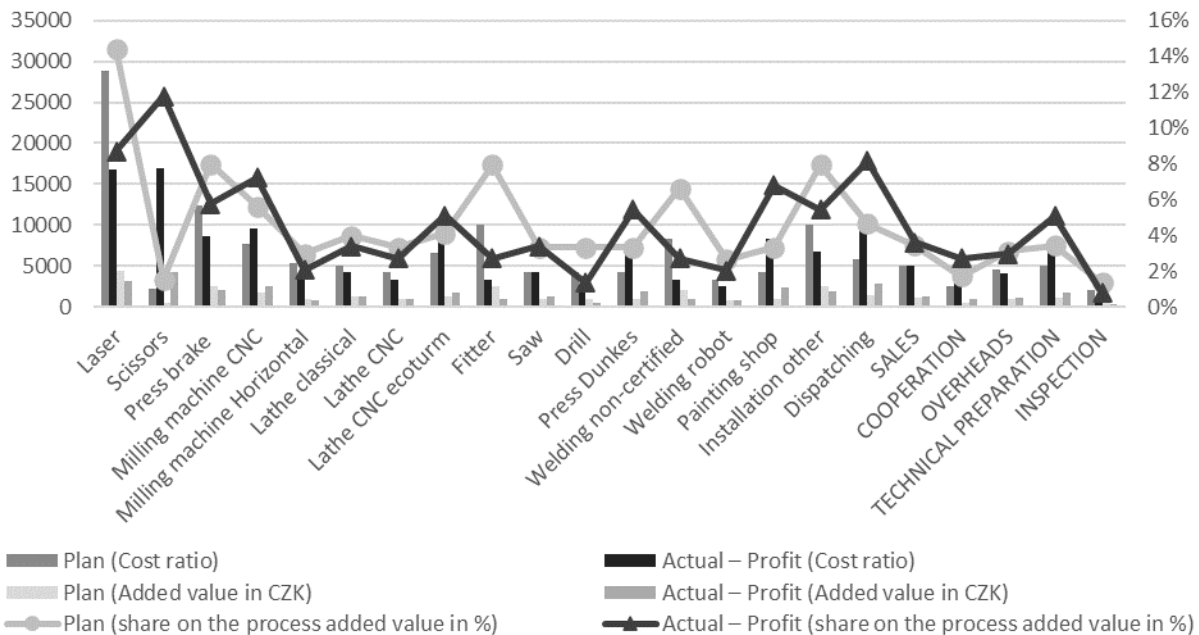

Figure 1. A graphic representation of operations comparing the planned and actual results.

Source: Own

Figure 1 compares the planned and actual profit on a one-off job. The planned share of the process added value for "Scissors" was lower than the actual result, and the difference between them was the highest for this particular activity. For "Scissors," the increase in the share of process added value was from 1,53% to 11,78%. On the contrary, a decrease compared to the plan was found for "Laser", specifically from 14,38% to 8,70%. The figure also suggests that the curve defining the actual share of the process added value is higher than the actual cost ratio of partial activities. For this reason, this job generates profit. The graphic representation in combination with Table 4 makes it possible for the enterprise to monitor and analyze partial operations from the viewpoint of cost ratio and achieved added value. Based on this information, the enterprise can optimize the production process from the viewpoint of cost ratio and achieved margin.

The calculation of the added value of partial processes determines the process added value of the individual operations. The calculations for the individual operations are based on an arithmetic average of costs and time. The presented results may be used by the enterprise to optimize the production process. Calculation of the process added value is provided here to determine all contributions of the processes necessary for calculation of the level of risk for the processes listed in tables 5 and 6.

Table 5. Process added value of partial processes for tested operations

Production operations	Level of risk from the viewpoint of cost ratio	
	Plan	Actual (profit)
Laser	19,77 %	12,10 %
Scissors	1,55 %	12,20 %
Press brake	8,46 %	6,21 %
Milling machine CNC	5,23 %	6,86 %
Milling machine Horizontal	3,71 %	2,60 %
Lathe classical	3,45 %	3,02 %
Lathe CNC	2,88 %	2,41 %
Lathe CNC ecoturm	4,49 %	5,65 %
Fitter	6,90 %	2,41 %
Saw	2,88 %	3,02 %
Drill	2,88 %	1,21 %
Press Dunkes	2,88 %	4,83 %
Welding non-certified	5,75 %	2,41 %
Welding robot	2,30 %	1,81 %
Painting shop	2,88 %	6,03 %
Installation other	6,90 %	4,83 %
Dispatching	4,03 %	7,24 %
SUMA for manufacturing	86,95 %	84,84 %
SALES	3,43 %	3,60 %
COOPERATION	1,72 %	2,72 %
OVERHEADS	3,09 %	2,97 %
TECHNICAL PREPARATION	3,43 %	5,08 %
INSPECTION	1,37 %	0,79 %
TOTAL SUM	100 %	100 %

Source: Own

Table 5 contains calculated levels of risk for the partial processes from the viewpoint of cost ratio based on the planned job card and the completed job. The calculation of the level of risk for the individual production operations from the viewpoint of cost ratio uses the following formulas, which are demonstrated on an example of the "Laser" operation:

$$Level\ of\ risk\ of\ the\ process\ (cost\ ratio)_{(Laser)} = \frac{Costs\ of\ partial\ process}{Total\ costs} \times 100$$

(25)

$$Plan \rightarrow Level\ of\ risk\ of\ the\ process\ (cost\ ratio)_{(Laser)} = \frac{28800}{145641} \times 100 = 19{,}77\ \%$$

(26)

$$Actual\ (profit) \rightarrow Level\ of\ risk\ of\ the\ process\ (cost\ ratio)_{(Laser)} = \frac{16800}{138878} \times 100 = 12{,}10\ \%$$
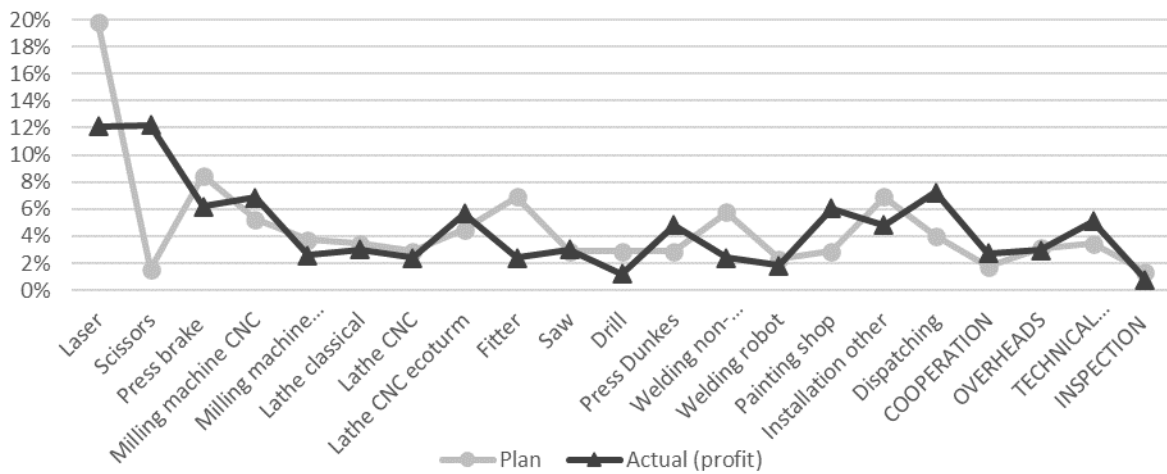
(27)

Figure 2. A graphic representation of the level of risk of partial production operations from the viewpoint of cost ratio

Source: Own

Figure 2 shows a comparison of the level of risk of partial production processes from the viewpoint of cost ratios for planned and actual jobs. The figure suggests that the most risky production processes from the viewpoint of cost ratio are "laser, scissors, press brake, milling machine CNC, welding non-certified, painting shop". The risks of partial production processes are different in the plan and in the actual result. The graphic representation in combination with Table 5 defines partial production operations and their level of risk from the viewpoint of cost ratio and thus makes it possible to optimize partial production processes or operations.

Table 6. Level of risk of partial production operations from the viewpoint of process added value

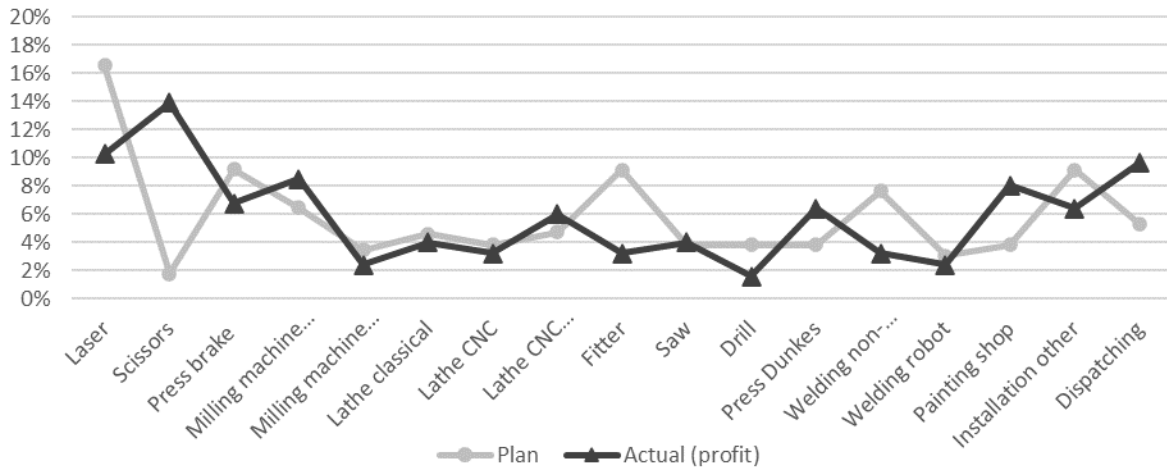| Production operation	Level of risk from the viewpoint of process added value	
	Plan	Actual (profit)
Laser	16,54 %	10,25 %
Scissors	1,76 %	13,89 %
Press brake	9,18 %	6,78 %
Milling machine CNC	6,46 %	8,51 %
Milling machine Horizontal	3,43 %	2,42 %
Lathe classical	4,57 %	4,01 %
Lathe CNC	3,81 %	3,21 %
Lathe CNC ecoturm	4,74 %	6,01 %
Fitter	9,14 %	3,21 %
Saw	3,81 %	4,01 %
Drill	3,81 %	1,60 %
Press Dunkes	3,81 %	6,42 %
Welding non-certified	7,62 %	3,21 %
Welding robot	3,05 %	2,41 %
Painting shop	3,81 %	8,02 %
Installation other	9,14 %	6,42 %
Dispatching	5,33 %	9,63 %
SUMA for manufacturing	100,00 %	100,00 %

Source: Own

Based on a comparison of the planned job card and the finished job, Table 6 shows the level of risk of partial processes from the point of view of added value. This calculation does not include processes that cannot be measured with time because this calculation method cannot be used to determine the level of risk from the viewpoint of the process added value of such processes. The calculation of the level of risk from the viewpoint of added value has been made with the formulas provided below, and the calculation is demonstrated using an example of the "Laser" operation:

$$Level\ of\ risk\ of\ the\ process\ (process\ added\ value)_{(A \to Z)} = \frac{Process\ added\ value\ _{(A \to Z)}}{Total\ sum\ of\ process\ added\ value} \times 100$$

$$(27)$$

$$Plan \to Level\ of\ risk\ of\ the\ process\ (process\ added\ value)_{(Laser)} = \frac{4439}{26833} \times 100 = 16{,}54\ \%$$

$$(28)$$

$$Actual\ (profit) \to Level\ of\ risk\ of\ the\ process\ (process\ added\ value)_{(Laser)} = \frac{3099}{30223} \times 100 = 10{,}25\ \%$$

$$(29)$$

Figure 3. A graphic representation of the level of risk from the viewpoint of the process added value of individual operations

Source: Own

From the point of view of the value added by the process, figure 3 compares the levels of risk of partial production processes. The figure suggests that the most risky processes from this viewpoint are "laser, scissors, press brake, milling machine CNC, welding non-certified, painting shop". There is a difference in comparison with the level of risk from the viewpoint of cost ratio, and the differences between the plan and the actual results are higher. We can conclude that the risks are proportional to the added value. The graphic representation, in combination with Table 6, defines the partial production operations and their levels of risk from the viewpoint of process added value. This makes it possible for the enterprise to optimize production in order to reduce the level of risk associated with partial production operations and, at the same time, increase their added value. The calculated levels of risk of partial production processes from the viewpoint of cost ratio and from the viewpoint of process added value specify the percentage risk in the entire production process. The provided calculations and tables 5 and 6 indicate that the high level of risk appears already in the plan because the production plan anticipates high risks. Based on the results, the enterprise should optimize production to reduce the level of risk associated with the job and complete it with the required margin.

Table 2 has been used for the evaluation of the overall level of risk for the partial operations and thus the entire production process. Table 7 contains imported calculations from MS Excel. Table 7 shows the evaluated levels of risk for the partial production operations based on the difference between the planned and actual results from the viewpoint of cost ratio and from the viewpoint of process added value.

Table 7. Level of risk of partial operations based on the difference between the cost ratio risk level and the process added value risk level.

