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PECULIARITIES OF MUNICIPALITIES' INVESTMENT ACTIVITY: A CASE STUDY OF EASTERN POLAND

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Abstract. Polish municipalities have the competence to initiate and guide own socio-economic development. Local public investment is a particularly important factor that supports the development of every municipality. However, local public investment depends on several conditions, including the current socio-economic status of a municipality, which in turn is influenced by the municipality's investment activity. The investment activity pursued by municipalities, as suggested by many authors, is of special importance in the development of municipalities situated in both socially and economically less developed areas, such as Eastern Poland. The purpose of this study has been to identify the determinants of investment activity carried out by municipalities situated in the provinces of Eastern Poland, in the context of local socio-economic development and the efficiency of local governments, and to assess the strength and direction of relationships between these determinants and the investment activity of municipalities. A multiple linear regression method was chosen to identify determinants of investment activity, as it enables the user to assess the presence of a relationship between a response (dependent) variable and explanatory (independent) variables as well as the strength and direction of such relationships. The time period for most of the analysed variables spanned the years from 2004 to 2020, and the territorial scope was composed of municipalities located in the Polish provinces: Lubelskie, Podkarpackie, Podlaskie, Świętokrzyskie and Warmińsko-Mazurskie. The study confirmed that the investment activity of municipalities depends on factors involved in local socio-economic development. Among these factors, the ones that play a significant role in the municipalities situated in Eastern Poland's provinces are demographic issues, especially internal migrations, economic activity, unemployment and other budget expenses which are competitive to investment outlays, for example expenditure on education and upbringing, or on social welfare. The factors mentioned above implicate the areas worthy special attention of local authorities for the sake of attaining improved socio-economic development of a given area.

Keywords: local socio-economic development; Eastern Poland; investment activity; municipal investments

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1. Introduction

The macroregion called Eastern Poland is the most poorly developed area in Poland and in the European Union in terms of its economic and social standing. This is mostly dictated by the lowest GDP per capita in this area, which is a consequence of low levels of most determinants of economic growth. This situation has persisted since Poland's access to the EU, and the subsequently slightly diminishing gap between Eastern Poland and the EU's average development was due to a less rapid economic growth in the EU developed countries rather than an improved situation in this part of Poland. Because of its specific character, Eastern Poland is particularly important in the country's regional policy (Resolution no 121 of the Council of Ministers … 2013; Lewandowska et al., 2015, pp. 785-786). However, considering the emerging data on the actual economic and financial impact of the CoVid-19 pandemic (Landmesser, 2021; Waliszewski & Warchlewska, 2021; Mikołajczak, 2021; Korzeb & Niedziółka, 2020; Kuc-Czarnecka, 2020), it can be suspected that this region's status is unlikely to improve.

Among the major economic and social causes of the above situation, the ones most often implicated are poor labour productivity and untapped labour resources, which are linked to a large share of the agricultural sector and a low share of industry in the local economy structure. This in turn results from the fact that provinces in Eastern Poland have poorer resources, such as infrastructure, technological and innovation potential, or work quality (Bal-Domańska et al., 2020). These drawbacks are exacerbated by the shrinking labour resources due to migration and the ageing of the local population (Resolution no 121 of the Council of Ministers … 2013).

In the aforementioned areas of local socio-economic development, the ones where improvement seems most important in Eastern Poland are innovation potential, quality of labour resources and infrastructure. One of the ways in which these areas can be affected is via investment activity, which should rest on the collaboration of various players, such as public authorities, private entities as well as R&D centres or the society (Rodrigues & Melo 2012, pp. 1484-1485; Cai & Etzkowitz 2020, pp. 189-226). As for public authorities, of key importance are local government units, including municipalities, which are closest to local communities. Local authorities can take a variety of measures to initiate, strengthen or constrain the other elements of the so-called treble or quadruple helix framework (Derulkiewicz et al., 2018; Dziemianowicz et al., 2018; Godlewska & Pilewicz, 2020; Marks-Bielska, et al. 2020).

Other than partnership and collaboration among various bodies engaged in local development, it is essential that municipal authorities, too, should initiate and execute prodevelopmental investments, which lie in the scope of municipalities' own tasks and are funded from municipal budgets. The purpose of such investments is to make qualitative and quantitative changes in the technical and social infrastructure.

On the one hand, the investment activity of municipalities should invigorate local socio-economic development; on the other hand, it can be stimulated or hindered by the achieved level of development of a municipality and the efficiency of a local government. In view of the above, the purpose of this study has been to identify determinants of investment activity in the context of local socio-economic development, and to evaluate the strength and direction of relationships of these determinants with a municipality's investment activity. The research covered municipalities from five provinces in Eastern Poland: Lubelskie, Podlaskie, Podkarpackie, Świętokrzyskie and Warmińsko-Mazurskie. The research time framework spanned the years 2004-2020. Twentynine variables characterising local socio-economic development and the efficiency of local governments were taken into analysis. The response variable was the share of investment expenses in a municipality's total expenditure.

A multiple linear regression method was chosen to identify determinants of investment activity of a local government, as it enables the user, once the method's strict assumptions are satisfied, to assess the occurrence of a relationship between a response variable and any of explanatory variables as well as the direction and strength of these relationships.

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The article consists of several parts: a review of the literature, which pertains to dependences, identified by other scholars, between local socio-economic development and efficiency of a local government versus investment activity; the next part describes the chosen research method, selection of variables to be analysed and conditions ensuring the correctness of inferences made on the basis of data generated by the performed linear regression analysis; the next section presents results of our study, and this part is crowned with a discussion, where an effort is made to compare the current research outcome with earlier results reported by other authors. The final part of the article contains a summary, which is a synthetic presentation of the conclusions drawn from the research and a suggestion for further research directions.

2. Theoretical background

The contemporary research literature contains many articles dedicated the issue of a relationship between the investment activity of public authorities (including local governments) and the socio-economic growth. These analyses are most often supported by various econometric models, which explain the above dependence. Among the scholars exploring this field, some have demonstrated the presence of a positive relationship, while others have proven it to be negative (e.g. Boarnet, 1998). The current public debate – both in science and in politics – implicates that investments are an important element in the economic policy on local, national and international levels. It is particularly important for less developed areas, for example provinces in Eastern Poland.

The investment activity carried out by local governments consists in the execution of tasks delegated to local authorities; in Poland these are mainly municipal authorities, which are responsible for ensuring spatial order and safety to local communities, maintaining municipal roads, providing waterworks and sewerage systems, removing waste, supplying electricity and gas, providing public transport, ensuring access to education, health care, etc. (Act on Municipal Government, 1990).

Local investment activity carried out by local governments may contribute to an improved production capacity of a given area in two ways: by increasing production resources and by enhancing the productivity of existing resources. Both can eventually lead to a raised GDP generated in the area governed by a given local government – but this will only happen when new jobs are created in the implemented projects or when multiplier effects are activated in other areas of economy.

In addition to capital and labour, analyses of productivity of companies (function of production) sometimes include public capital (assets) engaged in the mentioned areas. It is assumed that the latter contributes to the improvement of productivity of private capital. Public capital can also act as a substitute of private capital and a source of higher employment (Aschauer, 1989, pp. 171-172; Munnel, 1992, pp. 191-192; Kijek & Matras-Bolibok, 2020). There is a wealth of empirical data to prove that public local investments stimulate private investments, a connection that has an additional positive influence on the socio-economic development in a given area. It can result in the simultaneous increase in production, private investments and employment. Furthermore, public investments are claimed to have a positive impact on regional competitiveness, diminish the income gap, help protect the environment, and contribute to welfare (Bristow & Nellthorp, 2000, pp. 53-57). Local investments, particularly infrastructural ones, can stimulate beneficial organisational and managerial changes, and favour the concentration of economic resources as well as better accessibility of production means markets (Gu & Macdonald, 2009; Turnovsky, 2015, p. 220).

In socially significant areas, the local government's investment activity can also counteract cyclical unemployment and serve as an instrument to support development in areas where the economic activity of local population is low. It may also translate into an improved status of households in terms of health care and

education, and can raise incomes and demand for private assets (Aschauer, 1989; Holmgren & Merkel, 2017, p. 13; Palei, 2015, pp. 168-175; Agénor & Moreno-Dodson 2006; Demetriades & Mamuneas, 2000).

However, local governments' investment activity often requires high financial outlays. Municipalities, particularly ones with a low level of socio-economic development, do not have enough capital to satisfy investment needs, which creates a certain risk. As demonstrated in the study by Stanowicka et al. (2020, p. 82), the rational use of funding sources for investments in municipalities resulted in a more rapid conclusion of the implementation of these investments. Management of funds is rational in these territorial units which – apart from having been delegated own tasks – possess funds for executing such invest-ments. When a local government takes on liabilities (loans or credits) from external entities, an investment funded with this money can be completed and made available to the public sooner; however, the local government in question must retain the capability to repay these liabilities in the future because any case of irrational borrowing of funds can lead to a loss of financial liquidity and excessive debt.

The above review of references justifies the claim that a local government's investment activity is a significant determinant of local socio-economic development, the assertion that has been verified by other researchers (Banaszewska 2018; Jimenez et al., 2020). The multi-faceted nature of local socio-economic development and multi-directional type of investment projects implemented by local governments mean that investment activity can be classified as an element of the set of traditional local development determinants composed of economic, social, financial, infrastructural, political, institutional and other conditions (Wiatrak, 2018, p. 115; Sims et al., 2004, p. 4; Wong, 2002, pp. 1835–1837). On the other hand, as indicated by some authors, the investment activity of a local government is determined by the level of development already achieved and the factors which influence thereof (Kozera et al., 2021, p. 25). Consequently, factors that influence the development of municipalities were adopted in the empirical part of this study as potential variables explaining the scope of investment activity conducted by municipalities.

It is also worth noting that the efficiency of a municipality is a factor involved in the municipality's socio-economic development (Marks-Bielska et al., 2017, p. 13; Farelnik, 2020; Wierzbicka, 2020). According to these scholars, such efficiency corresponds to the ability of a local government to adapt itself to changes, to create relationships with participants of economic processes, to shape the socio-economic development on the basis of the municipality's available resources, and to create new local resources. All these elements composing a definition of the efficiency of a local government unit, especially the ability to create new resources, are connected with investment activity. Considering the above, the empirical part of our study, beside conditions influencing local socio-economic development, also focused on factors which shape a municipality's efficiency. The following are mentioned: issues associated with maintaining an adequate level of expenses and the acquisition of EU funds, social activity in the form of setting up foundations, associations and social organisations, and actions taken under the umbrella of local democracy (e.g. referenda). Other important manifestations of a municipality's efficiency are: the level of education of council members, the share of a municipality's total area covered by spatial management plans, or availability of places for children in creches and nursery schools (Marks-Bielska et al., 2017, p. 26). Finally, it needs to be emphasised that the investment activity carried out by municipalities also depends on previously mentioned factors which influence local socio-economic development (see Wichowska 2021; 2019a; 2019b). A measure of a municipality's investment activity might be the share of capital expenditure in the total expenditure of a municipality. This measure was applied in the research's empirical part. It should be borne in mind that a municipality's investment expenses are quite flexible depending on the economic status of a given local government unit (Breunig & Busemeyer, 2012, pp. 935-936). Actually, investment expenses are cut down most often whenever a crisis strikes and current expenses grow. It can also be expected that a municipality's investment activity will be lower in municipalities where the local socio-economic development and the municipality's efficiency are lower.

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3. Research objective and methodology

The objective of this study has been to identify the determinants of investment activity in the context of local socio-economic development and efficiency of local government, and to assess the strength and direction of relationships between these determinants and municipalities' investment activity. The authors also propose and discuss a corresponding research hypothesis, namely that there is a connection between investment activity and the level of socio-economic development as well as the efficiency of municipal authorities in provinces situated in Eastern Poland.

The territorial scope of the research comprised municipalities located in the provinces which compose Eastern Poland. The following provinces were included: Lubelskie, Podlaskie, Podkarpackie, Świętokrzyskie and Warmińsko-Mazurskie. The choice of the analysed time period was dictated by the availability of data in the Local Data Bank of Statistics Poland (former Main Statistical Office GUS) (2011), and for most variables spanned the years 2004 to 2020. This long time period was justified by the lengthy implementation of some investment projects, the funding of which was reflected in multi-year financial plans of municipalities.

The multiple linear regression method was employed to reach the research aim. This method lets the user determine a statistical linear relationship between a response variable and more than one explanatory variable. More specifically, the method aims to explain the variation (movement) of a response variable by the variation of explanatory variables (Brooks, 2008, p. 27). Estimated linear regression coefficients (parameters) determine by how many units on average the dependent variable value will change when the value of an independent variable changes by one unit. The basic limitation of this method is that the results do not inform about cause-and-effect relationships, but only provide information about relationships (dependences) occurring between variables. Moreover, results may vary if a different set of explanatory variables is selected. To avoid this problem, a fixed set of potential explanatory variables was chosen when collating data for all municipalities analysed in individual provinces within the same time range.

The response variable (Y) was the share of capital expenditure in the total budgetary expenditure of municipalities. Potential explanatory variables pertaining to local socio-economic development and the efficiency of municipalities were the variables adopted in the study by Marks-Bielska et al. (2017, pp. 38-39; 2021, pp. 41-42; Wojarska et al., 2018, p. 143). This choice was dictated by the complex character of socio-economic phenomena occurring during developmental processes, which necessitated the use of various metrics - symptoms of this development. The chosen parameters should also reflect all significant characteristics, which would enable quantitative evaluations of the analysed objects (Szymla 2005, p. 49).

The following variables were included among potential determinants of investment activity: X_1 – revenue to a municipality's budget from the income tax paid by physical persons, converted per capita; X_2 – share of own revenue in total revenue in a municipality's budget; X_3 – a municipality's budget own revenues per capita; X_4 – percentage of sewerage system users; X_5 – percentage of waterworks users; X_6 – number of natural persons conducting own business activity per 100 working age persons; X_7 – number of national economy entities per 1 000 residents; X_8 – value of the ration of newly registered businesses to businesses deleted from the REGON register per 10 000 residents; X_9 – share of registered unemployed in the working age population; X_{10} – share of working persons in the working age population; X_{11} – number of post-working age persons per 100 working age persons; X_{12} – internal migration rate in a municipality; X_{13} – external migration rate in a municipality; X_{14} - number of foundations, social associations and organisations per 10 000 residents; X_{15} – percentage of the area covered by spatial management plans in a municipality's geodesic area; X_{16} – expenditure on servicing debt per

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capita; X_{17} – a municipality's budget result per capita; X_{18} – share of acquired EU grants in total revenues to a municipality's budget; X_{19} – turnout in local government elections; X_{20} – expenditure on public administration in a municipality per capita; X_{21} – percentage of municipal councillors with higher education; X_{22} – expenditure from a municipality's budget on physical culture per capita; X_{23} – expenditure from a municipality's budget on education and children's upbringing per capita; X_{24} – number of places in nursery schools per 1 000 children aged 3 to 6 years; X_{25} – percentage of children aged 0 to 3 years in creches; X_{26} – expenditure from a municipality's budget on health care per capita; X_{27} – expenditure from a municipality's budget on social care and welfare per capita; X_{28} – revenues of a municipality from fees charged on seasonal and permanent markets per capita; X_{29} – expenditure from a municipality's budget on public safety and fire protection per capita.

Conditions for correctly drawing inferences from results of a linear regression analysis were met in respect of the following assumptions: the linearity of the model relative to the parameters (the Ramsey RESET test), homoscedasticity of random variables (the White's test), normality of the distribution of the random variable (the Doornik-Hansen test), collinearity of the parameters (the VIF). The F test for the total significance of parameters, t-Student test for significance of every parameter and determination coefficients R^2 served to assess the quality of the estimation of the model (Volkova & Pankina, 2014, pp. 552-555; Buja et al., 2019, pp. 523-544; Doornik & Hansen, 2008, pp. 927-939; Jou et al., 2014, pp. 1515-1541). Significance was set at p=0.05 in all determinations of satisfying the methodological assumptions. The linear regression analysis was carried out with the help of a software programme Gretl v. 2021b.

4. Results and discussion

The results of this study achieved with the multiple linear regression method, as well as the fulfilment of the conditions for correctly drawing inferences from the results thereof regarding every analysed province in Eastern Poland, are presented in table 1.

The factors attributed to local socio-economic development and the efficiency of municipalities in the lubelskie province that proved to be negatively correlated with investment activity, expressed by the share of capital expenditure in the municipal expenditure in total (Y), were: share of registered unemployed persons in the working age population (X_9); number of post-working age people per 100 working age persons (X_{11}); expenditure from the municipal budget on social care and welfare per capita (X_{27}). The factor that was positively correlated with Y was the expenditure on public administration in a municipality per capita (X_{20}). Among the explanatory variables, the one most strongly correlated with the response variable was the share of registered unemployed persons in the whole working age population (X_9), while the weakest correlation was determined for the expenditure from the municipal budget on social care and welfare per capita (X_{27}). The degree to which the variation of Y was explained by the variation of X_9, X_{11}, X_{20} and X_{27} was 35.39%.

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Table 1. Results of a linear regression analysis of the share of capital expenditure in total expenditure of a municipality (Y – the response variable) and properties characterising the development and efficiency of municipalities (X_n – explanatory variables) in provinces of Eastern Poland

Province	Independent variables	Coefficient of regression	P-value in Student's Test	VIF	F-Test	Doornik-Hansen's Test	White's Test	Reset Ramsey' Test	R^2
Lubelskie	X_9	-0.5520	0.0145	1.351	F(4, 52) = 7.12 with *p*-value = 0.00012	Chi-square = 4.19 with *p*-value = 0.12	LM = 7.19 with *p*-value = P(chi-square (14) > 7.19) = 0.93	F(2, 50) = 1.68 with *p*-value = P(F(2, 50) > 1.68) = 0.20	35.39%
	X_{11}	-0.2954	0.0035	1.092					
	X_{20}	0.0169	0.0418	1.202					
	X_{27}	-0.0114	0.0335	1.464					
Podkarpackie	X_5	0.051	0.0007	1.080	F(3, 77) = 6.44 with *p*-value = 0.000601	Chi-square = 4.58 with *p*-value = 0.10	LM = 6.27 with *p*-value = P(Chi-square (9) > 6.27) = 0.71	F(2, 75) = 0.59 with *p*-value = P(F(2. 75) > 0.59) = 0.55	20.05%
	X_8	-5.3101	0.0139	1.215					
	X_{12}	0.0242	0.0020	1.164					
Podlaskie	X_{12}	0.0294	5.65e-06	1.041	F(3, 63) = 16.29 with *p*-value = 6.04e-08	Chi-square = 1.77 with *p*-value = 0.41	LM = 8.44 z wartością p = P(Chi-square (9) > 8.44) = 0.49	F(2, 61) = 0.35 with *p*-value = P(F(2. 61) > 0.35) = 0.71	43.68%
	X_{23}	-0.0112	0.0008	1.069					
	X_{24}	0.0027	0.0456	1.063					
Świętokrzyskie	X_8	-3.7202	0.0055	1.039	F(3, 31) = 10.72 with *p*-value = 0.000054	Chi-square = 0.31 with *p*-value = 0.85	LM = 8.59 with *p*-value = P(Chi-square (9) > 8.59) = 0.48	F(2, 29) = 1.55 with *p*-value = P(F(2, 29) > 1.55) = 0.23	50.92%
	X_{12}	0.0585	5.89e-05	1.026					
	X_{23}	-0.0120	0.0062	1.062					
Warmińsko-mazurskie	X_4	-0.0634	0.0015	1.135	F(3, 42) = 9.74 with *p*-value = 0.000053	Chi-square = 1.72 with *p*-value = 0.42	LM = 7.60 with *p*-value = P(Chi-square (9) > 7.60) = 0.57	F(2, 40) = 0.44 with *p*-value = P(F(2. 40) > 0.44) = 0.65	41.03%
	X_9	-0,2727	0,0229	1,119					
	X_{18}	0,7957	0,0213	1,022					

Source: Own calculation based on Local Data Bank, Statistics Poland

In the municipalities of the podkarpackie province, statistically significant correlations with the response variable were determined for the following variables: percentage of waterworks users (X_5) – a positive correlation; value of the ratio of newly registered business to businesses deleted from the REGON register per 10 000 population (X_8) – a negative correlation; internal migration balance in a municipality (X_{12}) – a positive correlation. Of these, variable X_8 was most strongly correlated with the response variable Y, whereas variable X_{12} had the weakest correlation with it. Variation of the above variables explained the variation of Y in 20.05%, which can be seen as a low level. It means that 80% of the variation of Y can be explained by the variation of factors which were not taken into account in the study but which are linked to other aspects of the activities carried out by local governments or else which have a qualitative character.

In the municipalities of the podlaskie province, the response variable Y was statistically significantly correlated with the following variables: internal migration balance in a municipality (X_{12}) – a positive correlation; expenditure from the municipal budget on education and children's upbringing per capita (X_{23}) – a negative correlation; number of places in nursery schools per 1000 children aged 3 to 6 years (X_{24}) – a positive correlation. The strongest correlation with the response variable Y was determined for variable X_{12}, whereas the weakest one – for X_{24}. Variation of the response variable in the municipalities of this province was explained in 43.68%.

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Among the explanatory variables applied to explain the ratio of capital expenditure in total expenditure of the municipalities in the świętokrzyskie province, the following were found to play a role: value of the ratio of newly registered business entities to the business entities deleted from the REGON register per 10 000 population (X_8) – a negative correlation; balance of internal migrations in a municipality (X_{12}) – a positive correlation; expenditure from the municipal budget on education and children's upbringing (X_{23}) – a negative correlation. The strongest correlation with the response variable Y was determined for variable X8, and the weakest one – for variable X_{23}. The determination coefficient R^2 was 50.92%, which meant that over half of the variation of the mentioned explanatory variables explained the variation of the response variable Y. Noteworthy, this is the highest degree of explaining the variation of the municipalities' investment activity indicator by variables associated with local socio-economic development and the efficiency of local governments compared to the results from the municipalities in the other four provinces of Eastern Poland.

In the municipalities from the warmińsko-mazurskie province, the response variable Y was explained by three explanatory variables: percentage of sewerage system users (X_4) – a negative correlation; share of registered unemployed persons in the working age population (X_9) – a negative correlation; share of acquired EU funds in total revenues of the municipal budget (X_{18}) – a positive correlation. The strongest correlation with the response variable was determined for variable X_{18}, and the weakest – for X_4. The variation of Y was explained by the variation of X_4, X_9, and X_{18} up to 41.03%.

The performed regression analysis showed that of the twenty-nine potential explanatory variables describing local socio-economic development and the efficiency of local government in the municipalities submitted to our analysis, only 11 variables were identified as explaining the investment activity of municipalities in Eastern Poland, expressed by the share of capital expenditure in total expenditure of the municipalities. Among these 11 variables, the one that appeared most often was variable X_{12} – balance of internal migrations in a municipality, which was determined as a valid one in municipalities of three provinces: podkarpackie, podlaskie and świętokrzyskie. The following appeared twice as explanatory variables in different provinces: X_8 – value of the ratio of newly registered business entities to entities deleted from the REGON register per 10 000 population; X_9 – share of registered unemployed persons in the working age population, and X_{23} – expenditure from the municipal budget on education and children's upbringing per capita. The other variables appeared singly in municipalities of individual provinces. As many as 18 variables did not feature even once as explanatory variables.

As it results from the research of many authors (e.g. Baumol 1990, Audretsch & Thurik, 2001, Acs et al. 2008, Williams & Vorley, 2015, Williams et al. 2017), the formation and development of enterprises plays a significant role in the process of socio-economic development of individual economies at various territorial levels. Therefore, they can also stimulate the investment activity of units in which they operate.

Considering the characteristics of the provinces of Eastern Poland, presented in the introduction, and the results of our study, it can be concluded that the most frequently observed determinant of the investment activity of municipalities in that part of Poland are demographic problems, especially internal migrations. The higher the balance of migration, meaning more people arriving in a municipality than leaving it, the higher the share of investment expenses in the municipality's total expenses. This relationship could be explained by the direct connection between internal migrations and own revenues of municipalities, which are the basis for any investments carried out by municipalities (Wichowska, 2021b, p. 4; Kozera et al., 2021, pp. 7-8). The number of post-working age persons per 100 working age persons was identified as one of the demographic problems displaying a statistically significant relationship with investment activity in municipalities of the lubelskie province. The aging of societies is becoming the limit of economic growth. As a consequence, the shrinking labour resources are: slowing GDP growth and GDP per capita, as well as an increase in public expenditure. As indicated Bidisha et al. (2020) in contemporary economy importance of demographic composition on labour

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supply, asset accumulation, savings, hence on the overall growth processes increases. Very similar relationships and their explanation can be identified in terms of starting and conducting economic activity in municipalities of the other provinces of Eastern Poland, same as the issues connected with the unfavourable situation in the labour market (unemployment).

The expenses which seem to compete with investment expenses in municipalities located in Eastern Poland, and the level of which proved to be one of the determinant of municipalities' investment activity in some of the analysed provinces, were the money allocated to education and to social welfare, both displaying negative correlations. This attests to the previously mentioned elasticity of investment expenses to the current situation in a given territorial unit. This is confirmed by the results of the research by Lizińska and co-authors (2020), which indicated that the share of educational expenditure in municipalities of, for example, warmińsko-mazurskie province in their total expenditure in 2008-2018 remained within the range of 27–35%. When budgetary resources are scanty, local governments will tend to forgo investment projects and focus on current activities. As Stoker (2011) points out, local governments can generally be divided into two groups: those that try to fulfill all their functions and carry out tasks in a sustainable manner, and those that strive to implement only the chosen ones.

In conclusion, it should be emphasised that the research results presented in this paper might suggest some limited influence of the level of local socio-economic development achieved by now and the efficiency of municipalities on their investment activity. First and foremost, this is indicated by the fact that only 11 out of 29 variables tested in the study were determined to be significant determinants of investment activity. Secondly, it is also supported by the previously implicated low level of explanation of the response variable by the factors identified in the scope of local socio-economic development and the efficiency of local governments, which may suggest a lack of strong feedback between them, contrary to the situation in more developed regions. Verification of these assumptions can be seen as a subsequent research challenge.

Conclusions

Local government units in Poland have the competency to initiate and guide their socio-economic development. In less developed regions, such as municipalities located in the provinces of Eastern Poland, public investments implemented by local governments are a particularly important factor supporting the development of these territorial units, next to other measures taken to encourage the social and economic activity among local communities. On the one hand, municipalities are the nearest to and have adequate knowledge of the needs and problems of residents of these units; on the other hand, municipalities are legally obligated to perform the aforementioned activities. The cited literature indicates that local investments carried out in a planned and focused manner in areas particularly requiring public intervention, are a chance to bring about a number of positive outcomes, both economic and social ones. However, it is worth emphasising that the investment activity by local governments is embedded in specific reality in a given territorial unit and is determined by the current level of development as well as the efficiency of that local government.

The study reported in this paper suggests that the level of local socio-economic development achieved thus far and the efficiency of local governments are statistically significantly correlated with the investment activity of municipalities situated in the provinces of Eastern Poland. Thus, the research hypothesis was verified positively. Nevertheless, it needs to be pointed out that the research results can implicate the limited impact of determinants attributed to local socio-economic development and the efficiency of municipal authorities on the investment activity performed by municipalities. This can be inferred from a small number of determinants which explained the variation of the response variable (in total, 11 of the 29 variables chosen for the analysis). Secondly, these variables explained the variation of Y only to a small degree. These findings may indicate that the investment activity of municipalities in the provinces of Eastern Poland is more strongly influenced by other factors or that there is a lack of feedback between the analysed phenomena.

It is also worth noticing that municipalities situated in each of the provinces of Eastern Poland differed in the degree to which the variation in the share of capital expenditure in total expenditure of a municipality was explained by the variation of the variables attributed to local socio-economic development and the efficiency of local government. This variation was explained to the highest extent in the municipalities in the świętokrzyskie province (over 50%), and to the smallest degree in the municipalities of the podkarpackie province (over 20%). It can be expected that positive effects of investment activity, such as a higher GDP growth, higher levels of private investments, higher employment, as well as the resulting social profits, which the cited researchers have been pointing to for many years, will appear sooner and will be greater in municipalities situated in the provinces where the determination coefficient reached a higher value.

This study enabled us to identify the factors that influence investment activity. In this area, the following conditions play an important role: demographic variables, especially internal migrations, low economic activity, unemployment, as well as expenses from local budgets which are competitive towards investment expenses, that is expenses on education and children's upbringing, and on welfare. These factors naturally point to areas which deserve special attention of local authorities if the local socio-economic development is to be improved. Such areas should be associated with population policy, economic policy and financial policy. Investment activity, in turn, ought to be closely bound with local needs and integrated with existing investment projects and development. Furthermore, municipalities should adopt a long-term perspective in planning their activities. This is how they can activate positive effects of local public investments.

The results of our quantitative analyses as well as the limitations of the linear regression method suggest that it may be worth expanding similar studies by including qualitative factors. An appropriate method for this purpose could be via surveys, which might directly verify the research results presented above and could pose other questions on determinants of investment activity. Another interesting direction in future research can be a comparative analysis of municipalities from other Polish provinces, where differences and similarities could be displayed in terms of the analysed connections between investment activity and local socio-economic development or the efficiency of local governments, especially in municipalities which are distinguished by a high level of socio-economic development.

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PERCEPTION OF CREATIVE IDENTITIES BY MANAGERS AND NON-MANAGERS. DOES A MANAGER SEE MORE?

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Abstract. The research on the perception of managers, leaders, entrepreneurs, creators, and artists by individuals with and without managerial identity brings significant conclusions for understanding the way of thinking of managers, their inner characteristics, and the stimuli of their decisions. For this purpose, a global quantitative examination (n = 160) was designed and undertaken. The research exposed that individuals with and without managerial identity perceive managers, leaders, entrepreneurs, creators, and artists statistically similar (confirming hypotheses with the chi-square test of independence devoted to small samples without a normal distribution; $p < 0.001$). The supplemental qualitative analysis of the variances of the 50 features of investigated identities revealed that managers and nonmanagers see these elements differently in some areas. These discrepancies were analysed, and the most important, the least important, and the most equally perceived features were portrayed. The results were discussed with the literature, confirming most other researchers' views and revealing some contradictions. The practical research outcomes may be used to understand the qualities of a manager and the perception of explored identities by individuals, groups (with certain underlining of business organizations), and societies governed by persons with and without entrepreneurial factors.

Keywords: perception; manager's identity; leader's identity; entrepreneur's identity; creator's identity; artist's identity; management, leadership; entrepreneurship; creativity; creativeness; artistry

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1. Introduction and literature background

The interplay between personal and social identities is an area of social identity theory (social psychology) interest. This theory specifies the conditions of individuals' thinking about themselves as autonomous individuals or as group members. The effects of personal and social identities on individual perceptions and group behaviour should be considered (Wolf, 2019). As one of the central elements of social capital and economic growth, entrepreneurship is an extensively demanded feature of individuals and groups. Besides entrepreneurs, society requires managers to organize and achieve goals effectively, leaders inspiring people to grow and desire goals, artists who give rest, the possibility of catharsis, and add extra dimensions to everyday life. All the identities mentioned above have one common feature – creativity. That is why entrepreneurs, managers, and leaders are often called creators. The paramount entrepreneurs, managers, leaders, and creators are called artists of their professions (Szostak & Sułkowski, 2020a). It should be underlined that motivation and inspiration play significant roles in self-construction and efficiency in achieving goals by individuals performing these roles in society (Szostak, 2018, 2019). Identity changes with time, resulting in identity work (Miscenko et al., 2017). Researchers show opposite conclusions about the leading source of professional success of individuals with these identities: talent or education (Celuch et al., 2017); it seems that a combination of both elements is needed. Also, the distinction between personal (internal) and social (external) context is crucial (Korte, 2018). In these frameworks, the perception of the above identities can play a vital role in managing entrepreneurship among individuals and organizations.

Due to the stringently psychological appearances of identity research, scientists undertake discovering rules helping to include varied identities in management practice. Investigating the entrepreneur, manager, leader, creator, and artist in one research is crucial because these identities drive progress and development. They are not clear in distinction by society, and they typically happen not separated. These identities are frequently merged in twosomes, like artist-manager, artist-leader, manager-entrepreneur (Szostak & Sułkowski, 2021d), or bigger assemblies artist-manager-entrepreneur or creator-artist-manager (Szostak & Sułkowski, 2021b). Those complex identities may activate complications, dilemmas, and tensions (Mochalova, 2020) but correspondingly can uncover different dimensions, skills, and potentials for individuals. There is only one condition here: these individuals must control the particular identities using well-described methods like identity work, identity regulation, creativity development, or paradoxical thinking (Cuganesan, 2017; Szostak & Sułkowski, 2021c).

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

The subsequent hypotheses were designed for this research: H1) There are differences in perception of managers', leaders', entrepreneurs', creators', and artists' identities by managers and nonmanagers. H2) The differences in perception of the manager's, leader's, entrepreneur's, creator's, and artist's identities by managers and nonmanagers are not the same and vary in the case of each of the particular identities.

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2. Materials and methods

To verify the hypotheses, quantitative research was executed using a questionnaire enclosing the dimensions of the examined phenomenon and selected indicators that allow defining the examined phenomenon (Nowak, 2007). The initial research design was expected to create separated lists of indicators for every studied dimension. However, the indicators for individual dimensions began to be changed based on the literature on entrepreneurship, management, leadership, creativity, and artistry. Nevertheless, the analysis of individual groups of indicators did expose that each of the indicators preferred for different dimensions could portray each of the examined dimensions with benefits to its description. Based on this supposition, a single list of 50 identical indicators was composed and applied to all five observed dimensions. For additional conclusions, the obtained results can be compared with the same indicators for other dimensions.

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

The nonparametric chi-square test of independence devoted to minor samples without a normal distribution helped verify the hypotheses. The pairs of the observed values were associated with pairs of the expected values for each hypothesis – the p-value of the tests < 0.001. Data analysis was completed using Microsoft Excel. Due to the minor size of the sample (n = 160), complex statistics were not conducted. Therefore, this article exhibits only a portion of the conclusions from the complete research (Szostak, 2021; Szostak & Sułkowski, 2021a, 2021b).

The research lasted 34 days in December 2020 and January 2021. Questionnaires were disseminated via direct contact and indirect public tools (social networks, group communications to various types of public). Estimation of the number of individuals who were requested to participate in the experiment is approx. 2-3 thousand. 879 people were interested in taking part in the survey, which was estimated by clicking the link leading to the survey. The total contribution in the examination, involving filling in the questionnaire, was realized by 160 individuals, i.e., 18.2% of those interested in the research. The typical time of filling in the form was 32.5 minutes, and the mean age of a respondent was 38 years.

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

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named themselves creative individuals (answering *rather yes* or *definitely yes*), and 16.23% named themselves noncreative individuals (answering *rather no* or *definitely not*).

3. Results and discussion

The following conclusions were found about the statistical verification of the research hypotheses. H1 ("There are differences in perception of the manager's, leader's, entrepreneur's, creator's, and artist's identities between managers and nonmanagers") was verified negatively. The *chi-square* value amounted to: 407.50 for an entrepreneur, 410.55 for a manager, 413.41 for a leader, 396.72 for a creator, and 398.35 for an artist. For the $df = 49$, using the chi-square distribution table, there is a value of 85.3506. The results are statistically significant for the significance level of $p = 0.001$. H2 ("The differences in perception of the manager's, leader's, entrepreneur's, creator's, and artist's identities between managers and nonmanagers are not the same and vary in the case of each of the particular identities") was verified negatively. The *chi-square* value = 40.53. For the $df = 4$, using the chi-square distribution table, there is a value of 18.4668. The results are statistically significant for the significance level of $p = 0.001$. In the case of each investigated identity, the means of the 50 features of the identities of a manager, leader, entrepreneur, creator, and artist are higher than 1,98%. The graphical illustration shows Figure 1Figure 1.

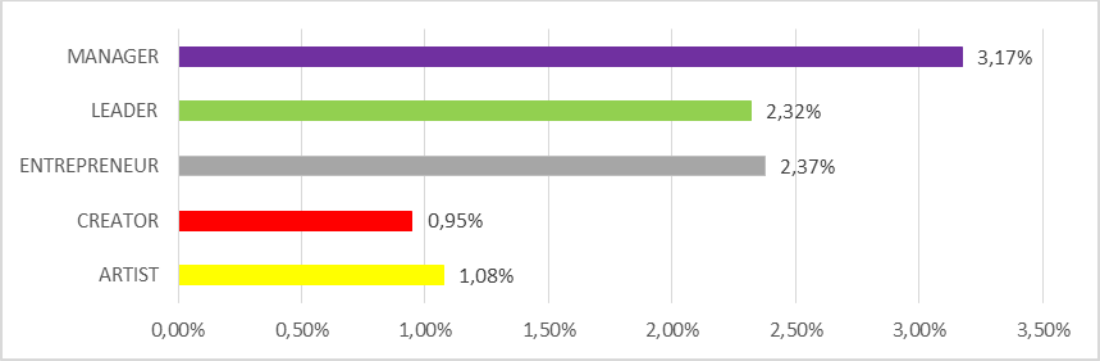

Figure 1. Means of the 50 features of a manager's, leader's, entrepreneur's, creator's, and artist's identities perceived by managers and nonmanagers

Source: own elaboration

The research hypotheses were established to confirm significant differences in perception of chosen issues by managers and nonmanagers. These discrepancies would underline commonly perceived differences. Their negative verification was astonishment and should be perceived as a novelty in the investigated area. Although both hypotheses were statistically verified negatively, the qualitative analysis of the in-depth characteristics of the investigated identities between managers and nonmanagers reveals interesting outcomes. It can be said that all investigated identities interpenetrate and are considered to be more or less complementary.