Production operation	Level of risk	
	Plan	Actual (profit)
Laser	-3,23 %	-1,85 %
Scissors	0,21 %	1,69 %
Press brake	0,72 %	0,57 %
Milling machine CNC	1,23 %	1,65 %
Milling machine Horizontal	-0,28 %	-0,18 %
Lathe classical	1,12 %	0,99 %
Lathe CNC	0,93 %	0,80 %
Lathe CNC ecoturm	0,25 %	0,36 %
Fitter	2,24 %	0,80 %
Saw	0,93 %	0,99 %
Drill	0,93 %	0,39 %
Press Dunkes	0,93 %	1,59 %
Welding non-certified	1,87 %	0,80 %
Welding robot	0,75 %	0,60 %
Painting shop	0,93 %	1,99 %
Installation other	2,24 %	1,59 %
Dispatching	1,30 %	2,39 %

Source: Own

The calculation of the level of risk for the individual production operations from the viewpoint of process added value and cost ratio was performed using the following formula, which is demonstrated on an example of the "Laser" operation:

$$Level\ of\ risk\ = Level\ of\ risk\ of\ the\ process\ (process\ added\ value) - Level\ of\ risk\ of\ the\ process\ (cost\ ratio)$$

(30)

$$Plan \rightarrow Level\ of\ risk\ = 16,54\ \% - 19,77\% = -5,39\ \%$$

(31)

$$Actual\ (profit) \rightarrow Level\ of\ risk = 10,25\ \% - 8,70\% = -3,40\ \%$$
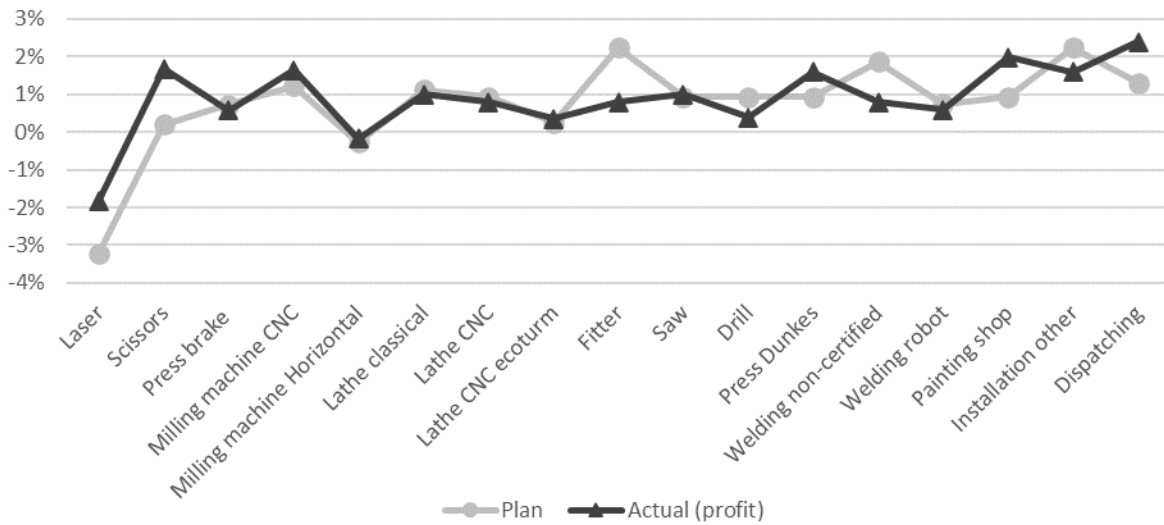
(32)

Figure 4. A graphic representation of the level of risk for partial operations in a one-off job

Source: Own

The calculations shown above in combination with figure 4 and table 7 indicate the levels of risk of individual partial operations. The calculation is based on the difference between the level of risk from the viewpoint of added value and the level of risk from the viewpoint of cost ratio. Based on table 2, which defines the risks, the riskiest process is "laser" because it demonstrates the highest risk in all the monitored situations; the medium level of risk has been found for "milling machine horizontal". On the contrary, the least risky processes are the operations "Milling machine CNC", "Fitter", "Dispatching" and "Installation other". The remaining operations can be classified as operations with medium to low risks.

The study showed that value added can be used as a way to measure risk in business processes, operations, and the production process as a whole (Panjehfouladgaran, Lim, 2020). The solution outputs demonstrated the validity of the first hypothesis, namely, that a lower proportion of value added in an operation results in a lower risk level. This is in direct opposition to the core aim of business, which requires organizations to concentrate on procedures and operations that provide the greatest amount of added value while addressing the possibility of increased risk (Bodnar et al. 2019). The solution for businesses is to establish consistency between the projected value-added level, cost pricing, and production process time limit. Clearly, processes that are less expensive and require less time generate lower levels of risk. As stated by Senova et al. (2017), it is crucial to identify and monitor the risks associated with time – and cost-intensive activities in the production process and to minimize errors that might negatively impact the flow and performance of business processes.

Using the pricing list items for the actual contract, it was determined that the most expensive activities involve automation, such as "laser, scissors, press brake, CNC milling machine, horizontal milling machine, CNC lathe ecoturm." This can be explained by the fact that the operation and maintenance of these tasks are time-consuming. Their activity is irreplaceable and one-of-a-kind in terms of value added, constituting a considerable cost item for the organization. The second hypothesis, which sought to determine whether automated activities contribute to a decrease in profitability, was not confirmed. This is evidenced by the fact that the "laser" operation generates the highest level of risk, whereas "shears, press brake, horizontal milling machine, CNC lathe ecoturm" operations generate a moderate level of risk. The remaining automated tasks have a reduced danger threshold.

The results were compared to those of other authors to figure out how important they were. Their findings are generally consistent with those of numerous other authors, including Blocisz and Hadas (2019). These writers found that the biggest risks happen during the planning phase of production, when the production schedule is made. The results of the authors' past scientific research, or at least some of the results, match the results of this work. Also, the field of sales and marketing, which is all about meeting customer needs, was found to be the most dangerous. These locations are anticipated to increase in significance. In the context of fluctuating prices, especially for energy and raw materials, input and output logistics are proving to be an additional high-risk aspect of the production process. As a consequence, it's natural that firms are looking for methods to significantly reduce expenses and rely heavily on outsourcing, for example (Hira, 2019). These subjects will be the focus of future study efforts.

The new method looks good, but it needs to be tweaked and tested in more corporate settings. A portion of the proposed procedure's benefits can be found in the field of creating estimates for prospective clients. The data can also be used to re-plan orders for potential customers, since knowing the risk level of previous orders will make the company's sales operations much more responsible and specific. This is in line with the results of Wallis (2020), who says that a company can't make its strategic plan or production plan without knowing what risks are involved in the process. Regardless of the technology or environment, company owners and managers must put in place strategies and procedures to guarantee a successful change management framework (Keengwe, Kidd, Kyei-Blankson, 2009). Regarding the relationship between the amount of value added by a process and the degree of risk, it is essential to identify and monitor the risks connected with the time and expense of the production process's operations. As stated by Senova et al. (2017), understanding the riskiness of operations is a necessity for avoiding repetition of past errors and determining the appropriate production process development strategies.

Conclusions

Even though the outputs and theoretical knowledge were judged to be good, it is important to evaluate them as a first approximation of the research goal. Risk analysis and assessment in the enterprise need to be looked at in more depth from an analytical and methodological point of view. As a next step, the newly established method needs to be tested on a group of test firms that are typical of different types and sizes of businesses.

The model company's approach was implemented with continual consultation and disagreement from its management. The management respected several comments during the solution's development. The production masters' remarks were extremely important since they represent a key factor in the analysis and removal of hazards. Another positive aspect of the solution was that in the model company, a process of new setup of the production process management and sub-operations, with concurrent validation of the system for the evaluation of value added in the production processes of the company in selected processes of the company, was in progress.

The COVID pandemic proved that the scientific study set was right, and it is expected that this problem will get worse in the business world. Already at this point in research, it is possible to assert that process risks can be removed in an integrated production process comprised of sub-operations, including the production planning and execution phases. This approach to risk will make it feasible to change the cost and overhead parameters, as well as the time aspects of production, while minimizing the amount of risk throughout the entire production process and its components. From this perspective, the research objective stated in this paper has been achieved; nonetheless, the results need to be modified, validated, and in some cases supplemented with extra information that the results suggest.

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RISKINESS OF VALUE-CREATING CORPORATE ACTIVITIES AND THEIR INFLUENCE ON STRATEGIC MANAGEMENT OF ENGINEERING COMPANIES[*]

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Abstract. This paper presents a procedure for definition and analysis of value-creating corporate activities on an example of a selected engineering company and a newly proposed calculation of riskiness of the production process. The risk calculation is based on an analysis of the value chain or value stream of its primary activities. Three research questions were formulated within the framework of the solution concerning differentiation of the value stream in serial and custom production, significance of individual primary processes for creation of the corporate margin and differentiation of the degree of risk between serial and custom production. The obtained outputs from the model engineering enterprise showed that the intensity of added value creation is lower in serial production than in custom production. In terms of the importance of the primary activities for serial and custom production in the value chain, the production process can be considered dominant from the viewpoint of margin generation, followed by the technical preparation process. In addition to the already mentioned reduced level of generation of added value, the lower average riskiness of the production process was also found for serial production compared to custom production. The graphical presentation at the end of the paper suggests a correlation between the level of added value creation in partial production operations and their respective level of risk. The authors of the article assume that the presented results have general validity for engineering production enterprises, which will be the subject of follow-up case studies on similar topics.

Keywords: value chain; value stream; process added value; riskiness of production process

JEL Classifications: G32, L11, L23

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1. Introduction

Companies in the corporate sector in general, including engineering companies, carry out their activities in a very difficult and demanding environment. This is true worldwide, and it has the greatest impact on developed national economies. Among other things, enterprises must face unexpected and unforeseen emergencies, most of which significantly affect their development, stability, and, in some cases, very existence. The current crisis has caused business restrictions and production cuts across nations due to various adopted measures. For this reason, some businesses need to eliminate unnecessary operating costs as much as possible, while others must reduce them to survive the current economic decline (recession). Every business faces the strategic challenge of finding new solutions to gain a competitive advantage. One possible solution is the decomposition of business processes based on their contributions to the added value generated by the company, as proposed by Porter (1985) and other authors; the processes can be used as described in the previous articles on supply chain. The analysis will make it possible to understand the decomposition of the primary activities in the supply chain into partial activities that contribute to the relative cost positions in the supply chain, and it will form the basis for their actual optimization with the objective of maximizing profit. For this reason, enterprises want to be competitive not only at the times of growth, but they must continuously adapt to the market even at the times of crisis to satisfy their customers and themselves. (Koc & Bozdag, 2017; Bedeley et al., 2018). Porter (1985) and his followers (added from previous articles) classify five primary activities as general activities in the supply chain of an organization's value chain, specifically input information management and processing, provision of resources, production and operations, and output operations management and services (Shobayo, 2017). Enterprise infrastructure, technological development, workforce management, and marketing are classified as supporting activities that create preconditions for the quality implementation of the primary activities. Mapping of value streams in an enterprise creates a basis for the development of value maps of the respective enterprise (Flanagan et al., 2018; Straková et al. 2021). In the current era of the worldwide coronavirus pandemic, business entities are threatened by serious risks, and one can agree with the authors' opinion (Straková et al., 2020) that the unique value chain in close cooperation with other components of the business environment is now becoming the crucial point for finding the competitive advantage, and that it is not possible to look for the competitive advantage only in the internal environment of business entities. When examining strategic risks associated with value creation activities, it is critical to achieve a successful interaction between the internal and external environments of the business, as this will help ensure the long-term success of the business (Kasych and Vochozka 2017). Managers who do not recognize prospective risks will not be able to adapt to future risks (Meinel, Schüle 2018). As already mentioned, risk management is dependent on the company's management, which sets the direction of the company. Risk aversion in strategic decision-making will determine the direction the company will take (Benischke, Martin, and Glaser 2019). Based on the classification of primary and secondary activities of an enterprise, the authors present a new approach to the identification, evaluation, and elimination of enterprise risks with the aim of increasing the competitiveness and profitability of the enterprise as its basic strategic goals at the present time. The article offers a fresh viewpoint on company risk-taking, claiming via various case studies that critical business risks include those linked with the sale of their goods (Korauš et al. 2021; Croitoru et al. 2021).