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3.1. Manager's identity

The range of differences in the manager's identity perceived by managers and nonmanagers shows Figure 2, Figure 3, and Figure 4.

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

Perception of the particular 50 investigated features of managers' identity compared to nonmanagers reveals the following conclusions.

First, all nine features of the manager's identity perceived as the least critical by managers than nonmanagers are (in descending order): sensitivity to Beauty, honesty, being guided by faith and spirituality, justice, sensitivity to Good, responsibility, resistance to fails and failures, ability to synthesize and draw conclusions, conservatism.

Second, the ten features of the manager's identity perceived as the most critical by managers than nonmanagers are (in ascending order): being guided by emotions, being innovative, tendency to risk, being guided by intuition, improving, quality through repetition, connecting contradictions, individualism, tendency to change, visualization skills (imagination), originality.

Third, the ten features of the manager's identity perceived the most similarly by managers and nonmanagers are: conservatism, interpersonal skills (communicativeness, reading emotions, sensitivity to others), focusing on financial profit, searching for opportunities, patience and persistence in achieving goals, efficiency, ability to analyze, ability to resolve conflicts, being guided by reason (rationalism), solving problems in a methodical way (logic).

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Figure 2. The most differently assessed manager's identity features by managers and nonmanagers

Source: own elaboration

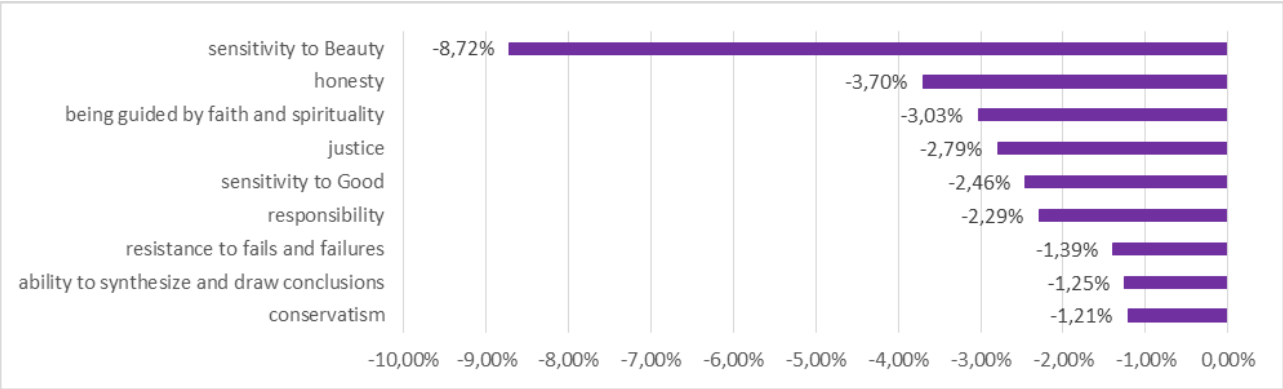

Figure 3. Manager's identity features perceived as less important by managers than nonmanagers

Source: own elaboration

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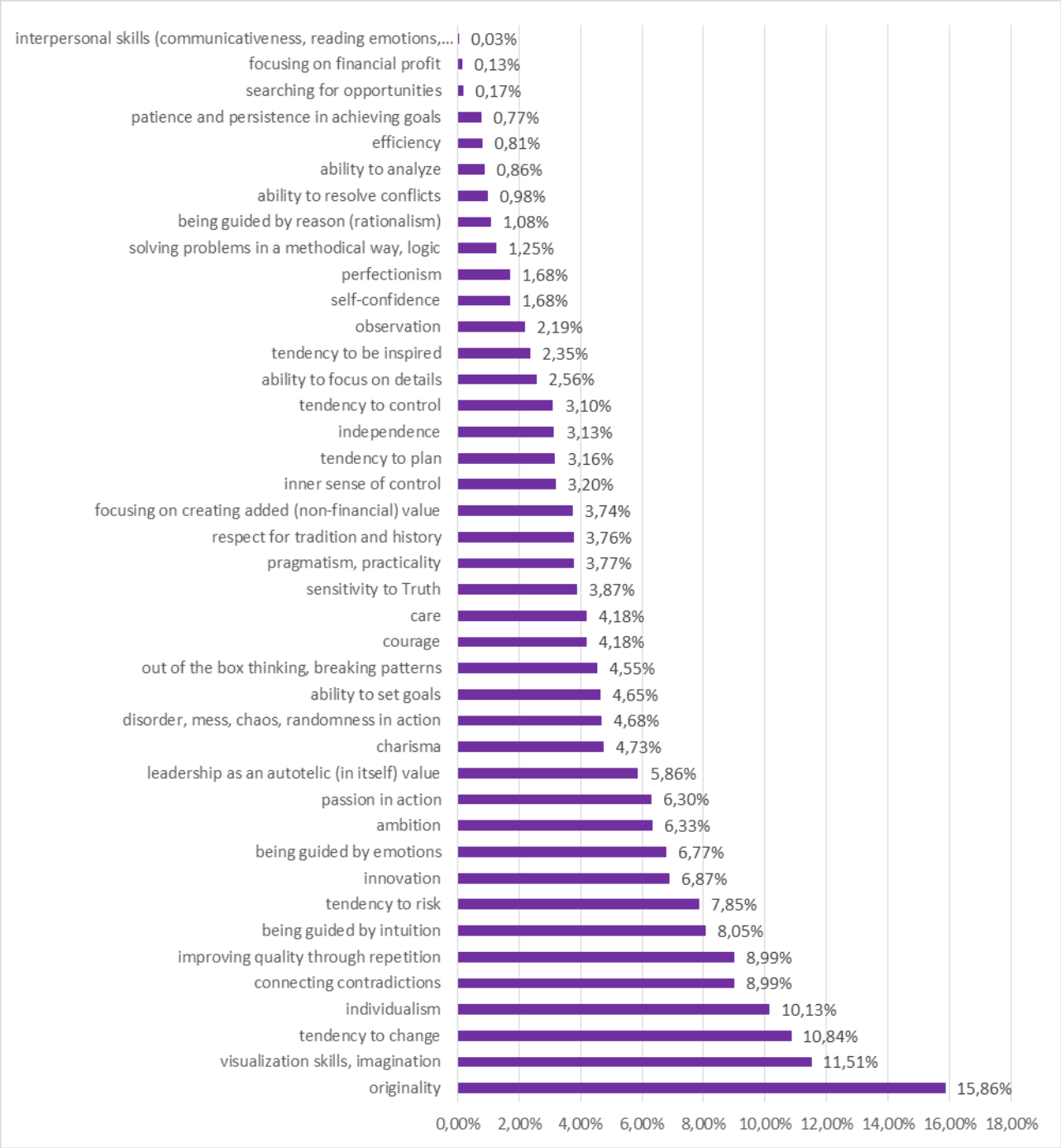

Figure 4. Manager's identity features perceived as more important by managers than nonmanagers

Source: own elaboration

Crossing the investigated areas, managers perceive the following features in the context of a manager's identity: leadership (4.67) and entrepreneurship (4.50) as *very important*, creativity (4.25) as *rather important*, and artistry (2.87) as *rather unimportant/neutral*. On the other hand, nonmanagers perceive the following features in the con-

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text of a manager's identity: leadership (4.55) in between of *very* and *rather important*, entrepreneurship (3.95) and creativity (3.77) as *rather important*, and artistry (2.50) as in between of *rather unimportant* and *neutral*.

According to managers, the following features define a manager (in descending order): experience and achievements (4.57, *very important*), actually performed work or occupation (4.48, *rather important*), personal characteristics (4.20, *rather important*), formal education in the form of schools, studies, courses, training (4.02, *rather important*), self-definition (3.91, *rather important*), and talent (3.89, *rather important*). On the other hand, according to nonmanagers, the following features define a manager (in descending order): experience and achievements (4.41, *rather important*), actually performed work or occupation (4.14, *rather important*), personal characteristics (4.05, *rather important*), talent (3.95, *rather important*), formal education (3.91, *rather important*), and self-definition (3.23, *neutral*).

Manager's identity in the literature is described as an expert, an organizer, a political operator, or a rational actor (Bulei et al., 2014). In the research, being guided by reason (rationalism) was assessed by managers (4.46) and by nonmanagers (4.41) as *rather important* – a difference of 1.08%. On the other hand, chaos, disorder, mess, and randomness in action are perceived as *rather unimportant* for managers (2.37) and nonmanagers (2.14) – a difference of 4.68%. It results in opposite to investigations suggesting that randomness is one of the particular attributes of the manager's identity (Lahmiri et al., 2020).

Manager's identity is built around profitability: financial or beyond financial (FitzGibbon, 2021). The research confirms this statement, but it needs to be underlined that focusing on financial profit is much vital (4.37 for managers, 4.36 for nonmanagers) than focusing on creating added (non-financial) values (3.78 for managers, 3.59 for nonmanagers, a difference of 3.74%).

According to the literature, certain qualities of the manager's identity are (alphabetically): conservatism (Sturdivant et al., 1985), courage (Barratt-Pugh et al., 2013), efficiency (Kohail et al., 2016), independence (McGrath et al., 2019), individualism (Frank et al., 2015), rationalism (Faran & Wijnhoven, 2012), responsibility (Mikkelsen & Marnewick, 2020). The research proves a prominent position of efficiency (4.72 for managers, 4.68 for nonmanagers, negligible difference of 0.81%), independence (by analogy 4.11, 3.95, 3.13%), courage (by analogy 4.48, 4.27, 4.18%), and responsibility (by analogy 4.70, 4.82, 2.29%). Individualism is perceived as *rather important* by managers (3.79) and *neutral* for nonmanagers (3.29) – a difference of 10.13%. However, conservatism is *rather neutral* for managers (3.17) and nonmanagers (3.23) – a difference of 1.21%.

Grounded on varied levels of creativity and efficiency, the following manager's identities may be observed: an administrator (an official), a manager-theoretician, a professional, a creative manager (a leader). A manager with extraordinary creativity and competence in his field can be named a management artist; it will also be authorized to call the manager as an artist/virtuoso who, achieving his ideas, knows how to organize reality according to his intentions (Szostak & Sułkowski, 2020a). Researches of educational institutions reveal factors affecting managerial creativity (alphabetically): action-oriented, confidence, domain expertise, emotional stability, innovative leadership attributes, openness, professional development, risk tolerance (Alsuwaidi & Omar, 2020). The literature emphasizes the intense influence of managers on their employees' creativity (Williams, 2001), but the level of creativity among managers varies depending on many factors, e.g., gender (Ahmad & Zadeh, 2016). Creativity also has its paradoxes in the form of assumptions and unanswered questions (DeFillippi et al., 2007). The research proves the importance of creativity among managers. Spreading creativity on analytical elements, it can be stated that: 1) innovation is perceived similarly *rather important* (a difference of 6.87%) by managers (4.39) and nonmanagers (4.05); 2) originality is perceived as *rather important* by managers (4.11) and nonmanagers (3.32) – the largest difference in manager's identity of 15.86%; 3) out of the box thinking and breaking patterns was assessed by managers (4.00) and by nonmanagers (3.77) as *rather important* – a difference of 4.55%; 4) searching for opportunities is perceived equally *rather important* by managers (4.46) and nonmanagers (4.45).

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3.2. Leader's identity

The whole range of differences in perception of the leader's identity by managers and nonmanagers displays Figure 5, Figure 6, and Figure 7.

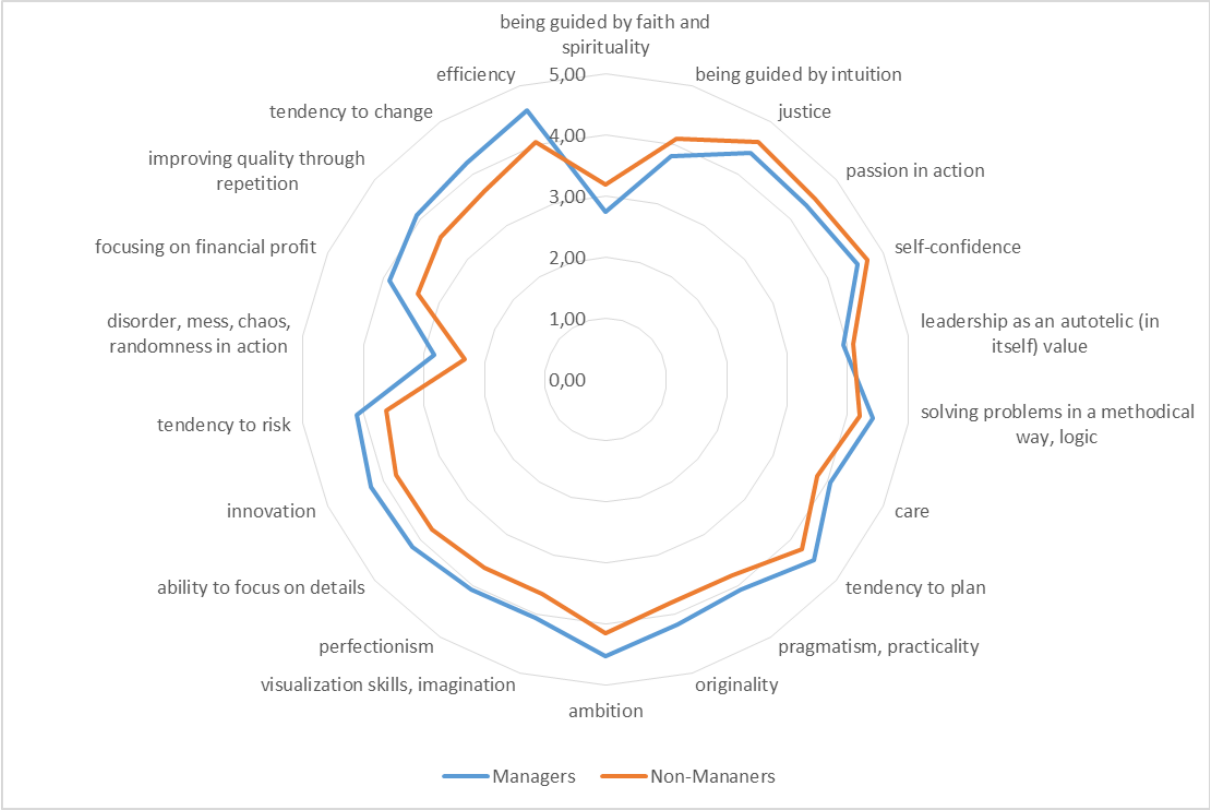

Figure 5. The most differently assessed leader's identity features by managers and nonmanagers

Source: own elaboration

The ten most important features of a leader's identity perceived by managers are (in descending order): charisma, ability to set goals, patience and persistence in achieving goals, responsibility, ability to resolve conflicts, interpersonal skills (communicativeness, reading emotions, sensitivity to others), courage, efficiency, self-confidence, ambition. Conversely, the ten most important features of a leader's identity perceived by nonmanagers are (in descending order): charisma, ability to set goals, self-confidence, ability to resolve conflicts, observation, patience and persistence in achieving goals, interpersonal skills (communicativeness, reading emotions, sensitivity to others), justice, responsibility, passion in action.

Perception of the specific 50 explored features of the leader's identity by managers and nonmanagers reveals the following conclusions. The ten features of the leader's identity perceived as the least critical by managers than nonmanagers are (in descending order): being guided by faith and spirituality, being guided by intuition, justice, passion in action, self-confidence, leadership as an autotelic (in itself) value, sensitivity to Truth, honesty, sensitivity to Beauty, charisma. The ten features of the leader's identity perceived as the most critical by managers than nonmanagers are (in ascending order): visualization skills (imagination), perfectionism, ability to focus on details, innovation, a tendency to risk, disorder (mess, chaos, randomness in action), focusing on financial profit, improving quality through repetition, tendency to change, efficiency. The ten features of the leader's identity perceived

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the most similarly by managers and nonmanagers are resistance to fails and failures, interpersonal skills (communicativeness, reading emotions, sensitivity to others), sensitivity to Good, patience and persistence in achieving goals, being guided by emotions, independence, ability to synthesize and draw conclusions, responsibility, ability to analyze, and courage.

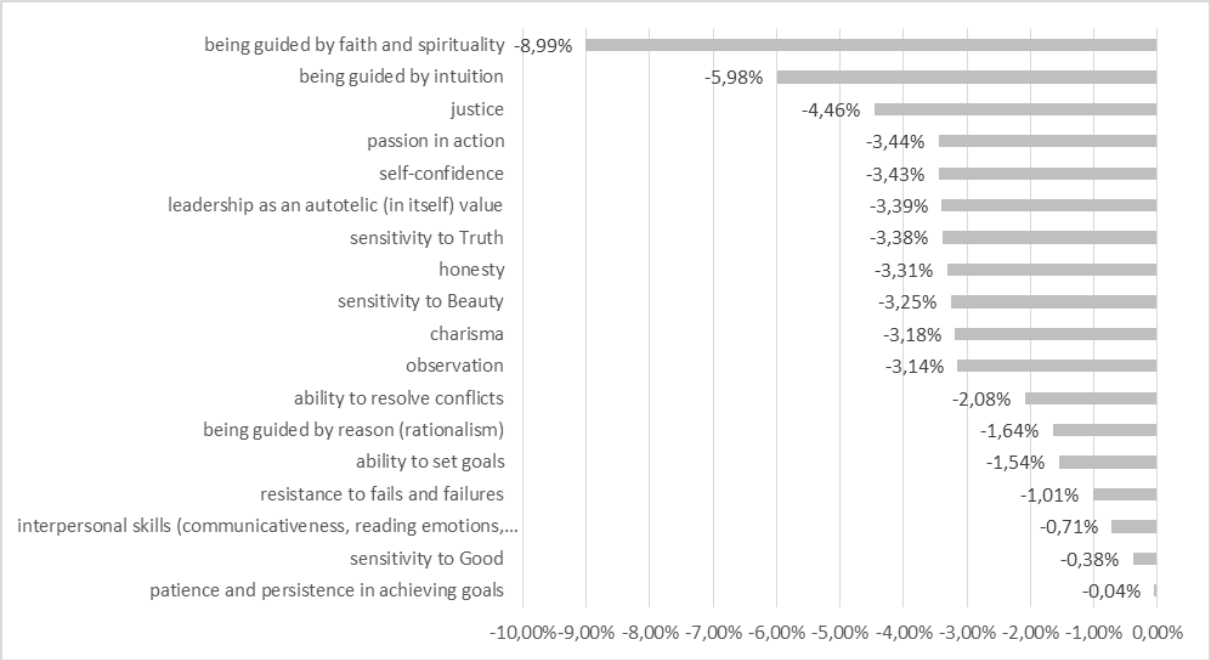

Figure 6. Leader's identity features perceived as less important by managers than nonmanagers

Source: own elaboration

Crossing the investigated areas, managers perceive the following features in the context of a leader's identity: entrepreneurship (4.56) and managing (4.51) as *very important*, creativity (4.25) as *very important*, and artistry (3.22) as *neutral*. On the other hand, nonmanagers perceive the following features in the context of a leader's identity: entrepreneurship (4.41), creativity (4.00), and managing (3.77) as *rather important*, and artistry (2.64) as *neutral*.

According to managers, the following features define a leader (in descending order): personal characteristics (4.61, *very important*), experience and achievements (4.56, *very important*), talent (4.29, *rather important*), actually performed work or occupation (4.28, *rather important*), self-definition (3.78, *rather important*), formal education at schools, studies, courses, training (3.43, *neutral*). According to nonmanagers, the following features define a leader (in descending order): personal characteristics (4.45, *rather important*), talent (4.45, *rather important*). Experience and achievements (3.95, *rather important*), self-definition (3.64, *rather important*), actually performed work or occupation (3.09, *neutral*), formal education at schools, studies, courses, training (2.68, *neutral*).

The literature shows that the level of a leader's self-identity impacts vision communication with collaborators and subordinates positively (Venus et al., 2019). The narcissistic personality has an essential impact on a leader's identity integration (Chen, 2018), but it may negatively impact the organization (Szostak & Sułkowski, 2020b). Transformational leadership and procedural justice positively and meaningfully affect manager trust, which positively impacts creating a maintainable organizational identity (Erat et al., 2020). The research confirms that justice is a *rather important* feature of a leader's identity for managers (4.40) and *very important* for nonmanagers (4.62) –

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a difference of 4.46%). Communicativeness, reading emotions, sensitivity to others as interpersonal skills are *very important* for managers (4.60) and nonmanagers (4.63).

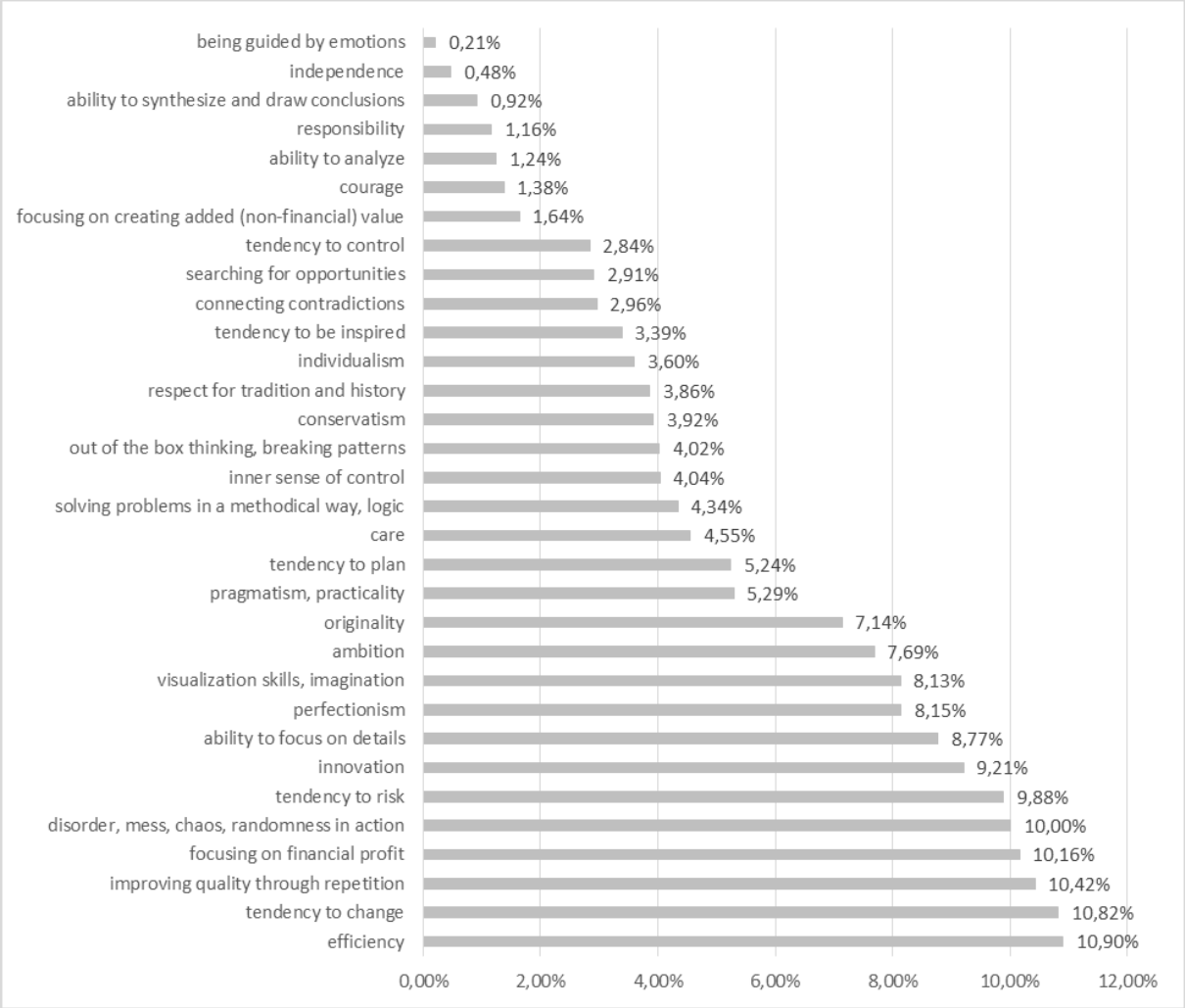

Figure 7. Leader's identity features perceived as more important by managers than nonmanagers

Source: own elaboration

There are arguments that the leader's values and approach to an organization's identity mark the organization's performance and financial income (Adler, 2006). The research reveals that focusing on financial profit is 10.16% more vital for managers (3.89, *rather important*) than for nonmanagers (3.38, *neutral*). In the case of focusing on creating added (non-financial) value, the difference in perception is negligible (1.64%) – managers (3.80) and nonmanagers (3.71) assess it as slightly lower than *rather important*.

Leaders influence, encourage, formulate a vision, motivate, inspire and mobilize followers; they affect their employees but are inspired by their surroundings and affect people through their charisma (Jankurová et al., 2017). A leader's identity must be strong enough to face current organisations' complex, dynamic, chaotic, and highly subjective, interactional surroundings and perspectives (Sutherland, 2013). The research confirms that charisma is vital for managers (4.70) and nonmanagers (4.86) – a difference of 3.18%.

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The level of surveillance regulates followers' replies to leaders with whom they either do or do not share an identity (O'Donnell et al., 2010). Tendency to control is assessed as *rather important* for managers (4.09) and nonmanagers (3.95) – a difference of 2,84%. A leader's effectiveness depends on sharing values by his followers and is negatively linked with compensation inconsistency between a leader and followers (Steffens et al., 2020). The research confirms efficiency as a *very important* factor of a leader's identity for managers (4.59) and *rather important* (4.01) for nonmanagers – a visible difference of 10.90%.

3.3. Entrepreneur's identity

The variety of disparities in the answers referring to the entrepreneur's identity seen by managers and nonmanagers displays Figure 8, Figure 9, and Figure 10.

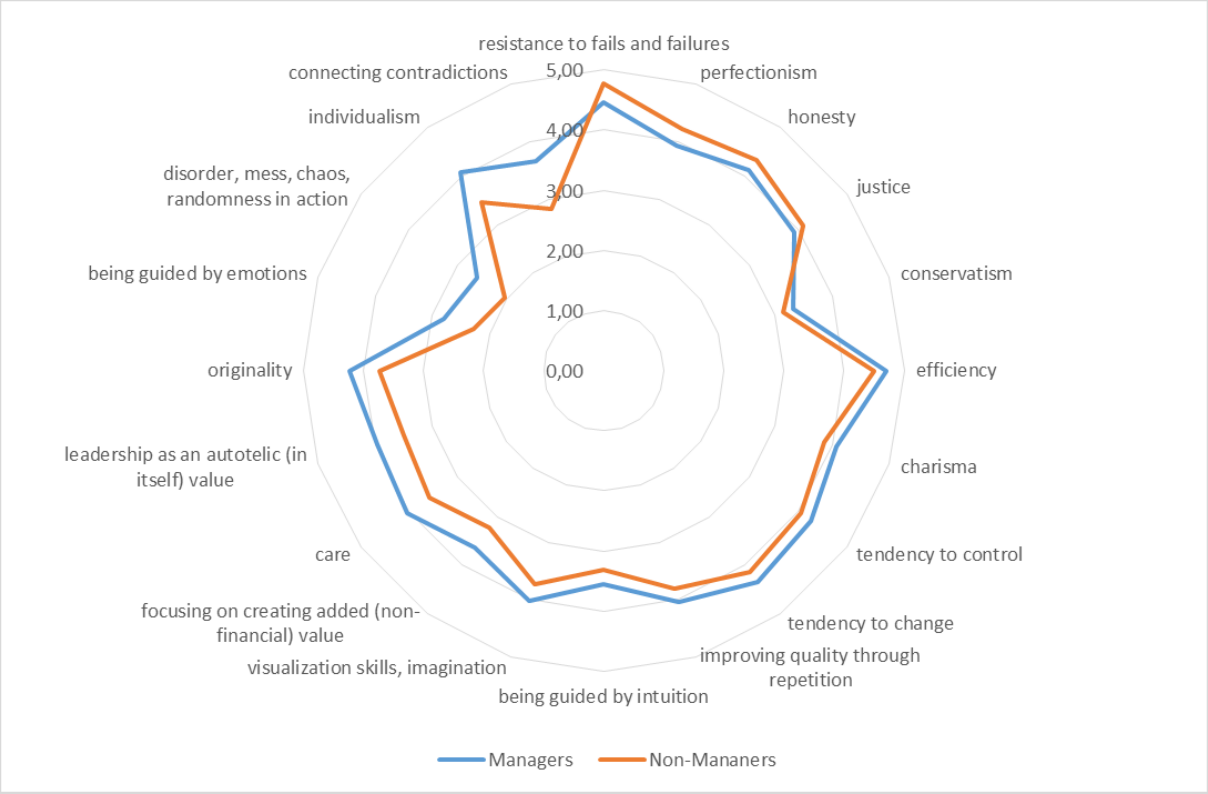

Figure 8. The most differently assessed entrepreneur's identity features by managers and nonmanagers

Source: own elaboration

The ten most important features of an entrepreneur's identity perceived by managers are (in descending order): patience and persistence in achieving goals, efficiency, responsibility, self-confidence, searching for opportunities, a tendency to plan, ability to set goals, courage, focusing on financial profit, innovation. Conversely, the ten most important features of an entrepreneur's identity perceived by nonmanagers individuals are (in descending order): resistance to fails and failures, ability to set goals, responsibility, patience and persistence in achieving goals, searching for opportunities, focusing on financial profit, observation, courage, self-confidence, ability to resolve conflicts.

Perception of the particular 50 examined features of the entrepreneur's identity by managers and nonmanagers reveals the following conclusions. The ten features of the entrepreneur's identity seen as the least critical by man-

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agers than nonmanagers are (in descending order): resistance to fails and failures, perfectionism, honesty, justice, sensitivity to Beauty, ability to set goals, sensitivity to Good, being guided by reason (rationalism), observation, ability to resolve conflicts. The ten features of the entrepreneur's identity seen as the most critical by managers than nonmanagers are (in ascending order): being guided by intuition, visualization skills, imagination, focusing on creating added (non-financial) value, care, leadership as an autotelic (in itself) value, originality, being guided by emotions, disorder (mess, chaos, randomness in action), individualism, connecting contradictions. The ten features of the entrepreneur's identity perceived the most similarly by managers and nonmanagers are: the ability to analyze, respect for tradition and history, focusing on financial profit, tendency to risk, methodically solving problems (logic), interpersonal skills (communicativeness, reading emotions, sensitivity to others), responsibility, searching for opportunities, ambition, inner sense of control.

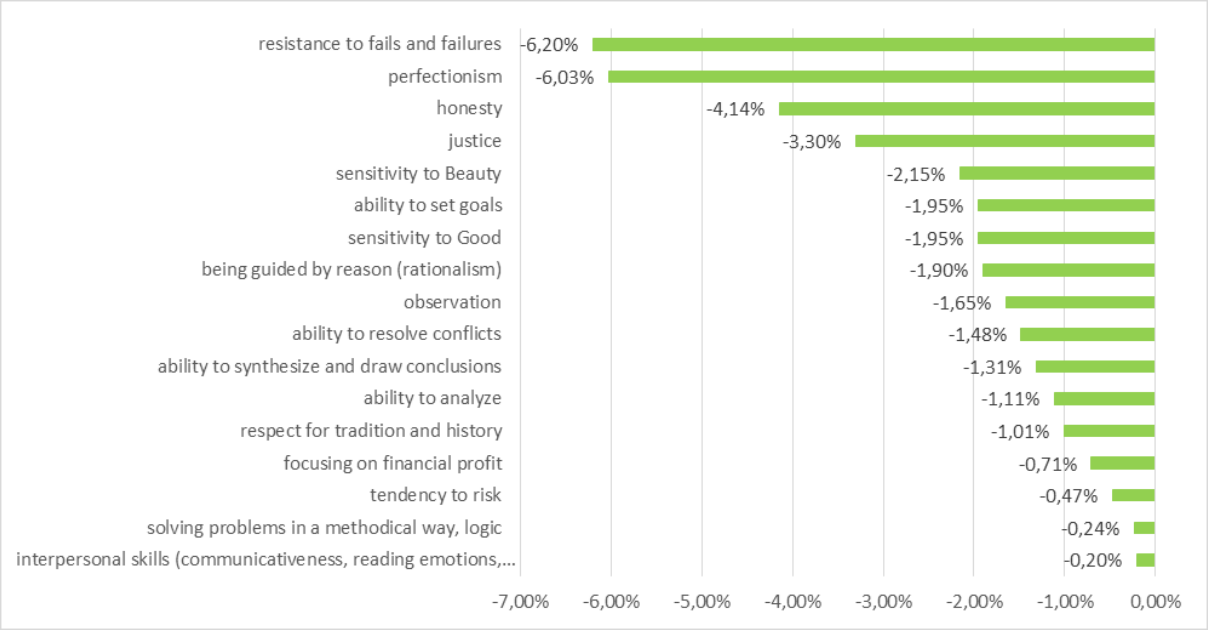

Figure 9. Entrepreneur's identity features perceived as less important by managers than nonmanagers

Source: own elaboration

Crossing the investigated areas, managers perceive the following features in the context of an entrepreneur's identity: managing (4.69) as *very important*, creativity (4.33) and leadership (4.31) as *rather important*, and artistry (3.11) as *neutral*. On the other hand, nonmanagers perceive the following features in the context of an entrepreneur's identity: managing (4.52) in between of very and rather important, leadership (4.27) and creativity (4.00) as rather important, and artistry (2.36) as rather unimportant.

According to managers, the following features define an entrepreneur (in descending order): experience and achievements (4.41, *rather important*), actually performed work or occupation (4.37, *rather important*), self-definition (4.09, *rather important*), personal characteristics (4.06, *rather important*), talent (3.72, *rather important*), formal education at schools, studies, courses, training (3.08, *neutral*). On the other hand, according to nonmanagers, the following features define an entrepreneur (in descending order): experience and achievements (4.32, *rather important*), actually performed work or occupation (4.23, *rather important*), self-definition (3.77, *rather important*), talent (3.59, *rather important*), personal characteristics (3.55, *rather important*), formal education at schools, studies, courses, and training (2.82, *neutral*).

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An entrepreneur's identity is commonly constructed around the subject of two sides of profitability: financial or beyond financial (Saxena, 2019). The research confirms this issue: financial profit is fundamental for managers (4.56) and nonmanagers (4.59). On the other hand, focusing on creating added (non-financial) value is described as *rather important* by managers (3.65) and as *neutral* by nonmanagers (3.23) – the difference is quite significant (8.42%).

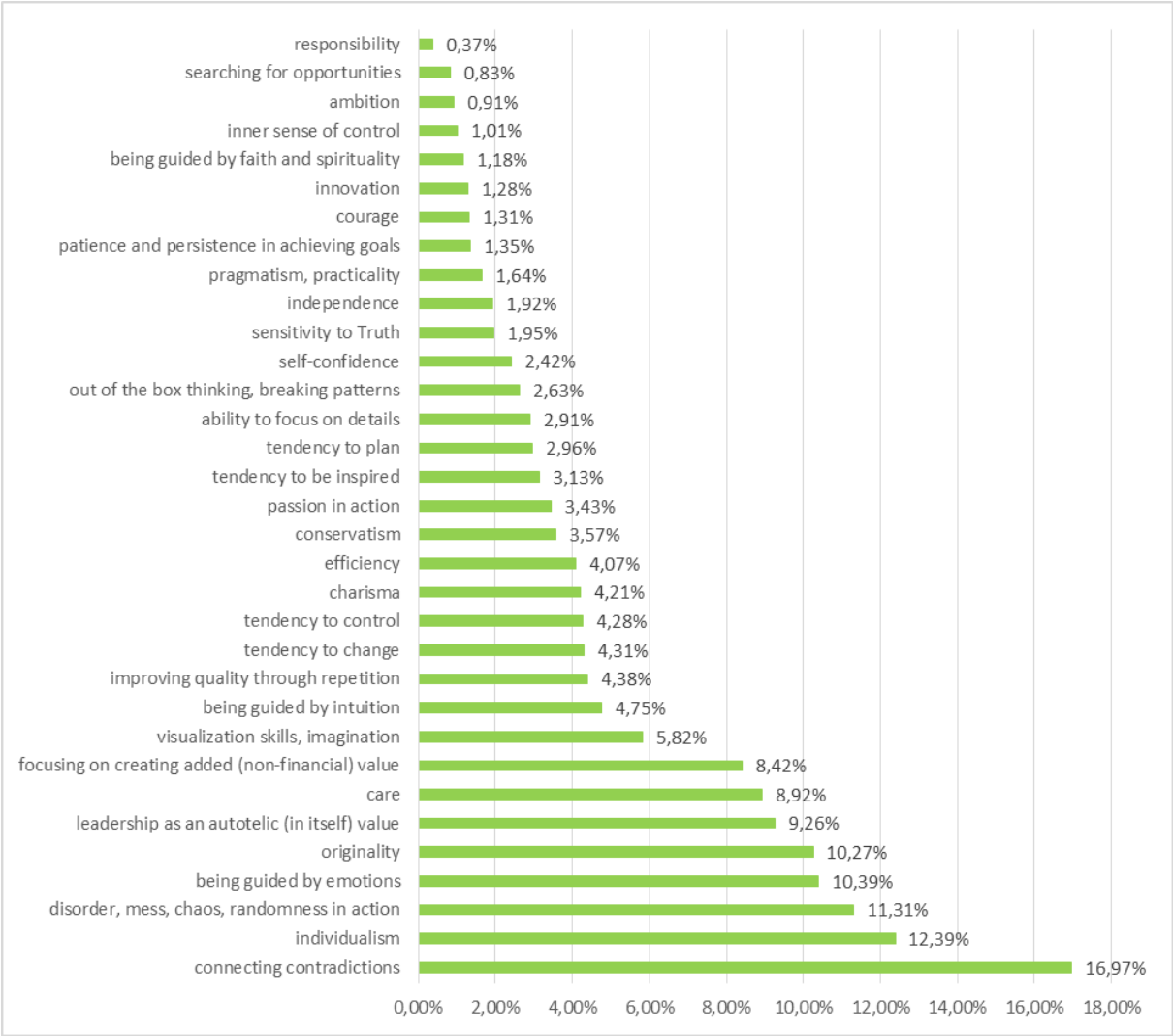

Figure 10. Entrepreneur's identity features perceived as more important by managers than nonmanagers

Source: own elaboration

The literature displays that entrepreneurship and creativity are linked together by motivation, actualization, and innovation (Fillis & Rentschler, 2010). Moreover, the research confirms the importance of innovation: both managers (4.52) and nonmanagers (4.45) perceive it between *rather important* and *very important* issues – the difference is negligible (1.28%).