2. Theoretical background

Each project is different in terms of its size, how it is managed (its context type), and how it can behave. Jaime et al. (2016) also talks about the project's five stages: start, plan, implementation, evaluation and control, and end. Regardless of the technology or environment, managers and leaders of businesses must have strategies and processes in place to ensure a successful change management framework (Keengwe, Kidd, Kyei-Blankson, 2009). As a result, it's unsurprising that organizations are searching for ways to dramatically decrease costs and use outsourcing as a key business strategy, for example (Hira, 2019). The analysis of business processes in terms of their contribution to the margin or profit generation helps businesses generate a competitive strategy and grow the

value of the business itself (Ponomarenko & Sergeev, 2017; Clay & Feeney, 2019). In the value chain, especially in its primary activities, the relationship between a business entity and its end customer gets closer (Dobrovič et al. 2016; Boaventura et al., 2018; Mihalčová et al. 2021; Trypolska et al. 2022; Šimberová et al. 2022). Application of the value chain in business strategy allows a new perspective on the management of business operations, including the management of resources, goods, processes, financial resources, customer needs, and by-products and services (Zhang & Gallagher, 2016; Thomas-Francois et al., 2017). The value chain and its model identify how the enterprise achieves added value (Tang & Zhang, 2017). A value stream is a process that occurs during the actual production performed by the enterprise that is created in the value chain and can be measured as the added value for the respective product (Wang et al., 2020). It maximizes the added value by drawing on technological, market, and institutional capabilities to enhance the productivity and competitiveness of the business entity (Kilelu et al., 2017). Competitive intensity is considered the main factor used to understand the performance of an individual business entity, and added value is characterized as the core analytical concept to evaluate the performance of a business entity (Rodrigues et al., 2016). The concept of added value is becoming an important topic in the development of corporate strategy, and it will continue to receive more attention (Klimecka-Tata & Ingaldi, 2020). Processes and activities that generate added value lead directly to the creation of products and services that are demanded by the business entity's consumers (Shou et al., 2020). The Porter's value chain characterizes business entities as systems made up of inputs, transformation processes, and outputs (Simatupang et al., 2017). Porter (2008) identifies five factors affecting the competitiveness of enterprises: rivalry among competitors, bargaining power of suppliers, bargaining power of customers, threat of new entrants, and threat of substitute products or services (Keller et al., 2017). Further, the value chain contains production factors, such as land, labor, capital, and technology, and it also contains economic activities, such as purchasing, transportation, handling, distribution, and marketing (Stehel & Vochozka, 2016; Brečka and Korauš 2016; Ferdous & Ikeda, 2018; Korauš et al. 2020). In the value chain, each business activity is not only a component of the process that creates value, but it is also a component used for the elimination of corporate resources that generate costs for the business entity and gives rise to cost management and pricing in accordance with the value chain (Ma et al., 2018). The value generated by the value chain is the amount of money for which the customer purchases the product, and this amount shall be much higher than the costs; this is the principle of survival in any business (Nagy et al., 2018). Some of the latest theories identify important aspects extending the value chain, which include energy, information, and attention. The key role of energy is in thermodynamics and ecological activity; the role of information is in increased digitization; and the role of attention is in monitoring the market value of the company (Noga et al., 2020). In the current era of globalization, the concept of the global value chain has emerged, which represents the value of all activities, from the production phase to delivery to customers across the world (Oliveira et al., 2019). A sustainable value chain applies procedures that improve current production and its environmental performance with the intention of achieving social and economic improvements (Brennan & Tennant, 2018; Anthony Jnr, 2019). The very aim of a sustainable value chain is to optimize resources with their proper alignment and focus on management of all activities along the value chain within the business entity (Degato & Carlos, 2017; Anthony Jnr, 2019). On a global scale, there is an urgent need for higher sustainability and significant improvements in the way businesses manage sustainability (Cavaleri & Shabana, 2018; Song et al., 2018). Also, a strategic risk analysis contributes to a proper value chain and its analysis (Straková et al., 2020; Sotnyk et al. 2022). An efficient enterprise manages its risks in a way that ensures the necessary production and reliable manufacturing (Klober-Koch et al., 2017). A strategic risk analysis is effective only if it is supported by strategic management; a well-executed analysis improves management of the business processes and minimizes negative impacts on work efficiency and other business activities (Walaszczyk 2016, Virglerova et al., 2020). According to Man, Radu, and Tabor (2015) and Pour et al. (2019), a strategic risk analysis is influenced by many aspects, and human resources are among the factors associated with the highest risk. Blocisz and Hadas (2019) believe that the greatest risk is in the first stages of the production process. In connection with the identification of risks associated with the production process, Pakocs and Lupulescu (2017) mention, among others, trademarks, patents, production know-how, the risk of counterfeiting, and the disclosure of company secrets. The value chain, as one of the basic tools for the formulation of a successful competitive

strategy (Straková et al. 2020, Straková et al. 2021), also facilitates an effective strategic risk analysis. Since the intensity of the production process and the associated risks are highly differentiated according to the above-mentioned categorization (size and industry), the analysis of strategic risks and their elimination also depend on the size categorization of companies and on the specific industry (Váchal, Pártlová, and Straková 2017). The current era, along with risk analysis, makes businesses understand that the use of the latest technologies and an innovative approach provide them with a competitive advantage that is determined at the time of the creation of the value chain (Hensen & Dog, 2020, Straková et al. 2021).

In accordance with the conducted research and the focus of the research activities, the following research questions were identified to meet the defined objective:

1. Are there any discrepancies (e.g., in time, cost, space, or personnel) in value streams between serial and custom production?
2. Do the primary business processes have roughly comparable shares on the corporate margin?
3. Is the riskiness of business processes higher for serial production compared to custom production?

3. Research objective and methodology

A value analysis of business processes will be performed at a selected company, whose name will remain anonymous for data protection reasons. The enterprise deals with the manufacturing of school and office furniture. It is a medium-sized enterprise that has been on the market for 30 years. The company focuses mainly on serial production, while its production capacity is supplemented with custom production (piece production), according to customer preferences. The company's custom production is offered according to a catalog. The company's main business activity, according to the CZ-NACE categorization, is manufacturing industry, specifically CZ-NACE C-31.0, manufacture of furniture; C-28.23, manufacture of office machinery, except computers and peripheries (specifically manufacturing of school boards; whiteboards and chart boards). The enterprise also cooperates with a plant that manufactures industrial electrical installations and power distribution equipment. The cooperation consists in custom production according to the requirements of the plant—in a production center specialized in metalworking. The collaboration was prompted by the manufacturing plant's lack of capacity, which resulted in the transfer of a number of production machines to the company under consideration, which gained new revenue opportunities.

The value analysis of the primary processes in the company will be carried out using a descriptive method that will characterize partial components of the value-creating processes and activities of the company. The input information for the descriptive method will be obtained from the company's information system, and the information and process parameters will be provided by the company's technical director, subject to the commitment to keep the name of the company anonymous. A summary enterprise value stream will be generated and classified both for its serial and custom production. According to the equations provided below, the "process added value" will be determined, and from it, the "riskiness" of the production process. The process added value will be determined from partial production processes based on job cards, which contain all in-house information related to the production process of the company. The added value and riskiness of the production process will be monitored for the serial and custom production of the enterprise.

Calculation of the process's added value for partial production processes:

$$
\begin{aligned}
Process\ added\ value_{partial\ production\ process} \\
= Planned\ oper.profit \\
\times \left[\sum \left[\left(\frac{Cost\ price_{(A \to Z)}}{Sum\ of\ costs\ for\ production} + \frac{Number\ of\ worked\ hours_{(A \to Z)}}{Total\ number\ of\ worked\ hours} \right) \div 2 \right] \times \left(\frac{Sum\ of\ costs\ for\ production}{Total\ costs\ sum} \right) \right]
\end{aligned}
$$

(1)

Determination of the average riskiness for the production process:

$$Process\ riskeness\ (avg.process\ added\ value)_{(produciton\ process)}$$
$$= \left(\frac{Aveg.\ value\ of\ process\ added\ value\ _{(A \rightarrow Z)}}{Total\ sum\ of\ process\ added\ value}\right) x100 \tag{2}$$

Based on the results, it will be possible to figure out which production process has the highest process value and, at the same time, the highest risk. So, an effective tool will be made to show the risk of the selected company's production process.

The model value chain includes primary and supporting activities that make up its overall value system and the value of the entire chain. Figure 1 shows the analyzed value chain for the concerned enterprise.

Figure 1. Value chain of the concerned enterprise

Source: own

In the first step of the solution, each activity in the company's value chain was described and rated, and its primary and secondary functions were set apart.

Analysis of primary activities

The management and processing of input information is the first primary activity handled by the company´s sales department, which is responsible for processing orders and purchasing necessary materials. The company's sales department cooperates with foremen of other departments, and based on applicable requests, they are supplied with materials in an effective and regular manner. Even so, there are sometimes not enough supplies, and the company is working on making this situation better. Most of the inventory is managed operationally. The company has three warehouses divided according to the material; a small warehouse contains basic and safety equipment used in the production. Another warehouse inside the complex contains material for the furniture production process (wooden panels, chipboards, moldings, seat cushions, etc.), and a newly built storage hall also houses material for metalworking and material used in cooperation with the manufacturing plant (sheet metal, bars, tubes, plastics, etc.).

Production and operation - The primary production of the company consists of school and office furniture. The main products of the company are chairs, tables, cabinets, etc.; another main product of the company are school

boards. In 2018, the enterprise opened a new production line that serves as a pre-production for the manufacturing plant dealing with industrial electricity installations. This production involves metal sheet and plastic sheet cutting, punching, and other works as requested by the manufacturing plant. Due to the different characteristics of the two production processes, two tables have been created to describe and characterize the value streams of a company's orders: in the serial production and in the custom production performed in cooperation with the manufacturing plant or based on other customer requirements. To improve the company's competitiveness, the production process is continuously optimized and improved. The individual production operations are linked to each other, and the premises are adapted to the process. In the production process of serial production, the first operation is the cutting or burning of the required material according to the catalog with a saw or laser. The next step is the welding of individual parts, and then the product in its basic form goes to the coating plant to be painted the required color. From the coating plant, the product is moved to the assembly department, where it is finalized. The last but one step is packaging, and the last step is dispatching the product to the end customer. The custom production for the manufacturing plant operates on request, and partial production activities produce the products; there is no assembly, only packaging and dispatching of the products to the manufacturing plant.

Management of output operations - The concerned enterprise manages output operations by scheduling individual orders. Equally as important as the unloading of materials, the loading of the products takes place in the company complex, both from the warehouse of the stored custom-made products and from the metalworking production hall, to ensure the safety of the individual products. The dispatching is carried out in cooperation with the sales department, which oversees the purchasing of material, the receiving of orders, and the dispatching of partial orders. The company has its own small transportation fleet, so the dispatching is carried out on request by company vehicles or by external forwarders. Dispatching of metal products for the manufacturing plant is performed as described above daily. The company has several regular customers in the Czech Republic and in other European countries, mainly Austria, Germany, and the Netherlands. The latest major cooperation has been established with IKEA.

Services - Services in the company emphasize the quality of the products. Inspections are carried out for various partial activities, and the maximum inspection focus is on assembly and subsequent packaging to prevent damage to the products during transport. The company also provides warranty and post-warranty service and spare parts for individual products where parts can be replaced. In the event of a complaint, the company is able to replace the product with a new one or repair it. Other services provided by the company are related to the fact that it offers assembly of the delivered products so that they can be used immediately. In addition to customer service, the company provides its employees with subsidized meals in a company canteen located in a neighboring complex. It also provides its employees with drinks at the workplace, and more information is provided on a notice board located at the entrance to the building.

Analysis of the support activities

Infrastructure of the company - In recent years, the company has switched from paper records to electronic records to reduce costs and time intensity. The company uses the internal accounting software HELIOS. The use of in-house accounting staff eliminates the problem of having to deal with external accountants and allows the company to solve any issues immediately. The company has a linear organizational structure, which eliminates the problem of communication noise at the workplace. The individual powers and responsibilities of the staff are identified and specified. The company also applies international ISO standards, specifically the Quality Management System according to ČSN EN ISO 9001:2009, the Occupational Health and Safety Management System according to ČSN OHSAS 18001:2008, and it holds the Environmental Management System certificate. The infrastructure has been expanded, with a newly built production hall now used for custom production in cooperation with the manufacturing plant and as a warehouse for materials used for this production.

Technological development - The company addresses the technological development of its production of school and office furniture by modernizing its production machinery. For this reason, the uniqueness of joinery production lies in its human resources. In the last two years, the coating plant has been modernized, and a new welding robot has been acquired. The coating plant has been upgraded with new automatic nozzles, which has increased painting speed. In tandem with the increased painting speed, a new welding robot has been acquired to weld unique types of chair sets and to improve weld quality and production speed. The aim of the technological development of the company is to improve the quality and stability of the production process and, at the same time, reduce the time intensity of the partial production processes.

HR management - The HR department oversees managing the company's personnel. The enterprise has a low employee turnover rate, and in recent years the enterprise has created new job opportunities due to the increasing demand for its products as well as due to the cooperation with the manufacturing plant. To fill the vacancies, the enterprise approached employment agencies that provided workers from abroad. The enterprise believes there is room for improvement in further education and regular training of the employees; currently, the company provides regular induction training and other training is provided on an as-needed basis. The enterprise does not currently offer paid training opportunities; however, it is considering improvements in this area. The enterprise's wage policy is at a medium level, and prior to the Corona crisis, the wages were growing every year due to increased demand for its products as well because of the newly introduced cooperative. The company is one of the leading employers in the area.

Marketing - In comparison with other companies, the enterprise pays less attention to marketing as its customers are mainly educational institutions. The company mostly uses its website, which includes a virtual tour of the production facility. Another marketing activity is an offered excursion to the facility. The company has set up an area in its building with products on display that visitors can try in person. Attention is also paid to the support of many social and cultural activities (Protected Workshop Proutek, Naděje Brno, Třeboň Theatre Festival, Auticentrum, School of Sight). The company is also classified as "green".

4. Results and discussion

Results of the calculations are presented in Tables 1 and 2.

Table 1. Value stream of the order in serial production of the company

Company department	Definition of activity	Order flow
Sales + Marketing	Product selection based on the catalogue of products, meeting the customer's requirement	1) Customer→ Inquiry
Sales + Marketing	Order execution, order processing, preparation and conclusion of contractual terms and conditions	2) Order
Sales	Scheduling of the created order based on the agreed delivery date	3) Planning
Sales	Checking of inventory levels, any missing materials are ordered	4) Supply of material
Production	Ensuring the production process based on the received drawings and schedule	5) Production Process
Production	Final inspection by employees responsible for the corresponding production processes -> subsequent packaging of the product	6) Quality Inspection → Packaging
Logistics	Completion of the order based on the order card, preparation of the order for dispatching	7) Warehouse
Logistics	Transportation of the order by the company´s means of transport or the order is handed over to an external forwarder	8) Dispatching
Logistics + Production	Based on the order the product may be also assembled, servicing and maintenance are also available	9) Services

Source: Own

In serial production and its value stream, as shown in Table 1, the increased complexity of the company's production process is obvious in terms of the involvement of all activities in the production process. All the departments are involved because the products are made based on the company's catalog of products. Although the complexity lies in the involvement of all the departments, activities in those departments are mostly automated, and therefore the process is not too demanding in terms of organization of the production or creative approach. For this reason, no higher added value is generated, as is the case with custom production (see Table 2). The table shows a difference in the number of workplaces involved, which is lower than in serial production, but their activities are not of the same administrative and regulatory nature as in serial production. The activities are creative and innovative, resulting in a higher added value in custom production. At the same time, however, it can be assumed that the degree of uncertainty in the serial, repeated production is considerably lower than in the custom production.

Table 2. Value stream of the order in custom production of the company

Company Department	Definition of activity	Order flow
Sales	The order is placed immediately based on the needs of the manufacturing plant, preparation, and conclusion of contractual terms	1) Manufacturing Plant (Customer) → Order
Sales	Creation of the order schedule, checking of inventory levels, any missing materials are ordered	2) Planning + Material Supply
Technical Department	Drawing documentation goes to the metalworking workplace	3) Delivery of Documentation
Production	Ensuring the metalworking production process, the production process takes place at one workplace only, in the production hall with applicable production machinery	4) Production Process
Production	Inspection is carried out during the manufacturing process based on specified dimensions and requirements	5) Quality Inspection
Logistics	The order is completed based on the order card, prepared for dispatching on external pallets and handed over to the carrier of the manufacturing plant	6) Warehouse → Dispatching

Source: Own

In the case of the serial production that was looked at, the company does not do any assembly at the place of delivery. This lowers the price of the product, which makes sense. Custom production is different from mass production because it uses non-traditional production methods, information sources, and ways of working. This makes the whole custom production process riskier, but it also increases the margin and adds value. Using these attributes, the riskiness of both types of production has been calculated.

A computational model for serial and custom production processes adds value and allows for risk analysis.
Input parameters for the computer model that was used to analyze the value added by the process and the risk of the process in enterprise serial and custom production:
- Invoiced price to customer: price excluding VAT → [211 500 CZK]; [150 000 CZK]
- Cost of materials: [37 500 CZK]; [20 000 CZK]
- Amount spent on
    o Production: price based on the costs and time in hours → [76 600 CZK]; [53 400 CZK]
    o Sales: Price to ensure ... % margin → [5000 CZK]; [3 500 CZK]
    o Overheads: [3 000 CZK]; [5 000 CZK]
    o Technical preparation: [3 000 CZK]; [5 000 CZK]
    o Services: [1 000 CZK]; [0 CZK]
- Total operating costs: [126 100 CZK]; [80 400 CZK]
- Operating profit: [86 400 CZK]; [69 600 CZK]

Calculation of the process added value for the serial or custom production:

$$Process\ added\ value_{partial\ production\ process}$$
$$= Planned\ oper.profit \times \left[\sum\left[\left(\frac{Cost\ price\ _{(A\to Z)}}{Sum\ N\ for\ production} + \frac{Number\ of\ worked\ hours_{(A\to Z)}}{Total\ number\ of\ worked\ hours}\right) \div 2\right] \times \left(\frac{Sum\ N\ for\ production}{Total\ sum\ N}\right)\right]$$

(3)

$$Process\ added\ value_{coating\ plant\ of\ the\ serial\ production} = 66400 \times \left[\left[\left(\frac{8800}{76600} + \frac{8}{82}\right) \div 2\right] \times \left(\frac{76600}{93600}\right)\right] = 5772\ CZK$$

(4)

$$Process\ added\ value_{ser.production\ activities} = \sum_{ser.production\ activities} 54340{,}17 CZK$$

(5)

$$Process\ added\ value_{punching\ machine\ of\ piece\ production} = 69600 \times \left[\left[\left(\frac{12000}{53400} + \frac{8}{82}\right) \div 2\right] \times \left(\frac{53400}{66900}\right)\right] = 13017\ CZK$$

(6)

$$Process\ added\ value_{piece\ produciton} = \sum_{piece\ produciton\ activities} 55555{,}15\ CZK$$

(7)

The process added value calculations show a higher process added value in the production process for custom production than for serial production.

Determination of the average risk value for the serial or custom production:

$$Process\ risk\ (avg.process\ added\ value)_{(production\ process)}\left(\frac{Avg.value\ of\ the\ process\ added\ value\ _{(A\to Z)}}{Total\ sum\ of\ added\ value}\right) x100$$

(8)

$$Process\ risk\ (avg.process\ added\ value)_{(serial\ production)} = \left(\frac{3622{,}678}{54340{,}17}\right) x100 = 6{,}67\ \%$$

(9)

$$Process\ risks\ (avg.process\ added\ value)_{(piece\ produciton)} = \left(\frac{9259{,}193}{55555{,}15}\right) x100 = 16{,}67\ \%$$
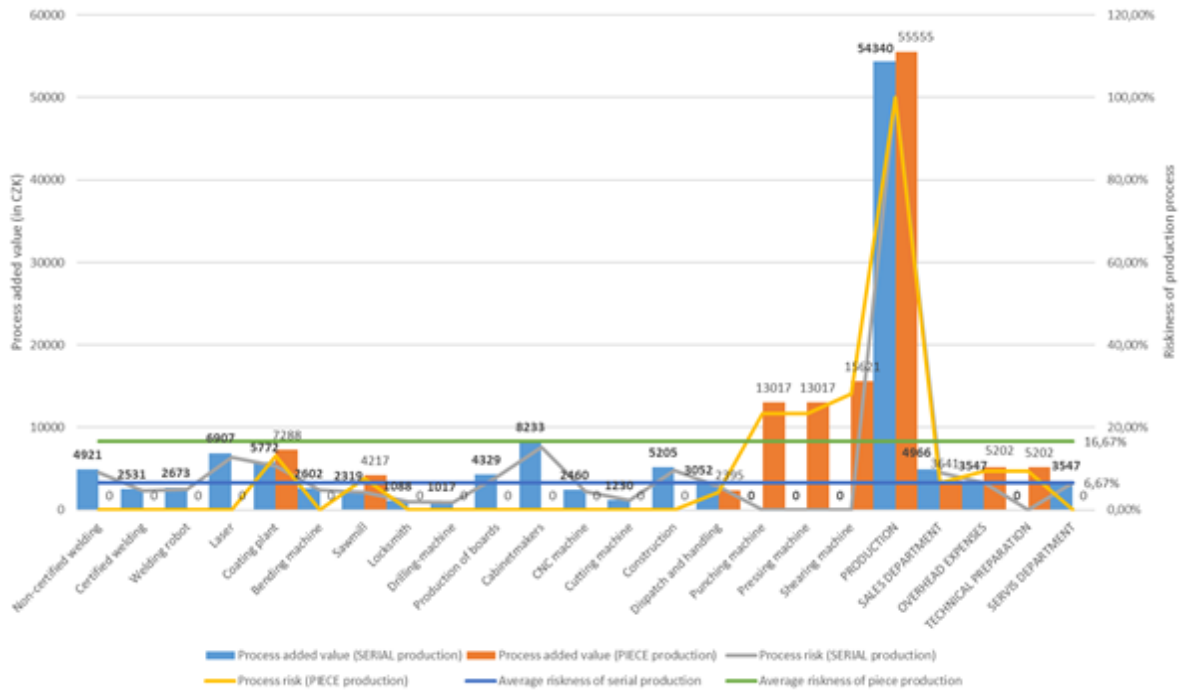
(10)

Figure 2. Process added value with riskiness of production process

Source: Own

In the next part of the solution, the calculation of the risk level for the analyzed types of production was carried out. The graphical representation clearly indicates that the serial production of the enterprise carries less process risk than custom production. The average process risk of the serial production is lower since this production process does not involve as much new preparatory (design) work, budgeting and pricing activities, or new workflows when compared to the custom production. At the same time, macroeconomic parameters (e.g., resource uncertainty, inflation, currency, employment, etc.) affect custom production much more than serial production. The average risk is lower for serial production because the risks can be eliminated or corrected during the serial production process. The risk is higher for custom production, as mentioned above, because the process is more complex and demanding, both in terms of production and organization, and, finally, recently also due to staffing issues. According to the company managers, the outputs are of crucial importance for the correction of the company's business strategy, both in terms of the definition of its business portfolio and the technical and technological equipment of the company, including the provision of necessary human resources.

The results presented in this paper resonate with findings gained abroad. For example, Clay & Feeney (2019) state in their conclusions that knowledge of the value of business processes contributes to the efficiency of business activities; the creation of strategies contributes to the efficiency of business activities, the creation of margin; and, last but not least, the development of a new business strategy. Similar conclusions were expressed by Boaventura et al. (2018), who brought the issue more towards the end customer and its relationship with the business. Along with the definition of the value chain, an analysis of value streams for serial and custom production was performed, and in this regard, one can agree with Wang et al. (2020), who define the value stream as a process created during production as well as the added value and stated margin that the company sets in relation to the added value. On the contrary, the value chain analysis of the enterprise did not confirm the results of Noga et al. (2020), who extended the value chain to include the aspects of energy, information, and attention. It is because the

enterprise is classified as "green," but its involvement in ecological activities could be greater, especially when it comes to the use of renewable resources. It should be noted that the enterprise is only working on its digitalization, which may also play a significant role in the creation of added value as well as the elimination of risks. In terms of the set research questions, the following conclusions can be drawn:

On the basis of the determined value stream in serial and custom production, there have been found to be significant differences, especially in the way that different departments of the company, or individual processes, are involved. This naturally leads to big differences in how production is planned, where materials come from, and how the production process itself is managed, as well as how orders are finished and sent out, including putting things together and giving services.

In line with the indicated outputs, the first research question can be answered positively. The discrepancies between serial and custom production in terms of process flow, process localization, personnel intenzity, and, last but not least, efficiency, have been demonstrated. The answer to the second research question is negative because the findings clearly indicate that the added value is higher for custom production compared to serial production. Respecting the economic principle that added value depends on the invested human labor (creative activity), the share of creative activities is clearly higher in custom production than in serial production. Calculations of the process added value have positively shown that the highest added value is generated in the production department, especially in custom production, while the preparation phase and the sales department are also significantly involved. However, the importance of the production process is also evident in serial production, but with a lower process value. The primary business processes are important in both types of production evaluated, but their values are significantly different.

The goal of the last research question was to find out if business process risks are higher in serial production than in custom production. Based on the process risk calculations and the data presented in Figure 1, the answer to the research question is negative. The risk of the serial production was determined at 6.67 % compared to the custom production, where the risk was found at 16.66 %. The reasons for the findings include the complexity and difficulty, uniqueness and originality, as well as the dependency on personnel of the custom production compared to the serial production.

Conclusions

In the current economic environment, the issue of the riskiness of value-creating corporate activities and their impact on the strategic management of business entities can be considered one of the tools to improve the competitiveness and profitability of companies. The topicality is enhanced by the ongoing COVID pandemic and the decline of the economy worldwide and in Europe. It is no coincidence that businesses have increased their interest in this issue in recent years. Nowadays, it is generally agreed in the corporate environment that a corporate strategy is also a business strategy. As a result, it can be concluded that knowledge of value-creating processes in a company is a basic prerequisite for setting up a competitive corporate portfolio. The importance of understanding corporate processes in terms of their value is also demonstrated by the fact that most companies apply process-based management instead of functional management. A gradual introduction of business process supervisors in enterprises that achieve exceptionally positive economic results is not accidental; it is a targeted effort of their managements to generate competitive corporate strategies.

The categorization of a company´s primary and support activities is a prerequisite for the definition of general procedures to achieve competitiveness of the company on the market as well as to create added value for its customers and itself. Understanding not only the value chain but also the determination of the process added value and risks of partial activities of the enterprise was the main objective of the paper.

The authors are aware that this is only the first approximation of the results, whose value they do not overestimate; at the same time, the obtained outputs indicate that the defined direction and the selected methods to solve the problem can be useful for further follow-up research activities in this area. It is objective to state that some enterprises, with which the authors of the article have been cooperating for a long time, already analyze their primary functions from the viewpoint of their value at a practical level using their pragmatic knowledge. They use results from their internal analyses for management purposes. This situation in corporate practice has motivated the authors to accelerate the solution and to propose a new methodological procedure for the generation of a corporate strategy based on an analysis of their processes.