Studies show that individual distinctions and qualities of proficiency, individuality, human capital, human abilities, and cognition play a vibrant role in the practice of an entrepreneur's identity creation (Lewis et al., 2016).

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The research confirms that independence (being analogous to individuality) is vital for managers (4.28) and non-managers (4. 18) – a difference of 1.92%. Managers also confirmed the issue of observation (being analogous to cognition) (4.46) and nonmanagers (4.55) – a difference of 1.65%.

3.4. Creator's identity

The whole range of differences in the answers about the creator's identity perceived by managers and nonmanagers shows Figure 11, Figure 12, and Figure 13.

The ten most important features of a creator's identity perceived by managers are (in descending order): courage, patience and persistence in achieving goals, passion in action, self-confidence, originality, innovation, visualization skills (imagination), ability to set goals, observation, out of the box thinking (breaking patterns). Conversely, the ten most critical features of a creator's identity perceived by nonmanagers individuals are (in descending order): passion in action, self-confidence, patience and persistence in achieving goals, visualization skills (imagination), resistance to fails and failures, tendency to be inspired, ability to synthesize and draw conclusions, ambition, courage, originality.

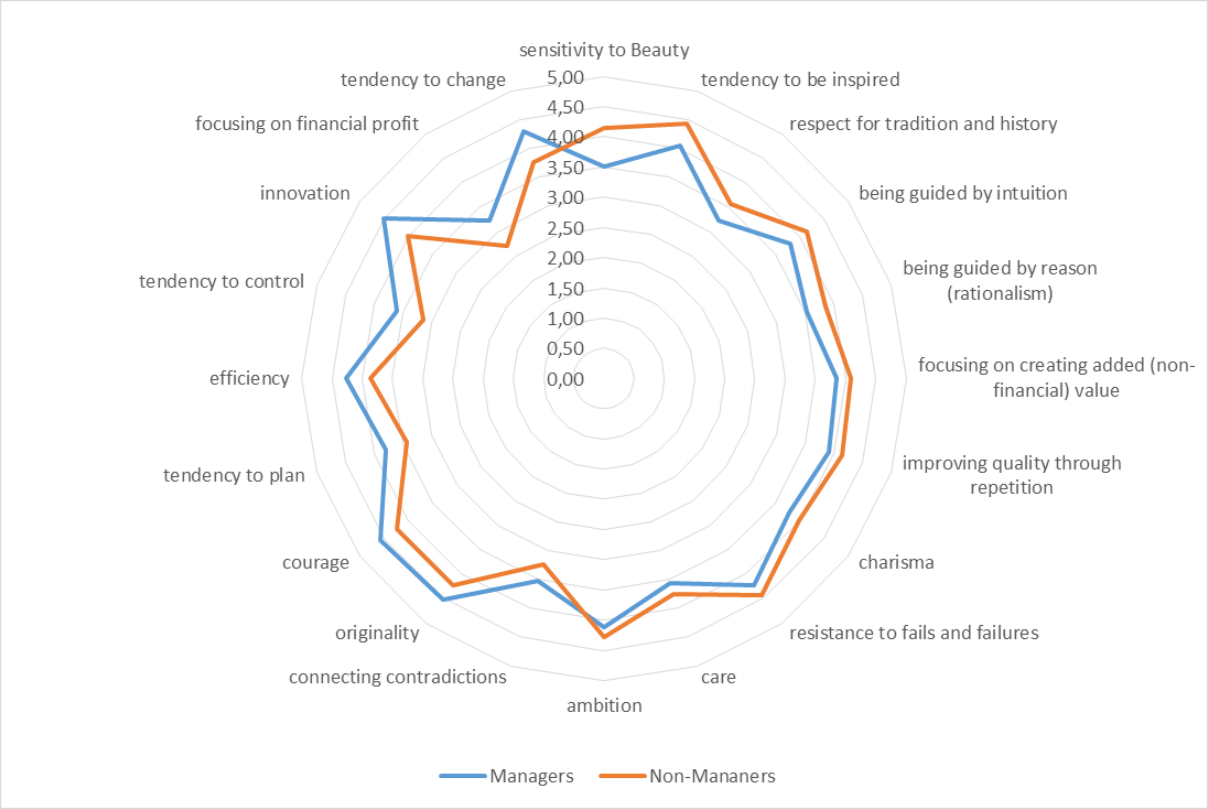

Figure 11. The most differently assessed creator's identity features by managers and nonmanagers

Source: own elaboration

Perception of the particular 50 examined characteristics of the creator's identity by managers compared to non-managers reveals the following conclusions. The ten features of the creator's identity perceived as the least critical by managers than nonmanagers are (in descending order): sensitivity to Beauty, tendency to be inspired, respect for tradition and history, being guided by intuition, being guided by reason (rationalism), focusing on creating

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added (non-financial) value, improving quality through repetition, charisma, resistance to fails and failures, care. The ten features of the creator's identity seen as the most critical by managers than nonmanagers are (in ascending order): responsibility, connecting contradictions, originality, courage, a tendency to plan, efficiency, tendency to control, innovation, focusing on financial profit, tendency to change. The ten features of the creator's identity perceived the most similarly by managers and nonmanagers are: visualization skills (imagination), honesty, ability to focus on details, sensitivity to Truth, patience and persistence in achieving goals, sensitivity to Good, being guided by faith and spirituality, interpersonal skills (communicativeness, reading emotions, sensitivity to others), independence, pragmatism (practicality).

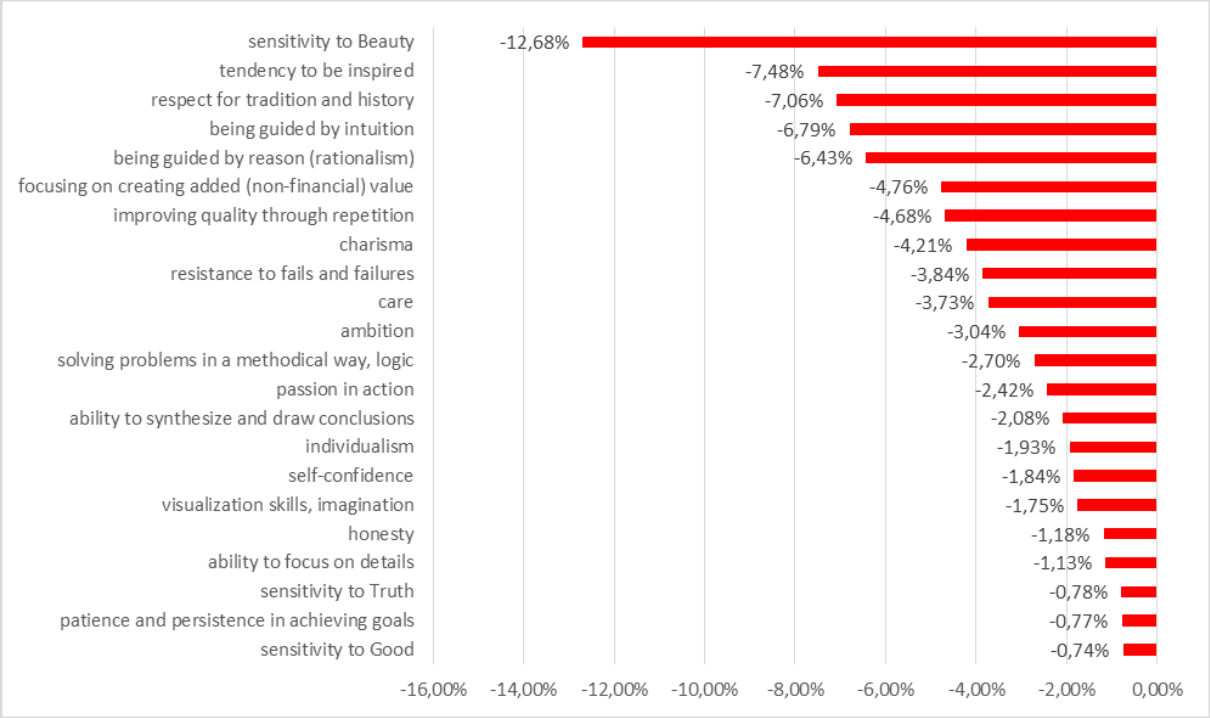

Figure 12. Creator's identity features perceived as less important by managers than nonmanagers

Source: own elaboration

Crossing the investigated areas, managers perceive the following features in the context of a creator's identity as *rather important*: artistry (4.21), managing (3.89), entrepreneurship (3.71), and leadership (3.60). On the other hand, nonmanagers perceive the following features in the context of a creator's identity: artistry (4.14) as *rather important*, managing (3.18) and entrepreneurship (3.05) as *neutral*, and leadership (2.55) in between of *neutral* and *rather unimportant*.

According to managers, the following features define a creator (in descending order): talent (4.51, *very important*), personal characteristics (4.35, *rather important*), experience and achievements (4.11, *rather important*), actually performed work or occupation (3.80, *rather important*), self-definition (3.66, *rather important*), formal education at schools, studies, courses, training (3.11, *neutral*). On the other hand, according to nonmanagers, the following features define a creator (in descending order): talent (4.41, *rather important*), personal characteristics (4.23, *rather important*), experience and achievements (3.95, *rather important*), actually performed work or occupation (3.68, *rather important*), self-definition (3.64, *rather important*), formal education at schools, studies, courses, training (3.00, *neutral*).

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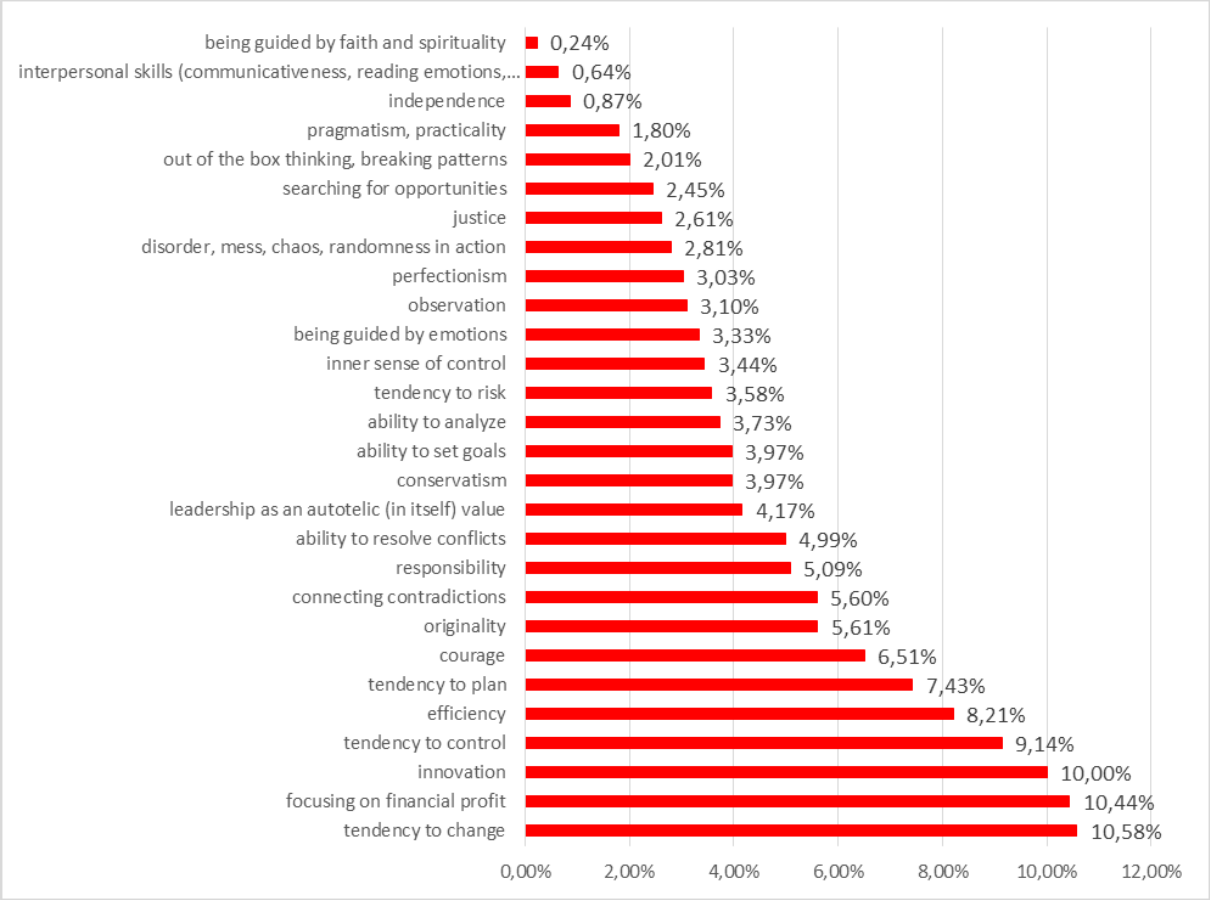

Figure 13. Creator's identity features perceived as more important by managers than nonmanagers

Source: own elaboration

Creator's identity may be explicated in the context of personalities dealing with profit- or non-profit organization's creator (Giacomin et al., 2007), classical arts –literature creator (Ottery, 2006), music creator (Tillay & Chapman, 2019), new arts – anime creator (Reysen et al., 2020), social media content creator (Maynard, 2021), religious institution creator (Jones & Massa, 2013), fake-news or rumour creator (Dong et al., 2019). Academics accentuate the shifting contexts and need for regulation to these deviations. The research shows that focusing on financial profit (3.24 for managers, 2.71 for nonmanagers, a difference of 10.44%), perceived as *neutral*, is generally less important than creating added (non-financial) value (3.86 for managers, 4.10 for nonmanagers, a difference of 4.76%) perceived as *rather important*.

Examining the creative personality, being the substance of aesthetics, allows for a comprehensive explanation of creative personality in disparity to basic personality, categories of creative personalities, and reasons for creating (Gołaszewska, 1984; Szostak, 2020; Szostak & Sułkowski, 2020a). Specific characteristics of creators inspected by researchers are motifs of the undertaking of creative actions (Gołaszewska, 1984; Szostak & Sułkowski, 2020a), resistance to fails and failures (Leone & Schiavone, 2019), individuality (Lorenzo-Romero & Constantinides, 2019), courage (Davenport & Redman, 2020), fairness (Thanh & Quang, 2019). Creativity overcomes stressful experiences (Hirschmann et al., 2020), and the creators build associations with social sustainability (Pinto et al., 2020). The research confirms the importance of a creator's resistance to failure (4.24 by managers and 4.43 by nonmanagers). Creator's courage is more vital for managers (4.56, *very important*) than nonmanagers

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(4.24) individuals (difference of 6.51%). By analogy to a creator's fairness, it can be stated that a creator's sensitivity to Truth (by analogy: 3.82, 3.86, 0.78%) and justice (by analogy: 3.65, 3.52, 2.61%) are *rather important*.

3.5. Artist's identity

Figure 14. The most differently assessed artist's identity features by managers and nonmanagers

Source: own elaboration

The whole spectrum of differences in the responses about the artist's identity perceived by managers and nonmanagers shows Figure 14, Figure 15, and Figure 16.

The ten most principal features of an artist's identity perceived by managers are (in descending order): passion in action, originality, visualization skills (imagination), self-confidence, patience and persistence in achieving goals, ability to focus on details, observation, courage, individualism, innovation. Conversely, the ten most vital features of an artist's identity seen by nonmanagers individuals are (in descending order): passion in action, patience and persistence in achieving goals, sensitivity to Beauty, improving quality through repetition, charisma, ambition, tendency to be inspired, visualization skills (imagination), originality, resistance to fails and failures.

Managers and nonmanagers' perception of the particular 50 studied qualities of the artist's identity reveals the following conclusions. The ten features of the artist's identity perceived as the least critical by managers than nonmanagers are (in descending order): sensitivity to Beauty, charisma, improving quality through repetition, leadership as an autotelic (in itself) value, focusing on creating added (non-financial) value, resistance to fails and failures, ambition, patience and persistence in achieving goals, a tendency to be inspired, honesty. The ten attributes of the artist's identity perceived as the most critical by managers than nonmanagers are (in ascending order): the ability to synthesize and draw conclusions, tendency to change, independence, a tendency to risk, conservatism,

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innovation, efficiency, out of the box thinking (breaking patterns), focusing on financial profit, a tendency to control. The ten features of the artist's identity perceived the most similarly by managers and nonmanagers are: being guided by intuition, passion in action, searching for opportunities, responsibility, justice, solving problems in a methodical way (logic), ability to set goals, connecting contradictions, visualization skills (imagination), observation.

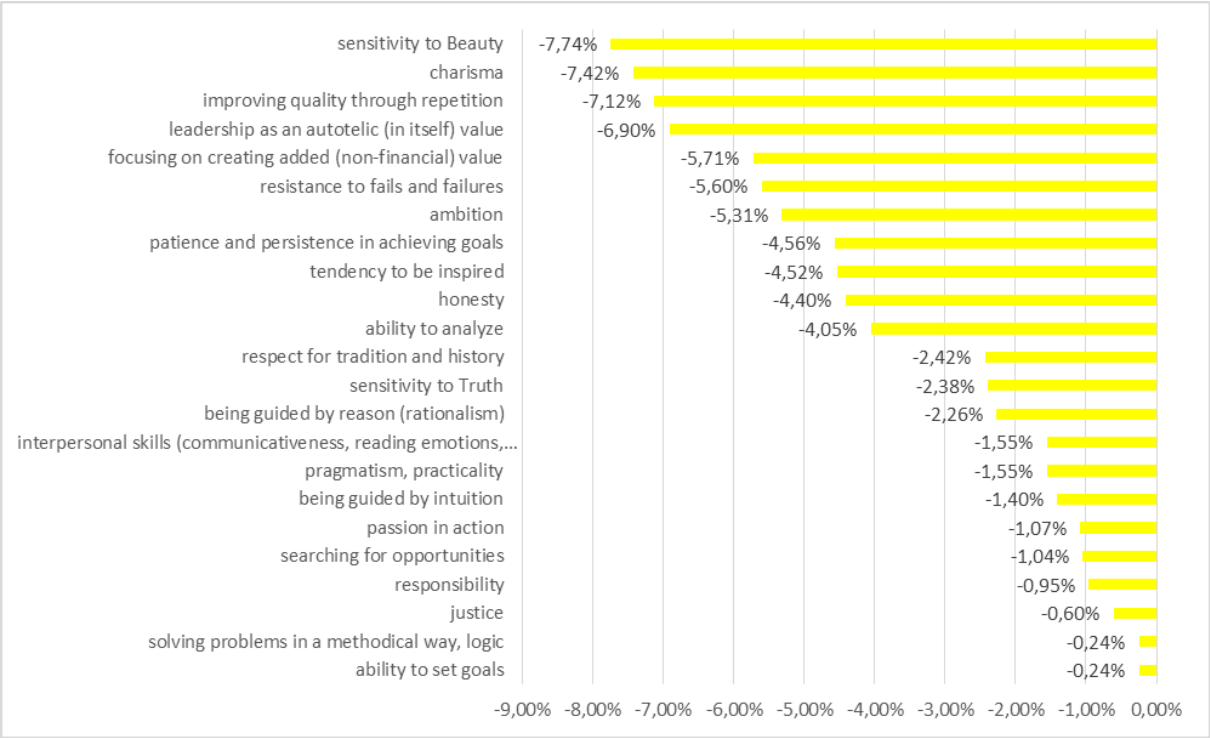

Figure 15. Artist's identity features perceived as less important by managers than nonmanagers

Source: own elaboration

Crossing the investigated areas, managers perceive the following features in the context of an artist's identity: creativity (4.64) as *very important*, entrepreneurship (3.42), and managing (3.44) as in between of *rather important* and *neutral*, and leadership (2.95) as *neutral*. On the other hand, nonmanagers perceive the following features in the context of an artist's identity: creativity (4.62) as *very important*, managing (3.27) and entrepreneurship (2.86) as *neutral*, and leadership as in between *rather unimportant* and *neutral*.

According to managers, the following features define an artist (in descending order): talent (4.70, *very important*), experience and achievements (4.24, *rather important*), personal characteristics (4.13, *rather important*), actually performed work or occupation (3.93, *rather important*), self-definition (3.85, *rather important*), formal education at schools, studies, courses, training (2.98, *neutral*). On the other hand, according to nonmanagers, the following features define an artist (in descending order): talent (4.45, *rather important*), experience and achievements (4.36, *rather important*), self-definition (4.05, *rather important*), personal characteristics (3.95, *rather important*), actually performed work or occupation (3.73, *rather important*), formal education at schools, studies, courses, training (3.41, *neutral*).

An artist's identity has been described historically as an artisan, a genius, a doer, a God's will doer, a master, a holy man in touch with the hidden, a cultural aristocrat, a knowledge worker, a professional, an entrepreneur,

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a freedom maker, an influencer, a value or idea guardian, a collaborator, a superman (Deresiewicz, 2020; Tatarkiewicz, 2015). Considering varied levels of creativity and efficiency, the artist's identity may be identified as a copyist, a conceptualist, an artistic craftsman (artisan), and a creator (Szostak & Sułkowski, 2020a). The research describes an artist's possibility of out-of-the-box thinking and breaking patterns as *rather important* for managers (4.23) and nonmanagers (3.76) – a clear difference of 9.40%. An artist's efficiency is also perceived with an apparent discrepancy (9.05%) between managers (4.21) and nonmanagers (3.76).

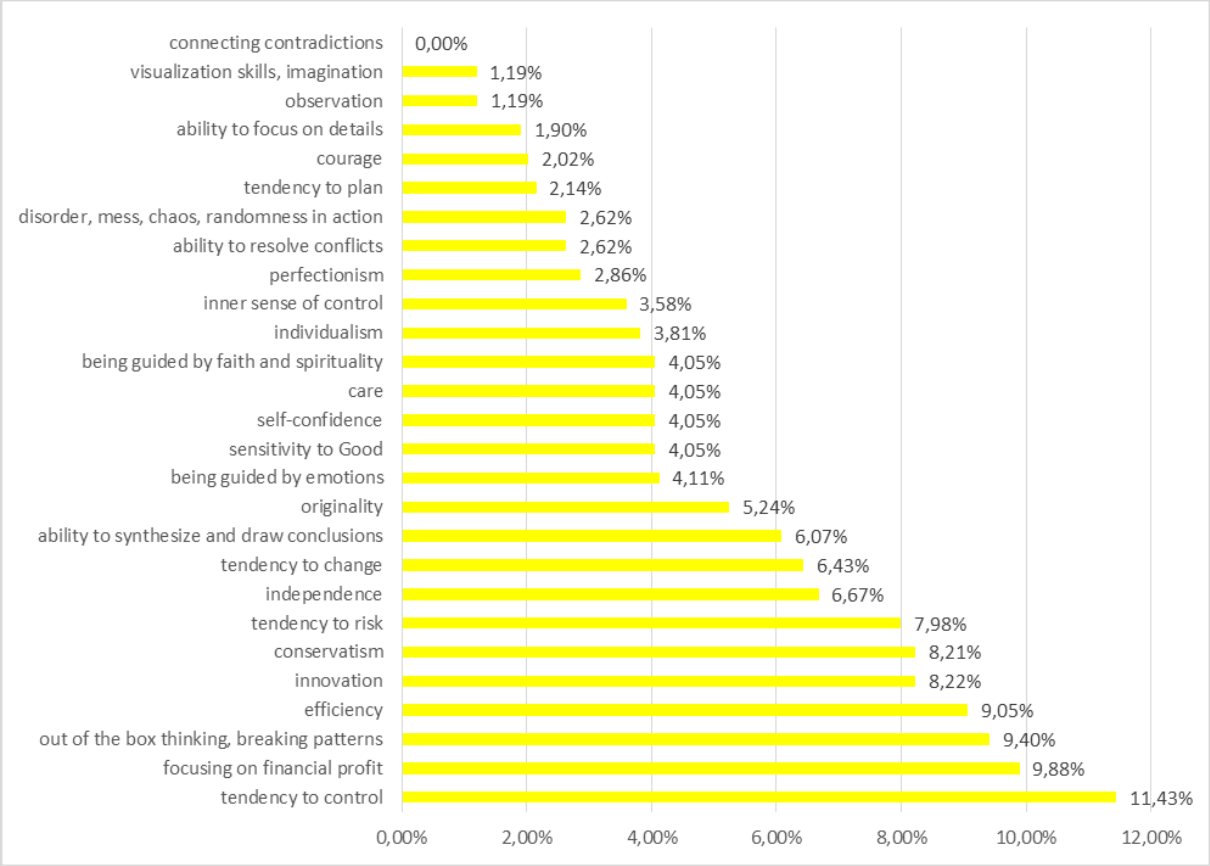

Figure 16. Artist's identity features perceived as more important by managers than nonmanagers

Source: own elaboration

Artist's identity is described in the situation of the crisis on the meta-level and the level of national identity (Rikou & Chaviara, 2016). The development of an artist's identity reduces symptoms and exposes damaging narratives based on a psychopathological paradigm (Thompson, 2016). The research exposes a discrepancy of 5.60% among artists' resistance to fails and failures: *rather important* for managers (4.05) and nonmanagers (4.33). Solving crises' problems methodically and logically was described as *neutral* (by analogy: 3.32, 3.33, 0.24%); it can be concluded that the issue of a solution is more important than the way the problems solving. Faced problems need to be resolved; an artist's ability to resolve conflicts is more critical for managers (3.61) than nonmanagers (3.48) – a difference of 2.62%. In the same context, an artist's ability to connect contradictions is identically perceived by managers and nonmanagers (3,57) halfway between *neutral* and *rather important*.

Artist's identity appears in numerous supplementary areas of human activity, e.g., among teachers and lecturers (Bremmer et al., 2020), managers (Szostak & Sułkowski, 2020a, 2021c, 2021d). Nevertheless, context is the es-

sential factor in self-identity and the artist's perception; artists' self-negotiation and identity formation rely considerably on context (Luger, 2017). The research displays that ability to synthesize and draw conclusions about the broad context of an artist's activity is expressed as *rather important* for managers (4.02) and nonmanagers (3.71) – a difference of 6.07%. Arts and art interventions in the organizational world are a fruitful tool for creativity and innovation growth among particular individuals and groups (Skoldberg Johansson et al., 2015). Researchers portray an artist's identity as a complex subject where the elements of self-defining, choosing an identity, and becoming are separate but deeply united (Hocking, 2019). Artist's innovation is more significant for managers (4.32) than for nonmanagers (3.90) – a difference of 8.22%.

The artist's identity may profoundly influence society, e.g., children dealing with musicians and artworks (Ey, 2016). Investigations about similarities and differences in artist's identities were also undertaken (Lindholm, 2015). Among particular features of the artist's identity, researchers underline randomness (Wagner, 2020), individualism (Kenning, 2009), sensitivity (Koide et al., 2015), charisma (Senior & Kelly, 2016). The research does not confirm that disorder, mess, chaos, randomness in an artist's action are important: managers (2.89) and nonmanagers (2.76) perceive this issue as less than *neutral*. The research confirms that an artist's individualism is *rather important* for managers (4.33) and nonmanagers (4.14) – a difference of 3.81%. Analytically investigating the issue of sensitivity, the research concludes that – among the Platonic triad elements – the most important is sensitivity to Beauty (by analogy: 4.23, 4.62, 7.74%), sensitivity to Good (4.25, 4.05, 4.05%), and sensitivity to Truth (3.93, 4.05, 2.38%). This order is contrary to the essential feature of art – in opposition to kitsch – which bases the most on Truth, then Beauty (Szostak & Sułkowski, 2020b). The research reveals that charisma is slightly more crucial in an artist's identity (4.11, 4.48, 7.42%) than honesty (3.73, 3.95, 4.40%), although both features are perceived as *rather important*. Artist's tendency to plan (3.54, 3.43, 2.14%) is perceived as less important than the ability to set goals (4.18, 4.19, 0.24%). Managers perceive artist's tendency to risk (3.88) more important than nonmanagers (3.48) – a difference of 7.98%.

4. Conclusions

The central research question of the article was: Do managers and nonmanagers perceive creative identities (of manager, leader, entrepreneur, creator, and artist) differently? If managers are individuals with certain features, they should differ in creative identities perception too. Verifying the central hypothesis shows no statistical difference between managers' and nonmanagers' perceptions of creative identities. This result is a novelty and deserved to be investigated in detail. On this basis, a detailed qualitative investigation was undertaken to determine particular areas of similarities and discrepancies in creative identities' perceptions between managers and nonmanagers.

The investigation concludes that the manager's potential is hidden in each individual instead of being a talent given to particular persons. That is why management should be taught by revealing sources of motivation and inspiration that play significant roles in self-construction and efficiency in achieving goals by individuals performing managerial functions in groups, organizations, and society. Furthermore, the same conclusion should be applied as policy implications for management: wanting a manager, we do not need to look for ready-one; we can raise him/her by revealing particular motivation and inspiration factors.

The research limitations are: 1) Division of respondents with and without manager's identity was done based on their self-perception; no external tools to assess the presence of managerial features were applied. 2) The research was run during the first deep phase of the COVID-19 pandemic (Spring 2020) to influence respondents' views and opinions. 3) The research sample (n = 160) was relatively small compared to the examined problem. 4) Synthetic suppositions cannot be broadly representative due to the density of the experiment problem. 5) Because more than 90% of respondents hold at least a higher degree of education – and because these people are statistically valuable equipped with awareness and perception tools than less educated persons – the deductions should not be automatically spread on society. 6) Controls for culture nor identity strength were not employed.

The following groups may benefit the outcomes of the study. 1) Managers desiring to understand the discrepancies in the perception of the creative identities by groups, organizations, and societies. 2) Individuals (managers, leaders, entrepreneurs, creators, artists) for a) better understanding the diverse levels of their personality with highlighting the matter of complex identity, b) likeness of own identity with the general perception of a particular role by managers and nonmanagers. 3) Scientists desiring to explore the similarities and variances between identity and its perception regarding managing, leadership, entrepreneurship, creativity, and artistry about managers and nonmanagers.

Potential research questions for future qualitative investigations or the hypothesis for additional quantitative research may be: 1) Self-perception of a particular identity may differ from the perception of the identity by groups/society varying on the belonging or not to the managerial world. 2) Self-perception of identity is analogous to a particular group's perception of the identity if there is a consistency (managers and nonmanagers) between the evaluated identity and people perceiving the identity.

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PECULIARITIES OF E-COMMERCE DEVELOPMENT: A CASE OF POLAND

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Abstract. The development of modern technology has changed not only the way of human communication but also the economy. The proliferation of new media and market entry of digital natives as consumers has changed the way of making purchase and sale transactions, collecting information about products, using internet services. There are new forms of human activity, corresponding to the needs of the new digital society. The article contains an analysis of the available statistical material regarding the e-commerce market in Poland together with the theoretical foundation. In the article, the author presents insights into consistent patterns of the development of the e-commerce market in Poland, distinguishes factors affecting this market, and analyses historical data on this market. The author provides a broader context of the processes by comparing the sizes of CEE-6 markets. The analysis of existing data used in the article, as the chosen research method enables presenting to the reader from outside the regional peculiarities of the e-commerce market development in Poland.

Keywords: digital economy; e-commerce; Central and Eastern Europe; digital marketing; e-shopping

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JEL Classifications: L81

Additional disciplines: history, media research, sociology

1. Introduction

The development of modern technology has changed not only the way of human communication but also the economy. The proliferation of new media and market entry of digital natives as the consumer has changed the way of making purchase and sale transactions, collecting information about products, use of internet services. There are new forms of human activity, corresponding to the needs of the new digital society. The emergence of e-commerce has become an alternative way for society to acquire the desired goods or to replace them, but besides the many advantages and benefits that also bring with it certain risks; its development faces many barriers. In the understanding of the impact of the new sales technology economy, it is important to recognize the significance of the impact of technological changes on social changes. Culture, i.e. human beliefs, values, cultural symbols can be the cause of technological changes. In explaining the phenomenon, the question of how

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technology affects ways of solving universal problems of societies, i.e. specialization, stratification, integration, and socialization, has to be answered. Nowadays, it is no longer questioned that new technologies create different business conditions and different competitive models capture this phenomenon well, e.g. Uber, the largest taxi company, doesn't have a single vehicle; Facebook, the most popular media channel, does not create content; Alibaba, the most profitable retail network, has no warehouses; Airbnb, the world's largest accommodation chain, has no building. As the author indicates, these companies are a sign of today's times or the beginning of the fourth industrial revolution announced by K. Schawab, creator of the World Economic Forum (Schwab, 2017). As researchers indicate, the most advanced economies in the world are based on a model in which, on the one hand, we are dealing with an economy focused on the production of information and cultural content, on the other, there is a development of digital environments, more economic, advanced and integrated, connected to the Internet (Rodriguez, 2017). The latter variable, which is constantly growing, determines non-market cultural production decentralized compared to the last century. According to the analysis of economic models, the relationship between the user and the enterprise is based on the peaceful coexistence of gift economics and market economics. It is assumed that new media is an industry and therefore can be studied from the point of view of ownership structures and professional practices. On the other hand, the communication and entertainment industry produces not only goods for consumption, but also intangible, fundamental for exercising power, consensus, or common sense (Medina et al., 2015). If production has moved from the company to the users, then the latter must be considered an important production force in a post-industrial society (Arias, Acebrón, 2001). Different definitions of e-commerce can be found, for example, in the works: Amor (1999), Strauss and Frost (2001), Phan (2003), Mohapatra (2012), Taranenko et al. (2021), etc. This study aimed to demonstrate the phenomenon of e-commerce from the perspective of the social economy. Theses that have been raised are: (1) e-commerce is the fastest-growing segment of the market; (2) e-commerce requires the implementation of other tools than those used in traditional sales; (3) a change in shopping preferences of consumers from shopping offline to shopping online. The present article uses the method of analysis of existing documents/sources such as literature, studies, and industry reports.

2. Review of literature

Before the internet business appeared in companies and international corporations, has developed e-business - EID (electronic data interchange). With the development of the internet began to move Electronic Data Interchange standards for e-business (Nojszewski, 2004; Wiktor et al., 2021).

The broadest concept relating to the economy, business, and commerce in the virtual world is an e-market, also called the new economy or the digital economy. E-market is: virtual space on which the activity is conducted, ongoing transactions, comes to the creation and exchange of values and mature direct contacts between its participants (Szymański, 2013).

A slightly narrower issue is the concept of e-business, which generally includes all forms of business using computer technology. As indicated Szymanski (2013, p.34), the first definition of e-business was founded in 1997 and described it as a secure, flexible approach to doing business consisting of the supply of additional business value by combining traditional methods with the possibilities offered by the Internet. It should also add that contemporary electronic business not only affects electronic transactions but also all the processes leading to making the transaction.

The concept of electronic commerce (e-commerce) is the narrowest and should be understood as handling, using, and creating commercial activities based on Internet technologies (Szymanski, 2013, p.34). It includes four business processes: promotion and marketing, payments, deliveries, and orders. E-commerce can be divided into the following segments (Table 1).

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Table 1. Segments of e-commerce and the relationships between them

Corresponding / Initiating	**Business**	**Consumer**	**Government**
Business	B2B - are contacts between different types of companies, transactions on electronic exchanges.	B2C - are commercial relations between companies and individual clients concerning retail sales.	B2G - initiatives buisness in relation to public administration
Consumer	C2B - the opposite of the traditional auction. The customer provides information about what the product is looking for and what price it can pay for it.	C2C - transactions between private individuals.	
Government	G2B - is the exchange of products and information between government agencies and businesses. It includes the following services: consulting, online payment systems, financial support schemes. The most popular service is the presentation of statistical data.		

Source: own study based on: Żukowska, Komańda, 2009

An analysis of the available literature source shows that in the aspect of functional since 2008, e-commerce divided into the following segments: (1) e-commerce traditional, (2) an auction site, (3) compare pricing, (4) m-commerce, and (5) f-commerce.