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CREATIVITY IN TIMES OF WAR AND PANDEMICS

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Abstract. The paper analyzes issues of creativity in times of war and pandemics, its concepts, origins, and possible development, together with the techniques and features it can be characterized by. It describes the potential present in each of the examined cases brought by the times of unrest. The scope for defining creativity in times of war and pandemics is broad and results in many manifestations. The discussion turns around the concept of creativity in everyday life and its applicability. The authors investigate whether and how to prove the interrelation of creativity to war and pandemics. They also discuss the emergence of creativity in war and pandemics because of provoked human imagination and the urgent necessity to act.

Keywords: crisis; creativity; businesses; pandemics; war

1. Introduction

According to Serbian Professor Emerita Milena Dragićević Šešić, our countries, meaning the ones that regained their independence in or around the 1990s, live in the "most turbulent and crisis-ridden" times (Dragićević Šešic & Sanjin Dragojević, 2005, p. 15). Her book is dedicated to the transformations in society at the dawn of the Millennium (Dragićević Šešić & Dragojević, 2005). However, it speaks about the political changes that were running before 2000 (with the hope that the "armed conflict and destruction" were gone), which is still relevant. Sadly enough, those crises in the Balkans had already left behind a "legacy of hatred, prejudice, and high levels of pathological social behaviour when the world confronted a new war. " (Dragićević Šešić & Dragojević, 2005, p. 15). Those decades are now often called t*urbulent times*, as every day we have reminded of a sort of a Hollywood movie: "Fasten your seat belts, it's going to be a bumpy night", as a character played by Bette Davis in "All About

Eve," says. (This famous line is spoken by Margo Channing, played by Hollywood actress Bette Davis, in the movie All About Eve, 1950, 20th Century Fox). Creativity is now envisioned as a panacea "for all the ills of the social system" (Dragićević Šešic & Dragojević, 2005, p. 15), including the most modern paradigm of the Ukrainian war. "In the case of the Balkans, even during times of war, creativity hubs were expected to go ahead with their transformation, despite the legal, political and economic systems to support the transformation in culture had not been established", professor Dragićević Šešic re-considers the issue (Dragićević Šešic, 2021). In turbulent circumstances, the creative industries/initiatives that, among other issues, suffered from the lockdown and the war are seen as the most vulnerable business. The recent article by Dragićević Šešic (2021) discusses the economic changes that occurred over the recent several years, which triggered the artistic initiatives. The artists complemented the world's "performance" with their creativity and demonstrated the surrender to the "turbulences**".**

Christopher Scanlon (2005) raises a valid question of whether creativity is a realm of exclusively artistic activities or is more of a generic origin. One thing is sure that we might say: these buzzwords "are much overused and abused nowadays" (Scanlon, 2005, p. 134). Indeed, he is correct that "creative" and "creativity" have recently become mantras in business texts.

As Scanlon mentions, "the increasing interest in creativity owes no small debt to Richard Florida, Professor of Public Policy at George Mason University." Florida is one of the most famous creativity gurus of the century and the author of numerous books on the importance of creativity to individuals, firms, cities, and regions. Florida put particular emphasis on the emergence of what he refers to as the "creative class", meaning the "individuals who work in jobs which require some form of personal input or expertise, which includes artists, writers, sculptors, software engineers, graphic designers, scientists, and academic researchers. Such people, according to Scanlon, show that Florida claims the mentioned jobs account for around one-third of the US workforce and are the key to generating economic value" (Scanlon, 2005, p. 134).

Among the major issues in the contemporary world that we confront in the multiple areas of human activities, Milena Dragićević Šešic mentions globalization, migrations, the COVID-19 crisis, new labour ethics, post-truth environment, climate change**,** global warming, and especially populism, authoritarianism, and dictatorship (Dragićević Šešic, 2021, p. 2).

Another author, Matthew Roberts, quoted by Scanlon (Scanlon, 2005, p. 134), thinks that creativity, design, and artwork can help a lot, often in ways you cannot always predict. Ukrainian creative frontline has become a significant force in repelling the russian full-scale invasion of this peaceful country that is now fighting for its freedom and independence. The article's authors further examine the basic concepts of creativity and its transformations during war and pandemics.

The research aims to investigate the methods and particularities of creativity in times of war and pandemics.

Objectives of the research:
- to present the concept, benefits, and role of creativity in times of war and pandemics in scientific studies;
- to summarize the knowledge of creativity in times of war and pandemics;
- to apply the case study method relating it to creativity in practice in times of war and pandemics.

Methodology

The article uses the methods of theoretical analysis, empirical research, and case study analysis. The analysis of scientific literature is an academic research method. While reading, analyzing, and comparing, its essence is that the authors evaluate the previous scientific literature in a particular field and assess the current situation, solving a specific problem. This section provides the context of the study and demonstrates its importance to the study. The purpose of the analysis of scientific literature is to base the investigative and analytical part methodologically.

The empirical part is a periodical literature review of the chosen time, which is dedicated to quantitative changes in business during pandemics. Case studies are widely used in all areas of the social sciences. Case studies are used as a reliable research strategy. They are one of the most common methods for conducting qualitative research. In this article, the cases examine creativity applied in the humanities during the war.

The article consists of an introduction, a theoretical part, a research part, a discussion, and conclusions. The article's introduction describes the topic's relevance, the problem, the purpose of the research, tasks, methods, and methodology. The theoretical part of the article describes the concept of creativity and the practices of creativity during political unrest. The third part of the article analyzes cases of creativity during pandemics and war. A discussion and conclusions are presented.

The input of this study is to develop theoretical and empirical arguments about the use of creativity in the case of pandemics and war. In addition, the possibilities of promoting creativity in pandemics and war are examined in detail, using the issues of Lithuania and Ukraine.

2. Theoretical background of creativity in times of war and pandemics

2.1. Creativity concept
Creativity is the ability to develop new ideas, think independently, non-stereotypically, orientate quickly in a difficult situation, and solve it efficiently and atypically. In addition, creativity is the ability to create new things, products, and services. In addition, creativity is the ability to look at an event or phenomenon in a way others need to learn, manage, or understand.

According to Jalan and Kleiner (1995) creativity is best described as the degree to which an employee demonstrates new ideas or adaptations to activities and solutions at work. There are obstacles to fully developing the creative potential of both organizations and individuals. These obstacles can be overcome with the help of exercises offered by psychologists.

Cook (1998) mentions that the success of product and service innovation depends on creativity, which is a crucial factor. With a healthy and constant supply of ideas, most organizations would continue to exist. The critical challenge facing leaders in the 21st century is how to capitalize on personal potential and harness it to create organizational innovation and excellence.

Martins and Terblanche (2003) mention that values, norms, and beliefs that play an essential role in creativity and innovation can support or inhibit creativity and innovation, depending on how they affect individual and group behaviour.

Gomez (2007) examines these different definitions of creativity, the link between creativity and intelligence and those factors that affect creativity, such as convergent and divergent thinking. In addition, the article examines the importance of computer technology, testing ideas, thoughtful review, and evaluation of thoughts.

Yar Hamidi et al. (2008) notice that creativity needs are to be taken into account in entrepreneurial intent models. However, using intentions as a dependent variable has drawbacks, as it may not distinguish between 'dreamers' and 'doers'.

Zenker (2009) mentions that the creative class as a target group is trendy in local marketing. This paper discusses the needs and preferences of this target group and the need to define the creative style more precisely.

Klijn et al. (2010) notice that a lot of varied research has been conducted on creativity in organizations, but a comprehensive review document on organizational creativity still needs to be added. This document satisfies the need for a survey. The findings of this paper provide a well-documented framework for addressing measures to enhance creativity in an organizational setting. In addition, it could provide suggestions for further research and be a good starting point for newcomers to this field of study.

Martens (2011) states that most literature on creativity and the physical workplace is about communication. Creativity research is broad and recognizes that culture, process, and activity are moments of creative thinking and insight that can be supported in the physical workplace.

Runco and Jaeger (2012) mention creativity needs originality and efficiency. Are those two criteria so necessary? Indeed, novelty is required. It is often labelled an innovation, no matter the label, if nothing unusual, new, or unique is ordinary, every day, or regular. It is not original, so it needs to be more creative. Efficiency can take the form of value. This label is well-defined in economic research on creativity; it describes how original and valuable products and ideas depend on the current market or, more precisely, the costs and benefits. Creativity prerequisites are both originality and efficiency.

Mumford et al. (2012) noticed that creativity is not just a matter of generating ideas, although it can significantly affect creativity. Instead, creativity is defined as creating high-quality, original, and elegant solutions to problems. Three key things need to be kept in mind to harness the creativity and innovation of organizations. First, creativity and innovation are very complex phenomena at any level of analysis. Second, several phenomena exist at the individual, group, and organizational levels. Third, phenomena operating at one level are not necessarily well integrated or compatible with phenomena used at other levels.

Al-Ababne (2012) notices that creativity is defined in various ways. Creativity is defined as "devising novel, appropriate ideas in any field of human activity, from science to art education, business, everyday life", so ideas must be new and depend on the opportunity to solve a problem presented. Al-Ababne (2012) highlighted that creativity generates new, relevant ideas in any field of human activity, e.g., from science to artistic education.

Kandi and Kandi (2013) state that creativity is a combination of creativity, flexibility, and intense sensitivity to ideas, allowing the learner to think about different and generative results from the insensitive thinking outcomes that lead to personal satisfaction or perhaps the happiness of others.

Samašonok and Leškienė-Hussey (2015) envision creativity becoming the foundation of a prosperous professional career, improving career prospects and ensuring practical problem-solving; therefore, creative personality development is critical. Personal skills development to respond creatively to contemporary global challenges by training future professionals is one of the main improvement tasks in organizing the study process.

Raymundo (2020) notices that higher education institutions often need to see the importance of fostering students' creative thinking. A review of the prevailing practice in a fully online distance learning institution in higher

education has revealed a need for learning activities that encourage creativity. Kacerauskas (2020) emphasizes the role of a creative society in building a creative economy.

Speckbacher (2021) suggests that creativity is the starting point for innovation, which can be defined as the successful implementation of creative ideas. Innovation can come from creative ideas within or outside the organization.

Yang et al. (2021) notice that the leader's humour is positively related to the employees' creativity, and the relative energy mediated this influence. In addition, traditionality also reduced the relationship between leader humour and relationship energy and weakened the indirect connection between leader humour and employee creativity through relationship energy.

According to Piirto (2021), creativity can be taught and nurtured, and we can create classrooms where creativity thrives.

Childs et al. (2022) mention that twentieth-century contributions to creativity include the greater understanding that emerges in such areas as psychology and neuroscience. In the second and third decades of the 21st century, we have seen significant advances in automated and augmented creativity in data mining and artificial data mining intelligence (AI). A modern analogy is an online platform Patreon, a crowd-based service to support creators.

Turner et al. (2022) notice that creativity can also be identified as a team or organizational construct rather than just an individual-level construct. According to the abovementioned authors, creativity at the corporate level includes new product development. By identifying creativity as an individual, team and organizational construct, literature portrays creativity as a multilevel construct.

Botella et al. (2022) analyze that scientists have been studying how the creative process takes place and what factors influence it for many years. The scope of their studies is essential in the school context; students can develop their creativity and thus meet the needs of the society of the 21st century. The results of this research will allow modelling, better understanding, and identification of the creative process in students when they design and produce valuable objects in the context of education and training having ecological validity (real teaching context).

Marrone et al. (2022) mention that innovative products are measured by novelty and effectiveness, where novelty refers to a new or original idea or concept, and effectiveness refers to the ability of a product or solution to achieve a desired result. The process is defined as the cognitive mechanisms of creativity and is central to understanding what artificial intelligence can offer to create new and practical solutions to problems. Therefore, to encourage imagination and artificial intelligence, educators should consider the process of creating and the product of creative endeavours.

2.2. Assessing creativity in war and pandemics

Creativity is the power of innovation in various fields, which is necessary to create new products, services, and ideas and solve non-standard problems (Zsolnai & Illes, 2017). A creative person is a "white collar worker", a musician, and a creator of new, innovative technologies with little knowledge of music. In addition, he/she is likely to be characterized by other qualities that usually accompany creativity, such as non-stereotypical, abstract thinking, having quick orientation, the ability to solve problems on their own and to create a new quality, as well as curiosity, motivation, imagination, and self-confidence. Creative people often self-realize themselves more

deeply in different fields than in one. Creativity can help you adapt to an ever-changing life, discovering new ways and means of working. Before the pandemic, this capability was considered one of the most important in the 21st century, but its importance has grown especially recently. Going through change, when there is a lot of anxiety and oppression, it is easy to succumb to a wave of resentment and denial. It is tough to think and plan your life, often filled with painful experiences and losses. Being creative can help us stop and look at our abilities and change reality from the sidelines and somewhat differently. Factors that promote employee creativity include leadership, organizational culture and climate that fosters creativity and innovation; a challenging and empowering context of work tasks; an inspiring physical work environment; innovative and creative thinking of employees and the ability to solve problems creatively, together with the employees who tend to be smart to take risks; employee well-being, job satisfaction, strong intrinsic motivation, or tendency to be creative. In a pandemic, some organizations face challenges in fostering and managing employees' creativity and are increasingly encouraged to look for creative challenges. Solutions, transition to innovative management practices, new strategies for developing and managing creativity and modern employability competencies for employees are related to creativity, leadership, and entrepreneurship.

According to the Office of the Equal Opportunities Ombudsman (2021), quarantine restrictions caused by the coronavirus pandemic have changed everyday living and working conditions. While telecommuting is not new, its scale has never been as significant as during the pandemic. Research reveals that this experience has transformed many workplaces, increased the flexibility needs of workers and opened opportunities to change the usual work culture fundamentally. According to Eurostat, in 2019, just before the pandemic, 14.7 per cent of workers worked from home occasionally or frequently. Lithuania's percentage was one of the lowest, comprising only 4.7 per cent. Before the pandemic, this form of work was most widely used in the significant computer-intensive sectors: information and communication technology and knowledge-based business services (consultancy, legal services, research, and analysis services). As a result, such work was most familiar to highly skilled workers and prevalent in countries with the largest market for such workers (for example, in Sweden, where 37 per cent of all workers worked from home often or occasionally in 2019).

Atthahira et al. (2021) noticed that COVID - 19 suddenly became a global problem and attracted attention and responses from surrounding policymakers around the world. There are various government policies, including one instructing the people how to do their homework, study and even pray at home. Application goals of social and physical isolation in Indonesia inhibit the COVID - 19 transmission chain. Organizational change is necessary during a pandemic to survive in these uncertain conditions. Organizations that adapt quickly to environmental change is an organization that survives. Change is needed development of creative ideas so that workflow continues to perform well during the COVID - 19 pandemic. The changes themselves are necessary for the organization changing times and societal needs constantly. COVID - 19 suddenly became a world problem and attracted the attention and responses of policymakers worldwide. The government has taken various policies, including instructing people to carry out their activities at home, such as working, studying, and even praying. The social and physical distancing in Indonesia aims to inhibit the chain of transmission of COVID - 19. Organizational change is necessary during a pandemic to survive in these uncertain conditions. Organizations that adapt quickly to environmental changes are the organizations that survive. The change requires the development of creative ideas, i.e., the workflow continues to run well amid the COVID-19 pandemic. Change itself is necessary for an organization, given society's changing times and needs, which transforms continuously.

Pérez-Sobrino et al. (2022) describe the models of metaphorical creativity, including creative realizations (oral and visual) of large-scale cartography, the use of single source domains, source domain valence shifts and the exploitation of source-specific source domains in discourse communities.

Tang et al. (2021) suggest creativity positively impacts social well-being. Due to the existence of sporadic and extreme 'lone geniuses' such as van Gogh, Tesla and Beethoven, the connection between loneliness and creativity

has become almost a cliché. However, although ubiquitous, this myth of a 'lonely genius' seems to have been disproved (Glăveanu, 2020). So far, it has not been scientifically studied. Research evaluating team creativity has shown that individuals who work well in teams and build close and positive relationships improve creativity (Reiter-Palmon & Paulus, 2020). In addition, recent work on creativity and social relationships has shown that developers and students have been more creative in maintaining better social relationships, such as romantic relationships or friendships (McKay et al., 2017; Lebuda & Csikszentmihalyi, 2020).

Tang et al. (2021) argue that the coronavirus disease pandemic (COVID - 19) has caused unprecedented uncertainty and challenges for the global economy and people's daily lives. Anecdotal and scientific evidence has confirmed a positive link between crisis experience and creativity. Although ubiquitous, the relationship between crisis, creativity and well-being has yet to be sufficiently explored in different countries using a sample of working adults. The recent study consisted of 1,420 workers from China (n = 489, where 40 per cent were women), Germany (n = 599, where 47 per cent were women) and the United States (n = 332, where 43 per cent were women) aiming at the examination of whether creativity can act as an effective means of overcoming the crisis and achieving prosperity and social well-being. Multidimensional analysis showed that the perceived impact of COVID-19 was positively related to involvement in creative processes and positively related to the creative growth of the workers themselves. Creative development has been associated with higher levels of prosperous well-being.

Zhai et al. (2021) assert that during the COVID-19 pandemic, individual emotional creativity was significantly positively correlated with a person's perceived social support, regulatory emotional self-efficacy, and PTG (further in the text – posttraumatic growth) and was significantly negatively associated with person's mental health problems (e.g., anxiety, depression, and somatization). This study confirmed that the predicted effects of emotional Creativity on PTG were due in part to perceived social support, regulatory emotional self-efficacy, and perceived social support together with regulated emotional self-efficacy; the predictable effects on anxiety and depression were due to perceived social support, regulated emotional self-efficacy, and perceived social support, also regulated emotional self-efficacy; and the predictable effect on somatization was due to perceived social support. The authors found that during the COVID-19 pandemic, individual emotional creativity was significantly positively correlated with individual perceived social support, regulatory emotional self-efficacy, and PTG, while it was significantly negatively associated with individual mental health problems (e.g., anxiety, depression, and somatization), which is consistent with previous studies. The findings by Zhai et al. (2021) correspond to the research of Orkibi and Ram-Vlasov (2019) that emotional creativity can positively predict PTG and negatively predict mental health problems.

Nobre (2020) thinks we must agree on approaches before analyzing the impact of the Coronavirus disease (COVID-19) crisis on the creative economy sectors and their ability to regenerate. First, there is no unique definition of the creative economy. Secondly, there are differences in which sectors make up the creative economy. Thirdly, we can confront a lot of critique of the concept, composition, and methodologies towards the creative economy.

Popa et al. (2021) notice that the COVID-19 pandemic has financial and operational consequences for many areas of human activity, including those related to the creative industries with their ability to survive by stopping all events in physical space. Long-term effects of the current health crisis are causing changes in cultural demand and supply and stressing our need to adapt and think about new ways of working. Based on this situation, the study mentioned earlier explores how Romania's creative sector adapts. The authors achieved this through 25 semi-structured interviews and case studies of two cities that are among the most culturally and culturally significant creative industries, Timisoara and Cluj-Napoca. They have identified people capable of acting in the short term to ensure the survival of some spaces; in the medium term through activating mechanisms that foster an entrepreneurial spirit and enable adaptation to any external shock. More about the COVID-19 pandemic has had

both economic and activity-related effects on several areas of activity, among which those involving the creative industries have proved to be weak in their capacity to survive the halting of all events held in physical spaces.

Vecco et al. (2022) confirm that COVID-19 is a major strategic challenge, disrupting demand and supply mechanisms and production capacity, increasing uncertainty and financial instability, and leading to scenarios that could not have been foreseen in the pre-crisis period. COVID-19 disrupted the market and business ecosystems the humans have traditionally known; on the other hand, it accelerated innovation and introduced the so-called 'imposed service innovation'. From the point of view of innovation management, it is fascinating that this acceleration of creation was not because organizations wanted to innovate but because they had to limit the harmful effects of the pandemic. In addition, this specific crisis has changed thinking and created business opportunities that would have never been considered under normal circumstances. The study of this 'imposed service innovation' is relevant in the context of the people experiencing a transition from a pandemic to an endemic and will increasingly face such phenomena in the future. There are usually two types of strategies used in a crisis: reactive or proactive. The scientists found in this study that all strategies developed over the period are reactive. To date, the creative industry or developer has yet to be able to implement a proactive approach because the scale and impact of this pandemic remain unpredictable.

3. Research on creativity in the world and Lithuania. The periodical press review demonstrates the quantitative response of businesses to the pandemic

3.1. Empirical research

As Christopher Scanlon (2005, p. 134), in his article dedicated to Richard Florida's concepts of the creative class, expresses his doubt whether creativity deals with all 'white collar' works or the ones with the artistic variable; therefore, the authors attempt spotting the relationship of the ingenuity and the 'turbulences' of the modern times.

Our methods designed to investigate the ways of the impact of COVID-19 on creativity deal with the examination of the press over the recent years, where one can find data on the business sector and society in general dealing with "turbulences" (Most citation is taken from the business publication "Verslo žinios weekly" (VZ).

According to Tom Jacobs, "War can inhibit creativity. Societies engaged in conflict have fewer resources to spend on art; they also often restrict the freedom artists require" (Jacobs, 2017).

Karol Jan Borowiecki, a University of Southern Denmark professor, reports that "overall, wars have been detrimental to the creative process" (Borowiecki, 2014, p. 105). However, he finds that it is particularly true for conflicts where the composer's home country is engaged in either a civil war or an armed conflict it initiated. In the meantime, artistic productivity goes up during defensive battles; Borowiecki says that it is probable that war makes an impact on the creator's emotional state, however, not directly, and "some wars may result in a psychological blockade of the creative process" (Borowiecki, 2014, p. 105).

Borowiecki and Hagan (2013) investigated the work of 115 prominent composers born between 1800 and 1910. According to the authors, this period encompasses many of the most influential composers and covers wars that significantly shaped most recent history. "The econometric analysis aims to compare composers' lifetime productivity in times of peace and during certain types of war. Based on point estimates age - productivity profiles for composers that have experienced peace or a specific kind of war each year during their careers are generated" (Borowiecki, 2014, p. 85).

The essential idea, which needs more attention, is that creativity is triggered in a particular way. It includes many indicators that might influence the complex, whereas they do not work if taken separately. "The findings of this

short study are quite conclusive. War, perhaps not unexpectedly, negatively impacts individual life-cycle creative output, despite some claims to the contrary. Perhaps the negative impact is not as large as one might expect though, thereby lending credence to the theories that link the stress and trauma of events such as war to an enhanced creative output" (Borowiecki & O'Hagan, 2013, p. 350).

A rich and relatively comprehensive Internet website dedicated to the issues of the inter-relation of war and creativity is The Correlates of War (COW) (https://correlatesofwar.org/). Correlates of War (COW) project homepage is an interactive tool by which the authors, as they declare it on the website, "seek to facilitate the collection, dissemination, and use of accurate and reliable quantitative data in international relations" (https://correlatesofwar.org/). The website says, "The Correlates of War Project was founded in 1963 by J. David Singer, a political scientist at the University of Michigan. The original and continuing goal of the project has been the systematic accumulation of scientific knowledge about war. Joined by historian Melvin Small, the project was initiated by assembling a more accurate data set on the incidence and extent of wars in the post-Napoleonic period. Singer and Small needed to resolve numerous difficult issues scientifically and operationally. Building upon the work of other pioneers such as Pitirim Sorokin, Lewis Frye Richardson, and Quincy Wright, Singer and Small published "The Wages of War in 1972", a work that established a standard definition of war that has guided the research of hundreds of scholars" (https://correlatesofwar.org/). According to Borowiecki (2014), the project is committed to the free public release of data sets to the research community, to release data promptly after data collection is completed, to provide version numbers for data set and replication tracking, to provide appropriate dataset documentation, and to attempt to update, document, and distribute follow-on versions of datasets where possible.

The authors of the article have examined the website "as the centre of the data distribution efforts, to serve as a central site for collection of possible error information and questions, to provide a forum for interaction with users of Correlates of War data" (https://correlatesofwar.org/). The creators of the website express their belief that this is a good "way for the international relations community" to contribute to the further research.

Lithuanian press review. Quantitative dynamics. The reaction of businesses to the pandemic

The following chapter is based on the data published in the periodical "Verslo žinios weekly" over the recent year.

In Lithuania, business leaders also can adapt to changes, including war and pandemics, mainly specializing in industries; however, the authors have been interested in the business indicators affected by the pandemics, as the war in Ukraine started later when the article was in the primary state. The authors have examined a large amount of the local press and discovered a lot of proof of the dynamism of commercial activities during the pandemic.

During the second year of the pandemic, the most prominent Lithuanian companies proved their fantastic ability to adapt to difficult circumstances and overcome challenges – most of the leaders managed to increase sales revenue. However, the profits of a third of the top 1000 companies shrank, and not all of them successfully coped with the rising energy prices and inflation. Such trends were revealed by "Verslo žinios weekly" with the credit bureau "Creditinfo" based on the data by the most prominent Lithuanian companies following the 2021 income TOP 1000. The list included those companies that submitted their financial statements to the Register Center (RC) by May 31, 2021.

In 2021, 14 companies exceeded the sales revenue limit; six were retail or wholesale, and four were in production. In 2020, only 10 Lithuanian companies totalled half a billion euros or more. Biotechnologies even surpassed the business sector.

The novelty of 2021 appeared to be the modern biotechnology UAB "Thermo Fisher Scientific Baltics", which made one of the top positions in the list of the most prominent Lithuanian companies. The year's 2020 winner of the silver medal, retail trade UAB Maxima LT, took third place on the list in 2021. The income of Thermo Fisher Scientific Baltics grew by 53.7 per cent in 2020 to 1.94 billion euros; the turnover of Maxima LT in 2021 reached 1.76 billion euros and was 4.2 per cent higher than in 2020.

Orlen Lietuva, the only oil refiner in the Baltic States, saw 4.26 billion Euros in annual income (75.7 per cent higher than a year ago) and a relatively modest 78 million Euros pre-tax profit.

Companies traditionally dominated the TOP 1000 list from three main economic activities – wholesale and retail trade, added by manufacturing, transport and storage, and the first ten leaders were incredibly diverse.

In addition to the primary winners, the transport and logistics company "Girteka Logistics", the state energy company "Ignitis", the agricultural company "Linas Agro", the gas station network manager "Viada LT", and the wholesale company "Sanitex" entered the top ten in 2021", together with fertilizers producer "Achema" and retailer "Lidl Lietuva".