The first category includes traditional stores and online entrepreneurs offering their services through newsletters sent by e-mail.
The second most popular category is the electronic auction websites available on the net. Auction sites are divided into sites providing free access and movement of goods and services between users of institutional and individual (allegro.pl, e-bay), in which options are available to purchase by auction and immediate (instant purchase) and auction services in the strict sense, in which the user is required to buy special envelopes and participation in an auction until the expiry of exposure time object (eg. www.za10groszy.pl).
The third category consists of price comparison websites (ceneo.pl, opineo.pl) to enable a user to find the most favorable offer and correlate it with the opinions of other internet users about the store and product.

Another segment of e-commerce is m-commerce services dedicated to users that purchase through smartphones and tablets. It is the most dynamically developing branch of e-commerce. This is related to the digitization of cultural assets and a change in habits absorption of culture by ordinary users. The most popular goods sold through m-commerce services include e-books, audiobooks, and music (Fura, 2009). The last category consists of financial services sold over the Internet (f-commerce as commerce financial acronym). According to analysts (Nazarko, Dziekonski 2020) is the most promising market covering sales through the internet full package of insurance and financial services. Today noticeable is the trend to create special offers for Internet users. Also, of interest is present contemporary cohabitation offers virtual and real on the f-commerce services and their mutual convergence, which by J. Nazarko and K. Dziekonski (2020) presented in Figure 1.

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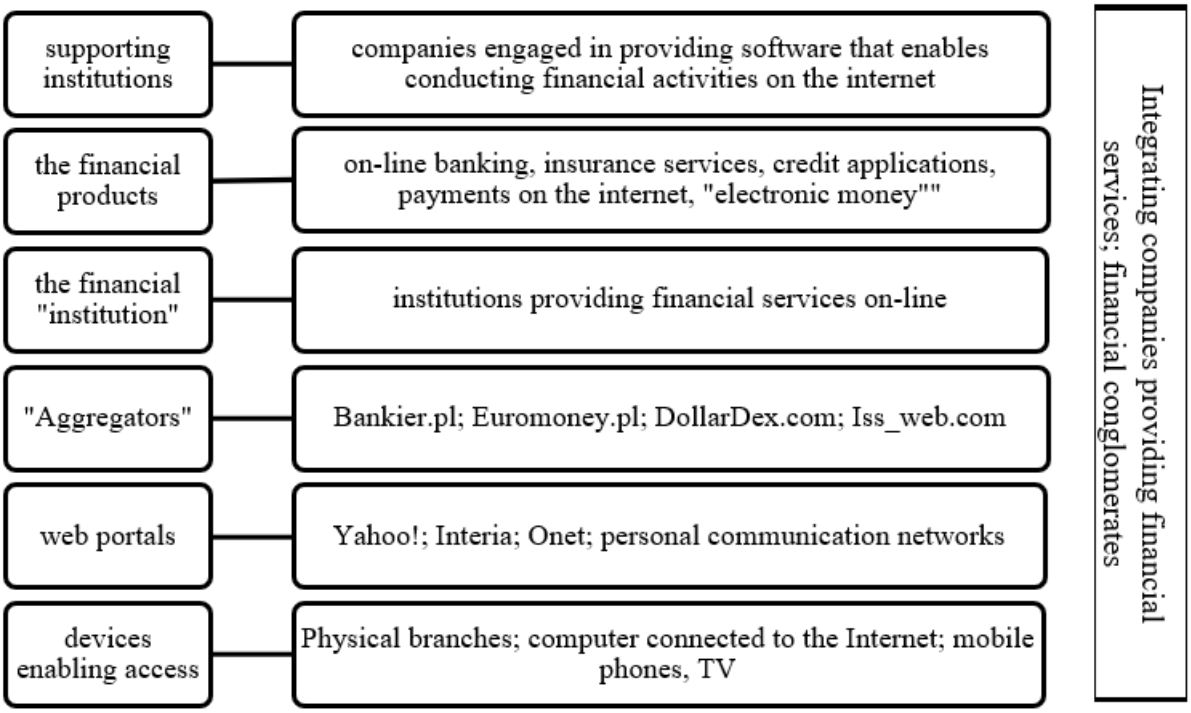
Figure 1. Distribution segments of e-commerce and their relationship with physical branches of financial institutions



Source: Nazarko, Dziekoński (2020)

2. A gap

In the process of analyzing available scientific studies, the issue of e-commerce is analyzed in a fragmentary way, referring only to the selected issue. A comprehensive analysis of the market from a historical perspective using a research perspective appropriate for the humanities. The subject matter is aimed at structuring and emphasizing the views. It also has a practical dimension; it may provide instructions on the characteristics of the market for external entities wishing to start a business on the Polish e-commerce market. The issues of barriers, as well as the advantages and disadvantages of operating on the market contained in the study, may be included as an element of business plans of platforms and sales stores entering the market.

3. Research aim and research questions

The main purpose of the work is the analysis of changes that have taken place in the e-commerce market in Poland in relation to the twin markets of Romania, Ukraine, and Hungary, which are absent in a combined form. Taking up this research topic is a contribution to further research on the phenomenon of e-commerce and will enable the creation of tools for historical and sociological analyzes of the phenomenon. The following research questions were adopted during the research planning process:

(1) How has the development and popularization of the Internet in Poland changed the perception of e-commerce?
(2) Are there differences in purchasing activity between men and women?
(3) What barriers for the e-commerce industry can be diagnosed in the historical context and whether these barriers in the process of further technologization of the trade market have been lifted?

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(4) Is it possible to define patterns of consumer behavior based on historical and sociological knowledge?
(5) Which industries recorded the greatest increases in the adopted historical perspective?
(6) What was the size of the market investigated and the markets used for comparison over the selected historical period?

5. Methodology

The basic research technique adopted in this type of study is the analysis of existing documents understood as - the process of data processing to obtain useful information and conclusions on their basis. Depending on the type of data and the problems posed, this may mean the use of statistical, exploratory, and other methods. Using existing data is an example of non-reactive research - methods of researching social behavior that does not influence these behaviors (Babbe, 2006). For this purpose, a catalog of studies and research reports was created, which were included in the bibliography. In the work on the article, both scientific studies and reports of specialist organizations as well as available press publications in specialist periodicals and internet portals dealing with economics and the influence of new media on economic processes were used. The research was carried out as part of the core business of the unit employing the author of this study.

6. Practical part

The development of the Polish e-commerce market is affected by many factors, among which are the following: economic, political, educational, demographic, and legal. One of the economic factors, the most authoritative in the context of the development of e-commerce is the correlation of this sector of the economy in terms of sector involvement in e-commerce in GDP (Zatonatska, 2018; Beyari, 2021). According to PMR which is the study of the internet, quoted by the website Pb.pl (Portal Pb.pl 2014), the value of the Internet economy in Poland in 2012 amounted to PLN 93 billion, and e-commerce PLN 21.5 billion. The share of sectors in GDP was 6%, compared with countries associated with the G7 and the BRIC (from 0,8-6,3% of GDP) is a good result. According to the company's Polish Internet Research, e-commerce in our country in 2012, generated PLN 21.5 billion, giving him a share of 3.8% for the whole trade. An important indicator is an increase in the correlation from year to year, which in 2016 amounted to 17,3%, and the market reached PLN 37.4 billion PLN.
The above-mentioned growth is presented graphically in Table 2.

Table 2. Value and growth of online retail in Poland in 2010-2016

Year	Value (bn PLN)	Growth (%)
2010	15,7	16,5
2011	16,2	16,2
2012	21	15,7
2013	23,8	12,9
2014	27,3	15
2015	31,8	15,4
2016	37,4	17,3

Source: own, based on: Portal Pb.pl (2014)

Among the other important factors determining the development of the e-commerce sector are socio-demographic factors. According to the report, "Kupuję w internecie", commissioned by the E-Commerce Polska Izba Gospodarki (E-commerce Poland 2014: 2-3), in Poland use the Internet 21.6 million people (64% of the population), of which 17 million users visit e-commerce sites. According to the report, the predominant group of internet users is young people, entering the labor market, while the largest demographic group is people over 55 years old. Analyzing the data presented in Figure 1 and Figure 2. You can conclude that in the future will increase

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revenue from e-commerce and the development of these services due to mental and generational change that occurs.

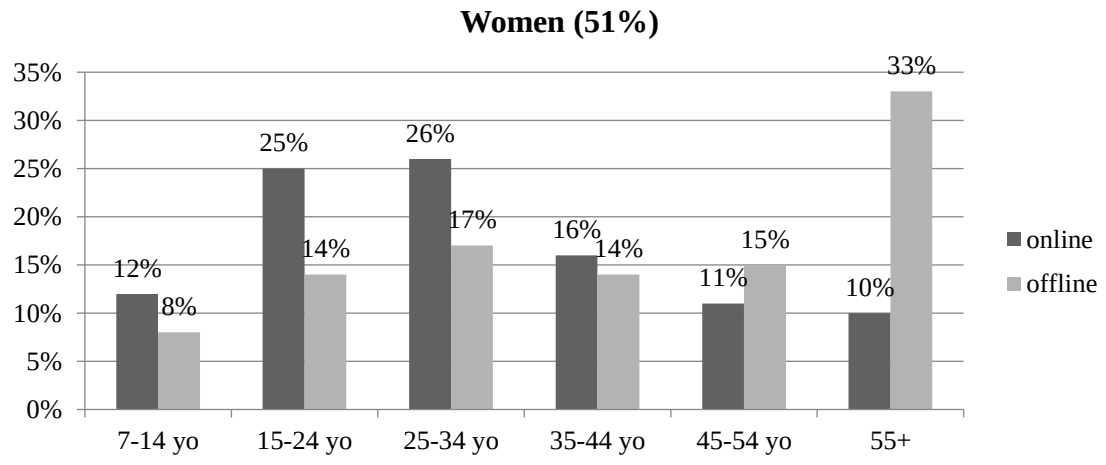

Figure 1. Demographics in e-commerce – women
Source: Gemius (2014)

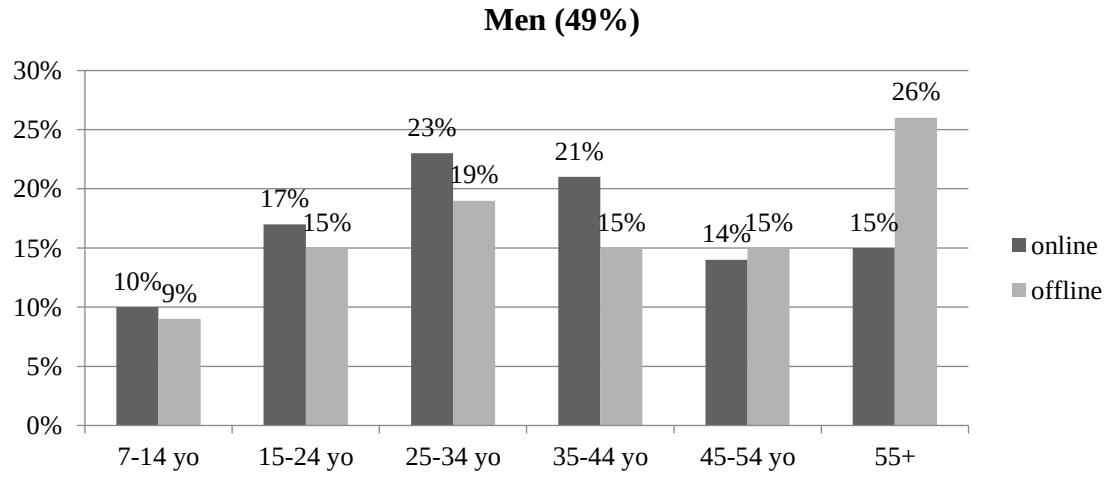

Figure 2. Demographics in e-commerce – men
Source: Gemius (2014)

According to the data of the report "E-Commerce in Poland 2014" (Gemius, 2014, p.24) indicate that a larger group interested in participating in the process of purchasing on the internet are women (53%). In the correlation of age, observable are (1) an increase in the number of internet users between the ages of 25-34, and (2) a decrease in the number of active users e-commerce in the age group 50+. Shopping online, make most people with a high school education (45% of the sample), a growing number of people with higher education that perform such transactions (35%) can see the downward trend when it comes to people with lower education (19%). With e-commerce sites most often used by people living in cities up to 200 000 people (41%), an increase

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in the number of users is observed in large cities (36%). A decrease in the number of active users was observed among residents of villages and small towns (23%). The above-mentioned trends are probably related to the processes of mass education and migration from rural to urban areas. Visible in the research is to reduce involvement in participation purchasing on e-commerce sites with lower-income households (up to 2000 zł). The increase is visible among households with affluent or very affluent portfolios (from PLN 2001-10000). It maintains at a constant level the market share of the holders of more than 10 000 PLN per month. Presented above increases are linked to the market entry of branded outlets and websites offering luxury goods (e.g. 5thavenue.eu, amazon.com, istore.com). A detailed statement is presented in Figure 3.

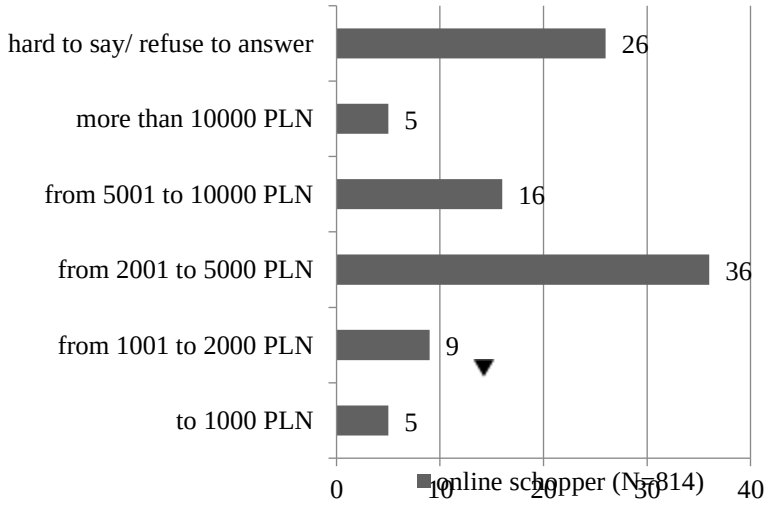

Figure 3. Household income - active users of e-commerce services
Source: Gemius (2014)

An important legal factor contributing to the increased interest in internet users, the use of e-commerce is the Law on Consumer Rights (OJ 2014 item. 827), which entered into force on 12.25.2014 year. Through this law introduced new rules protecting e-consumer against unfair practices of traders, imposing an obligation to fully provide information on the proposed offer. This Act introduced a catalogue of 21 information obligations - these are the issues about which the tenderer must inform the e-consumer, e.g. The manner of delivery, the period of withdrawal from the concluded contract, guarantee conditions. Also expanded regulations for withdrawal time (14 days) and built a catalogue of cases in which the right of withdrawal is not entitled. The entrepreneur is also obliged to inform the e-consumer in a clear and understandable on the issues of key importance to the concluded agreement (which is problematic for those containing the agreements using the SMS channel, due to a large amount of information to be provided). This obliges the trader to provide information on product description, method of payment, payment terms, the total price of the service, methods of delivery, and costs. This Act has equipped the e-consumer rights and protected them from unfair practices, and thereby encouraged people sceptical about the safety of e-services, to use the services of e-commerce. It will result in the unification of rules and regulations of online stores, but it is difficult to conclude what will be the impact these regulations have on the condition of Polish e-commerce sites. This Act is an implementation of Directive 2011/83 / EU, which has been implemented in all Member States of the European Union, which was supposed to eliminate differences in legislation and remove barriers to cross-border e-commerce. Unify the rules were designed to facilitate e-consumers access to foreign online stores and increase competitiveness (Chomiczewski, Lubacz, 2015, p.77).

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To political factors, affecting the dynamic development of the e-commerce sector may include the de-monopolization of telecommunications and postal services. The first of these factors is closely correlated with the affluence and purchasing power of individual households and the political decisions related to the public finance sector. Allowing the deduction of tax on goods and services (VAT) and making it easier for settlements in e-commerce and the ability to deduct from income tax the cost of access to the Internet, enabling the development of the e-commerce sector. The second of these factors made it possible to achieve greater profitability online stores, most of which operate business model oriented smaller profit associated with a higher turnover than the profit per unit. Achievement of a present level of development of the e-commerce sector would not be possible without the grants to set up new businesses from European funds. As indicated by the "Dziennik Internautów" (Lisowska, 2014) direct grant stimulates young entrepreneurs to start a business, and enables business growth through free training and business workshops or constitutes an important element for the development of the company.

The increase in interest in the e-commerce sector is undoubtedly also influenced by educational factors. More and more young people have contact with the media, according to the "Diagnoza Społeczna 2013" (Batorski, 2013: 334) already 3-4-year-olds use mobile devices. This increases confidence in this form of communication and ease of use of modern technologies. Young people are not afraid to enter into transactions over the internet, increasingly it is for them an alternative, less expensive form to get the desired goods - according to the Report "E-commerce w Polsce 2014" (Gemius, 2014, p.43) for 93% of teenagers motivator for online purchases is a lower price.

The most important benefits associated with the establishment and development of e-commerce sector, we can, for the professional literature, (Grudzieński, Hajduk, 2002; Szpringer, 2005; Sroczynska-Baron, 2018; Tikhomirova et al., 2021) indicate: (1) reducing the operating costs of the company, in particular the costs associated with maintaining offices and costs associated with maintaining the network of delegations and human costs, (2) the possibility of interactivity and customization of communication with customers through a variety of additional services (newsletter, contact form), (3) flexibility in logistics chains, (4) saving working time due to the reduction of responsibilities of employees, (5) making available of customer a much larger number of products - due to the much greater availability of goods on e-commerce market, (6) automate the process of product search, understood as a reduction of labour costs, and (7) continuous updating of the commercial offer related to the competitiveness of the market. The disadvantages of commerce that have been described in the literature can include those, seen from the point of the customer and that of defects that relate to the seller. They are presented in table 3.

Table 3. Summary of disadvantages of e-commerce

The disadvantages for the consumer	The disadvantages in terms of the seller
ensuring the security of payments over a network	too high cost of delivery to the customer
uncertainty as to the reliability of the seller	lack of an effective and extended system of forwarding and delivery
the inability to try or touch the purchased goods	lack of effective handling credit card payments
perceived lack of physically existing vendor with whom you can consult some urgent issues	reduction of profit margins, resulting from flattening prices and often with a "price war" between operators, mainly advertise in the price comparison websites

Source: Own study based on: http://zakupydodu.blogspot.com/2012/11/zalety-i-wady.html

In the context of psychological barriers associated with online shopping, an important problem are shopping models appearing in the online store-client relationship. The most popular model defining the relationship is a model ROPO (Research offline purchase online) developed by K. Hudetza, A. Hotz and S. Strothmann (2011). Following laid down in the paradigm of the modern internet user becomes familiar with the commercial offer in

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the real world, but the purchasing decision-taking in the virtual world. From an economic perspective, this leads to a reduction in demand in the local market and an increase in demand in the global market. This economic relationship is related to the theory of McLuhan (2004) paradigm of the global village, in which people seek out the most attractive offers without geographical barriers, guided by the only profitable individual understood as a benefit unit. As noted by Joanna Bilińska from the website Ceneo.pl: the internet is currently the main source of information on services and products, which can be seen even enduring popularity of price comparison sites. However, not every shopping that Poles begin in the network ends the online transaction. The research we conducted among our users indicates that half of them make purchases in stationary stores, after earlier research on the internet. ROPO effect, translated as search online, buy offline, is a strong trend in shopping habits of those consumers who prefer to see the merchandise before buying, save the cost of delivery, or to buy merchandise available "on the spot" (Gemius, 2014: 86). This phenomenon is particularly strong in these product categories and industries like automotive, tourism, home electronics/appliances, and mobile communications, or wherever the key is time that the consumer can devote to wait for the goods from the decision of purchasing (Gemius in 2014: 86). Under the effect of ROPO noted convergence on trade channels online and offline. Stationary stores have recognized the need to intensify marketing activities on the internet so that its offer be getting to the client, which is oriented to the purchase traditionally but actively seeking information on the Web. Online shops notice the need for the complexation and flexibility it offers - more and more of them can receive personal goods or all-day contact with the seller via the hotline. In terms of convergence of sales channels is an interesting sales subchannel called e-FMCG, which deals with fast-moving products. Large retail chains have noticed the potential sales of smaller batch via the Internet and allow you to make so-called everyday purchases electronically (Tesco.pl, Alma.pl) with the delivery to the house or in a specially prepared receiving point near the shop.

Polish internet users are positive about buying online stores, with active users of e-commerce services evaluating them better in all dimensions. E-consumers appreciate above all the convenience of the transaction and the costs lower than in the traditional trade. People not using services of the e-commerce sector, the least evaluate the safety of such transactions, considering it as risky (Gemius, 2014, p.28). Specific concerns of internet users are associated with electronic payment methods. Research Gemius, SA (2014, p.25-26) shows that doing online shopping the internet users show the greatest concern in matters related to security and the time of delivery. Not surprisingly high, the third item of cash transferred upon receipt of the goods (21% surveyed), on the list of the most popular forms of payment for online purchases. Wins the force of habit and feel that paying on delivery faster and easier to turn merchandise. The respondents as the most convenient payment method in the shop online, most often mention fast internet payments (36%). Second place, with the same result (24%), take cash and payment by online bank transfer. With high-speed internet payments using mostly young, well-educated and living in big cities. It is also a form of payment preferred by men.

It is interesting also to present in the report "Kupuję w internecie" prepared for the Association of IAB Poland list of the most popular online trades in Poland. The above research shows that the greatest popularity among Internet users it has the following categories of stores: clothing stores (28%), department stores (25%), and electronics (24%). In the following part of the statement were shops offering books, music, and virtual pharmacy. At this point, it should be noted that part of the market is devalued by shops located in countries neighboring the Polish employing a more favorable tax system. Among the factors, motivating people to make purchases online should be replaced (1) clock availability, (2) favorable pricing, (3), direct distribution defined as the delivery of the product directly to the customer's home. Expenditure related to commercial activity in the virtual world is dependent on the industry. For shopping network statistics Pole spends a month on average, including 89 PLN for jewelry, 90 PLN for clothes, and 49 PLN for perfume (E-commerce in Poland in 2014, p.15). In terms of growth in the number of online stores in the next 5 years (2008-20013), the largest increase recorded online stores that sell perfume products for children and department stores, reflecting the low saturation of this market in the aforementioned period. A full list is presented below in Figure 4.

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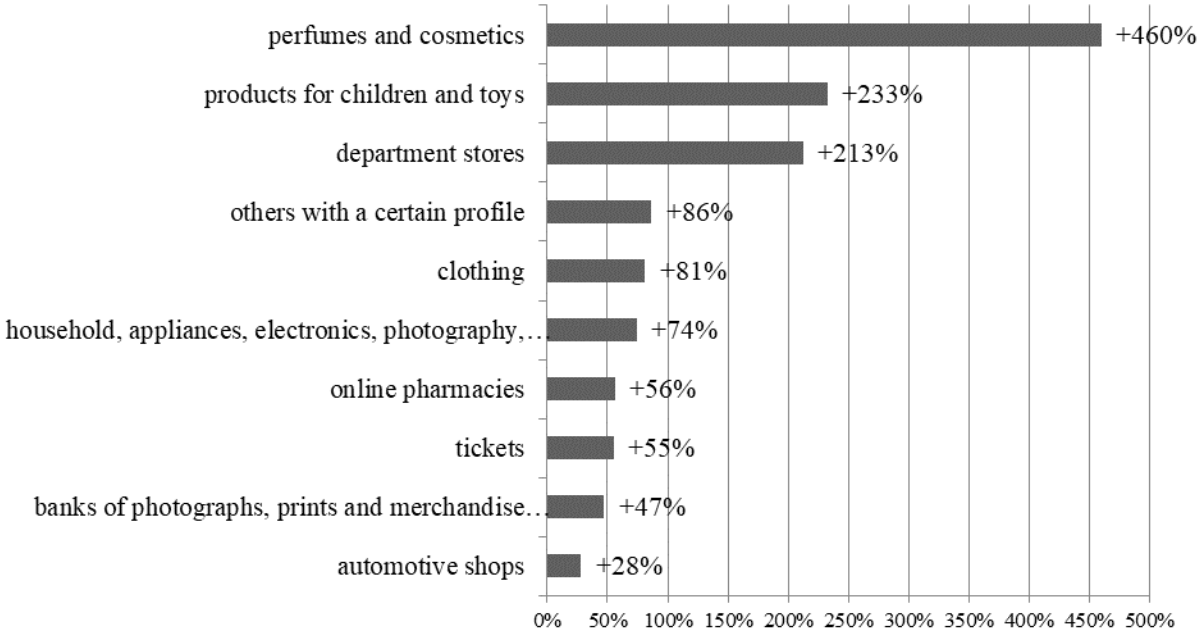

Figure 4. Increase in the number of online stores by category
Source: Ryciak (2014)

As pointed out by Andrew Garapich (2011) determinant of shopping online is the possibility of a comprehensive familiarize with the product and its specifications. According to the aforementioned Andrew Garapich, internet users are becoming users of e-commerce services due to the ability to compare products and find a more satisfactory price offer. Searching for suitable products, people buying online support mainly information found in the results of search engines on merchant websites and online auctions. The research (Gemius, 2014, p.66) shows that the determinant of purchase decisions in the virtual space remains the price of the product. More and more often indicated in the offer is the availability of virtual products non-phase on the traditional market, friend recommendations, and opinions obtained from external sources (specialist press). If the decision of purchasing, users are increasingly turning attention to the credibility of the shop (opinions about the store, the physical location), and on the options available in after-sales warranty. Interestingly, factors that fit the credibility of online shops, in the opinion of internet users (Gemius, 2014, p.70) are a visually appealing look of the page, the photo headquarters store in the contact tab, the ability to purchase in installments, and logos banks. Such prioritization is a potential threat associated with the possibilities of falsification of the elements mentioned above by people with more advanced computing competencies, for example by creating a non-existent store based on photos of the buildings available in the public domain. The biggest problem in the development of e-commerce in Poland is the low public trust associated with purchases made at a distance (Bylok, 2021). It is connected with the experience of the transition period experienced by the older generation and digital exclusion associated with smaller digital competence elderly (Van Dijk, 2010, p.248-264). An equally pressing problem enterprise operating in the sector of electronic services is to create in a customer so-called consumer loyalty (Olejniczak-Merta, 2010, p.135). As mentioned above, the majority of consumer decisions taken in the webspace is determined by the lowest price. The challenge for entrepreneurs is to prepare the additional offer for regular customers, which would encourage repeat purchases in a given shop. The largest e-entrepreneur (oleole.pl, electro.pl) prepare for its customers' special packages loyalty. These are the offer of discounts, rebates, and additional products at preferential prices or free delivery options. These are marketing techniques also present in the standard business.

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As indicated by several economic reports, e-commerce plays a very important role in the rapid development of the service sector in the CEE-6 region, however, the irregular nature of the rapid increase in internet sales makes estimating precise values extremely difficult. The authors of the "Statistica" report forecast an increase in online sales to EUR 6.9 billion, which is 10 percent of the total projected increase in retail sales at EUR 71.5 billion in 2018-2022. The extreme scenario presented in the report, assuming that all retail sales from today until the end of 2022 will be responsible for e-commerce, seems unreal. This would mean that online sales would increase to 19-29 percent retail sales in all CEE-6 countries. The above data indicate that the e-commerce market is becoming an important element of the economies of Central and Eastern Europe. Based on the data collected by the United Nations Statistics Division in Table 4. Data on the value of the E-commerce market in Central and Eastern Europe are presented below (Table 4).

Table 4. The estimated value of the e-commerce market in 2018 in Euro

Country	The estimated value of the e-commerce market in 2018 in Euro
Bulgaria	690.000.000
Hungary	1.690.000.000
Poland	9.300.000.000
Romania	3.800.000.000
Ukraine	1.830.000.000
Russia	16.3000.000.000

Source: E-commerce in CEE, https://www.gemius.pl/e-commerce-100/category/europa-poludniowo-wschodnia.html

As indicated above, e-commerce markets are an important element in assessing markets and affect the development of the sector of innovative solutions for individual national economies. However, the author of this article did not find data specifying the percentage of GDP generated by the e-commerce sector as a whole for the economy of the countries described above. These data could be extremely valuable for understanding the economic impact of this sub-market.

7. Novel insights

The estimated value of the Polish e-commerce market in 2017 was about 40 billion PLN. As in previous years, the industry still recorded a double-digit percentage increase in sales. It is worth noting that in countries with a stabilized market of the e-commerce percent increase in turnover is about half less than in Poland, while the value of the e-commerce market is much higher than in Poland. In addition, consumers are increasingly aware of their rights and responsibilities. Entry into force of the new law, which took place on December 25, year 2020 was widely reported in the media and commented. The subject pointed out both entrepreneurs and consumers. This year's e-commerce challenges include more accurate analysis of customer needs, customized content to target groups, and real-time content management, which means the collection and management of data in real-time (Kozlowski 2015). Present an analysis of the phenomenon of e-commerce is due to the reduced volume of text, only fragmentary. However, the text should be a contribution to further interdisciplinary scientific discussion because of poor scientific literature. Presented in the text of the individual elements require more than a multi-page analysis from a scientific point of view, which not only systematizes the issues but also cleaned up the data present in the literature of industry.

8. Research limitations

The conducted study was contributory. Due to the research methods used, it can only be a reference point for future planned research related to e-commerce. In principle, the article is the beginning of in-depth research aimed at the categorization of entities e-commerce and the description of phenomena occurring in small and medium-volume e-commerce markets in Central and Central Europe. These markets have enormous potential that should be explored in the future, using sociological methods both at the level of site-centric and user-centric research, which was noticed by the author of the article and placed in the individual research development program. In subsequent studies, the author will take up the subject of the development period (2017-2020) and the impact of the CVID-19 pandemic on consumer decisions and behaviour in the e-commerce industry on the example of selected market sub-segments using quantitative (questionnaire) and qualitative (IDI) methods in the research process.

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IMPACT OF INDUSTRY 4.0 ON BUSINESS STUDIES

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Abstract. The purpose of this paper is to investigate the methods and peculiarities of Industry 4.0 in developing business studies at the University of Applied Sciences. State-of-the-art technologies such as cloud computing, additive manufacturing, advanced robotics, augmented/ virtual reality, big data analysis and artificial intelligence are applying their concepts in higher education in order to meet the specific needs of each learner with acquired competencies in higher education. This paper analyses the scientific literature of Industry 4.0 and related topics, presents the empirical study which is focused on analysis of the learners' expectations and University of Applied Sciences curriculum. It shows that many students are willing to enroll in new technological courses. The quantitative study is presenting the main novelty of the research and is intended to create recommendations of how to incorporate Industry 4.0 elements in developing business studies at the University of Applied Sciences. Those practical implications could be useful for higher education institutions and are focused on practical value.

Keywords: Industry 4.0; Internet of things; Education 4.0; Robotics; Big Data

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JEL Classifications: A20, A22, C40, C83, I21, L80, M20

Additional disciplines: management, education

1. Introduction

Lee, Trim (2018) consider that in the digital age, information and communication technology (ICT) is supported everywhere. Today, about 50 percent of the world's population has access to the Internet, and 2.5 billion people use smartphones every day. The digital divide is much more serious than just separating those who have access to information through their ICT devices from those who do not. Schumacher et al. (2016) analyze that Industry 4.0 indicates the latest technological advancements when the internet and assistive technologies (such as embedded systems) serve as a basis for the integration of physical objects, human actors, smart machines, production lines and processes organizational boundaries to create new intellectual, network and mobile value chain. As the

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Ministry of Economy and Innovation of the Republic Lithuania (2020) mentions, Industry 4.0 is a new stage in economic and technological development, featuring technologies such as big data, artificial intelligence, the Internet of Things, robotics, 3D printing and synthesis, and their physical, digital and biological interactions. The new revolution differs from the first three industrial revolutions, firstly in its speed, exponential development, secondly in its wide diversity, encompassing changes in both economic and business, societal and human paradigms, and thirdly, in system transformations involving states, companies, industry and transformation of systems in society as a whole.

Scientific issue. At present, the influence of Industry 4.0 in the higher education process has intensified, especially in the context of a pandemic. Industry 4.0 innovations related to the educational process require the integration of smart technologies into the teaching process. Thus, the current situation causes a problem because the development of business studies is not focused on clear integration of Industry 4.0 The process of how to integrate Industry 4.0 elements in business studies is not presented in detail in scientific literature as well as in practice, which makes it difficult to determine the opportunities and importance of the Industry 4.0 in higher education.

The research aims to investigate the methods and peculiarities of industry 4.0 in developing business studies at the University of Applied Sciences.

Objectives of the research:
- to present Industry 4.0 concept, benefits, role in business studies by analyzing scientific literature;
- to determine the knowledge of Industry 4.0 peculiarities, covered areas of business studies students**;**
- to create recommendations based on the result of the research in order to develop business studies at the University of Applied Science based on methods and peculiarities of Industry 4.0.

Methodology. The article uses the method of theoretical analysis, statistical analysis, comparative empirical analysis, and quantitative research – the organization of an online survey.

2. Theoretical background of Industry 4.0

Kotianová (2019) defines, that the origins of the debate over industry 4.0 have taken place in Germany in 2011. It was based on the country's goal of strengthening competitiveness, securing a future in the advanced manufacturing segment, providing technologies for integration and interoperability between the physical and virtual worlds. This initiative was supported by the German Government, which announced the initial and priority recommendations for accelerating development. Anshari (2019) mentions, that after the success of the first revolution, this process led to the emergence of a sequence of industrial revolutions and spread to other parts of the world, hence becoming a global phenomenon. The second industrial revolution took place in the 19th century, when electricity emerged, which created mass production and quickly moved to the third industrial revolution, which took place at the end of the 1990s, leading to the introduction of information technology and electronics to automate production. No doubt, Industry 4.0 has sparked a debate not only among industry experts but also in education.

Alcáce et al. (2019) mention that Industry 4.0 is leading the digitization era. Vaidyaa et al. (2018) consider that Industry 4.0 marks customized increasingly individualized needs of customers because it involves strict human integration into the production process to continuously improve and focus on value-added activities and avoid waste. Zhou, Le Cardinal (2019) state that Industry 4.0 is a great opportunity and a big challenge for businesses. Nwaiwu et al. (2020) identify digital technologies in the production environment, which include: strategy, organizational suitability, competitiveness, performance, and human resources. Kumar et al. (2018) mention that digitization and technology play a key role in changing market trends. This opens up a wide range of possibilities

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and business potential in the market of manufacturing sectors. Hofmann, Rüsch (2017) mention that Industry 4.0 is currently a much-debated topic that is thought to affect all industries by changing the design of goods, method of production, delivery and payment. Above mentioned authors discuss the potential of Industry 4.0 in the context of logistics management. Wichmann et al. (2019) consider that new technologies, as a key feature of the industrial revolution, are paired with new business logic. The new generation of offers can have a whole new value component, which could create learning and development tools for the client. Sølvsberg et al. (2020) analyze that Industry 4.0 is the result of industrial Internet integration Items (IIoT) and production. Javaid et al. (2020) consider that Industry 4.0 provides an automated solution for a variety of manufacturing industries and other related areas. This includes a variety of manufacturing and digital information technologies for the collection, transmission, storage, analysis, and proper monitoring of an information system. All highlights of the other authors understanding of Industry 4.0 can be found in Table 1.

Table 1. Industry 4.0 highlights

Author	Highlight
Erboz, G. (2017)	Digitized systems and network integration through smart systems.
Hermann et al (2016)	Classified as Internet of Things, Electronic Physical Systems, service internet and smart factory.
Rojko, A. (2017)	Keep Germany's position as one of the most influential countries in the field of machinery and car production.
Ślusarczyk, B. (2018)	The fourth industry revolution improves information management and decision-making.
Adebayo, A. O., Chaubey, M. S., Numbu, L. P. (2019)	Facilitate high product customization and automation, mass production becomes more flexible, efficient and effective.
Nagy, J., Oláh, J., Erdei, E., Máté, D., Popp, J. (2018)	Electronic physical system monitors physical processes, marking the physical world, the virtual world and decentralizing operational decision-making (autonomous machines).
Fonseca, L. M. (2018)	Digitization, integration and use of the Internet and smart objects, and the synthesis of the physical and virtual worlds through the application of information and communication technologies.
Mohamed, M. (2018)	New production paradigm.
Kumar, P. (2019)	Industry 4.0 has often mentioned and analyzed together with embedded systems, cyber physical system (CPS) and cloud computing (Xu et al. 2018; Kamble et al. 2018).
Tofan, T., Jakubavičius, A. (2018)	Different interpretations limit the development of unification and standardization processes required for the digitization of industry. It all complicates the opportunities offered by the digitalisation of industry to increase competitiveness.
Bičkauskė, D., Šermukšnytė-Alešiūnienė, K., Simanavičienė, Ž. (2020)	Industry 4.0 is called the fourth industrial revolution when the manufacturing process is in place digitized and machines are directly connected to each other and personalized production becomes possible (Ulas, D. (2019)).
Tay, S. I., Lee, T. C., Hamid, A., Ahmad, A. N. A. (2018)	Industry 4.0 allows the manufacturing sector to be substantially digitized using built-in sensors manufacturing components, products and equipment.
Crnjac, M., Veža, I., Banduka, N. (2017)	Industry 4.0 features include horizontal, vertical, and system-wide digital integration.