One-third of the businesses saw their profit shrinking. The performance results of a thousand of the most prominent Lithuanian companies vividly reveal challenges in 2021 and abilities to resist;- evaluates the results of the new TOP 1000 Aurimas Kačinskas, Director of Creditinfo Lietuva.

Other businesses also managed to reorient themselves. In the opinion of Tadas Povilaukas (VZ, 2022/07/14), an economist at SEB Bank, Lithuanian business leaders worked to achieve relatively good profitability indicators, which means that most of them were able to reorient themselves and take advantage of the favourable economic growth environment.

The Thermo Fisher phenomenon stands out in numbers. According to him, Thermo Fisher Scientific Baltics, the flagship of the Lithuanian high-tech industry, deserves a special mention in 2021 as well – its profit before taxes amounted to 1.3 per cent of the gross domestic product (GDP) of Lithuania. In addition, after adding costs for employees and intermediate consumption, the influence of this company alone on the country's GDP reaches about 2 per cent. "The main reason for the increase in income is the manufacturing of products directly related to the COVID-19 pandemic and their huge demand. When the pandemic started, Thermo Fisher Scientific was actively involved and made a huge effort to try to contain the pandemic. Products delivered by the company's companies are widely used for diagnostics of COVID-19, including reagents produced by the company in Vilnius" - this is how the biotechnology company bases its excellent achievements in its annual report. The press wrote that Thermo Fisher Scientific Baltics was not only able to take advantage of the pandemic situation, increasing capacity in a short time and offering a highly demanded product. First, the right direction was chosen – mRNA technology.

The commodity price component was identified as critical during the previous years.
According to T. Povilauskas, SEB financial analyst, the year 2021 was favourable for the income of the top thousand industries not only because of the development of the world and Lithuanian economy after the 2020 recession caused by the pandemic but also due to the rapid rise in raw material prices. "Therefore, those companies that extract, produce and trade in materials, raw materials, and energy products stand out in revenue growth," he points out. The economist explains that the leap mainly influenced the impressive 76 per cent revenue growth of "Orlen Lietuva" in the prices of sold products, as the amount of crude oil processed at the factory grew by just 1 per cent last year. The income of the electricity, gas, and renewable energy company "Ignitis", which took the 5th place in the list, increased by 70.4 per cent last year, reaching 862 million euros, and the increased prices of electricity and natural gas in the market contributed the most to this, T. Povilauskas points out. "Due to

increased prices, revenues in 2021 were in the list of the most growing companies; we find gas station operators, companies involved in the production of metals, crops, chemical products and wholesale trade", says the SEB economist. "Compared to 2020, companies dealing in oil products did better in 2021. After 2020, after the pandemic crisis hit last year, the demand for fuel quickly recovered, trips increased, and therefore the results of most gas station networks improved, except for those with higher prices," the head of Creditinfo Lithuania mentioned as an additional reason. In his opinion, more price-sensitive customers began to save more and look for cheaper fuel, so the largest gas station company Circle K experienced a decline in revenue (-4.8 per cent) and profit (-21.3 per cent). After receiving 538.9 million euros in income, it fell from 6th to 12th place in the TOP 1000 list of euros pre-tax profit.

Another trend was visible: the pandemic has benefited IT companies. According to Kačinskas (VZ daily, 2022/07/14) the increased demand for mobile IT solutions was a well-taken advantage of telecommunications companies, whose income grew from 5.5 to 15.5 per cent the previous year. "Out of them, the smaller operators gained their income faster, and their profitability was higher. In two years, employees of companies who have become accustomed to remote work would likely continue to use this opportunity – this should encourage the use of mobile Internet solutions by both business and private users. The popularization of e-commerce provides opportunities to earn more for telecommunications companies and IT companies", assessed by Kačinskas.

Smart investments helped to sustain the market.
Povilauskas singles out industrial companies, whose growth was stimulated by earlier investments that allowed them to take advantage of favourable market conditions, into a separate group of fast-growing companies, including the already mentioned Thermo Fisher Scientific Baltics and furniture manufacturing companies. SBA Home grew by almost 22 per cent, 494 million Euros (15th place); IKEA Industry Lithuania grew by 19 per cent (110.6 million Euros, 91st place), and "Narbutas International" showed a 26 per cent growth (108.9 million Euros, 94th place). Yukon Advanced Optics Worldwide, a manufacturer of optical equipment, increased its revenue by 30 per cent (146 million euros, 62nd place). It is worth mentioning the industrial companies that came to Lithuania with their investments not so long ago and is rapidly increasing their volume here. "HELLA Lithuania" grew 173 per cent to 72.3 million Euros, and "Continental" 494 per cent to 48.6 million Euros), points out T. Povilauskas.

Manufacturers are experiencing challenges compared to other sectors.
However, from a general perspective, in the year 2021, producers had to overcome many challenges, reminds Mr Kačinskas: energy and transportation prices were rising, raw materials were expensive, and problems arose in supply chains. All this dampened the income growth of many manufacturing companies and hit their profitability even more complex – a significant number suffered losses last year.

Last year, fertilizer producers "Achema" reached a 590 million Euros turnover, 15.5 per cent less than a year ago was struck by the price of natural gas. According to the company's announcement in 2021, in the second half of the year, the gas price started to increase drastically, and by the end of the year, its price was six times higher than in 2020. "Fertilizer buyers, hoping that the price of fertilizers would be temporary, were not inclined to take risks and did not buy fertilizers for the spring period. Due to the unfavourable market situation, "Achema" has not resumed part of its ammonia production capacity since September after scheduled maintenance. The factory finished the year working with one of the two ammonia workshops", says Ramūnas Miliauskas, CEO of Achema.

Retailers' profits were modest.
Last year, as before, large retail companies also showed an increase in income, although most of them, except for Lidl Lietuva, showed single-digit growth, notes SEB Bank's economist. "At the beginning of last year, due to

trade restrictions, it was a favourable time for large merchants to receive a larger flow of customers, as some non-food stores were closed," explains T. Povilauskas (VZ, ibid).

According to A. Kačinskas (VZ, ibid), the income of retail chains in the TOP 1000 list grew by 4-10 per cent last year, but most retailers earned a much less pre-tax profit last year than a year ago. "Retailer profits were hit the hardest by rapidly rising operating costs, as last year's surge in inflation prompted some consumers to review their grocery basket," he explains. "Maxima LT" wrote in its report that "2021 had the greatest impact on the decline in profitability." Increased operating costs, especially the cost of transportation of goods and utility services. Last year, the basic salaries of most of Maxima's employees were raised, with an additional 8 million Euros allocated to the wage fund. Incentive bonuses of EUR. In total, the average salary of "Maxima" grew by a tenth last year."

E-commerce jumped faster. Povilauskas points out that the TOP 1000 also reflects that e-commerce grew faster than retail – this is illustrated by Pigu.lt jumped from 80th to 66th place on the list. The company's turnover increased by 35 per cent last year, up to 144 million euros.

"We can also see the drastic jump of Vinted UAB, which allowed it to enter the 50 largest Lithuanian companies. "Vinted's losses increased last year, but we expect the company's investments in marketing and employees will ensure no less income growth this year," says Povilauskas. In this year's TOP 1000, Vinted rose from 54th to 34th place; its turnover increased by 63 per cent to 245 million euros, and the company suffered 105 mln. Euros pre-tax losses. Povilauskas singles out one more group of companies in the thousand, for which is 2020, the pandemic and quarantines had a significant negative impact, and in 2021 after the easing of quarantine restrictions, they were already able to return to average activity volumes. One of the more prominent examples is the travel organizer Novaturas, whose sales volume last year was two times higher than the year before and reached almost 60 million Euros.

The year 2022 was expected to be more difficult. According to the SEB economist, it is likely that the TOP 1000 companies will continue to grow their income this year – but for many of them, this will only be a consequence of general price growth. "The income of those companies that extract, produce and trade raw materials or energy products will grow more because raw materials are costly. Therefore, this year we expect strong growth in the income of oil refining, crops, chemicals, metals, and food wholesalers", the economist predicts.

The income of some wholesalers may be severely cut by the decline in re-exports to russia and Belarus caused by the war in Ukraine.
"Due to rising prices, industrialists who do not have sales in russia or Ukraine should earn higher incomes this year. Of course, if only in the second half of the year, Western and Northern Europe will not be hit by a more serious recession", predicted T. Povilauskas. In his estimation, the turnover growth of retail trade companies should slow down, despite inflation that is significantly higher than in previous years. After the excellent last year for traders, retail trade growth in the second half of this year is likely to be negative. "This is also influenced by the return of consumers to services this year, which is why the income of service companies that have suffered from the pandemic and quarantines in the past two years should grow strongly this year – from catering, travel arrangements, etc. sectors", predicts T. Povilauskas.

In his opinion, construction companies are unlikely to show good results this year, and some companies in the transport sector related to railway transportation or loading at the seaport will record worse changes in income. And because of the war in Ukraine, companies are exposed to innovation.

According to A. Kačinskas, when the TOP 1000 would have been compiled according to the 2022 performance results in the coming year, there might have been fewer, perhaps more, changes than this year. "Companies'

financial results will undoubtedly reflect business ties, suspension of operations and lost markets due to Russia's war in Ukraine," he says; the companies themselves stated this.

Here are the furniture manufacturing companies belonging to the SBA group in 2022 that sold products for 96.5 million euros in the first quarter – 30 per cent more than at the same time last year, when sales reached 74 million euros. However, Egidijus Valentinavičius (VZ, ibid), vice president of the SBA, says that the war could significantly affect the annual results of manufacturers. "The first quarter of the year should have given a strong impetus to the whole year's results, but everything is fundamentally changed by the war in Ukraine and its direct and indirect effects. Our most important goal is to secure the necessary raw materials so companies can work at full strength. The team works hard to find suppliers in new markets and create efficient logistics chains. The changed geopolitical situation also affects the prices of energy, raw materials, and components, which will affect the profitability of companies", says E. Valentinavičius (VZ, ibid).

The head of Creditinfo Lietuva says he remains an optimist, believing in the resilience and vitality of Lithuanian business. "Lithuanian business in difficult 2020 and 2021. Perfectly demonstrated the ability to adapt to new circumstances. Therefore, we hope that his strength will also bring positive results in 2022.

Humour helps the reported notice. "The paradox of creativity and efficiency is that we must constantly look for new things, new ways to communicate accurately. Efficiency is synonymous with novelty, that's why we want to talk about the "new language" in marketing", said Tomas Ramanauskas (VZ, 2022/05/09), creative director of creative advertising agency "New!", at the "Password 2022" conference organized by "Verslo žinios weekly". "Humor is probably the cheapest and easiest highway to hearts, the easiest way to reach emotion. We have too many serious brands", notes T. Ramanauskas. Another trend is the era of brand openness. "We must understand that in the era of social networks, you can't hide, and it's better to tell the truth, even if it's not convenient. What you try to hide eventually, and probably shortly, will come to the surface. It is better to stand up and say: we've had a rough time, and it's better to say it yourself than others will. No one wants to hear excuses anymore. Openness and sincerity create trust. It is better to admit the bitter truth yourself than to hope to slip away," T. Ramanauskas has no doubts. Change boundaries and rules, the consultants say.

Equally crucial for brands is the ability to transcend the boundaries of their category, sometimes even through the seemingly silly. "Stupid things also provoke emotions; such brands could be called "immature". At the same time, seriousness is still overrated in the world of brands, and playfulness is lacking," T. Ramanauskas is convinced. For example, he gives a brand of water called "Liquid death." "If we look at the water category, the specific brands of this segment, we would see blue plastic bottles, in the names that mark the area or combinations of the word water (aqua). At that time, "Liquid death" took a radically different path: it created labels that are more like those of a tattoo parlour than of water, it chose aluminium can packaging, as if it were a beer manufacturer, it rebels in advertisements," says T. Ramanauskas.
Further, let us follow how the advertising message changed. According to T. Ramanauskas, looking at the history and evolution of advertising, certain stages can be distinguished: a century ago, the purpose of advertising was to deceive the consumer because there was almost no regulation, and presidents smoked cigarettes in advertising posters. Later, deception changed to embellished lies. The most effective advertising was reiterating without stopping so the consumer will always remember the brand or service seen in the advertisement. Around the 1960s, we saw a creative revolution where advertising sought to surprise. Later, as social norms loosened, advertising tried to shock. After that, we still had the era of supermodels, where advertising tempted and enticed, then – ironized, says T. Ramanauskas. Finally, he says, the last decade has seen a phase of awareness in advertising. "We are still in it now. We are becoming more conscious in all aspects: how we produce, how we sell, how we consume, and how we communicate. At the same time, the usual ways of talking to the audience are getting old", emphasizes T. Ramanauskas. According to him, "smart" brands react, transform, move with the audience and habits, follow changes, and look at what is happening in people's lives. At that time, stupid brands wave their

hands at it, thinking that it is a temporary fad – it will pass; they only think about sales and discounts. Therefore, if we talked primarily about the product in the "new language" earlier in the advertisement, it would be appropriate to emphasize the emotion.