Source: created by the authors

As Morrar et al. (2017) stated the Fourth Industrial Revolution, introduced by Germans, now has gained worldwide awareness under the term Industry 4.0. Business, government, industry and science as a platform has been set up to help companies set up innovation into their production processes. According to Lithuanian Industry Confederation (2017) industry 4.0 in Lithuania should encourage and help all Lithuanian industries and companies to adopt digital technologies, share good examples of technology uptake, open funding channels as well as shape modern education and training system, progressive social security system. According to Vilkas (2021), the progress of the digital transformation of manufacturing companies poses a great challenge in the EU and Lithuania. The recent economic crisis has shown that with the disappearance of manufacturing companies, other sectors are shrinking, the workforce is becoming unbalanced and inequality is rising.

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When analyzing the peculiarities of Industry 4.0 in developing business studies, many research can be found. Hariharasudan, Kot (2018) explore the scope and progress of education in the context of Industry 4.0. Grenčíková et al. (2021) state that in oder to understand the overall modernization of education, it is needed to look at the areas of production and new technologies for which students, as potential employees, should be partially prepared. The introduction of new technologies will require the recruitment of many professionals, this will create new jobs and reduce unemployment, but will still get rid of many low-skilled workers. It will be a huge challenge for people to find a new job. According to Grenčíková et al. (2021) one of the possible ways to solve this problem is to increase education through retraining courses, which will give people new opportunities. Gueye, Exposito, (2020) propose to apply the concepts of Industry 4.0 in higher education organizations in order to evolve towards University 4.0 and better respond to the application of learning and the differentiation of the pedagogical path of each learner. Salah et al. (2020) mention that Industry 4.0 deployment is based on multidisciplinary teams of various technologies and methods in which students must deepen and strengthen their skills. Halili, Sulaiman, (2021) research results show that students had a positive understanding of preparation integrating education 4.0 into the Science Program, the impact of technology infrastructure, and improving digital skills for employment. Above mentioned authors recommend in the further research to evaluate the preparation of students or readiness to integrate teaching and learning using technology 4.0.

Marzano, Martinovs (2020) focus on the development of a higher education mechatronics teaching module students. The inclusion of Industry 4.0 in the mechatronics curriculum will strengthen the integration of students' flexible and fast production competencies. Catal, Tekinerdogan (2019) introduce Industry 4.0 in life science education system, which is based on 16 technologies related to Industry 4.0 and the four pillars: identify current training, identify students' skills, identify the needs of stakeholders (industry), describe the required Industrial 4.0 courses, provide gap analysis, develop a strategy for the implementation of the updated program, implement the strategy, confirm, repeat, improve. Sivasankaran, Karthikeyan (2021) notice that Industry 4.0 will undoubtedly have a major impact on the Indian education system, which will change the future of advanced technologies with a visual approach.

Despite the analysis of previous research, it can be seen that all researches are focused on different areas of Industry 4.0, the incorporation of Industry 4.0 elements in the higher education is not sufficiently detalized. This study aim is to investigate the methods and peculiarities of industry 4.0 in developing business studies at University of Applied Sciences. Research questions are formulated based on the aim of the study – which Industry 4.0 elements can be integrated into the business studies at University of Applied Sciences? What could be students' attitudes towards Industry 4.0?

2. Research methodology and methods

Research method. The research method is based on the quantitative research methodology, which supports mathematics model development, theories and hypothesis according to the phenomena. The process of measurement provides the linkage between empirical observation and statistical information by using specialized software such as SPSS and Excel to generate the results (Leavy, 2017). Hence, the major aim behind the implementation of the quantitative research method is to analyse the data collected from participants on their perception on necessary aspects of Industry 4.0 topics to be included into business studies.

Research design. The research questionnaire is designed as an exploratory study to review characteristics of main Industry 4.0 topics relevant to education of the students of the University of Applied Sciences. The research is not intended to provide the conclusive evidence but help to understand the problems that have not been clearly

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defined yet (Dudovskiy, 2018). Collecting the data from respondents' perspectives towards Industry 4.0 topics has helped in testing hypotheses designed for the study, which can be found in Table 2.

Table 2. An illustration of the hypotheses designed for the study

Hypotheses	
H1	there is a significant and meaningful relationship between the positive evaluation of the impact of the solutions implemented by Industry 4.0 and study form (full time and part time) of the respondents.
H2	There is a significant and meaningful relationship between the positive attitude to Industry 4.0 topics to be taught at Vilnius University of Applied Sciences and study year of the respondents.

Data collection method. The research method is performed in a form of survey in order to collect data among students of the International Business program at Vilnius University of Applied Sciences, as "it is an effective way to collect the data from wide range of people in a short period of time" (Sincero, 2018). In addition, surveys are conducted anonymously, this encourages respondents to be more open, honest regarding to the perspectives and opinions of individuals towards the topic (Porter et al., 2004). Moreover, most of the students spend lots of time on the Internet, so it is easier for respondents to do the survey online and it also easy for researcher to analyse the data by using specialized statistical software.

Sampling design. The study used a probability sample in order to collect the data from students studying International Business program at Vilnius University of Applied Sciences and understand their perspective towards Industry 4.0 topics. The survey method is convenience sampling which is the way to collect the information without incurring the cost or time required to select a random sample (Porter et al., 2004). The survey was distributed through specialized survey platform. It can reach large number of people within a short period of time and let the participants who are willing and available to complete the survey (Sedgwick, 2013). The online survey was distributed on 20 October – 15 November, 2021. The total amount of participants is 170 people.

Questionnaire design. The questionnaire consists of 20 questions. The first set of questions introduces the topic and generates the overall perspective of participants' general attitude towards the topic of investigation. The second set of questions verifies respondents' awareness of Industry 4.0 topics, their importance and shortage. The third group of questions is dedicated to test the need of improving the current curriculum of the Vilnius University of Applied Sciences based on respondents' status and professional specialization. Finally, the last section of the questionnaire is based on demographical information of the participants including gender, age, education level, and monthly income.

Research instruments and measurement. This study followed a quantitative research method, so, the data were collected in form of the survey questionnaire through specialized survey platform. This method is not only convenient but also cost efficient and allow the researcher to collect data from a wide range of people in a short period of time (Sincero, 2018).

Measurement scale items. The measurement scales that were used in the survey questionnaire are ranking order based on Likert scale. Ranking will easily describe the order of the specific elements allowing researchers to quickly evaluate the most preferred answer choice (Blasius, 2012). While, Likert scale measurement can generate the scores in each statement that the participant will select the most suitable degree of agreement or disagreement (Maeda, 2015), hence, the researchers can compare between one factor to another based on the score which provided by participants. All of the measurement scales items are easily analyzed by statistical program such as SPSS and excel. So, it allows the researchers to generate the information within short period of time.

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Data analysis. The primary data were analyzed by using SPSS tool in order to test the research hypothesis and achieve the objective of this study. Each question was analyzed with different data analysis depend on the suitability in each question. Descriptive statistic allows researchers to simplify large amount of data and summarize it in the easy way (Fisher, 2009). Correlation Analysis indicates the strength of a relationship between two metric variables. The result is be shown between -1 to 1 describing the level of linear relationship. Thus, the researchers are able to find the connection between variables (Ho, 2006).

3. Research results' analysis

The survey involved 170 respondents, of whom 20% study logistics specialization, 8% study e-commerce specialization, 40% - international marketing and sales, no specialization - 41.2% of respondents. The vast majority, almost 73% of respondents study full-time. 55% of respondents were men and 45% of respondent were women. The vast majority of respondents live in Vilnius and Vilnius district.

Research results show that, according to most respondents Industry 4.0 covers software and its integration (13.4%), internet of things (12.2%), advanced robotics systems (9.5%). According to respondents, the smaller Industry 4.0 area includes the following areas: smart sensors (4.6%), cloud computing solutions (5%), remote control solutions (5.5%) (see Table 3).

Table 3. Areas covering Industry 4.0 according respondents' opinion

Answer options	Number	Percent
Software and its integration	70	13.4%
Big data and data analytics	36	6.9%
Communication between technological equipment objects	39	7.4%
Cloud computing solutions	26	5.0%
Advanced robotics systems	50	9.5%
Virtual reality modelling	41	7.8%
Cyber security	45	8.6%
Mobile devices	30	5.7%
Smart sensors	24	4.6%
Remote control solutions	29	5.5%
All of the above options	25	4.8%
Internet of things	64	12.2%

During the study it was important to investigate the impact of the solutions implemented by Industry 4.0. The results of the study show that it is difficult for the vast majority of respondents to evaluate the impact of the solutions implemented in Industry 4.0 (many answers after evaluation are based on neither agree nor disagree). Nevertheless, it can be seen, that most of the respondents evaluated the impact of the solutions implemented by Industry 4.0 in a positive approach (4- agree and 5- strongly agree) (Figure 1).

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	1- Strongly disagree	2 - disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree
Operational productivity is growing	4.5	1.3	55.1	30.1	9.
Operational efficiency is increasing	3.2	5.1	47.4	36.5	7.7
Knowledge sharing is accelerating	3.2	4.5	51.6	29.	11.6
Decision-making flexibility are increasing	3.8	3.8	53.2	30.1	9.
The experience of customers is improving	3.2	5.1	55.1	29.5	7.1
The level of customer satisfaction is growing	2.5	5.1	55.4	28.7	8.3
Production and service costs are falling	3.8	7.1	58.3	23.7	7.1
Production processes are accelerating	3.8	7.6	51.6	31.2	5.7
Optimizes the use of resources in activities	2.6	5.8	50.	30.1	11.5
Downtime for equipment is reduced	3.8	5.7	54.1	26.8	9.6
The number of quality problems is decreasing	3.2	7.1	57.1	24.4	8.3
Waste of resources is declining	3.8	11.5	52.9	24.8	7.
The overall operating costs are reduced	3.8	13.5	53.8	23.1	5.8
Opportunities for innovation are created	1.3	8.3	47.4	27.6	15.4
Higher revenue is generated	2.6	5.8	55.5	26.5	9.7
The learning process is being improved	3.2	5.8	54.5	26.9	9.6
Improving working conditions	2.6	7.1	52.3	31.	7.1

Fig 1. The impact of the solutions implemented in Industry 4.0
Source: authors

Seeking to assess the reliability of these findings, the authors implemented the Pearson's correlation coefficient (Pearson's chi-square criteria) in order to test H1.

On the basis of the Pearson's correlation coefficient, the authors verified the presence of the link between the positive evaluation of the impact of the solutions implemented by Industry 4.0 and study form (full time and part-time). It was important to check if there is an important statistical connection. Pearson's chi-square test helps to evaluate the presence or absence of statistical relation between the studied indications. This criterion is calculated on the basis of the frequency of probability (Armstrong et al, 1987).

H1: there is a significant and meaningful relationship between the positive evaluation of the impact of the solutions implemented by Industry 4.0 and study form (full time and part-time) of the respondents.
α – significance level in this case was selected as 0.05

After calculation Pearson's correlation coefficient, it was defined, that the observational significance level (p-level) = 0.492, where 0.492> 0.05. It can be stated that the positive evaluation of the impact of the solutions implemented by Industry 4.0 does not depend on study form (full time and part-time) of the respondents.

Respondents were asked what they suggest to do to ensure the implementation of Industry 4.0 tools in the teaching process at the University of Applied Sciences. Respondents suggested to focus more on industry 4.0 trend and case studies during seminars and self-study (24.2%), integrate Industry 4.0 related subjects into the curriculum (23.4%), during the lectures, sharing the best practices of other countries in the field of Industry 4.0 (20.9 %) (see Table 4).

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Table 4. Respondents' suggestions on how to ensure the implementation of Industry 4.0 tools in the teaching process at the University of Applied Sciences

Answer options	Number	Percent
Organize outgoing lectures in companies implementing Industry 4.0 solutions	52	14.3
Organize open lectures with experts working in the field	62	17.1
During the lectures, sharing the best practices of other countries in the field of Industry 4.0	76	20.9
Integrate Industry 4.0 related subjects into the curriculum	85	23.4
Focus more on industry 4.0 trend and case studies during seminars and self-study	88	24.2

Respondents answer to question, if they like the following Industry 4.0 topics to be taught at Vilnius University of Applied Sciences (see Figure 2). According to most respondents opinion, they would like that following Industry 4.0 topics to be taught at Vilnius University of Applied Sciences: Blockchain, cryptocurrency and financial technology, additive production and 3D printing, Software systems environment, Cloud computing and service orientation, Information technology security.

	1- Strongly disagree	2 - disagree	3 - Neither agree nor disagree	4 - Agree	5 - Strongly agree
Interaction between man and equipment	5.9	8.6	31.6	38.8	15.1
Ancillary systems, augmented,virtual reality	4.6	9.2	35.5	30.9	19.7
Cloud computing and service orientation	3.9	8.5	35.3	30.1	22.2
Software systems environment	3.3	10.5	36.6	30.7	19.
Change Management for Industry 4.0	4.6	9.9	38.4	30.5	16.6
Information technology security	4.6	8.6	32.9	31.6	22.4
Continuous and digital engineering	5.9	18.3	35.3	26.1	14.4
Additive production and 3D printing	3.9	7.2	31.6	34.2	15.
Deployment management of digital processes	4.6	10.5	35.9	34.	15.
Blockchain, cryptocurrency, fin-tech	5.9	7.8	27.5	24.2	34.6

Fig 2. Respondents' opinion about Industry 4.0 topics to be taught at Vilnius University of Applied Sciences
Source: authors

For a deeper analysis H2 hypothesis was tested by calculating the Pearson's correlation coefficient, where $\alpha = 0.05$. H2: there is a significant and meaningful relationship between the positive attitude to the Industry 4.0 topics to be taught at Vilnius College and the study year of the respondents.
The calculations revealed that the observational significance level (p-level) = 0.039, where $0.039 < 0.05$. It can be accepted hypothesis H2.

Conclusions

1. After analyzing the scientific literature of Industry 4.0 it can be stated that authors are focusing on different areas and advantages of Industry 4.0. All analyzed research can agree that Industry 4.0 and its elements can be a great opportunity, which is focused on digital technologies, smart systems and can increase business potential, especially in the manufacturing sectors. But implementing Industry 4.0 requires new business logic, understanding of new value components. When analyzing the peculiarities of Industry 4.0 in developing business studies, all processes are focused on the overall modernization of education. Application of the concepts of Industry 4.0 in higher education organizations can help better respond to the market needs. Also, studies are showing, that students have a positive understanding of preparation integrating education 4.0 into the study programs.

2. The knowledge of Industry 4.0 peculiarities of business studies students can be focused on covered areas. After the quantitative research, it can be stated, that software and its integration, internet of things, advanced robotics systems are the most familiar areas of Industry 4.0 for business studies students. The impact of the solutions implemented by Industry 4.0 was evaluated in a positive approach by the students of Vilnius University of Applied Sciences.
3. After application of a quantitative study, recommendations in order to develop business studies at University of Applied Science based on methods and peculiarities of Industry 4.0 can be prepared by defining elements and topics of Industry 4.0. Topics such as Blockchain, cryptocurrency and financial technology, additive production and 3D printing, Software systems environment, Cloud computing and service orientation, Information technology security can be defined as the most recommended to include in the business studies. Also, it can be recommended to focus more on Industry 4.0 trends and case studies during seminars and self-study, sharing the best practices of other countries in the field of Industry 4.0.

Novelty and research limitations. Novelty of the research is based on identifying elements and topics of Industry 4.0, which can be included in the curriculum of business studies at the University of Applied Science.
Research limitations—the study examined the methods and peculiarities of industry 4.0 in developing business studies only in general terms, just at Vilnius University of Applied Sciences and the findings cannot necessarily be applicable to other higher education institutions. In addition, it includes just the population of business students; the scope of further research could include different study areas.

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BARRIERS TO THE DEVELOPMENT OF THE CIRCULAR ECONOMY IN SMALL AND MEDIUM-SIZED ENTERPRISES IN SLOVAKIA*

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Abstract. The circular economy is the successor to the current model of the linear economy. Its basic principle is the environmentally acceptable use of resources. At present, it can be understood as an intensively developing megatrend of the business environment. It can be assumed that the competitiveness of companies in the future will be highly dependent on how companies will be able to implement the principles of the circular economy. The article is focused on the analysis of the use of activities of the circular economy in the conditions of small and medium enterprises in Slovakia and on the willingness to finance these activities from the turnover of the company. Based on the conducted questionnaire survey, it was confirmed that smaller companies implement activities of the circular economy more slowly and their willingness to finance these activities is lower compared to larger companies. It can also be stated that if smaller companies carry out activities of the circular economy, these are mostly cost-free or low-cost activities. As the size of the company increases, so does the level of company involvement in the circular economy. The results achieved are similar in several areas to those of the Eurobarometer 2016. It may therefore appear that, despite the various activities of economic policy makers, there has been no shift in this area. However, it should be taken into account that our questionnaire survey was conducted during the Covid 19 virus pandemic, which has a significant impact on the business environment, business decision-making processes.

Keywords: small and medium-sized enterprises; circular economy; economic policy

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1. Introduction

We are experiencing the civilizational transformation that humanity has experienced in its history, for example during the agricultural and industrial revolution. After the Industrial Revolution, humanity began to remain a non-renewable resource, and the results of this activity are waste that is largely not biodegenerable. Science and technology have so far focused on the production side. However, humanity is currently hitting the boundaries of the ecosystem, affecting climate change, irreversibly contaminating various parts of the environment, and the reserves of some natural resources are almost empty. As a solution to this problem, it offers a circular economy, which represents a new look at the current model of the linear economy. This is characterized by the high consumption of non-renewable resources. It is already clear that the principles of the circular economy will fundamentally affect the basic attributes of business in the future, and every business will have to adapt to the new model of the economy. At the same time, several studies have shown that large companies have greater opportunities to implement business models based on the circular economy. The application of the principles of the circular economy in small and medium-sized enterprises requires the overcoming of many barriers. The circular economy will become a megatrend in the global business environment that cannot be ignored. It will be important for the development of business competitiveness that this megatrend becomes an opportunity for businesses, otherwise, the effects of this change on businesses may, unfortunately, be very unfavorable.

2. Theoretical backround

The growth of industrial production, electricity and heat production, mining, agricultural activities associated with population growth and caused by increased demands on housing, transport, consumption, and related infrastructure, causes an increase in demands on natural resources, as well as an increasing impact on the quality of life environment. This influence no longer has the character of a local effect on the area around the place of its origin, but it is increasingly manifested in a global perspective. Since the beginning of the industrial revolution in the 19th century, environmental pollution has intensified and become a global problem. Mankind can see the consequences in the deterioration of the quality of water, air, soil but also various ecosystems. At the same time, environmental pollution is directly linked to human health and welfare (Guštafíková et al., 2019). This influence no longer has the character of a local effect on the area around the place of its origin, but it is increasingly manifested in a global perspective. The solution to this problem is the circular economy, the concept of which was first introduced by the British environmental economists David W. Pearce and Kerry R. Turner in 1989 (Pearce & Turner, 1990). The circular economy is the successor to the current model of a linear economy, dependent on the high consumption of non-renewable resources. The linear economy is economically, ecologically, and socially unsustainable in the long run (Goyal et al., 2018), does not meet the needs of today's society, and cannot sufficiently reflect the solution of the problems outlined above. The circular economy promotes more appropriate and environmentally sound use of resources (Kirchherr et al., 2017). Generally speaking, recirculation of resources in the circular economy comes from a cycle of taking, transforming, using, and returning. Industries take resources from the environment and transform them into services and products. These are then distributed and used by consumers or other businesses as part of other products. Despite the importance of the concept of circular economy, research in this area is insufficient and the effects of the circular economy on business and society need to be examined in more detail (Korhonen et al., 2018). As there is a presumption that future economic growth cannot be secured in an extensive way, it is essential to use resources in a much more sustainable and efficient way. Only in this case will we be able to talk about sustainable growth. In 2015, United Nations members adopted a document entitled Agenda 2030 for Sustainable Development. This document was a response to the efforts of the world community and economic policy makers to address these issues. The Agenda 2030 includes 17 targets, with an emphasis on sustainable consumption and production processes that alleviate the problems of scarcity of natural resources. In addition to the UN, in 2015 it adopted the European Union Action Plan for the Circular Economy in this area. Emphasis is placed on measures throughout the product life cycle. (Guštafíková et al., 2019).

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It is already clear that the principles of the circular economy will fundamentally affect the basic attributes of business in the future, and every business will have to adapt to the new model of economic functioning. Several studies state that large companies have more opportunities to implement business models based on the circular economy (Araujo Galvão et al., 2018). On the contrary, the application of the principles of the circular economy in small and medium-sized enterprises requires the overcoming of many obstacles (Cassells & Lewis, 2011). Most studies suggest that SMEs do not adopt and implement circular economy principles due to high capital costs (Urbinati et al., 2017), long payback periods, or high resource efficiency costs (Álvarez Jaramillo et al., 2019; Ormazabal et al., 2018). SMEs tend to have difficulty solving environmental problems because they see only economic costs and do not perceive the relationship between environmental practices and profits (Biondi et al., 2002). According to the European Commission, up to a third of SMEs say they struggle with complex administrative and legal procedures when seeking to use resources more efficiently. As awareness of climate risks and other environmental issues and consumer preferences change, this transformation towards sustainable business practices is a key aspect for the continued competitiveness and growth of small and medium-sized enterprises (European commission, 2020). Businesses need to consider how to implement the principles of circularity in their operation and what business model strategies to use if they want to move to a circular economy model (Bocken et al., 2016; Silva et al., 2019). To this end, companies need to find new partners for cooperation and rethink the value they offer to stakeholders. For companies to solve this problem, it is necessary to use innovative tools and processes that will help companies on their way to new business models (Antikainen et al., 2017; Liu, 2018; Lüdeke-Freund et al., 2019). Eco-innovation strategies are therefore important for the development of a company's business model, and the company should be able to invest in innovation in products, processes, and organizational structures (Barbieri & Santos, 2020). Circular economics or circular business models can solve this problem and provide an economic response to environmental practices by helping companies create value through value-added logic designed to increase resource efficiency. The integration of the system of the circular economy into business activities thus brings several benefits associated with new business models, marketing, corporate culture. From a marketing point of view, the circular economy is considered a new business model that should lead to more sustainable development and a harmonious society (Ch'ng et al., 2021). Companies cannot cope with barriers in implementing the principles of the circular economy (Pacheco et al., 2017). Therefore, how macro-level support will be provided, especially to SMEs, will play a key role in overcoming these obstacles (Heyes et al., 2018). In addition to encouraging SMEs to become involved in environmental practices, environmental legislation also plays an important role (Hoogendoorn et al., 2015). At the same time, it is essential that legislative and support initiatives are coordinated at the European Union level (Bassi & Dias, 2019).

3. Research objective and methodology

The main goal of the article is to estimate the current status of implementation of the circular economy in small and medium-sized enterprises in Slovakia and to identify the extent to which small and medium-sized enterprises finance the activities of the circular economy from their turnover. We obtained the necessary data from primary and secondary sources. The basis of the research was mainly the scientific literature. Current secondary data will allow us to theoretically define and practically formulate the initial state of the researched issues. We obtained primary data through a questionnaire survey. After compiling the first design of the questionnaire, we carried out pilot testing on a sample of 6 companies. Based on the achieved results, we slightly modified the final form of the questionnaire. The questionnaire survey was conducted in Slovakia from January to March 2021 in electronic form. The respondents, in this case, were small and medium-sized enterprises. The questions of the questionnaire were focused on various areas of business, while one part also dealt with circular economics. After completing the questionnaire survey, we checked the data obtained. We did not use data from incorrectly and incompletely completed questionnaires. Finally, we used data for 169 companies. The basic characteristic based on which we

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will segment companies will be their size. Size categorization is based on the European Commission Recommendation 2003/361/EC (Commission, 2020), which divides companies by size into micro, small, medium, and large. The division in our case was made only based on the number of employees of the company. Table 1 below shows the representation of individual types of enterprises in the sample.

Table 1. Characteristics of the sample

	Frequency	Valid Percent	Cumulative Percent
micro	92	54.40	54.40
small	51	30.20	84.60
medium	26	15.40	100.00
total	169	100,00	

Source: own processing based on questionnaire survey

Based on the stated goal of our article, we determined the dependence between the size of the company and the number of activities related to the circular economy that companies perform. The second test was aimed at examining the relationship between the size of the company and the willingness to finance activities related to the circular economy. All questions used were designed for comparison based on the Flash Eurobarometer 441: European SMEs and the Circular Economy (European Union, 2016). In the case of the question concerning the degree of involvement of companies in the circular economy, the representatives of companies indicated the selected activities that they carry out. These were the following activities

- Re-plan of the way water is used to minimise usage and maximise re-usage
- Use of renewable energy
- Re-plan energy usage to minimise consumption
- Minimise waste by recycling or reusing waste or selling it to another company
- Redesign products and services to minimise the use of materials or use recycled materials

Based on how many activities the companies identified, we divided the companies into 3 groups. The first group consisted of companies that did not carry out any of the above activities. The second group consisted of companies that carried out one or two activities. And the third group consisted of companies that implemented 3 to 5 of these activities. The second issue through which we conducted testing was related to the willingness of companies to finance activities related to the circular economy. We investigated how much of their turnover micro, small and medium-sized enterprises would be willing to finance the activities of the circular economy. We divided the companies into four groups. The first group consisted of companies that were not at all willing to finance activities related to the circular economy. Other groups of companies were divided into the range of 1% to 5% of turnover, 6% to 10% of turnover, and finally 11% and more of turnover. In the field of theoretical research, the obligatory method will be the reception of knowledge from available sources through content - causal analysis. The basis of the theoretical elaboration of the solved problem will be a critical analysis, comparison, summarization, and synthesis of the obtained opinions and findings. Using the induction and deduction of the basic terminological apparatus, we will contribute to the generalization of the acquired knowledge and formulate our own opinions. In the analysis of primary data, we will use selected mathematical-statistical methods related to the verification of hypotheses. In our case, we will examine the relationships between the two nominal variables. The dependence of two nominal variables is also called contingency and the basis for its determination is the chi-square test of independence (Řezanková, 2017). We assume that if the two characters are independent, then the distribution of frequencies in the PivotTable is proportional to the row and column marginal frequencies. These numbers are called expected. If we denote the relative abundance in the base set as πij, then we write the null

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hypothesis of independence in the form H0: πij = πij, 0, where πij, 0 is the relative abundance expected in the case of independence, given by the relation πij, 0 = πi + πj. We test this null hypothesis against the hypothesis H1: πij ≠ πij, 0 for at least one pair i, j (i ≠ j). Pearson's chi-square statistic can be used as a test criterion, which is expressed as follows:

$$\chi_P^2 = \sum_{i=1}^{R}\sum_{j=1}^{S}\frac{(n_{ij} - m_{ij})^2}{m_{ij}}$$

The chi-square statistic takes values from the interval $\langle 0; n.(q-1)\rangle$ where $q = \min\{R, S\}$. Assuming the null hypothesis, this random variable has an approximate chi-square distribution with (R-1) (S-1) degrees of freedom, i.e, $\chi_P^2 \sim \chi^2[(R-1)(S-1)]$. Therefore, we compare the calculated value of the mentioned test criterion χ_P^2 with the quantile $\chi_{1-\alpha}^2[(R-1)(S-1)]$, where α is the selected level of significance. If $\chi_P^2 \sim \chi_{1-\alpha}^2[(R-1)(S-1)]$ so, we reject the null hypothesis of independence. Otherwise, this null hypothesis cannot be rejected. Rejection of the null hypothesis means that the difference between actual and expected frequencies is so large that it cannot be merely random, i.e., there is a relationship between nominal variables (Rimarčík, 2007). The use of this test presupposes that the expected abundances in the individual fields do not fall below 5 in at least 80% of the fields, and in the other fields at least 1 value (the literature differs in these requirements). If these assumptions are not met, we use exact tests (e.g., Fisher's exact test). To determine the degree of dependence between two qualitative features, the values of which are arranged in the contingency table r x s, the contingency coefficient C is used, which is defined as follows:

$$C = \sqrt{\frac{\chi^2}{\chi^2 + n}}$$

where χ^2 is Pearson's test statistic and $n = \sum_{i=1}^{r}\sum_{j=1}^{s} n_{ij}$,

The closer the value of the coefficient C is to zero, the greater the degree of independence between the qualitative features. Another measure of the dependence between the qualitative features is the Cramer's V coefficient. If the results of the sample survey are arranged in a contingency table of type r x s, then Cramer's V is defined as follows:

$$V = \frac{\chi^2}{\min\{(r-1),(s-1)\}.n}$$

where χ^2 is Pearson's test statistic and $n = \sum_{i=1}^{r}\sum_{j=1}^{s} n_{ij}$,

The closer the value of the coefficient V approaches zero, the greater the degree of independence between the qualitative features. The degree of association between two binary variables can also be expressed through the Phi coefficient (Rimarčík, 2007). When interpreting the contingency coefficient in our research, the scale introduced by Cohen for the correlation coefficient can be used, according to which the correlation less than 0.1 is trivial, 0.1–0.3 small, 0.3–0.5 medium and above 0, 5 is large.

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3. Results and discussion

To achieve the goal stated in the previous chapter, we divided the experimental chapter into two parts. In the first part, we present the characteristics of the economy of the Slovak Republic. This is necessary as we assume that the performance level of the economy, the state of the business environment, the support of innovation have an important impact on the implementation of the circular economy in companies. In the second part, we analyze the results of a questionnaire survey using basic scientific methods and selected mathematical and statistical methods, which we specified in more detail in the chapter materials and methods.

Realities of the Slovak economy concerning the transition to a circular economy

The biggest challenge of Slovakia's economic policy is solutions that align consolidation goals with the goals of growth, employment, and quality of life (Guštafíková & Lieskovská, 2016). The Slovak Republic is a small, highly open economy. Small and medium-sized enterprises employ almost 75% of the workforce and contribute more than 50% to gross output and value-added. However, the Slovak economy is dependent on the economic results of large multinational companies operating in export-oriented industries. In the long run, Slovakia is one of the industrialized countries with a strong production base. Industrial production is a key sector of the economy. The industry contributes the most to the creation of gross value added. The second most significant contributors to gross value added are the common wholesale and retail sector, motor vehicle repair, transport and storage, accommodation, and food services (Beresecká & Hudáková, 2018). About 15% together represent public administration, defense, compulsory social security, education, social services, and health. In recent years, the construction sector accounts for about 10% of total gross value added. The decline of agriculture is related to the liberalization of the domestic market in favor of foreign retail chains. In addition to the dominance of the industry, another characteristic feature of the Slovak economy is the high openness. Heavy industries also dominate the structure of exports. The commodity structure of exports and imports has a very similar composition, which indicates a high involvement in international trade and also a high share of intra-industry trade.

Among other tools (Gruenbichler et al., 2021), research, development, and innovation (Stacho & Stachová, 2016; Urbaníková et al., 2020) are keys to long-term sustainable economic growth but increasing competitiveness but the development of the circular economy. Slovakia lags far behind the EU average in terms of innovation performance and R&D funding (Sojková et al., 2015). The low quality and underestimated importance of the scientific base hinder the creation of a functioning research and innovation environment. Cooperation between academia, research, and business remains insufficient. Slovak small and medium-sized enterprises are characterized by the fact that they mostly use basic technologies that they buy from other companies, their own innovative activities are rare in these companies. On the contrary, large foreign corporations often carry out their own research and development, their innovative performance is at several times higher levels. As research and development departments are mostly retained by foreign companies in their home countries, these companies are important for Slovak small and medium-sized enterprises, especially in the transfer of technology and know-how (Hudáková et al., 2020). Businesses can only increase their productivity, profits, and market position by implementing innovations. The area of research, development, and innovation in Slovakia has long been insufficiently supported. The structure of expenditure on research and development is dominated by public resources.

Results of a questionnaire survey focused on selected issues of circular economy in SMEs

Following the set goal, in the second part of the experimental chapter, we focused on testing two assumptions. The first assumption is that for smaller companies, the transition to the conditions of the circular economy is slower. We investigated this by examining the relationship between the size of the company and the number of defined activities related to the transition to a circular economy (see the chapter on materials and methods).

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Subsequently, we tested the validity of the second assumption, namely what part of their turnover they are willing to invest in the form of costs in activities related to the circular economy. Table 2 shows the results of testing the dependence of two nominal variables - the size of the enterprise and the intensity of involvement in the circular economy through defined activities. Using Fisher's exact test, we tested a null hypothesis that expresses the independence of variables. Thus, the null hypothesis assumes that the intensity of the transition of enterprises to the circular economy has no relation to the size categories of enterprises. Based on the test results, we reject the null hypothesis as the p-value is less than 0.01. We state that the size of the company has an impact on the intensity of the company's involvement in the circular economy. Based on the calculated values of the statistics in Table 3, it can also be stated that there is a moderate dependence between the variables.

Table 2. Results of testing the dependence of the size of the company and the number of activities of the circular economy

	Value	Exact Sig. (2-sided)
Pearson Chi-Square	24.922	.000
Likelihood Ratio	22.791	.000
Fisher's Exact Test	21.535	.000

Source: own processing

Table 3. Results of testing the strength of dependence between the examined variables

	Value	Approximate Significance	Exact Significance
Phi	.384	.000	.000
Cramer's V	.272	.000	.000
Contingency Coefficient	.358	.000	.000

Source: own processing

Figure 1 shows a graph that shows how the size categories of enterprises are involved in the circular economy, based on the number of selected activities related to the circular economy that enterprises carry out. It is clear from the graph that with the increasing size of the company, the representation of companies that carry out a larger number of activities of the circular economy also increases. Based on the number of activities of the circular economy, we can assess the extent to which companies have a circular economy implemented. It is interesting to note that up to 26% of micro-enterprises do not carry out any activities related to the circular economy. These companies also do not carry out basic activities such as waste separation or water and energy-saving measures. As many as 90% of all micro-enterprises implemented a maximum of 2 activities of the circular economy, while it is also important to find out that these are mostly cost-free or low-cost activities. The implementation of activities related to the circular economy was slightly higher for small businesses. Only about 11% of these companies did not carry out any of these activities. For medium-sized enterprises, a much higher level of involvement in the circular economy can be observed, as evidenced by the fact that up to 46.1% of these enterprises carry out 3 to 5 activities related to the circular economy.

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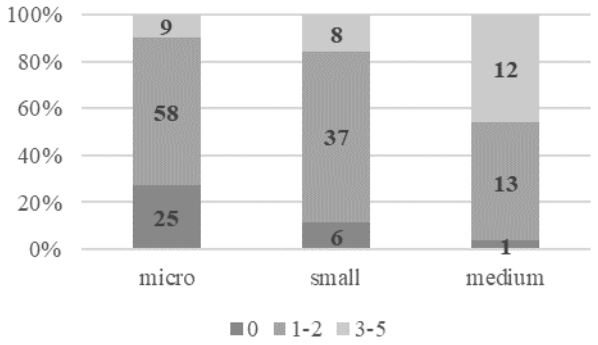

Figure 1. Numbers of circular economy activities in size categories of enterprises

Source: own processing

Second, we examined the relationship between the size of the company and the willingness to finance the activities of the circular economy through part of the company's turnover. Table 4 shows the results of testing the dependence of two nominal variables - the size of the company and the relative part of the turnover, through which companies are willing to finance the activities of the circular economy. Using Fisher's exact test, we tested a null hypothesis that expresses the independence of variables. Thus, the null hypothesis assumes that the willingness to finance the activities of the circular economy has no relation to the size categories of enterprises. Based on the test results, we reject the null hypothesis as the p-value is less than 0.01.

Table 4. Results of testing the dependence of the size of the company and the degree of financing of the activities of the circular economy from turnover

	Value	Exact Sig. (2-sided)
Pearson Chi-Square	25.223	.000
Likelihood Ratio	25.701	.000
Fisher's Exact Test	25.467	.000

Source: own processing

Table 5. Results of testing the strength of dependence between the examined variables

	Value	Approximate Significance	Exact Significance
Phi	.386	.000	.000
Cramer's V	.273	.000	.000
Contingency Coefficient	.360	.000	.000

Source: own processing

We state that the size of the company affects the willingness of the company to finance the activities of the circular economy through part of its turnover. Based on the calculated values of the statistics in Table 5, it can also be stated that there is a moderate dependence between the variables. The graph in Figure 2 documents how much of the turnover is the size categories of companies willing to finance the activities of the circular economy. From a quick look at the graph, it is clear that with the growing size of the company, the share of turnover with which companies are willing to finance the activities of the circular economy also increases. An important finding can be considered that up to 54.35% of micro-enterprises that were involved in our survey do not finance the

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activities of the circular economy at all. At the same time, micro-enterprises make up almost 97% of all business entities in the Slovak economy. From the above, it is clear that if micro-enterprises carry out circular economy activities, they are probably activities that do not require any additional costs. Approximately 35.87% of micro-enterprises spend 1 to 5% of their turnover on circular activities. In the case of medium-sized enterprises, the share of enterprises that are not willing to finance the activities of the circular economy or are willing to finance them with a maximum of five percent of turnover is declining. On the contrary, there is a growing representation of companies that spend most of their turnover on the activities of the circular economy. In the case of medium-sized enterprises, the group of enterprises that is not at all willing to finance the activities of the circular economy is the smallest (26.92%).

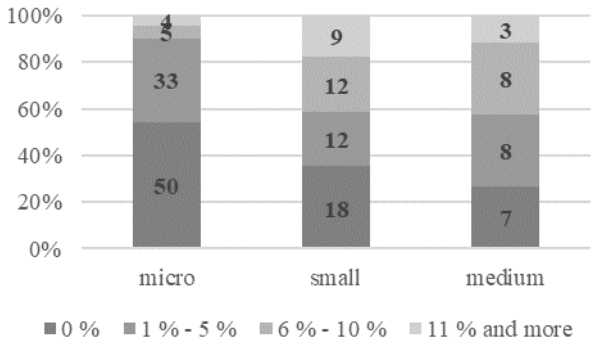

Figure 2. Percentage of turnover with which size groups of companies are willing to finance the activities of the circular economy

Source: own processing

Conclusions

Based on the achieved results, it can be stated that micro-enterprises, which are significantly predominant economic entities in the Slovak economy, are probably very little involved in the circular economy. If this group of companies carries out activities of the circular economy, these are mainly basic, cost-free, or low-cost activities. As the size of the company increases, so does the level of involvement in the circular economy. We found that almost half of the medium-sized companies involved in our survey carried out at least 3 activities of the circular economy. Based on the analysis of data obtained from the questionnaire survey, we found that 54.35% of micro-enterprises do not incur any costs for the activities of the circular economy. The achieved results are almost identical to the results of the Eurobarometer from 2016 (European Union, 2016), according to which 54% of micro-enterprises did not finance the activities of the circular economy at all. Based on the above, it may seem that, despite the various activities of economic policymakers, there has been no shift in this area. However, it is necessary to take into account that our questionnaire survey was conducted at the time of the Covid 19 virus pandemic, which has a significant impact on the business environment, business decision-making processes. Based on the performed analysis, we agree with the opinion that small and medium-sized enterprises usually have difficulty solving environmental problems, because they see only economic costs and do not perceive the relationship between environmental practices and profit (Biondi et al., 2002). Therefore, how macro-level support will be provided, especially for small and medium-sized enterprises, in overcoming the barriers to the implementation of the circular economy, will play a crucial role. In the case of Slovakia, the non-existence of a national strategy for the transformation of the Slovak economy into a circular economy, and thus uncoordinated action and the adoption of measures (Guštafíková et al., 2019) can be considered a problem in achieving this goal.

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ECONOMIC DEVELOPMENT FACETS AND THEIR INTERRELATION*

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Abstract. For many years, people have been trying to examine the factors that affect life in the country in which they live. Many procedures and methodologies have emerged into the help to measure individual aspects of life. One of them is GDP. But even though it is the most used of them, it focuses mainly on the economic side of life and ignores other factors that affect the lives of people in a given country. The aim of this paper is to identify the degree of connection between the development of the macroeconomic indicator of GDP and the index of economic freedom for the Slovak Republic. Based on the analysis of their development, components and impacts on the country, their main advantages and disadvantages will be determined, as well as their effectiveness compared to GDP. As no indicator can cover all areas, each of them looks at the same issue from a different angle, so to get a more comprehensive view of a country, it is not appropriate to focus on just one of them.

Keywords: index of human development, index of economic freedom, economies competitiveness, press freedom, Slovakia

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1. Introduction

Gross domestic product is one of the basic macroeconomic indicators. Its development significantly indicates the state of the economy of a given state and in the case of its conversion per capita; it can serve to compare the economic level of individual countries. GDP growth is also related to other macroeconomic indicators, such as inflation and unemployment. Quality of life is important for everyone. It affects the daily life of every person in a given country from meeting basic life needs such as basic life needs (food, water, shelter) to education, health

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care, cultural activities and the like. However, if we want to examine the quality of life in a given country, we must be able to measure it. Here, however, there is a problem to which many people have not yet found a clear answer. The problem is that the quality of life is influenced by many factors. However, a much bigger problem is that everyone perceives it from their subjective point of view. What is the quality of life? When is a person happy? When can he say he is missing nothing? For many years, people have tried to study and measure this immeasurable quantity. Some focused only on the economic aspect, such as the well-known Gross Domestic Product or GDP. However, it did not include other influences, such as the quality of education, the quality of health care or personal freedom. In this paper, we will therefore analyze various indicators in their time development and their interrelation. We focused on the significant correlations. In consideration of the complex correlations between the indicators we regarded their extent useable for GDP evaluation in connection to HDI development, index of economic freedom, GCI development and press freedom index with aim to find obstacles for increasing of the Slovakian competitiveness, contributing to the worldwide economy.

2. Theoretical background

If we want to find out how a country is performing compared to other countries, where there are opportunities for improvement, it is necessary to find a way to compare countries. However, since there can be many aspects to compare, no way will perfectly reflect the reality of a given country. Probably the oldest way to measure a country's performance and compare it with other countries is the country's economic strength (Dvořáček et al., 2012). The most commonly used indicator is GDP. Gross domestic product (GDP), measures the number of goods and services that are produced in a country's economy. As each region has a different approach to resources and especially the number of inhabitants, which directly affects the absolute amount of GDP, this indicator is not directly applicable to the comparison of different countries, so GDP per capita is often used.

GDP is an indicator that measures a country's economic strength. Since we can also derive other quantities from the size of GDP, such as the real wage of the country's population is often used to measure the quality of life. While economically a very good tool, this indicator does not reflect other important aspects of people's lives in a country, such as education, healthcare, and freedom of speech, freedom of the business and the business environment, and especially differences between the populations. It can very easily happen that a group of very rich people distort the overall view of the whole economy of a given country. Nevertheless, it is the most commonly used indicator, which is easily usable for measuring the economic growth of the country and comparing the quality of life with the past. The main advantage of the given indicator is that it is measured in USD, which makes it very easy for people to imagine what it expresses and what the calculated number means, what can no longer be said about other indicators. Since, as mentioned, GDP measures mainly the economic strength of the country does not take into account the quality of health, respectively quality of education (Teplická et al., 2021). Therefore, an index of human development index was created (Cingranelli and Richards, 2007). One of the advantages of the human development index is that it does not take into account only one aspect, such as one's income, but rather takes into account a whole complex of variables, such as the percentage of illiterate people in a country, people's access to drinking water, people's access to health services, number of children under 5 years of age suffering from malnutrition, percentage of probability in a born individual that he will not live to 40 years of life (Jurgelevicius and Tvaronaviciene, 2021).

The index is studied in connection with human rights, as presented by Jeffords (2021) that used the newly developed Sustainable Development Index (SDI) as the outcome variable and panel regression results demonstrate a positive correlation between SDI and having a substantive environmental human rights provision. In response to an increasing demand for rigorous monitoring of states in meeting their human rights obligations, a growing literature has emerged on measuring human rights fulfillment. In this connection the human rights index provides important new information compared with other measures of economic and social rights fulfillment; although it still does not fully capture some desired features such as the right to nondiscrimination and equality,

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and the right to social security (Fukuda-Parr et al., 2009). The main disadvantage of GDP is that it does not take into account the environmental aspects of sustainable development. Until recently, one of the disadvantages of the human development index was the overly rough classification of countries into groups with low, medium and high levels of human development. In recent years, almost all European countries have belonged to the group of countries with a high degree of human development.

Another positive aspect of GDP is that it also notes the economic growth of the country. An extremely important factor in the globalization of the world economy is the country's competitiveness in the world economic area. The growing importance of economic relations encourages the openness of individual economies to foreign goods, services and capital. The WEF – The World Economic Forum deals with the evaluation of the competitiveness of countries, which annually compiles a ranking of countries on the basis of the global competitiveness index. We can look at competitiveness on an international as well as a national scale. We can understand it as a comparative view of the researched object and its ability to offer and sell services and goods in the market. However, international competitiveness can be defined rather as the ability to penetrate foreign markets with goods and services. The advantage and positive in assessing the competitiveness of countries around the world is that the WEF takes into account in assessing the competitiveness of various factors and sub factors, which are placed according to certain features into twelve groups, the so-called pillars of competitiveness. In this area there are some studies, as for example the Global Competitiveness index (GCI) is studied by some authors from the view of the connection to other indexes. Kalman and Toth (2021) examined the relationship of competitiveness and logistics performance. According to Poufinas et al. (2021) the more competitive a member country of the EU is, with respect to the global competitiveness index, GDP per capita, exports as a percent of GDP and unemployment rate, the smaller its shadow economy (as a percent of GDP) becomes. More precisely, as anticipated, there is a negative relationship between the shadow economy and global competitiveness, GDP per capita and exports. Global Competitiveness Index introduced a major methodological change in 2018; therefore, Dudas and Cibuľa (2018) used the new methodology on the national competitiveness of Slovakia and its position in the global rankings of national competitiveness.

The other index, influencing GDP development, is the index of economic freedom (Piątek et al., 2013). Extent of economic freedom is created each year by comparing 4 different indicators divided into five areas. A comparison of the results of the economic freedom index and indicators with the resources of the European Union, the World Bank, the UN, Transparency International and others leads to the conclusion: the prosperity of countries depends on economic freedom. The economic freedom index is one of the most important indexes on the basis of which the global economies are ranked. Hryniewicka (2018) classified the 28 EU countries into individual groups and to characterize them in comparison to the five countries of the world that create the best and worst development conditions for their businesses. Karateev (2017) demonstrated that annual Index of Economic Freedom actually describes not only country's economic freedom level but also levels of other kinds of freedom. At the same time taking population size into account raises correlation coefficient between Index of Economic Freedom and GDP (PPP) per capita demonstrating strong correlation between human income and economic freedom. Kacprzyk (2016) evaluated which aspects of economic freedom contribute to economic growth in the EU, finding a positive relationship between economic growth and four of the five aspects of economic freedom: security of property rights, quality of monetary policy, freedom to trade and regulatory policies.

GDP development on the mentioned indexes in the conditions of Slovakia is the aim of presented contribution. The conditions in Slovakia reflect a following situation: about one-third of the human development index is gross national income. Gross national income in Slovakia is GDP adjusted for income of companies operating in the country, but coming from abroad. The directives of Slovaks and Slovak companies operating abroad are also taken into account as the second possible alternative. Another alternative to measuring a country's success is, in addition to the human development index, gross national happiness. The index measures and takes into account nine areas: environment, culture, good corporate governance, education, health, life ability of communities (these

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have a large representation in Slovakia) and play a significant role in measuring the success of the country, time use, mental well-being, environmental level.

The Swiss Institute for Management Development in cooperation with the Slovak F.A. Hayek Foundation Bratislava published the World Yearbook of Competitiveness Economies in 2018. According to the book, Slovak Republic ranked 55th out of 63 evaluated countries, which did not keep the competitiveness year-on-year compared to previous years partition worsened by four places. This result was mainly due to a lack of qualified staff, a high administrative burden on businesses, insufficient developments in business digitization, high recruitment and dismissal costs and, last but not least, insufficient reforms in education as well as in public services. Compared to its closest neighbors, Slovakia ranked last among the countries of the V4 region, behind the Czech Republic (29th place), Poland (34th place) and Hungary (47th place). Only in 2007-2009, Slovakia was one of the highly competitive countries (30th place).

Table 1 provides a concise and symbolic overview of the interconnections between economic freedom, political freedom and economic growth, according to the scientific contributions of the authors whose work is analyzed in this dissertation.

Table 1. Overview of the interconnections between economic freedom, political freedom and economic growth in the studies presented

authors	interconnections
Farr, Lord and Wolfenbarger (1998)	Economic freedom ⇔ GDP → political freedom
Vega and Alvarez (2003)	Economic freedom – GDP ⇔ political freedom
Aixalá and Fabro (2009)	Economic freedom ⇔ GDP ⇔ civil freedom ⇔ political rights
Peev and Mueller (2012)	Political freedom → economic freedom → GDP
Piatek, Szarzec and Pilc (2013)	Economic freedom → GDP → political freedom

3. Research objective and methodology

The first step in the creation of the model was the study of possible situation in Slovakia, compared with other countries. Since the GCI is a composite type of index, its pillars are not independent of each other. Thus, one cannot be selected from among them for the competitiveness increasing purpose because of mutual interactions between all the pillars, which would result in an unexpected result. However, analyzing all the correlations is unnecessary, so we only focused on the significant correlations. However, analysing all the correlations is unnecessary, so we only focused on the significant correlations. Because of considerable multicollinearities, after normalizing the value of the 0-100 pillar-score to values 1-7, we resulted from the partial correlation analyses to select the most significant ones. Then, we followed the same principle in the assessment of interactions between the six components of the LPI. In consideration of the complex correlations between the pillars, we regarded their extent useable from 0.3. Thus, we used a model with the application of significant correlations (Kálmán and Tóth, 2021), to select the most significant ones (see Table 2). In consideration of the complex correlations between the pillars, we regarded their extent useable from 0.3.

Table 2. GCI partial correlations in 2018

Pillars	Institu-tions	Infrastr ucture	ICT ado-	Macro-economic	Health	Skills	Product market	Labor market	Finan-cial	Market size	Busine ss	Innova -tive

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			ption	stability					system		dynamism	capability
Institutions	1											
Infrastructure	0.328	1										
ICT adoption	-0.099	0.381	1									
Macroeconomic stability	0.090	0.115	-0.002	1								
health	-0.024	0.085	0.043	0.008	1							
skills	-0.028	0.157	0.413	0.004	0.542	1						
Product market	0.351	-0.039	0.209	-0.016	0.112	-0.117	1					
Labor market	0.120	-0.051	-0.011	0.135	-0.125	0.064	0.202	1				
Financial system	0.169	-0.043	-0.048	0.159	-0.014	0.044	0.179	0.169	1			
Size of market	-0.42	0.233	-0.159	0.161	0.028	0.035	0.002	-0.169	0.082	1		
Business dynamism	-0.012	0.243	-0.123	-0.052	-0.122	0.166	0.337	-0.085	0.268	0.203	1	
Innovative capability	0.339	-0.21	0.293	-0.086	-0.052	0.046	-0.107	0.209	-0.15	0.309	0.477	1

Source: own processing according to Kálmán and Tóth (2021)

Notes: p<0.05
Coefficients >0.3 <0.2 – 0.3> <0.1 – 0.2> in other cases, ther is no assessable corrrelation

The results of the correlation had been considered for evaluation of the HDI development in Slovakia, development of economic freedom index, GCI development and press freedom index during 13 years analysis.

Human Development Index

As stated by Kubátová (2004) the big problem of GDP is that GDP per capita does not capture the differences in the economic well-being of individual inhabitants or population groups. In an economy with social equality, GDP/capita can be as valuable as in a country with a small group of very rich people and a large group of people living in high poverty. Therefore, efforts to use other indicators are increasingly being pursued. One of the most important is the so-called Human Development Index (HDI – Human Development Index). This index takes into account the average life expectancy at birth, the literacy rate of the population, the proportion of the population attending primary, secondary and tertiary schools and the level of GDP per capita. The UN publishes an annual Human Development Report with an overview of the HDI. Slovakia is one of the countries with a high level of human development. In 2014, the Slovak Republic ranked 37th.

Individual institutions and states are interested in data on the achieved economic level of a given country, which allows comparing the economic level of individual countries. Currently, the most important and most used indicator by which to measure and express the achieved level of human development is the Human Development Index - HDI, which is also used by the United Nations Development Program (UNPD) for international comparisons (National Report on Human Development of the Slovak Republic 2001 - living a healthy and creative life). The favorable political climate, democracy, political and economic freedom, law enforcement,

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developed informal rules, a stable economy, a functioning and open education system, the development of science and research, quality health services, a targeted social system, environmental protection, tolerance, respect contribute to this, etc. However, this does not guarantee that the expected objectives will be met. Human development is more than being healthy, educated, and rich. It is also the ability of people to take advantage of these opportunities in everyday life. The following factors are taken into account when calculating the human development index:

- life expectancy of the population of the country,
- the achieved educational level of the population (Lisý 2005a).

The human development index determines the minimum and maximum levels for each sub-indicator as follows:

- Life expectancy at birth: 25 years and 85 years
- Adult literacy rate: 0% and 100%
- Combined enrollment rate for schools (primary, secondary and higher, respectively I., II. And III. Degrees) 0% and 200%
- Real GDP per capita (in USD) converted through purchasing power parity: USD 100 and USD 40 0000 (Lisý 2005a).

These HDI sub-indicators are calculated as follows:

$$HDI\ Index = \frac{real\ value\ xi - nominal\ value\ xi}{maximal\ value\ xi - minimal\ value\ axi}$$

The calculated level of the index ranges from zero to one. The resulting value in Table 3 shows how far the country has moved towards the maximum level 1 and at the same time, it is possible to compare the economic maturity of a given country with other countries (Lisý 2005a).

Table 3 HDI values

Range	Level of human development
0,000 – 0,5	Low
0,501 – 0,8	Medium
0,801 – 1	High

Source: UNDP (Human Development Report, 1999, p. 113)

From the above brief characteristics of the human development index, it follows that in 21st century, a developed country is considered a state that creates the conditions for its inhabitants to achieve long and healthy life.

Index of the economies competitiveness

The Index of economies competitiveness expresses how the quality of the business environment contributes to increasing the performance of the economy while evaluating and comparing individual countries in four basic areas: economic growth, government efficiency, the efficiency of the business environment, infrastructure efficiency. The most important factors that the index compares include the achieved level of GDP, investment rate, trade and balance of payments, inflation and unemployment rate, development of public budgets, labor productivity, education, science and research, health care, state intervention, law enforcement and the level of legislation, corruption, foreign relations, the impact of globalization (Lisý 2005b).

Index of economic freedom

The index of economic freedom is one of the indicators, the aim of which is to measure the degree of economic freedom in relation to the overall performance of the economy. The initiators of the compilation and regular enumeration were Nobel Prize winners for economics Miton Friedman, Gary Becker and Douglas North. More

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than 50 institutions from around the world are involved in the calculation of the index, which analyzes indicators in five important areas:
- Impact of state interventions on the economy (amount of tax burden and public expenditures) (Istok and Taušová, 2021)
- protection of property rights (quality of legislative conditions, law enforcement, functioning and efficiency of the judiciary)
- price and currency stability (effective budgetary and monetary policy)
- freedom of trade and functioning of the capital market (customs policy and other obstacles to free trade)
- scope of regulatory interventions in the functioning of the financial market, the labor market and the conditions for starting a business (Lisý 2005b)

The index of economic freedom is researched according to the following categories (see Table 4).

Table 4. Categories of the Economic Freedom Index since 2017

I.Rule of law	**II. Government size**
1. Property rights	1. Tax burden
2. Government integrity	2. Government spending
3. Judicial effectiveness	3. Fiscal health
III. Regulatory efficiency	**IV. Open markets**
1. Business freedom	1. Trade freedom
2. Labor freedom	2. Investment freedom
3. Monetary freedom	3. Financial freedom

Source: Miller & Kim (2017)

$$Trade\ Freedom_i = (((Tariff_{max} - Tariff_i) / (Tariff_{max} - Tariff_{min})) * 100) - NTB_i \qquad (1)$$

Trade Freedomi represents the sub-index trade freedom in country *i*, Tariffmax and Tariffmin represent the upper and lower bounds for tariff rates (expressed in %) and Tariffi represents the weighted average tariff rate in country *i*. The lower limit is the rate of 0% and the upper 50% of the value of imported goods. NTBi represents the non-tariff barrier of the country *i* and is subtracted from the base score in the form of a penalty to obtain the final score. The penalty may be 0, 5, 10, 15 or 20 points, depending on the frequency of use of non-tariff barriers (20 for barriers that completely impede international trade due to extensive use across most goods and services). Determination of the number of points that will be deducted on account of non-tariff barriers depends on qualitative and quantitative information on the types of restrictions, the most important of which are: quantity restrictions, price restrictions, regulatory restrictions, investment and customs restrictions as well as direct government intervention.

$$Monetary\ freedom_i = 100 - \alpha \sqrt{Weighted\ average\ inflation_i} - PC\ penalty_i \qquad (2)$$

In formula (1) $\alpha = 6.333$ represents the coefficient for stabilizing the variance of the results. It converts the percentage of inflation into the value of sub-index on a scale from 0 to 100. For greater accuracy, the square root of the weighted average inflation rate is used. PC penalty *i* represents penalties for price control by the state, which range from 0 to 20 and are subtracted from the monetary freedom sub-index base to obtain the final score.

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4. Results and discussion

Results of human development index (HDI) development are given in table 5, illustrating development in time horizon 2006-2018 from the view of the index development as well as the index ranking.

Table 5 HDI development

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
HDI develop-ment	0,802	0,813	0,82	0,822	0,829	0,835	0,838	0,841	0,842	0,845	0,853	0,855	0,855
HDI Ranking	41	40	36	37	37	37	38	37	35	40	39	38	38

The Human Development Index was created to emphasize the fact that people and their abilities should be the final criterion for assessing a country and not economic development itself. The Human Development Index is one of the aggregated indicators measuring the progress of society in three dimensions, which relate to health, education, living standards of the population. The aim of the human development index is to measure the level of human development achieved by a single index and to enable comparisons between different countries of the world. HDI expresses the geometric mean of three normalized indices calculated from three dimensions.

The Human Development Index expresses the ratio of the current indicators of a given country to the maximum value of indicators, such as the life expectancy of the population of a given country, the achieved educational level of the population and the quality of life of people. HDI has so far adopted the only alternative that successfully breaks the hegemony of focusing on economic growth. These statistics include the country's gross domestic product and two other factors. These two factors are the education of the population, based on the level of literacy and completion of individual levels of education and average life expectancy. Education is measured by two indicators. The average length of schooling for adults aged 25 and the expected length of schooling for children aged six when they start school are monitored. Both indicators are normalized by setting a maximum and a minimum value, which is compared with the fair value reported by the country. The maximum value of the expected length of school attendance is set in 18 years. The partial value of the education index is then determined as the geometric average of the indicators. Life expectancy at birth is standardized using a minimum and a maximum value. The maximum is set in 83.4 years and the minimum in 20 years.

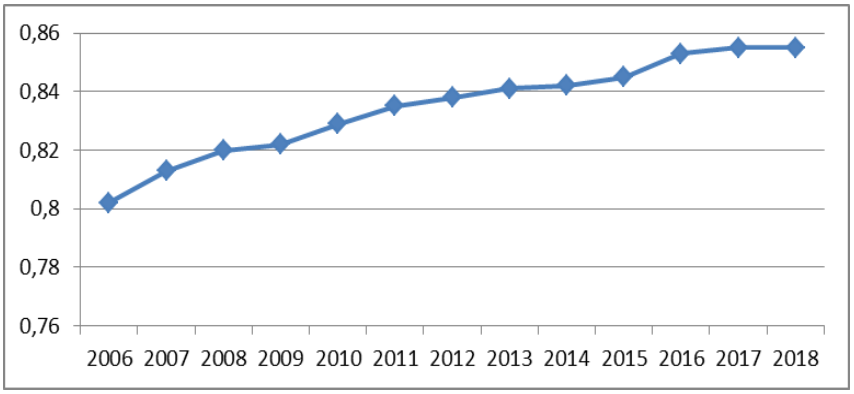

Figure 1. HDI development in Slovak republic
Source: own processing

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As we can see in Figure 1, the human development index has been growing regularly over the last ten years, maintaining a value above 0.8, which means a high level of quality of life in Slovakia. Slovakia's HDI in 2015 reached a value of 0.845, which puts the Slovak Republic in 40th place on a global scale. This position speaks of the improving state of socio-economic variables in Slovakia, while the HDI indicator has had an increasing tendency since 2005 from 0.793 to the current value of 0.845 (2015). In general, we can assess such a state of living from 2005 with a slowdown from 2008 to the present as an increase. In recent years, the quality of services, health care, education has grown. However, if we look at HDI on a global scale, Slovakia was almost constantly around 37th place. In 2015, it even dropped to 40th place. We can therefore say that the overall growth of HDI is a global trend. Although the quality of life is increasing in Slovakia, the growth of HDI is proportional to other developed countries of the world and is, therefore, a global trend. On the other hand, we can say that, compared to other countries, Slovakia does not lag behind in improving the quality of life. If we look at the individual components of the HDI index, we will find that the main components for the development of HDI were the life expectancy and quality of life of the people, which is based on GDP. Life expectancy and compared to 2005 increased by 2.2 years. The expected period of school attendance has been around 15 years for a long time, while compared to 2015 it increased by 0.7 year.

Development of the index of economic freedom in the Slovak republic

A result of the index of economic freedom development is given in table 6, illustrating development in time horizon 2006-2018 in Slovak republic.

Table 6. Development of the index of economic freedom in the Slovak republic

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
index	69,0	69,6	70,0	69,4	69,7	69,5	67,0	68,7	66,4	67,2	66,6	65,7	65,30

Source: own processing

The Index of Economic Freedom has been measured by the Heritage Foundation and the Wall Street Journal since 1995. It covers ten areas: freedom of enterprise, freedom of trade, monetary freedom, government sector size, fiscal freedom, property rights, freedom to invest, financial freedom, corruption, labor freedom. It evaluates the level of economic freedom. It analyzes economic openness, the effectiveness of regulation, the competitiveness of countries and the application of the law. The country's final score can range from zero (minimum economic freedom) to 100 (maximum economic freedom).

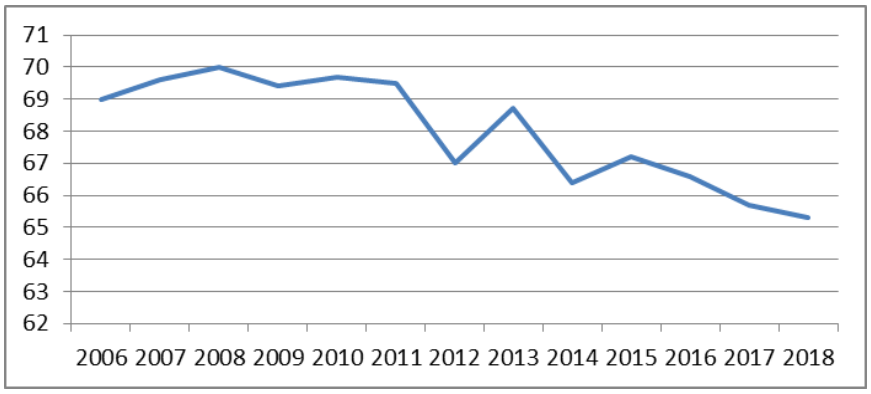

Figure 2. Development of the index of economic freedom in Slovakia
Source: own processing

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As we can see from Figure 2, the index of economic freedom from 2006 to mid-2008 had an upward trend. From 2008 to mid-2009 there was a slight decrease. From mid-2009 to mid-2010, there was another slight increase. In the following years, however, it was marked by a decline to 66.4 in 2014. From this value to mid-2015, it rose slightly to 67.2, already fell to its lowest value of 65.3 in 2018. As we can see, the index of economic freedom fell from 69 to 65.3, despite a slight increase, which means a decrease of 3.7 points, which is not a favorable situation for doing business in Slovakia. The government of Slovakia has also seen a sharp decline in recent years, which may be due to government crises. The Slovak Republic ranked 59th out of 180 countries compared in the economic freedom index.

Development of global competitiveness index

The Global Competitiveness Index is an indicator measured since 1975 (GCI). GCI is used to compile the Global Competition Report. It is being prepared by the World Economic Forum. Based on the 90 variables contained in nine headings, an index will be compiled that will clearly classify countries into countries with economies based on factors of production, countries with economies driven by increasing efficiency and countries with economies based on innovations. The report was last evaluated by 133 countries. The categories of evaluated categories can be summarized as follows: institutions, infrastructure, macroeconomic indicators, health and basic education, higher education and training, market efficiency, technological addition, implementation of new practices in business, innovation. The results of the index development in Slovakia are given in Table 7 and Figure 3.

Table 7. Development of the Global competitiveness index in Slovakia

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Index	4,54	4,45	4,40	4,31	4,25	4,19	4,10	4,10	4,10	4,20	4,28	4,33	4,93

Source: own processing

As we can see from the Figure 3 from 2006 to mid-2012, the index of competitiveness of economies has been constantly declining. From that period onwards, it stagnated until about the middle of 2014 and then continued to grow slightly until 2017, where it was 4.33. The highest increase to 4.93 was recorded in the Index of Competitiveness of Economies in 2018. This year, the Slovak Republic ranked 41st out of 140 countries, evaluated and achieved a score of 66.8 out of 100. Possible solutions for the growth of competitiveness for Slovakia in the coming years are improvements in the area of:

a) Insufficient number of qualified staff
b) Reduction of administrative burdens on businesses
c) Advances in business digitization
d) Reducing recruitment and redundancy costs
e) Reforms in public services and education

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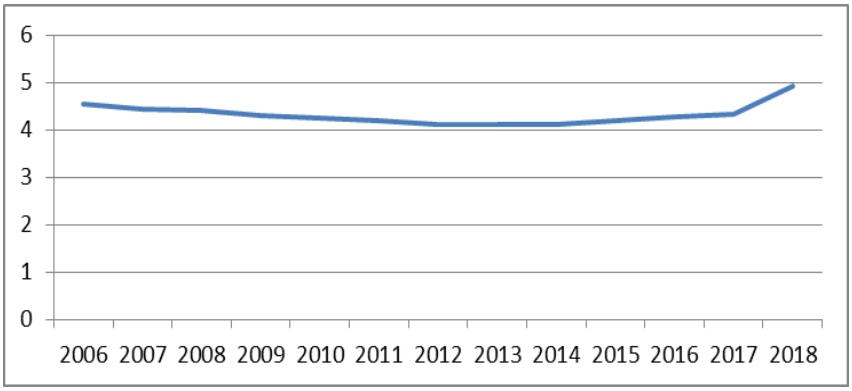

Figure 3. Development of Global competitiveness index in Slovakia
Source: own processing

Development of press freedom index in Slovakia

The results of the index in the analyzed period in Slovakia are given in table 8.

Table 8. Index of press freedom in Slovakia

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Index	2,50	1,00	3,00	11,00	11,50	0,00	0,00	13,25	11,39	11,66	13,26	15,51	20,26

The Press Freedom Index is prepared each year by Reporters without Borders. Every year, Reporters without Borders prepares an index evaluating press freedom. This index evaluates 180 countries around the world. The index is compiled on the basis of the following criteria: pluralism - determines the degree of representation of opinions in the media.

1. Environment and self-censorship - analyzes the environment in which news and information providers operate.
2. Legislative framework - measures the impact of the legislative framework governing intelligence and information activities.
3. Transparency - measures the transparency of institutions and procedures that have an impact on reporting and information.
4. Infrastructure - measures the quality of the infrastructure that supports the production of messages and information.
5. Abuse - measures the level of abuse and violence. The calculation also takes into account a seventh indicator based on data collected on abuses and acts of violence against journalists and the media during the period under review.

Each indicator has a score between zero and 100, with 0 being the best score and 100 being the worst value. The RSF calculates two indicators. The first is based on the first six of the seven indicators listed above. The second combines the first six indicators with the seventh (abuse). The country's final score is the higher of the two results. This method avoids the disproportionately low score (high rating) awarded to a country where there is little or no violence against journalists, as the disclosure of news and information is strictly controlled.

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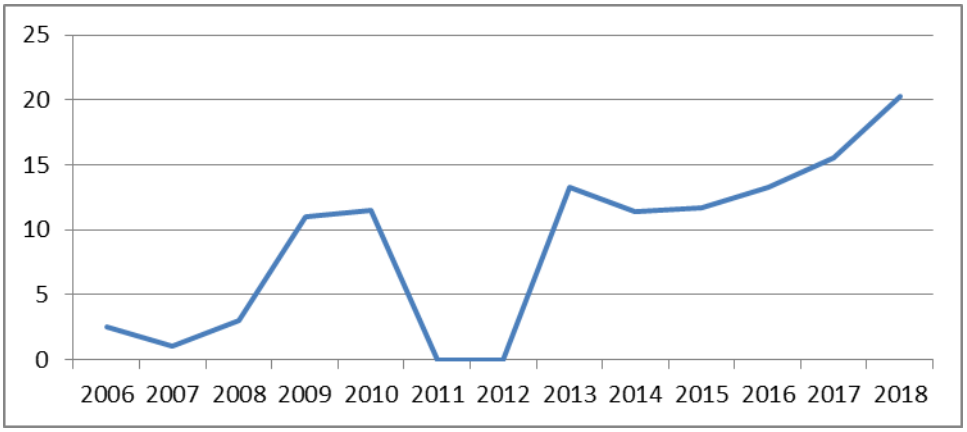

Figure 4. Development of press freedom index in Slovakia
Source: own processing

In 2006, the press freedom index scored 2.50. From this period to mid-2007, there was a slight decrease from 2.50 to 1.00. From mid-2007 to mid-2008, it showed an increase of 2.00. By 2009, there was a sharp increase from 3.00 to 11.00. By mid-2010, we are recording a slight increase from 11.00 to 11.50. From this period until mid-2011, there was a sharp decline from a score of 11.50 to 0.00. In the period 2011-2013, the index remained zero. From mid-2013 to mid-2014, there was a sharp increase from 0.00 to 13.25. Since this period in 2014, there has been a slight decrease to 11.39. Since mid-2015, there has been a slight increase to 11.66. We record a sharp increase from about the middle of 2015 to 2018 up to the value of 20.26.

As we see in the development of the economy in Slovakia, in recent years, GDP in Slovakia has been constantly growing, which was caused by the global trend, deflation and investment in Slovakia. However, GDP growth slowed in the last year compared to previous years. In contrast, however, the index of freedom of enterprise and the index of press freedom declined. This can also have an impact on GDP growth. In recent years, various political cases, overpriced public procurement have adversely reflected the overall situation in Slovakia. Civil unrest also has an adverse effect on economic growth and living standards. If the Slovak Republic wants to continue to grow, it must improve mainly in the following sectors:
1. Improving the business environment - infrastructure must be created for the development of the business environment in Slovakia: the development of small and medium-sized enterprises and the support of self-employed persons help both to increase employment and to increase competition and the quality of services. At present, there are many barriers that prevent small businesses from settling in the market, and current legislation is not very helpful, which is also reflected in the declining index of economic freedom.
2. Investment in research and development: research and development is the engine of economic growth. Unfortunately, there is currently very little investment in this area in Slovakia.
3. Stabilization of the political situation: political cases and confusing public procurement not only undermine people's confidence in the state but also adversely affect the business environment, foreign trade, and economic development.

The downside of the competitiveness process is that it is affected by what is happening on the political scene. At the same time, the state plays the role of a creator of the business environment and should create such conditions that companies in the Slovak Republic are as competitive as possible not only on the domestic market but can also develop in foreign markets. However, we can only argue whether the current stability in government circles is sufficient and whether the current policy of supporting domestic and foreign investors is correct and non-discriminatory for Slovak entrepreneurs. In the institutional environment of the country where we encounter problems such as high levels of corruption, the inefficiency of state offices (or their inability), the unreliability of

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the population in the judiciary, these factors negatively affect the value of the competitiveness index. Deficiencies in the business environment and a high tax burden, as well as constantly changing tax regulations and the Labor Code, only contribute to the deterioration of the situation and the reduction of the country's index.

We see the advantages of GDP in the fact that it is a common indicator, which has been used for several years for comparisons of individual countries, i.e. the administrations in the states are set to simply calculate the given indicator. The disadvantages, as we have mentioned, are that, in our opinion, this indicator has a weak explanatory power. It is not the amount of production in sales that is important, but also the sales. It would be appropriate to move farther in measuring the economy and to propose a new way, a new indicator, which would be able to better point out the development and prosperity of individual countries, which would be mutually measured. We can say that if we were to think about a new indicator that could compare the prosperity of countries, we would combine the indicator of the average wage, the average cost of living, and also the tax and contribution burden, which would bring us to the living standards of the population. It could be helpful to develop this indicator with the satisfaction of citizens in the country.

Conclusions

Measuring the quality of life in a country is not easy. The contribution focused on the most used macroeconomic indicator - GDP. We approached its development in Slovakia. In recent years, GDP has grown almost steadily, but the growth rate is now lower than it was ten years ago. From the development of GDP, we could think that the quality of life in Slovakia has improved. However, the problem with this statement is that GDP alone does not cover various other aspects such as education or health care. This shortcoming seeks to address the Human Development Index (HDI). It no longer takes into account only the income of the population itself, as GDP does, but also takes into account life expectancy and level of education. This index has been growing for a short time. Based on the analysis, we found out which main aspects caused this growth. However, even this index does not cover many aspects.

The creators of the Index of Competitiveness of Economies took a different view of the given issue. It tries to compare the competitiveness of individual countries. The ranking of the countries with the highest competitiveness is determined every year. This index uses 15 criteria based on which individual countries are evaluated. However, the height of a given index depends to a large extent on external influences. The latest indexes have focused mainly on the freedom side. While the index of economic freedom speaks mainly about freedom of enterprise and the economic side of freedom, the index of freedom of the press focused mainly on freedom of information and media. As we can see, none of the indicators takes into account all possible aspects of human life, while some of them are closer to GDP and economics, others focus on other aspects. GDP is a good indicator if we want to look at the country only in terms of its economic strength. But if we want to focus on other aspects of life, we must also use some alternatives.

The results of the contribution provide important information for increasing of the competitiveness of the Slovakia in the frame of globalized worldwide economy, initiating to the openees of the Slovakian economy toward national and international business effectiveness. The results can be used as comparative view. However presented research with its results demand regarding various factors of the competitiveness pillars that had not been considered in the frame of the contribution, such as quality of public institutions, infrastructure, macro economic stability, education and qualification, effectiveness of markets with goods and services, financial and labor market, technological preparedness, volume of the market and innovation potential of the business. This could be object of the future research in Slovakian conditions.