3.2. Case studies. Art in Wartime: Both Therapy and Weapon

In Lithuania, there is a feeling that art should be apolitical. "But when the situation gets worse, we shouldn't be apolitical," art historian and critic prof. Rasa Žukiene thinks (Lietuvos Rytas daily, 2014/05/01).

According to art historians, not only beauty and harmony are reflected in the artworks; aggression accompanied humanity from the beginning of the times. According to researchers willing to know our predecessors better, studying the carvings of wars and countless bloody conflicts on the "body" of art is necessary to understand the difficulties of human history. The Roman proverb that when the guns clang, the muses are silent is false, according to Rasa Žukienė, because in wartime, artistic life takes place, and art becomes both therapy and weapon. The study of art reveals something beyond the scope of researchers of political and social history (Lietuvos Rytas daily, 2014/05/01). Art, just like paintings on pre-historic murals, reflects upon the mood of society very sensitively.

From the history of Western European art, it has long been known that war is an inspiration for the avant-garde. For example, post-World War I artists gave birth to the Dada movement. It was a reaction of the young generation to what was happening at the front. In addition, P. Picasso painted "Guernica" in 1937 after hearing about the war in Spain. This was his protest as a Spaniard. "Though this work was intended for a world exhibition, he said that the work would be returned to Spain when peace prevails", recalls R. Žukienė (Lietuvos Rytas daily, 2014/05/01).

In the same way, after the Second World War, European culture was given a big boost by existentialism. This philosophy was born out of people's despair after realizing what war was and how it threatened helpless people. A man was lonely in the world. Bob Dylan's songs were significantly affected by the war.

Art influenced by existentialism is characterized by anxiety, alienation, absurdity, metamorphoses, and concern. "For example, the work of Alberto Giacometti or the paintings of other sculptors, even of another generation, which includes Lucian Freud or Francis Bacon – all these expressions were of war experiences. In one case, a person is like a chaplet. It is a visual motif chosen in Giacometti's work. Otherwise, with L. Freud, the concept that a person is only a body comes into play. There is no spirit in it. This is also a result of nihilistic thinking in art," the art critic thinks (Lietuvos Rytas daily, 2014/05/01).

The October Revolution in 1917 initially gave a very positive impulse to Russian art and Western Europe. Artists like Kazimierz Malevich or Mark Chagall thought they would create new art for a new state. Unfortunately, it did not last long. "They were looking for new paths, and they discovered constructivism, abstraction," says R. Žukienė (Lietuvos Rytas daily, 2014/05/01). However, the October Revolution turned into a prison for the creative class, and M. Chagall and many others managed to emigrate. The russian avant-garde was not even shown in the halls," says the art critic (Lietuvos Rytas daily, 2014/05/01).

As it is well known, developing the imagination is dangerous because critical, educated people begin to question the lies and demagoguery spread by totalitarian systems. The Russian avant-garde experienced the peak of creativity and popularity from the October Revolution in 1917 to 1922. Then, it was suffocated by socialist realism promoted by the state because any art above average understanding is dangerous. "Danger rests in that such art speaks of a higher human being, especially when constructivists or abstractionists express themselves in abstract forms: this was an impossible thing in a socialist country because its basis is materialism and a physical

understanding of reality. As a result, during the Soviet era, all abstraction was unwanted in Lithuania", says R. Žukienė (Lietuvos Rytas daily, 2014/05/01).

Going to the Lithuanian Center of Chicago, you will see many photographs from our refugee camps, where they make things and even jewellery. You may be amazed that "the post-war people, who were expelled from their country, were highly cheerful, had many humour magazines, and made fun of themselves," says R. Žukienė (Lietuvos Rytas daily, 2014/05/01). This fact testifies to the effort not to give in to the crushing reality. A phenomenon is the cultural activity of former citizens of the Baltic countries, displaced persons from Germany after the Second World War. Having lost their homeland due to the Soviet occupation, they became lawless and unwanted in war-torn Germany, but they organized art exhibitions and concerts, staged operas, and published books. National cultural representations have become vivid signs of the cultural distinctiveness of the Baltic nations (Ibid.).

Warfare, mass extermination of civilians, population displacement and occupations resulted in the 20th century, and Lithuania lost a third of its population. The war years' suffering, deaths, survival, exile, and post-war renewal have become central themes in the country's culture and its expatriates. Studying war and culture in Lithuania requires a comparative, multilingual and cross-national analysis. These studies could give us a better understanding of history to prevent it from happening again.

In Kaunas, the Capital of the European Capital of Culture 2022, the Project "In the Dark" was another example of how the war could inspire creative persons to establish artistic initiatives. Reporter Beatričė Laurinavičienė (Verslo Žinios) depicts the exhibition "From the Darkness", a reflection on WW II displayed this year on August 4 in Kaunas, in the building next to the Historical Presidency of the Republic of Lithuania (Gimnazijos str. 4), the exhibition "From the Darkness" created by a Litvak female artist Jenny Kagan. The artist, who grew up in the United Kingdom, returns to Kaunas, the childhood city of her parents, Kaunas natives J. Kagan and M. Štromaitė, with an authentic story that she often heard in her childhood - about the Holocaust they experienced. The story touches upon a very close family of the Lithuanian Holocaust victim, already deceased professor Irena Veisaite.

The idea of J. Kagan's project "From the Darkness", which was part of "Kaunas - European Capital of Culture 2022", was born 15 years ago. After starting to study drawing, the artist and her mother decided to draw a "box", remembering the emotional and symbolic history of the family. The idea of a "box" created with her family over several years turned into the author's attempt to find out the fragments of the story to bring them into a broader context. "In 1941, on October 28, all Kaunas ghetto residents get up before dawn. Most of them were awake. They pour out of their houses in an unnatural and solemn silence, some carrying candles to light the way, shrouded by their exhaled air in the cold night. Did it snow that morning? I can't tell you" - extracts from letters and diaries written by Ms Kagan herself based on the stories of her parents remind us of life in the ghetto. Followed by images, music, projections and saved fragments of stories, the audience has been invited to feel a personal and, at the same time, relevant story. The stories of the exhibition remind us that even in the darkest situations, light can be found; the stories reveal friendships, love, help, and kindness. "This is a story of oppression and persecution, incomprehensible loss and horror, but above all, it is a story of love and survival," says the artist. According to the exhibition organizers, "From the Darkness" is a memory of the lost residents of Kaunas and an opportunity to measure our values - how would we act in the face of light and darkness? How sensitive we are to others is especially important in front of the war in Ukraine. "This exhibition arose out of the desire to talk about bright and dark pages of the history of Kaunas. It was born out of the realization that thousands of citizens, who lived here and made their plans, are no longer in the city today. Together with them, part of the identity of Kaunas disappeared forever. The other part - with the memories torn from here - scattered in different corners of the world - the United States, Israel, South Africa, the United Kingdom, Poland," said the exhibition organizers. (Verslo Žinios weekly, 2022/08/03). Creativity allows the materializing of memories.

Case I. The case of Ukraine

We can find more examples from the war zone in the current Ukrainian press. One of the initiatives that serve as an excellent example of how creativity can increase a nation's spirits is modern Ukraine's arts and crafts.

According to the Drum publication (Ormesher, 2022), Ukraine is well-known within the industry for its solid digital workforce and burgeoning creative scene. Willing to support the industry professionals impacted by the conflict in Ukraine, Talenthouse has developed a platform that assists in cooperating with the creative forces of Ukraine. They say that the best response of creative people to hard times is their creativity. Regardless of the sounds of guns, Ukraine continues making music. How did Ukraine react to winning Eurovision? Ukraine's government tweeted on its official account: "You have melted our hearts, friends," adding that the win "matters the world to us during this time." On social media, Ukrainians cheered a victory that Kalush Orchestra's frontman, Oleh Psiuk, called a win for all Ukrainians gained on May 15, 2022.

Washington Post reporter recalls: "The reaction to Ukraine's Eurovision win underscored the political undertones of the quirky musical event, from which russia was excluded after it invaded Ukraine. Officials in Kyiv portrayed the win as a sign of success in Ukraine's war with Russia. Kalush Orchestra used the Eurovision stage to call for help for Mariupol and the soldiers inside the Azovstal steel plant. On Sunday, the band released a music video for "Stefania," the song that helped secure its first-place Eurovision finish, filmed in war-torn areas of Ukraine (Washington Post 2022/05/15). For many Ukrainians, the contest was a rare chance to have fun and think about something other than the war.

Next year, in 2023, Ukraine is expected to host the competition, an occasion that Zelensky said he believes will not be the last. The president hoped that one day Kyiv could "host the participants and guests of Eurovision in Ukrainian Mariupol" — the southern port city shattered by Russian forces."

Case II. One more case is the representation of russian actress Chulpan Khamatova.
Khamatova, who is exceptionally well known in her homeland, came to Latvia in the spring after the russian invasion of Ukraine and joined the troupe of the New Riga Theater. There, together with the director Alvis Hermanis, a solo performance, "Post Scriptum", was created for her as a commentary "on russia's (and not only) consciousness, conscience and subconsciousness in the context of recent events" (the programme of the production says).

Case III. Why were the windows of the buildings of the Vilnius Academy of Arts taped?
This art installation was completed by Valentyn Odnoviun, a graduate of the academy, a PhD student and a Ukrainian teacher, and the creation of which the academy's community contributed to show a sign of solidarity and support for the struggling Ukraine and its courageous people. People remember January 1991 in Lithuania and how the windows of institutions and apartment buildings looked. During explosions and cannon volleys, such tapes were supposed to soften the shock waves and protect windowpanes and people from glass shards.

Figure 1. Vilniaus dailės akademija. VDA fotomedijos katedra.
https://www.facebook.com/vdafotomedija/photos/a.277103719034116/4969512673126507/?type=3

Those stripes on the windows helped us fight and win. We believe that it will be the same in Ukraine! Odnoviun states in his FB account. "We invite other organizations and residents to join this artistic installation of solidarity", the post ends.

4. Discussion

Creativity is the voice that tells us to rebel, be original, produce, and design. It can be instrumental for anything from science to political strategies; nothing new could be invented without it. Creativity and innovation are humanity's most vital resources, and they are something innately within us that cannot be taken away. As the authors write these words, the war in Ukraine has been going on for over eleven months. The Ukrainian people didn't take long to mobilize and start volunteering, gathering donations, and signing up to go to the frontline – even Ukrainian ex-pats in other countries moved back home to add their contribution to the cause.

The Ukrainian marketing agency, the SAPHIRA team (Saphira Agency, n.d.), cannot forget the power of advertising and branding in a time of war. War and propaganda go hand in hand. World War I and II saw a barrage of motivational posters, slogans, songs and poems that still live in people's minds today and continue to serve as a source of inspiration and pride, the SAPHIRA (Saphira Agency, n.d.) says in their website. In times of sorrow and defeat, these campaigns remind people of their resilience, strength, and the better times ahead.

What is important, creativity is a term that needs to be clarified. You do not need to be a professional painter or a renowned musician to express yourself creatively. Creativity is a show of human ingenuity, inherent in us as a species, an expression of our will: the human desire to strive, to fight, to survive, to explore – to live fully, the Ukrainian creative team purposes.

Creativity allows us to evolve, adapt and thrive – and in the 21st century, even as war, disease and natural disasters rampage the world as we know it, humans continue to fight for independence, freedom, and a complete and dignified life. Whether we use our ingenuity to devise fighting tactics against the invader forces or create hauntingly beautiful art that brings us all together in a crisis, the world has never been more creative than today (Saphira Agency, n.d.). Thus, we can state a vital observation: if COVID-19 generally caused a lot of confusion, destruction, and disintegration in society, only the most critical businesses managed to survive, demonstrating the reactive strategies. The statistical data proves that the most innovative companies win in the circumstances of COVID-19. Regarding the artistic initiatives, those *turbulences* (such as war) trigger even stronger patriotic feelings in the fighting sides and bare a character of proactive strategies. Those insights are novel and contribute to scientific knowledge in the creative field.

Conclusions

1. Creativity is the ability to develop new ideas, think independently, non-stereotypically, quickly orientate in a problematic situation, and solve easily and atypically. In addition, creativity is the ability to create new things. Creativity is also the ability to look at an event or phenomenon in a way others cannot or do not want to.

2. Businesses need more time to make creative decisions in the face of uncertainty when a pandemic hits or a war breaks out. It is equally difficult for everyone to predict the future, and collecting as much information as possible on it is essential because there is no absolute unknown – everyone still knows something. During the quarantine, new devices were created, funds were collected, drones were used, and creativity was in great demand.

3. From the point of view of innovation management, it is particularly interesting that this acceleration of innovation did not occur because of the organizations who wanted to innovate but because they had to limit the negative effects of the pandemic and war. Moreover, this crisis has changed people's thinking and created business opportunities that would never have been considered under what we call the 'normal new'. Furthermore, studying the idea of the "imposed service innovation" is essential in the context of people experiencing the transition from pandemic to endemic and will perhaps increasingly encounter such phenomena in the future.

4. The authors prove that reactive or proactive strategies are usually applied during t*urbulent times*. The authors say that most techniques developed over recent events are reactive. However, in some areas of activities, a creative industry or developer has yet to be able to implement a proactive strategy because the scale and impact of this pandemic remain unpredictable. In contrast, the war inspires people to undertake many initiatives and behave more proactively.

5. The information on quantitative and qualitative changes of the war and pandemics needs to be more systematic and is hard to find.

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