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THE ROLE OF MANAGEMENT COMMITMENT IN ADOPTION OF OCCUPATIONAL HEALTH AND SAFETY AT HIGHER EDUCATION INSTITUTIONS

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Abstract. At the very core of organizational sustainability lies the health and safety of its people, the welfare of society, and the conservation of resources. Adoption of Occupational Health and Safety (OHS) is considered as a way forward to achieve organizational sustainability. However, due to an increased number of incidents, OHS has become a serious concern in Pakistan. This creates a dire need for OHS adoption in Higher Education Institutions (HEIs) to prevent such incidents and achieve sustainable OHS performance. This study aims to examine the factors playing a vital role in OHS adoption that leads to sustainable OHS performance in HEIs of Pakistan. The data were collected through a survey questionnaire from academic and administrative employees of the top 23 universities of Pakistan. A total of 306 responses were analysed in the Partial Least Square (PLS) approach of Structural Equation Modelling (SEM) to test the research hypotheses and validate the model. The findings showed that external pressure (regulatory, mimetic, competitive, and social) serves as the main stimulus for the adoption of OHS practices in HEIs of Pakistan. In addition, management commitment in implementing the OHS practices serves as a mediator that catalyses the impact of external pressure on OHS adoption. Consequently, successful adoption of OHS practices leads to sustainable OHS performance in HEIs. The findings imply that external pressure alone may not be sufficient to push HEIs for OHS adoption unless the top management shows real commitment.

Keywords: Sustainable OHS performance; Regulatory Pressure; Mimetic Pressure; Competitive Pressure; Social Pressure; Formal Policy; Formal Training; Encouragement

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1. Introduction

Aimed the global concerns over natural resources, climate change, sustainability received much attention of the organizations of all types across the world. Most organizations have embraced this mindset in all aspects including people, planet, and profit (OSHA, 2021). However, in the field of higher education, it remained a relatively novel and under-researched theme. Casarejos et al. (2017) believed that at the very core of organizational sustainability lies the health, safety, and welfare of its people — the most valuable asset. In the context of HEIs, sustainability is mainly concerned with its people, educational services, physical environment, and infrastructure. HEIs serve as important landmarks of cities and contribute to urban. The physical environment that entails modern and environmentally friendly infrastructure plays a vital role in ensuring the health and safety of the workforce (employees and students) (Pandita & Kiran, 2020). Beyond anything, an overall safe environment and established infrastructure of facilities are the major requirements for a sustainable educational system. For establishing a sustainable and safe educational environment, occupational health and safety (OHS) is a major factor that needs to be acquired or maintained (Koonmee et al., 2010). A safe and healthy working environment leads to the quality management of human resources, along with the assurance of high performance. Leggat et al. (2011) also argued that occupational health and safety in higher education institutions have a significant positive effect on their quality assurance. However, Westgaard and Winkel (2011) stated that OHS is not only considered as an important factor for a sustainable education system but considered as people's rights within an organization. National and international quality standards organizations enforce the HEIs for the adoption of OHS standards. However, such efforts are relatively less effective in developing countries. OHS-related regulations and legislations and their implementation are quite weak in developing countries like Pakistan (Lakhiar & Lakhiar, 2021). Noman et al. (2021) reported that OHS is still a serious concern in Pakistan as a high number of OHS-related incidents have been observed in recent years in various organizations and industrial sectors including HEIs. HEIs face a myriad of OHS-related issues. Like any other workplace, they face various hazards such as ventilation, electrical hazards, internal roads, and parking issues, slips, trips, and falls, etc. Apart from these traditional infrastructural and environmental, health and safety issues, most universities have medical labs containing toxic, flammable, and reactive chemicals posing a serious hazard to the people on campus (Nascimento & Tenuta Filho, 2010). Likewise, some HEIs have animal houses on campus that could cause allergies, infections, and various other diseases, if OHS practices are not in place.

In most Pakistani universities the OHS practices are far below the standards. The recent incidents attracted the attention of concerned authorities, policymakers, and the government that forces HEIs to adopt OHS practices at the workplace. Consequently, HEIs in Pakistan are facing pressure from regulatory authorities, national and international organizations, and other stakeholders to improve their physical environment in terms of OHS practices to be recognized as sustainable organizations (Farrukh et al., 2019). Having said that, HEIs are in dire need of answering the questions such as: How HEIs can successfully adopt OHS practices? What internal and external factors may contribute to the successful adoption of OHS practices? And what would be the outcome of successful OHS adoption that leads to sustainable HEIs? The extant research lacks answers to these questions. This study endeavors to empirically investigate the answers to these questions by identifying antecedents and consequences of OHS adoption in HEIs as well as the role of top management as a mediator. This study contributes to the body of knowledge by filling these gaps and offers important implications for sustainable HEIs and provides future research directions.

2. Theoretical Background and hypotheses development

Sustainability is a broader and multifaceted notion that in general refers to such development that meets the present needs without affecting the needs of future generations (Lozano, 2008). Its three broader dimensions include environmental, social, and economic. Sustainability in the context of HEIs as defined by Velazquez et al. (2006) and cited by Aleixo et al. (2018), implies the mitigation of negative environmental, economic, social, and

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health effects of resource utilization while performing the core functions of teaching, research, and community partnership to help the society making a transition to a sustainable lifestyle. Adoption of OHS practices helps in minimizing such negative effects and leads to sustainability.

Workplace injuries and accidents pose serious challenges for organizations around the globe. According to Adu-Gyamfi (2020), every year 270 million people suffer from fatal and non-fatal workplace injuries. These injuries can be prevented or at least mitigated by the effective adoption of OHS measures. OHS is considered as a complete mental, social and physical well-being at the workplace that leads to the sustainability of the organization (Ahmad et al., 2020). However, the issues of health and safety often are not prioritized due to a lack of resources (Wong et al., 2015). It has often been agreed that the status of practices of OHS is improved in the internationally qualified and prominent universities of developed countries, but a similar notion has not been found in developing countries (Hossain et al., 2015). Developed countries possess HEIs specific OHS regulations, however, developing countries lack such specific regulations. Likewise, this area is better researched in developed countries as compared to developing nations.

OHS in general is a well-researched area. A vast amount of literature exists on OHS in various industries and organizations. However, OHS research on HEIs is quite a handful. Some of the notable scholars focused recently on OHS in HEIs include Morrish (2019), Kersh (2018), Zhang et al. (2018), Malik et al. (2017), Franco-Santos and Doherty (2017), and Hossain et al. (2015). These scholars professed that certain internal and external factors compel organizations to the adoption of OHS practices. Hossain et al. (2015) identified four main constructs of external pressure that impact an organization's adoption of OHS including regulatory pressure, mimetic pressure, competitive pressure, and social pressure. However, other scholars like Malik et al. (2017) and Morrish (2019) did not consider social pressure as a stimulus for OHS adoption. Society or community is one of the main stakeholders of HEIs from which employees and students are attracted. In addition to regulatory, competitive, and mimetic pressures HEIs also face social pressure that force them to adopt OHS practices. Apart from these external factors, internal factors also play a vital role in effective adoption of OHS practices. Among them, top management is one of the leading factors that serves as a catalyst and strong intervening force. Previous studies addressed top management in different perspectives. This study, however, considered top management as a mediator between external pressures and OHS adoption.

OHS practices in HEIs of Pakistan: While developed countries have effective health and safety regulations specific to educational institutions, developing countries like Pakistan lack them. No independent health and safety law for educational institutions exists as of today. The existing OHS laws are primarily directed towards various manufacturing industries. For instance, Chapter 3 of the Factories Act 1934 is the main law that deals with the health and safety of workers. Established in 2002, the Higher Education Commission of Pakistan (HEC) is the regulatory authority on HEIs in Pakistan (Baloch et al., 2021). It officially refers to the Factories Act 1934 when it comes to health & safety, inspection, paid holidays, working hours, and other special provisions. Due to the lack of specific OHS laws, educational institutions in Pakistan have been vulnerable to numerous incidents, including fire eruption, building collapse, kidnapping, and even terrorist attacks such as Peshawar School Massacre (Biberman & Zahid, 2019). Thus, the government needs to formulate specific OHS laws for educational institutions, and HEC should effectively implement the regulations to the universities to attain a safe and healthy workplace. Apart from the regulatory authorities, OHS should be of equal concern for accreditation bodies that can exert pressure on the universities through the accreditation process.

OHS adoption and external pressure: Researchers believe that certain external pressures force organizations to adopt OHS practices. Previous research identified four types of external pressures including regulatory pressure, mimetic pressure, competitive pressure, and social pressure. In the first place, organizations are bound to comply with national legal and regulatory standards. The regulatory environment of any organization impacts its practices associated with OHS adoption (Chambers et al., 2013). Regulations have been serving as a powerful force urging

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the organization to adopt the practices and policies of OHS. In addition to regulatory pressure, organizations face mimetic pressure. Castro de Castro Maia et al. (2016) asserted that mimetic isomorphism is the notion that occurs when the firm is prone to imitate the practices of its competitors to reach the horizons of legitimacy and success. To attract students, HEIs often mimic their competitors because health and safety measures, availability of various facilities, and overall environment are of great concern to the students (Pilbeam et al., 2016). HEIs, often find it easier to mimic other organizations to develop their safety programs (Hossain et al., 2015).

Another main external pressure that impacts the firm adopting OHS practices is competitive pressure (Hossain et al., 2015). Introducing health and safety measures within the organization is associated with competing concerns. And the adoption of the consistent and coherent policies of OHS is only possible if the organization can compete ostensibly in the market (Hermanus & Hermanus, 2001). Intense competition is one of the major categories that entail the adoption of OHS practices by HEIs (Lamm et al., 2017). World Health Organization (2002) also acknowledged competitive pressure as one of the factors influencing OHS adoption. However, the private sector faces more competition than public sector organizations. Private HEIs despite limited resources often provide a better working environment and health and safety measures than their counterparts.

In addition to this, the construct of social pressure has also been included to claim that it can impact the adoption of OHS. van Heerden et al. (2018) have identified that societal pressure is regarded as one of the major reasons as well as motivations behind the OHS adoption. As per the social cognitive theory, social recognition is one of the main motivators of adopting such measures that can lead towards respect and better image and prestige of the organization and it can also impact their adoption of OHS policies. Based on the review of the literature, this study forwards the following hypotheses.

H1: *External pressure has a significantly positive effect on top management commitment.*
H2: *External pressure has a significantly positive effect on OHS adoption.*

Top Management Commitment: The attitude of the management is often reflected in how much it is motivated to adopt, disseminate and develop the formal policies, encourage participants, and engage in the formal training regarding OHS (Mullen et al., 2018; Purba et al., 2015; Ramos-Galarza et al., 2019). The implementation of formal policies and training exhibit top management commitment to adopt OHS. Mousa and Othman (2020) claimed that organizations engaged in incorporating good safety measures believe in controlling the risk and implementing formal OHS policies. OHS adoption leads to better organizational Sustainable OHS performance. Laberge et al. (2014) believe that effective Sustainable OHS performance depends on providing appropriate training to employees. Whereas the commitment of top management towards the implementation of OHS practices is associated with how it is prone to train its people.

Hence, OHS adoption primarily depends on top management commitment towards the implementation of OHS that leads to effective Sustainable OHS performance (Podgórski, 2015), this study examines it as a mediator between external pressure and OHS adoption. Management commitment has been extensively examined as a mediator variable in numerous previous studies as well: See, for example, Yousef (2000), Patulak et al. (2013), and Lee and Jeong (2017) in this regard. Yeap et al. (2020) also regarded the commitment of top management as the factor that impacts the adoption of OHS policies within the firm. Based on the review of the literature, this study forwards the following hypotheses.

H3: *Top management commitment has a significantly positive effect on OHS adoption.*
H4: *Top management commitment has a significantly positive effect on Sustainable OHS performance.*
H5: *Top management commitment mediates the relationship between external pressure and OHS adoption.*

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Sustainable OHS Performance: Organizational sustainability is a multidimensional construct that considers financial, social, and environmental aspects of sustainability. However, the scope of this study is limited to the environmental dimension as it primarily examines the adoption of OHS practices. Hossain et al. (2015) argued that organizations that incorporate full practices of OHS are often prone to encourage and motivate their people to perform as per the rules and standards of OHS. The management is responsible for encouraging employees and their participation in OHS management (Mousa & Othman, 2020). Employees' participation in OHS practices increases organizational Sustainable OHS performance and effectiveness. Further, this has also been supported by Mohammadfam et al. (2016), who professed that the adequate level of safety management impacts the Sustainable OHS performance in the organization and also offers satisfactory results of safety management. Hence, the adoption of OHS policies and practices creates a significant impact on Sustainable OHS performance if the variables mentioned above are used as measures. Based on the review of the literature, this study forwards the following hypotheses and proposes the research model shown in Figure 1.

H6: *OHS adoption has a significantly positive effect on Sustainable OHS performance.*

Conceptual framework: The theoretic foundations of the conceptual framework of this research remain in Stimulus-Organism-Response (SOR) theory. Where external pressure (regulatory, mimetic, competitive, and social) serves as the stimuli that force top management of HEIs for the adoption of OHS practices (organism) that eventually leads to sustainable OHS performance (response). Based on the hypotheses the conceptual framework is presented in Figure 1.

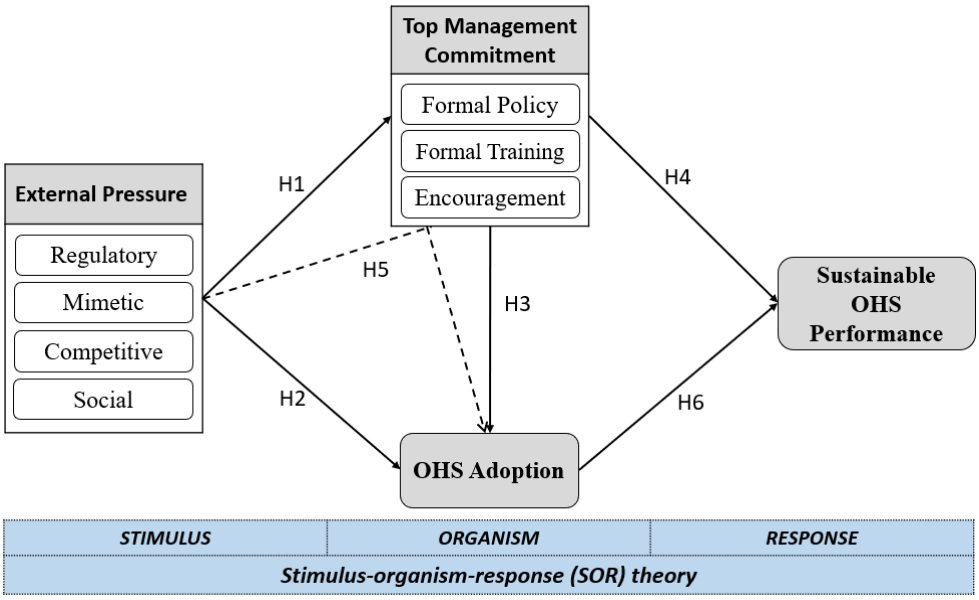

Figure 1. Conceptual framework

3. Research methodology

Population and sampling: This study employed a positivist research paradigm employing a survey questionnaires strategy. For exploratory and descriptive research, the survey strategy is most appropriate and commonly used (Saunders et al., 2016). The population of this study included 196 recognized HEIs as per the Higher Education Commission (HEC) of Pakistan's website (Habib et al., 2021). In this study, the top 23 HEIs with a score greater than 50 on HEC's latest ranking (2015) in the general category were chosen to collect data.

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The authors extracted the email addresses of 920 participants (40 from each university) from the top 23 HEIs. The participants included both administrative and academic staff members. The participants were approached by email and were requested to fill out the online survey created in QuestionPro.

Saunders et al. (2016) guidelines on questionnaire development and validity were followed. The questionnaire did not require any personal information of the participants and their participation was made voluntary. The questionnaire contained nine latent variables with 33 measured variables/items/indicators apart from the demographic profile. For minimum sample size, Hair Jr et al. (2014) recommended 5:1 respondents to item ratio for multivariate analyses. Following this rule, the minimum sample size should be 165 (5x33) for this study. The measurement scale for OHS sustainable performance was adapted from Lingard et al. (2011) and Lee and Ha-Brookshire (2017) whereas, scales for external pressure, management commitment, and OHS adoption were adopted from Hussain and Shah (2015). To measure participants' response for each statement, a five-point Likert scale was utilized with 1 indicating strongly disagree' and 5 indicating strongly agree. Three professors of operations management having a background in OHS were requested to review the questionnaire. After face validity, a pilot test was conducted with 30 participants to refine and finalize the questionnaire. Once finalized, the link for the self-administered questionnaire was emailed to 920 participants across the top 23 selected HEIs.

Data collection: A total of 920 questionnaires was circulated to the respondents from March to June 2021. Out of which 412 were returned, producing a response rate of 45%. After applying the filtration and data screening process,106 questionnaires were dropped from the analysis because they were incomplete, partially filled, or attempted in an unengaged manner. Only 306 responses were maintained for final analysis.

Data Analysis: The data were analysed in Smart PLS3 software that utilizes PLS-SEM (Partial Least Square-Structural Equation Modelling). As per guidelines by Hair Jr et al. (2014), the research model was analysed in two phases. In the first phase, the measurement model was analysed to establish the validity and reliability of the model. In the second phase, the structural/path model was assessed for hypotheses testing. The reliability of the measurement model (both in first and second-order) was ensured with relatively higher factor loadings and composite reliability scores (>0.7). Whereas validity of the model at both levels was ensured through discriminant and convergent validity tests. After validating the measurement model and ensuring its reliability, hypotheses testing was performed for the structural model. The two steps data analysis procedure was adopted in many previous studies such as Syed et al. (2019), Syed et al. (2020), and Eltayeb and Ahmad (2021).

4. Results

Descriptive statistics: Among the top 23 universities of Pakistan, 18 (78%) were public universities. Only 5 (22%) private HEIs could secure a place among the top 23. In the socio-demographic profile of respondents, most were male (83%) which is consistent with the gender composition of the population in the HEIs. Most respondents (around 80%) were aged between 26 and 45, whereas around 10% were between 18 and 25 years and 10% were above 45 years. Concerning education level, 56% of respondents held a master's degree, 34% had a Ph.D. degree and 10 % had a bachelor's degree. Based on the nature of the study and the ability of the participants to respond to this survey, employees on lower-level jobs which require below bachelors' qualification were not included in the survey. Most respondents (72%) had job experience between 6 and 20 years, 20% had 5 years or less experience, 8% had over 20 years of experience. Around 54% of participants belonged to academia while 46% were administrative staff at middle and senior-level positions.

Measurement model assessment: This research contains a higher-order measurement model composed of four constructs including external pressure, top management commitment, OHS adoption, and Sustainable OHS performance. Among them, external pressure and top management commitment are second-order constructs having four and three dimensions, respectively (see Figure 1). According to Hair Jr et al. (2014), the validity and

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reliability of second-order constructs should be established once the validity and reliability of first-order variables (latent) have been established. In the first order, the model contains nine latent variables including regulatory pressure, mimetic pressure, competitive pressure, social pressure, formal policy, formal training, encouragement, OHS adoption, and Sustainable OHS performance (See Figure 1). Accordingly, the reliability and validity of the measurement model were ensured, as detailed below.

Table 1. Reliability and convergent validity

Variables & Indicators	Factor Loading	CR	AVE
Regulatory Pressure		**0.889**	**0.728**
Rgltry1	0.851		
Rgltry3	0.793		
Rgltry4	0.913		
Mimetic Pressure		**0.930**	**0.816**
Mimtic1	0.873		
Mimtic2	0.900		
Mimtic3	0.936		
Competitive Pressure		**0.900**	**0.751**
Compt1	0.891		
Compt2	0.852		
Compt3	0.857		
Social Pressure		**0.840**	**0.638**
Social2	0.740		
Social4	0.880		
Social5	0.770		
Encouragement			
Encrg2	0.918	**0.939**	**0.837**
Encrg3	0.909		
Encrg4	0.917		
Formal Policy		**0.878**	**0.643**
Policy1	0.775		
Policy3	0.814		
Policy4	0.811		
Policy6	0.807		
Formal Training		**0.955**	**0.841**
Train1	0.925		
Train2	0.896		
Train3	0.952		
Train4	0.893		
OHS Adoption		**0.934**	**0.781**
Adopt1	0.832		
Adopt2	0.921		
Adopt3	0.881		
Adopt4	0.898		
OHS Sustainability Performance		**0.933**	**0.698**
OHSP1	0.886		
OHSP3	0.846		
OHSP4	0.853		
OHSP5	0.738		
OHSP6	0.781		
OHSP7	0.901		

A factor loadings criterion of greater than 0.70 was set to ascertain the reliability of the measurement model. The indicators that did not fulfil the criterion were eliminated from further analysis. Each indicator was loaded to its respective latent variable fairly above 0.70, as shown in Table 1 it ranges between 0.738 and 0.952. Likewise, above 0.70 scores of composite reliability (ranging between 0.840 and 0.955) were achieved which further

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reinforces the reliability of the measurement model. As per Hair Jr et al. (2014) guidelines, a measurement model must fulfil three conditions to claim the convergent validity: (i) AVE > 0.5; (ii) CR > 0.7; and (iii) CR > AVE. As shown in Table 1, the model fulfilled all three criteria to establish convergent validity.

By employing Fornell and Larcker (1981) criterion discriminant validity of the model was established. This criterion compares √AVE with the squared correlation coefficients. The measurement model's discriminant validity was established as all √AVE values alongside the diagonal were fairly greater than the corresponding squared of correlation coefficients of the latent variables vertically and horizontally (See Table 2).

Table 2. Discriminant validity of 1st order variables

Latent Variables	1	2	3	4	5	6	7	8	9
1. Competitive Pressure	**0.867**								
2. Encouragement	0.402	**0.915**							
3. Mimetic Pressure	0.523	0.357	**0.903**						
4. OHS Adoption	0.605	0.312	0.350	**0.884**					
5. Sustainable OHS performance	0.488	0.433	0.436	0.714	**0.836**				
6. Formal Policy	0.474	0.344	0.283	0.664	0.523	**0.802**			
7. Regulatory Pressure	0.496	0.471	0.609	0.432	0.484	0.408	**0.853**		
8. Social Pressure	0.769	0.333	0.529	0.473	0.340	0.412	0.486	**0.799**	
9. Formal Training	0.337	0.608	0.295	0.342	0.353	0.561	0.386	0.282	**0.917**

N.B: The shaded bold values along the diagonal are the square root of AVE that should be higher horizontally and vertically.

Assessment of 2nd order construct: The research model contains two-second order constructs, including external pressure and top management commitment. External pressure has four dimensions, namely regulatory pressure, mimetic pressure, competitive pressure, and social pressure. Similarly, top management commitment was measured through formal policy, formal training, and encouragement (see Figure 1). The validity and reliability of second-order constructs are provided in Table 3, and discriminant validity is provided in Table 4. As shown in the respective tables, the factor loadings of all the latent variables are higher than 0.70 thresholds for each construct and range between 0.793 and 0.909. The composite reliability values of 0.926 and 0.923 show that both measurement scales are sufficiently reliable. Similarly, AVE values for both constructs are above the threshold of 0.5, and all CR values are greater than AVE. Therefore, the convergent validity of both constructs remains intact. As shown in Table 4, the criteria for discriminant validity were also satisfied that established the reliability and validity of the 2nd order measurement model.

Table 3. Second-order construct validity and reliability

Constructs & Indicators	Loading	T-value	CR	AVE
External Pressure				
Competitive Pressure	0.831	37.55	**0.926**	**0.513**
Mimetic Pressure	0.860	41.21		
Regulatory Pressure	0.837	28.98		
Social Pressure	0.815	32.25		
Top Management Commitment				
Formal Training	0.909	69.50	**0.923**	**0.525**
Formal Encouragement	0.769	20.82		
Formal Policy	0.773	24.81		

Note: T-value = 1.96 (P<0.05)

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Table 4. Discriminant validity of 2nd order constructs

	External Pressure	Management Commitment	OHS Adoption	Sustainable OHS performance
External Pressure	**0.716**			
Management Commitment	0.533	**0.725**		
OHS Adoption	0.558	0.526	**0.884**	
Sustainable OHS performance	0.529	0.519	0.614	**0.836**

N.B: The shaded bold values along the diagonal are the square root of AVE that should be higher horizontally and vertically

Structural model assessment: After establishing the reliability and validity of the measurement model, the structural model was analysed for testing the hypotheses and research model. To evaluate the explanatory power of the model and assess the significance and relevance of the hypotheses, the coefficient of determination (R^2) and path coefficients (β) were utilized. Hair Jr et al. (2014) provided guidelines on coefficient of determination: $R^2 > 0.67$ = substantial; $R^2 > 0.33$ = moderate; $R^2 > 0.10$ = weak; and $R^2 < 0.10$ = no explanatory power or it is by chance. In addition, all the values above 0.10 must be statistically significant.

The results of this study have demonstrated a sufficient statistical significance of R^2 values of exogenous variables. The R^2 value of management commitment is 0.284 (t=5.158; p= 0.000), which is predicted by external pressure. Similarly, OHS adoption has a value of 0.384 (t=7.239; p= 0.000) predicted by external pressure and management commitment, whereas Sustainable OHS performance was predicted by external pressure, management commitment, and OHS adoption by the amount of 0.538 (t=11.108; p= 0.000). All the explanatory power values remained statistically significant. Overall, all three endogenous constructs had moderate explanatory power, indicating a parsimonious research model.

The model was also analysed for path coefficients. Table 5 shows the results of the path coefficient analysis. Hypotheses 1-5 show a direct effect and hypothesis 6 shows an indirect effect. The indirect effect was analysed using top management commitment as a mediator. All the hypothesized paths of the study were statistically significant with a t-value of 1.96 and a p-value below 0.05. The findings indicated that both direct and indirect relationships were statistically significant, hence, supporting all six hypotheses (See Table 5). An assessment of mediator analysis is provided in the following section.

Table 5. Hypotheses testing and path coefficient assessment

Hypothesis		**β**	**T-value**	**P-value**	**Decision**
H1	External Pressure -> Management Commitment	0.533	10.071	0.000	Supported
H2	External Pressure -> OHS Adoption	0.387	5.998	0.000	Supported
H3	Management Commitment -> OHS Adoption	0.320	4.382	0.000	Supported
H4	Management Commitment -> Sustainable OHS performance	0.199	3.775	0.000	Supported
H6	OHS Adoption -> Sustainable OHS performance	0.609	10.530	0.000	Supported
Indirect Effects (Through Mediator)					
H5	External Pressure -> Management Commitment -> OHS Adoption	0.171	3.021**	0.001	Supported

N.B.: t-value = 1.96 (P<0.05)

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Mediator Analysis: Apart from one-on-one causal effects, the proposed model contained a mediatory relationship of top management commitment between external pressure and OHS adoption. Both direct and indirect effects between external pressure and OHS adoption were statistically significant, as shown in Table 5. However, structural equation modelling requires assessing the existence and amount of mediation as well. To examine the existence and amount of mediation, Hair Jr et al. (2014) suggested following a three-step process given in Table 6.

Following the guidelines, the model was assessed for mediation analysis, and the findings showed that top management commitment partially mediates the relationship between external pressure and OHS adoption. The results confirmed the existence of top management commitment as a mediator between external pressure and OHS adoption. Concerning the amount of mediation, Variance Accounted For (VAF) analysis was conducted as per Hair Jr et al. (2014) guidelines. The results showed that top management commitment partially mediates (30.47%) the relationship between external pressure and OHS adoption.

Table 6. Mediation analysis of management commitment

Paths	β	T - value	P-value	Result	Decision
EP -> ADOPT (Direct- Without Mediator)	0.558	11.706	0.000	Significant.	Further analysis can be performed.
EP -> ADOPT (Direct- With Mediator EO)	0.389	5.754	0.00	The direct effect decreased and remained significant.	Mediation Exists
EP -> MC (Direct- With Mediator EO)	0.533	10.071	0.00	The indirect effect is significant.	
MC -> ADOPT (Direct- With Mediator EO)	0.320	4.382	0.00		
Variance Accounted For (VAF) =				**30.47%**	**Partial Mediation**

VAF= (IV- Med x Med-DV)/ (IV- Med x Med-DV + IV-DV)
EP= External Pressure; ADOPT= OHS Adoption; MC= Management Commitment

5. Discussion, implications, limitations, and future research directions

The objective of this research was to identify the antecedents and consequences of OHS adoption in HEIs of Pakistan. The empirical evidence has confirmed that external pressure and top management commitment are the two major antecedents of OHS adoption, whereas, and Sustainable OHS performance is the consequence. In addition to a significant causal effect, top management commitment mediates the relationship between external pressure and OHS adoption. This implies that external pressure alone may not be a sufficient condition for OHS adoption. Rather, it is more effective when the top management is committed. The top management commitment is reflected through practical measures such as the formation and implementation of formal OHS policies, companywide OHS training programs, and encouraging the stakeholders to adopt OHS policies and practices. The successful adoption of OHS practices leads to better Sustainable OHS performance that eventually helps in long-term survival (Ahmad et al., 2019). The findings are consistent with the existing OHS literature and suggest the parsimony of the proposed model, as discussed below.

A significant positive impact of external pressure and top management commitment on OHS adoption was supported by Hossain et al. (2015) in an empirical study on Bangladeshi universities. Whereas, external pressure reflected by regulatory, mimetic, competitive, and social pressures serves as a stimulus for universities' intention

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to adopt OHS measures. Hossain et al. (2015) have shown that external pressure in general and top management commitment, in particular, have a positive influence on OHS adoption in Bangladeshi universities. Similarly, Wu et al. (2008) conducted an empirical study on four universities in Taiwan and found a positive impact of OHS adoption and Sustainable OHS performance. To some extent, our results are contrary to the existing evidence provided by Hossain et al. (2015). For instance, mimetic and competitive pressures had an insignificant impact on OHS adoption in Bangladeshi private universities. Whereas, in our studies, all four types of pressures have shown a positive impact on OHS adoption. The significant positive effect of top management commitment on OHS adoption is also well supported in numerous studies, see, for instance, Laberge et al. (2014); Nielsen (2014). The findings of this study have important theoretical and practical implications, as discussed below.

Implications: Concerning theoretical implications, this study proposed and validated the mediating role of top management commitment between external pressures and OHS adoption. Existing OSH literature on higher education institutions or universities is mainly focused on the causal relationship (Hossain et al., 2015; Wu et al., 2008). Top management commitment has been widely perceived as an intervening variable between various organizational aspects in numerous other studies, see, for example, Čater et al. (2018); Michaelis et al. (2009); Tzempelikos (2015). However, its mediating role in OHS research is unexplored despite the existence of theoretical and literature support. Besides, this study extends the existing research on OHS adoption to the consequences, whereas previous studies primarily focused on the antecedents. Thus, an integrative model of OHS adoption proposed and empirically validated in this study significantly contributes to the body of knowledge on OHS adoption.

In addition, the literature on higher education institutions of Pakistan, in general, is quite a handful, it is almost unexplored from the safety and health perspective (Khalid & Tadesse, 2021). Accordingly, this study contributes to the body of knowledge by providing the first empirical evidence on OHS practices in HEIs of Pakistan.

The practical implications of this study target various stakeholders mainly including HEIs, the government, the regulatory authorities (HEC), and accreditation bodies. Among the external pressures, the regulatory pressure by the government, regulatory authorities, and accreditation bodies is the most effective factor in OHS adoption (Hossain et al., 2015). Considering the existing state OHS of in HEIs, which has long been neglected, both central and provincial governments, in general, and HEC in particular need to pay attention and accordingly device appropriate OHS policies and standards in addition to increasing the fund allocation for the adoption of OHS practices.

On the other hand, the empirical results entail important practical implications for the top management of the HEIs. The top management commitment plays a key role in OHS adoption. The management needs to realize the importance of a safer environment for the student and staff not only to abide by the regulations but to have a truly safe work environment and to get a competitive advantage. It is the top management that can inculcate OHS adoption in true essence. As stated earlier and the results showed, top management commitment mediates the influence of external pressure on OHS adoption. This implies that external pressure alone may not be sufficient conditions for OHS adoption in HEIs unless the management is not committed. Hence, management needs to play a proactive role and exhibit commitment through practical measures. Developing an OHS plan along with the guidelines, disseminating them to all the stakeholders, providing training, conducting audits, and rewarding the best performers would be some of the effective ways of creating an organizational culture for safety practices. OHS adoption and practice will enhance the image of the HEIs that eventually brings numerous rewards, including the financial rewards for private institutions and increased funding for public institutions (Khan, 1991). in recent years, the major focus of the government funding has been on quality of education, research, and scholarships (Ramzan et al., 2012), while safety and health issues, as well as infrastructure development, have been relatively neglected areas. Thus, the management should conceive the external pressure (regulatory, competitive, memetic, and social) as an opportunity rather than a threat and capitalize on them.

Limitations and future research direction: This study has certain limitations that open new avenues for future research. First, this study included only the top 23 HEIs from the list of 196 HEC recognized HEIs. This may not be a representative sample as most top HEIs are located in mainstream cities. HEIs of remote and less developed areas may have different socio-economic, political, and cultural factors that may affect the opinions of the respondents. Thus, future research may apply other sampling methods to represent the population better. Secondly, this study did not include other academic institutions such as vocational and professional institutions. Future research may focus on examining the OHS practices in these institutions and conduct a comparative analysis with the results of this study.

6. Conclusion

The objective of this research was to identify the antecedents and consequences of OHS adoption in HEIs of Pakistan. To achieve this objective, data were collected from 306 employees of the top 23 universities of Pakistan through a self-administered survey questionnaire. The data were analysed using Partial Least Square Structural Equation Modelling in Smart PLS3. The findings have empirically shown that top management commitment and external pressure are the core antecedents of OHS adoption in HEIs of Pakistan. Furthermore, it suggests that external pressure alone may not be sufficient conditions for these institutions to adopt OHS practices unless top management is committed to implementing the policies. The top management commitment is primarily reflected by devising formal OSH policies and implementing them. The effective implementation entails formal OSH training programs for employees. It further suggests that formal policies and training programs should be accompanied by encouragement from the top management in the form of a certain reward system for adherents and best performers. Once in place, OHS adoption will enhance organizational Sustainable OHS performance, as the empirical findings of this study have indicated. Overall, the findings of this study are aligned with the existing research conducted in other geographical contexts and for other forms of organizations.

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ENTREPRENEURIAL ATTITUDE OF STUDENTS - COMPARATIVE STUDY BETWEEN CHINA AND POLAND*

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Abstract. One of the crucial topics in the field of entrepreneurship is analysis of having a specific entrepreneurial mindset. In this paper Authors investigate perception of chosen characteristics of entrepreneurial person in China and Poland. Consequently, the primary aim of this paper is to discover differences and similarities of view regarding the characteristics of entrepreneurial person in China and Poland. The secondary aim is to examine the intensions to start a company and verify whether the students in analysed countries regard themselves as entrepreneurial persons. The sample size of described pilot study is 226, whereas 124 questionnaires were accepted in Poland and 102 in China. Questionnaire based survey was conducted from June till September 2016. To quantize the results of the questionnaire, the AHP (Analytic Hierarchy Process) model proposed by Saaty was used. As top three features that characterise an entrepreneurial person students from both analysed countries indicated readiness to bear responsibility; diligence, enthusiasm and conscientiousness in action and resourcefulness and organising. This study has an exploratory character but results clearly show that students from China less often characterize themselves as persons having an entrepreneurial attitude or intentions.

Keywords: entrepreneurship; entrepreneurial attitude; entrepreneurial intention; China; Poland

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1. Introduction

In both analysed countries, China and Poland, entrepreneurship is one of the most popular research areas. Entrepreneurship has many forms and may by analysed in various aspects, but in this paper focus is placed on entrepreneurial attitude of students, taking into consideration cultural differences between analysed countries.
Young people during their education acquire different skills, one of them are entrepreneurial competences. Do they, thinking about their professional career, plan to establish an own company? Do they believe that during the whole process of education they have the possibility to learn how to be a successful entrepreneur? What are the characteristics of entrepreneurial person? Are there any cultural differences? Those questions gave an impetus to conduct research among students from different countries such as Poland, Germany, Romania, China, Turkey, Georgia and Sri Lanka. In this paper the emphasis is placed on the presentation of research results from two countries: Poland (European culture, HDI 0.834) and China (Asian culture, HDI 0.727). The target group of the survey was constituted by young people, students, who will soon start or recently started to shape their professional development.

The primary aim of the paper is to discover differences and similarities of view regarding the characteristics of entrepreneurial person in China and Poland. The secondary aim is to examine the intensions to start a company and verify whether the students in analysed countries regard themselves as entrepreneurial persons. The paper is organised as follows. Section 2 is devoted to the explanation of phenomenon of entrepreneurship with special focus on entrepreneurial spirit and consciousness. Section 3 presents the methodology and characteristics of the sample. Section 4 shows the main results and discussion of findings, and lastly, Section 5 reflects conclusions together with limitations of the study and future research directions.

2. Literature review

If the 19th century is the era of industrial revolution, the 20th century is the era of management science, then the 21st century will be the entrepreneurial era of knowledge-based economy. In this era, the global industrial structure is facing a complete deconstruction and reorganization movement. The entrepreneurial spirit is the most important driving force for this reorganization. Drucker (1995) pointed out that the knowledge economy was shifting from a big company-dominated economy to an entrepreneurial economy. The so-called "entrepreneurial economy" is based on entrepreneurship and innovation, with the new "entrepreneurial company" as the main way to achieve the individual value of entrepreneurs in the micro sense and to promote the country's economic development in the macro sense. *The Our Competitive Future: Building the Knowledge Driven Economy* (DTI, 1998), published by the British government, provides the following statement on why the spirit of entrepreneurship is advocated: "Entrepreneurship in innovation is the focus of innovative economic growth that increases productivity and creates job opportunity". Drucker expects the 21st century to be the era of entrepreneurial economy and society. Innovation and entrepreneurship will become the normal behaviour of knowledge economy society, whether it is government, industry, or academia, they have shown more and more intense interest and concern on entrepreneurial phenomena and entrepreneurial theory. Especially in the past ten years, the phenomenon of entrepreneurship has aroused widespread concern, it also attracts many scholars and entrepreneurs in this field to do theoretical and practical exploration continuously.

Entrepreneurship is the further deepening of students' academic study. The healthy development of career choice is an attempt for students to take the initiative to participate in social competition. As a new trend of students' modern career choice, its significance is far beyond its form. The world has entered the era of achieving success with wisdom, achieving self-realization by entrepreneurship. Self-employment is one of the best choices for students facing the current employment pressure, shaping their ideal life, but also the best way to reflect and display their creativity, which might be a key success factor of entrepreneurial venture (Hirschmann, Hartley and Roth, 2020). Young and enthusiastic students possessing professional quality are excited by such a possibility to

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conduct an own company and become an entrepreneur. It is worth noting that creativity is also one of crucial competencies related to social entrepreneurship (along with i. e. empathy, risk taking or recognition os opportunities) (Saxena, 2019). Entrepreneurship has become a trend of young people, and entrepreneurship is also a process from awareness to practice. It carries the ideals of young people, and also carries the responsibility and commitment of young people. Due to this fact entrepreneurial education is crucial. One of the aims of such education is promoting self-employment, innovativeness and creativity (Kozlinska, 2011; Kajrunajtys and Grodek-Szostak, 2013). Raising awareness of students about different types and forms of entrepreneurial behaviour along with development of soft skills such as leadership, risk taking and risk tolerance or teamwork management constitute part of entrepreneurial education promotion (Grodek-Szostak, Jando and Kajrunajtys 2017; Jando, 2018).

Drucker pointed out that the entrepreneurial economy is a significant part of the national economy and one of the important ways to provide employment opportunities and create value. The 21st century is not only an era more focusing on personal development than any other time before, but also offers the best opportunity for young people to start business. Starting their own business for students is not only an attempt, but also a trend. At present, both Chinese and Polish economies are facing further development problems, and students are the main promoters of future economic development. This paper will compare and contrast the different attitudes towards entrepreneurial awareness and entrepreneurial spirit between Chinese and Polish students. The results might benefit both parties. They can learn from each other. More importantly, it not only promotes students' personal growth, but is also beneficial to the progress of society as a whole.

Entrepreneurship is an multidimensional aspect and research interest and objective that cuts across various scientific fields. Siropolis (1989) argues that entrepreneurship refers to creating a new business by an entrepreneur based on his own ideas and hard work. In the "Global Entrepreneurship Monitoring" project jointly organized by The London Business School and the Babson School of Business in the United States, the entrepreneurial concept is defined as a process relying on individuals, organizations or an existing business to create a new business or re-expand existing enterprises.

Chinese scholar Zhang (2011) argued that some individuals bear some necessary risks and engage in business activities using existing capability and resources in order to obtain a certain profit, even though they do not even establish a business, which can also be defined as "quasi-business". That is to say, it can be defined as the activity of using opportunities and resources to convert them into value and at the same time assuming a certain risk. Students' business activities in many colleges and universities can be included in this range. Ge Jianxin (2004) in the book "Entrepreneurship" defined entrepreneurship in a narrow sense as certain economic activities with individual characteristics which combine a variety of economic elements with innovative methods in order to create a new business and to maximize profits for the fundamental purpose. In this context entrepreneurial activities are relate to bearing a certain risk.

According to the Polish literature entrepreneurship is related to innovativeness, creativity, problem solving, risk management, seizing opportunities and others. It can be also described as an attitude or as a process of setting up and conducting an enterprise (Misiak-Kwit, 2020). Bieniok (2005) presented entrepreneurship as a set of features such as foresight, determinedness in achieving goals, resourcefulness, ingenuity, self-reliance or ability to deal with difficult situations. Person which might be described as entrepreneurial is characterized by having and skilfully using an initiative. Initiative, in turn, is understood as creation of intentions and an attempt to implement them (Kotarbiński, 1982).

From the long-term economic growth, innovation and technological progress play an important role, while entrepreneurs play the role of innovative micro-subject. According to the Encyclopedia Americana, the term 'entrepreneur' was coined by the Frenchman Richard Cantillon (1755), referring to the expeditions made by the

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generals from Central Europe in the fifteenth century, by which they gained profit. The basic characteristic of these people is to take risks. After the 20th century, many Western scholars began to summarize entrepreneurship as some characteristics an entrepreneur should have. Among them, Schumpeter (1934) is the first who systematically expounded the core of the entrepreneurial spirit. Schumpeter pointed out that innovation is one of the cores of entrepreneurial spirit in the 'economic development theory'. Entrepreneur is the enterprise development promoter, but also might be the destroyer of creativity, which reflected the essence and connotation of the entrepreneurial spirit. Voorhis (1980) argued that entrepreneurs have the following five qualities: preferring competition, being the implementer rather than the planner, tending to control their own destiny, having an independent character, moderate risk preference.

Individuals display behaviours like innovativeness, taking risks and the initiative to take action, then he or she has entrepreneurial spirit. Sharma & Chrisman (1999) summarized the opinions of Gartner (1989), and Stopford & Baden-Fuller (1994), and defined it as: entrepreneurial spirit encompasses new organizations both within and outside the existing organization, updating and innovative activities. Sharma & Chrisman distinguish the entrepreneurial spirit from the concept of the system as follows: the individual entrepreneurial spirit and the organization's entrepreneurial spirit.

Zhuang Ziyin (2010) stressed that the core of entrepreneurial spirit is the continuous technological innovation and imitation, the micro-organizational mechanism in the long-term economic growth, the driving force of long-term economic development. Entrepreneurs are also the bearers of risks. His research shows that business with strong entrepreneurial spirit has a higher economic growth rate and per capita income than the one with weak entrepreneurial spirit. Among the many expositions on the concept of entrepreneurial awareness, the definition of Peng Gang (1995) is the most widely cited. He argued that entrepreneurial awareness refers to the individual tendency which motivates entrepreneurs in entrepreneurial practice, including motivations for entrepreneurship, the need, ideals, interests, beliefs and other elements. At the same time, he believed that entrepreneurial consciousness displayed the social nature of the entrepreneurial qualities. This awareness directed the attitude and behaviour of entrepreneurs in the entrepreneurial activities. It is not only an important part of entrepreneurial quality, but also a strong internal driving force for people who engage in entrepreneurial activities.

Having an entrepreneurial intention and spirit is prior to the decision of organizing a business venture (Engle et al., 2010). Polish scholars point out that entrepreneurial intention has an individual character (Arent and Walczyna 2018) which results from external and internal determinants. Internal determinants are linked with features and attitudes of potential entrepreneur. External determinants, on the other hand, occur in the environment and can be assessed as push or pull factors.

Intentions, according to the theory of planned behaviour, depend on three independent elements (Ajzen 1991, Linan and Chen 2009, Urban, Chantson, 2019). First factor is attitude toward behaviour together with positive or negative personal assessment of certain behaviour (Kolvereid, 1996). Perceived behavioural control is understand as a level of difficulty of managing a behaviour. Third determinant, subjective norms, examine perception of received help from others (i.e. family, friends).

The theory of entrepreneurial intentionality describes intention as an intrinsic factor that not only supports the entrepreneurial effort but also shapes the resources in order to formulate appropriate entrepreneurial competence (Mishra and Zachary, 2015).

Individual entrepreneurial awareness varies from person to person and varies from place to place. Some scholars argue that the measurement of entrepreneurial awareness requires a continuous measurement rather than an absolute measurement (Thompson, 2009). Chen, Greene and Crick, in 1998, designed a five-topic questionnaire. The five questions are "whether interested in creating new businesses", "thoughts on the creation of new

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businesses", "the preparation for the new business", "the possibility of making best effort to start a new business" and "when will a new business start". A five-point score was used with a Colombian alpha coefficient of 0.92, which was used as a good calibration and was also cited by many researchers. Chinese scholars represented by Zhang (2008) made a preliminary survey on the college students' entrepreneurial awareness. They designed a questionnaire for contemporary college students, analysed the data collected from 867 students, got findings about the contributing factors of entrepreneurial consciousness of college students. The total scale of the Colombian alpha coefficient was 0.9240.

Students are particularly relevant research group. First of all recognition of their intentions might become a fundamental basis to develop activities under entrepreneurial education. On the other hand, this group will soon enter a labour market, where a new venture might be an alternative to the full-time employment (Piróg, 2013). Regardless the option, soft skills along with entrepreneurial attitude are desirable from the point of view of knowledge-based economy and modern labour market (Zioło 2008; Wronowska 2016).

After the relevant literature analysis, it can be found that more research on entrepreneurial spirit and organizational innovation focused on quantitative study and theoretical analysis. At the same time, there is a lack of in-depth study of students' entrepreneurial awareness and there are few articles on the international comparison and contrast of students' entrepreneurial awareness. According to the authors, different cultural backgrounds, different economic development status, different educational ideas affect young people's world viewpoint and entrepreneurial attitude. A comparison and analysis of the similarities and differences of students' entrepreneurial awareness between Poland (European country) and China (Asian country) is not only a theoretical supplement and addition to the existing literature, but also has a strong practical significance.

3. Materials and Methods

The aim of the conducted pilot study was to realize the attitude of young people in setting up an own company in different countries. In this paper, the researchers selected the Polish and Chinese university students as the objects of study for comparative analysis. It's based on the following reasons: First, after the victory of World War II and before economic transformation, China and Poland were deeply affected by the former Soviet Union, the political and economic systems of the two countries were very much similar. Second, although China's population is much larger than the size of Poland, the Human Development Index (HDI) of the two countries was very close (Table 1). Third, in the 1980s, both countries experienced a reform, both have achieved remarkable results, especially small and medium enterprises developed very well under government's support and encouragement. Fourth, since 1990s, both countries have attached great importance to the development and quality of higher education, the number of students in the school rise steadily. Both countries also emphasize the cultivation of applied talents. The comparison of basic indicators in China and Poland is presented in Table 1.

Table 1. Comparison of the basic background between China and Poland

Description	China	Poland
Per capita GDP (USD, 2018)	9,770.8	15,424.0
Human Development Index (2017)	0.7	0.8
Start-up procedures to register a business (number) (2018)	4	5
School enrolment, tertiary (% gross)	51% (2018)	68% (2017)

Source: World Bank Database, https://data.worldbank.org/ [03.10.2019].

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Taking into consideration research group, it is worth to indicate the tertiary enrolment rate in analysed countries. In Poland 68% of the population has tertiary education, while in China 51%, as shown in Table 1. Also GDP per capita is higher in Poland then in China. Looking at the procedures to register a business, the number of those is slightly lower in China then in Poland. From this point of view, it may be easier for Chinese students to establish an own company.

The authors share the opinion that it is worth to notice differences and similarities between Asian and European countries, which is crucial concerning future cooperation between those countries. To discover them, authors have compared the research results from China and Poland. Questionnaire based survey was conducted from June till September 2016. Microsoft excel and YaAhp 4.0 were used as the analysis tools. A preliminary data and a recheck was carried out in order to ensure that there were no missing values. Pivot tables were used to compare the responses from both countries. Tables are described based on the aggregate mean values for two countries. The study was conducted among young people, students, who will soon start or recently started to shape their professional development. The characteristics of the surveyed group is presented in the Table 2.

Table 2. Characteristics of the surveyed group participating in research in China and Poland

	China	**Poland**
Gender		
Male	17%	25%
Female	83%	75%
Place of residence		
Rural areas	37%	27%
Urban areas	63%	73%
Year of birth		
1989 or earlier	4%	2%
1990	2%	4%
1991	6%	0%
1992	15%	7%
1993	15%	21%
1994	6%	32%
1995	4%	32%
1996 or later	48%	2%

Source: own collaboration based on the conducted research

Altogether, the sample size of this pilot study was 226, whereas 124 questionnaires were accepted in Poland (out of 133) and 102 in China (out of 103). During sample selection multistage mixed sampling method was used. A simple random sample was selected from the students of Guangdong University of Foreign Studies and Ningbo University from China and University of Szczecin from Poland to represent the young people of each country.

In both countries the surveyed group was mainly represented by women, 75% in Poland and 83% in China. While analysing the data shown in Table 2, it can be also noted that persons living in urban areas mainly participated in the study – 73% in Poland and 63% in China. The biggest difference was the age – the people who took part in the survey in China were statistically younger than in Poland. The authors believe that the age difference has no greater impact on the differences in answers as all respondents belong to the group of young students.

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3.1 Model Setting

In this paper, to quantize the results of the questionnaire, the AHP (Analytic Hierarchy Process) model proposed by Saaty (1970), an American operational research scientist, was used. It is a simple method to make decisions on some more complex and fuzzy problems, especially for those problems that are difficult to be fully quantitatively analysed. The specific steps are as follows:

Step 1. Establish multi-level hierarchical structure of evaluation indexes. In this paper Indicators come from the answers to the questions selected in the questionnaire, so there is only a secondary structure.

Step 2. Establish a pair comparison matrix.

Saaty suggested that the method of pairwise comparison matrix can be established by comparing two factors. In other words, the sum of two factors at a time is used to express the ratio of the influence of the sum to the pair, and all the comparison results are represented by judgment matrix. As for how to determine the value, Saaty and others suggest using the numbers 1 to 9 and their reciprocal as the scale. Table 3 lists the meanings of 1-9 scale.

Table 3. 1-9 scale meaning

Scale	Meaning
1	Indicates that the two factors are of the same importance
3	The former is slightly more important than the latter
5	The former is more important than the latter
7	The former is much more important than the latter
9	The former is extremely more important than the latter
2, 4, 6, 8	Represents the intermediate value of the above adjacent judgments
Reciprocal	If the ratio of factor i to factor j is b_{ij}, then the ratio of factor j to factor i is $b_{ij} = 1/b_{ji}$

Source: T. L. Saaty, Analytic Hierarchy Process, Encyclopedia of Biostatistics, 1970.

Calculation of the weight vector of the hierarchical total sorting: first, calculate the weight vector Wi of each element in the next layer to each element in the upper layer; second, arrange the weight vector of each element in the lower layer to each element in the upper layer in the following table form by columns, assuming that there are m elements $A_1, A_2, \cdots, A_m$ in the upper layer A, and the weight vector of the hierarchical total sorting are $a_1, a_2, \cdots, a_m$, and there are n elements $B_1, B_2, \cdots, B_n$ in the lower layer, then the column vector of the single sorting weight vector of the elements is b_{ij}, as shown in Table 4.

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Table 4. Calculation method of weight vector and related test value

Level / Inspection value	$A_1 \quad A_2 \quad \cdots \quad A_m$ $a_1 \quad a_2 \quad \cdots \quad a_m$	B *Layer total sort weight (weight vector, column vector)*
B_1 B_2 $\vdots$ B_n	$b_{11} \quad b_{12} \quad \cdots \quad b_{1m}$ $b_{12} \quad b_{22} \quad \cdots \quad b_{2m}$ $\vdots \quad \vdots \quad \vdots \quad \vdots$ $b_{n1} \quad b_{n2} \quad \cdots \quad b_{nm}$	$W_1 = \sum_{j=1}^{m} a_j b_{1j}$ $W_2 = \sum_{j=1}^{m} a_j b_{2j}$ $\vdots$ $W_n = \sum_{j=1}^{m} a_j b_{nj}$
$\lambda_{\max}$	*Calculate the maximum characteristic root*	
$C \cdot I$	$C \cdot I = \frac{\lambda_{\max} - n}{n-1}$	
$C \cdot R$	$C \cdot R = \frac{C \cdot I}{R \cdot I} = \sum_{j}^{m} a_j CI_3 \Big/ \sum_{j=}^{m} a_j RI_j$	*Test* $CR < 0 \cdot 1$ *or not ?*

Note: if there is no relationship between the lower element B_k and the upper element A_j, then $b_{kj} = 0$

4. Empirical Analysis and Findings

Using the AHP model, authors quantized the question ”Please rank the chosen characteristics of entrepreneurial person from 1 to 10” and got the weight values of each characteristics of respondents from China and Poland, as shown in Table 5.

Table 5. The weight values of each characteristics in China and Poland

Question	**Characteristics**	**Weight Values**	
		China	**Poland**
Please rank the chosen characteristics of the entrepreneurial person from 1 to 10 (where 1 is the most and 10 the least characteristic feature)	The readiness to bear responsibility	0.325	0.134
	Willingness to search for the new solutions	0.058	0.134
	Hard-working, enthusiasm and conscientiousness in action	0.204	0.252
	Resourcefulness and organizing	0.109	0.252
	Practical skills	0.030	0.066
	Intuition	0.011	0.018
	Creativity and innovativeness	0.109	0.066
	Ability to use knowledge	0.058	0.033
	Confidence	0.078	0.033
	Independence and the need of autonomy	0.019	0.012

Note: own collaboration based on the conducted research

On the basis of Table 5, some differences between China and Poland can be distinguished. In the Chinese young’s eyes, ‘The readiness to bear responsibility’ is the most important characteristic of the entrepreneurial person, while ‘Hard-working, enthusiasm and conscientiousness in action’ and ‘Resourcefulness and organizing’ are chosen by the young’s from Poland. ‘Intuition’ is the least important characteristic according to the Chinese

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students but students in Poland chose 'Independence and the need of autonomy'. Research results, conducted in other countries like Belgium, Serbia and Bosnia and Herzegovina, confirmed that among characteristics enhancing entrepreneurial potential can be distinguished capability of making decisions, creativity, diligence, independence, meeting challenges, problem solving and looking for new solutions (Maric, Subotic, Dudic, Melovic, Brankovic and Milisavjevic, 2021). Those characteristics are also on the list of the most important features of entrepreneur's identity (Szostak and Sułkowski, 2021). Another research conducted in Oman and Sudan indicate that there is statistically signifanct impact of entrepreneurial features of students on their entrepreneurial intention (Atiya, Bilal, Abulhamid and Shoaib, 2019). Therefore, the Authors analysed entrepreneurial mindset and intention in China and Poland.

The breakdown of the answers to the questions about having an entrepreneurial mindset and intention is shown in Table 6.

Table 6. Entrepreneurial mindset and plans to open an enterprise according to the respondents in China and Poland

	China	Poland
Specific entrepreneurial mindset		
Yes	27.72 %	56.15 %
No	41.58 %	14.62 %
I do not know	31.68 %	29.23%
Entrepreneurial intention		
Yes	30.7%	51.5%
No	38.6%	12.3%
I do not know	30.7%	36.9%

Note: own collaboration based on the conducted research

Table 6 shows that the respondents from Poland are more entrepreneurial, 56.15% of Polish students think they have an entrepreneurial mindset, while only 27.72% Chinese students believe so. The largest proportion (41.58%) of Chinese young people clearly believe that they do not have an entrepreneurial mindset. At the same time, more than half of the surveyed young people in Poland plan to open an own business (51.5%). In comparison, 30.7% of Chinese students would like to open an own business in the future. It is also worth to notice that the share of undecided students, who are not sure whether to establish a company is pretty high and was noted as 30.7% in China and 36.9% in Poland. From this point of view, in would be crucial to examine actual entrepreneurial behaviour in order to complement the research on entrepreneurial intentions. It is also worth to compare this results with other research. According to Zhang, Wang and Owen (2015) and their examination of students in U.S. attitude fails to generate a significant impact on intention to behave in an entrepreneurial way. However, research conducted in Spain clearly show that subjective norms, such as attitude and perceived behavioural control are positively related to entrepreneurial intention (Entrialgo and Iglesias, 2017). Those results might be an indicator for future research to examine similarities and differenced in all countries.

For the question about career plans after graduation, it can be seen from Figure 1 that 23.8% of Poland's students chose to open an own company, while the percentage of Chinese students who plan to do so is only 10.9%. Most of the respondents from China (with 42.6%) would like to get a job in private company.

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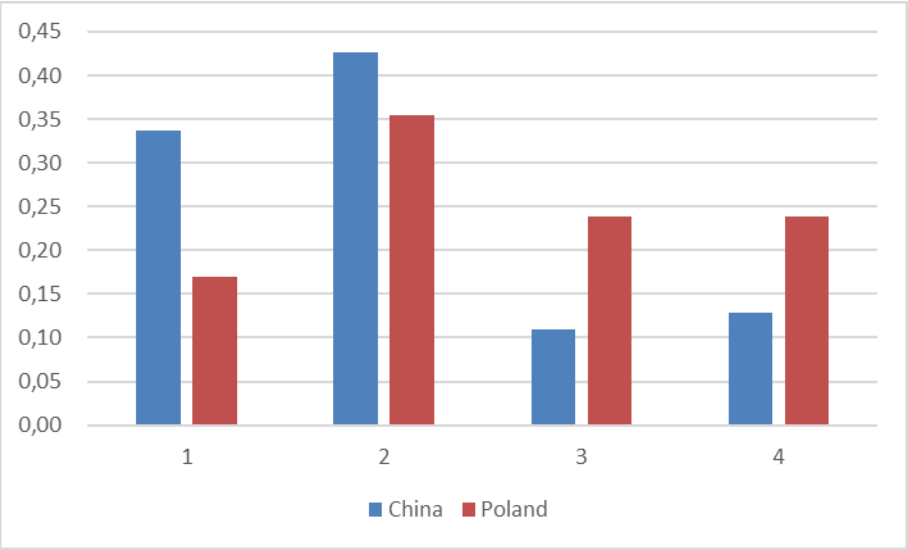

1. To get a job in the public sector.
2. To get a job in private company.
3. To open my own company.
4. I don't know.

e

Figure 1. Career plans after graduation - answers according to the respondents from China and Poland

Source: own collaboration based on the conducted research

Looking for similarities, it can be concluded that students both in Poland and in China chose "The possibility of higher earnings", "Independence, self-reliance" and "Self-realization" as the top three biggest advantages of running an own business. The internal motivation is considered more reliable then external leadership in maintaining and developing entrepreneurial potential of students (Mukesh, Prabhu, Koodamara, Chakraborty and Kamath, 2020). Despite the country, the possibility of higher earnings seems to be very important factor, so students were also asked to indicate whether they think that establishing an own company can give better possibility for higher income than working for somebody. Answers to that question are shown in Figure 2.

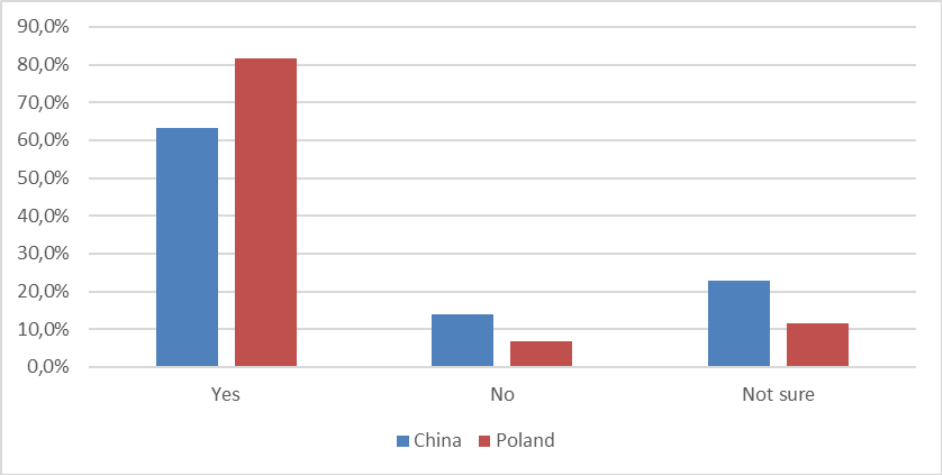

Figure 2. Establishing an own company gives better possibility for higher income then working for somebody – answers in % according to the respondents from China and Poland

Source: own collaboration based on the conducted research

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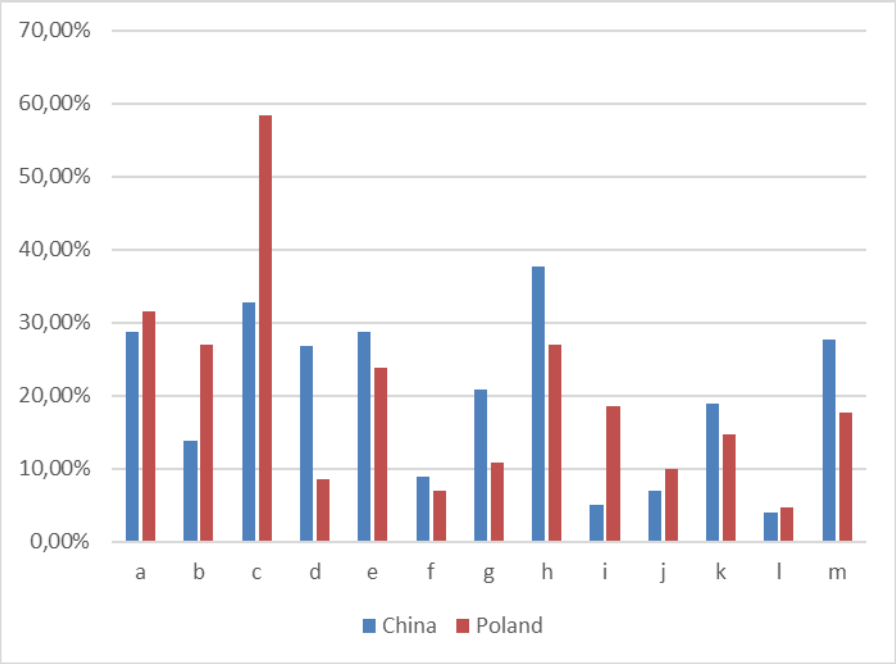
According to the data presented in Figure 2, 81.5% of respondents from Poland and 63.4% of respondents from China answered positively and agreed that conducting business can give them better possibility for higher income than working for somebody. However, studies conducted in Romania did not confirm that income influence willingness to start a business. Desirability of entrepreneurship is rather determined by feasibility and social stability (Paucescu, Popescu and Duennweber, 2018).

The respondents were also asked to assess whether the skills acquired in the process of education (school, studies) are useful for running an own business. 69.3% of students in China think that graduation from the university will guarantee receiving the necessary diploma as well as knowledge, but 46.2% of students in Poland deem that graduation from the university will give them just a diploma. Moreover, 59.4% of Chinese students and only 30.8% of Polish students agree that the education system has a positive effect on developing entrepreneurial students. Presented data indicate that according to Polish students, higher education could focus more on developing entrepreneurial skills. The relevant scheme of the entrepreneurship education process, together with teaching methods and tools, is proposed by Wasilczuk and Richert-Kaźmierska (2020). The acquisition of entrepreneurial competences during studies is of great significance for majority of students (Menshikov and Ruza, 2021).

Important aspect while analysing the phenomenon of entrepreneurship is getting to know the perception of barriers to running a business. During the research, the respondents had the possibility to choose maximum three answers (Figure 3).



a. No idea for business
b. Legal difficulties
c. Lack of adequate capital
d. Lack of appropriate skills
e. No business contacts
f. Fixed and certain pay received as employee
g. Very big responsibility
h. Very high risk
i. High taxes
j. High labour costs
k. Bureaucratic regulations related to conducting business activities
l. Low prestige of entrepreneur's profession
m. High competitiveness

Figure 3. The biggest obstacles of running an own business – answers in % according to the respondents from China and Poland

Source: own collaboration based on the conducted research

The Chinese students chose 'very high risk' as the most important barrier. Next five barriers obtained similar number if indications: 'lack of adequate capital', 'no business contacts', 'no idea for business', 'high competitiveness' and 'lack of appropriate skills'. As a biggest obstacle students from Poland indicated 'lack of adequate capital'. Next, respondents pointed out: 'no idea for business', 'very high risk', 'legal difficulties' and

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'no business contacts'. According to students from both analysed countries, 'low prestige of entrepreneur's profession' is the least significant barrier to entrepreneurship. Taking into consideration the international scope of presented research results, the role of digital capabilities should be emphasized (Davenport and Redman, 2020). Having skills to use digital technologies positively effects international entrepreneurial intentions, and not having them can become a vital barrier, as research conducted in Germany proved (von Arnim and Mrozewski, 2020).

Conclusions

The primary aim of the paper was to discover differences and similarities of view regarding the characteristics of entrepreneurial person in China and Poland. The secondary aim was to examine the intensions to start a company and verify whether the students in analysed countries regard themselves as entrepreneurial persons. This international comparison constitutes an added value of this research. This paper also fills in a gap regarding acquisition of entrepreneurial competences and research results might be important for researchers and practitionaires from both analysed countries. The obtained results indicate that higher education should be more focued on developing entrepreneurial competences. The listed differences and similarities might become indications for people cooperating with students, current and future entrepreneurs regarding their intentions, mindset or perceived obstacles.

According to students from both analysed countries, the top three features that characterise an entrepreneurial person are the readiness to bear responsibility; diligence, enthusiasm and conscientiousness in action and resourcefulness and organising. As the least important features respondents indicated independence and the need for autonomy and intuition.

Results presented in the paper allow to conclude that respondents from both countries see the same advantages of having an own enterprise. Although, the possibility of higher earnings is indicated as biggest advantage, only 63.4% of Chinese students agreed that running an own company can give them better possibility for higher income then working for somebody. Looking for similarities, it can be also concluded that respondents indicated the same most important and least important barriers. As biggest obstacles students identified external barriers to entrepreneurship, which are related to risk and lack of capital. At the same time, they did not consider low prestige of entrepreneur's profession as a significant barrier.

One of the differences between the respondents from the surveyed countries concerns the assessment of the education system. Students from China assess their education process higher then students from Poland.

The differences include also the fact that students from Poland more often characterise themselves as entrepreneurial persons then the students from China. Greater share of Polish students also plans to establish an own company. Important question that arise from this fact is 'why'? Why so few Chinese students perceive themselves as a person having an entrepreneurial mindset? What are the reasons (according to students in China) for choosing a paid job as a better option? Why the respondents do not want to conduct an own business? The questions posed indicate the direction of future research. It would be also worth to realise how current situation caused by pandemic influenced the perception of young people considering further career development.

It is also worth to mention the limitations of the study. In this paper Authors present results of a pilot study and due to small sample size, the numbers are not sufficient to generalize the findings. However, the presented analysis was made on the basis of descriptive measurements (i.e. weight values). This study has an exploratory character and is a decent starting point for further analysis concerning perception of the entrepreneurial spirit in different countries.

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ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE BUSINESS DEVELOPMENT

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Abstract. The article examines theoretical and methodological approaches and practical aspects of greening business, which are relevant to the imperatives of sustainable development. Based on expert assessments of domestic and foreign researchers, the ISO 1400 series (International Standard Organization) standards are considered a necessary prerequisite for solving environmental problems of an enterprise, a condition for their integration into the world economy. Four companies' environmental strategies have been identified (Indifferent Strategy, Opportunity Strategy, Risk-based Strategy, and Innovation Strategy) depending on the ratio of market opportunities and environmental risks. The need for innovation arises when both factors are high. An innovation-driven strategy combines both vectors of the green economy: maintaining dynamic economic growth and preserving the natural environment on a long-term basis. The structure and significance of eco-innovations (product, process, organizational) in forming a circular economy (CE) is clarified. A shift towards product-based service systems is proposed as one of the critical solutions to accelerate CE transition. Digitalization is a significant factor driving this process and forming open innovation platforms. Digital technologies provide transparent access to data on the consumption of resources, products, optimize product life cycles, create cyclical business models through automated monitoring, control, and optimization of processes and resources. Depending on technological processes, Cyclic business models are divided into three groups: slowing down, closing, and narrowing the cycle loop. Innovative business models are focused not only on the production of economic value for companies but also on creating environmental and social value for stakeholders.

Keywords: environmental management; sustainable development; environmental strategy; product eco-innovation; process eco-innovation; organizational eco-innovation; circular business model

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1. Introduction

Currently, the sustainable development paradigm is complemented by the idea of a "green economy". The third stage of transformation of the concept of sustainable development has come, when it has become complex - socio-ecological-economic - both in theory and in its practical interpretations (Bobylev, 2016). The contours of the new economy were defined in the conceptual documents of the UN and OECD (Organization for Economic Co-operation and Development) (OECD, 2009; UN, 2021). The terms green economy and green growth denote the ecological orientation of sustainable development. These terms emphasize the importance of environmental sustainability to the modern economy. The "green economy" in UN documents is defined as an economy that improves human well-being, ensures social justice, and significantly reduces the risks to the environment and its degradation (UN, 2021). The transition to such an economic model is a complex strategic task that requires a combination of two previously not combined development vectors: maintaining dynamic economic growth and preserving the natural environment on a long-term basis.

The global nature of economic and social development and the provision of sufficient opportunities increase the requirements for the competitiveness of products and the ability to adapt to external and internal challenges of the socio-economic and natural environment. It is also necessary to consider the strategic priorities and imperatives of development associated with the need for sustainable business development. Today, due to the lack of adequate systems and management methods, many enterprises, even with unique technologies, may lose their competitiveness, intellectual and innovative potential.

The activities of both public and private organizations have an environmental dimension, which is increasingly coming to the fore in company strategies and is seen as a strategic goal, the practical application of which can be realized at the national, industry, regional, and business levels (Plant et al., 2015; White et al., 2014; White & James, 2014; Chan et al., 2013; Govindan et al., 2014; Pane Haden et al., 2009; Mirzekhanova, 2020; Bobylev, 2016). P. Drucker's idea of the role of "creative destruction" applies to understanding the dynamics of digital society, which is based on continuous innovation. A new type of society based on digital technologies gives rise to appropriate attitudes, rules of conduct, and values that transform traditional business management forms. In this area, radical changes are expected, signs of which are already visible in the activities of companies most sensitive to innovation. Adapting management practice to changing business conditions is one of the main directions of modern management. A comprehensive study of the problem of managing business development becomes relevant from the point of view of increasing competitiveness and developing the strategic goals of the "green economy." Sustainable business development is difficult to implement without greening the activities of economic entities. Modernity requires less resource-saving than resource-efficient business models that imply the environmentally responsible building of business within the green economy paradigm. The level of environmental responsibility characterizes the quality of the enterprises' activities. On the other hand, there is a growing public interest in the environmental impact of corporations (DEFRA, 2011).

The study aims to analyze the main directions of greening management, reflected in modern business management models. Determine the range of environmental strategies of enterprises based on the opposition of two factors: market opportunities and environmental risks. Reveal the importance of the main types of eco-innovations (product, process, and organizational) in implementing a circular economy as the basis for sustainable business development.

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2. Theoretical background

The problems of environmental management as a necessary component of an integrated business management model for its sustainable development are considered in various aspects of foreign and domestic researchers. Russian and foreign authors justify the need to develop new management strategies (Stojanovic,2019; Ivlev et al, 2019; Milovidov, 2020; Schwab, 2019; Roscoe et al., 2019; Boons & Ludeke-Freund, 2013; Pane et al., 2009; Johnson et al., 2008). Particular attention is paid to the experience of various companies in the implementation of ISO 14000 standards as an effective environmental management system (Environmental Management Systems, EMS). It is noted that the importance of effective EMS systems is not limited to improving only environmental performance. Implementing them can lead to efficient operations, lower costs, and foster a sustainable corporate culture (Abd Razak et al., 2016; White & Lomax 2010; Pane et al. 2009).

Researchers from the UK, Slovenia, Russia, based on the analysis of the activities of national companies, have identified the relationship between the availability of environmental certificates (EMAS or ISO14001) for firms with high innovative potential (Hojnik et al, 2017; Abd Razak et al, 2016; Ratner & Ratner, 2016). The idea of maximum openness of the innovation process was formulated based on the systematization of the experience of the most advanced companies.

In the works of domestic and foreign researchers, the problem of an increase in the complexity and complexity of strategic planning in a "green economy" is sharpened, associated with both the uncertainty of the market and the uncertainty of the environment (Milovidov, 2020; Mirzekhanova, 2020; Plant et al., 2015; White et al. al., 2014; White & James, 2014)

The introduction of environmental innovation (eco-innovation) in various EMS components is seen as the primary trend that allows companies to achieve sustainable business development (Ahmad & Wu, 2022; Yan et al.,.2021; Huddart et al., 2019; Hojnik et al., 2017; Geissdoerfer et al., 2018; Sarkar, 2013; Triguero et al.; Boons & Ludeke-Freund et al., 2013; Belin et al., 2011).

Innovative models and types of closed-cycle production to preserve the environment are spreading. One of the critical areas in this process is the circular economy model, which implies the introduction of used goods into recycling instead of recycling through new technologies and creative environmental design. Fundamental trends in this area are highlighted in publications: (Ahmad & Wu, 2022; Johl & Abu Toha,2021; Xu, Y 2019; Pagoropoulos et al., 2017; Kirchherr et al., 2017; Bourguignon, 2016; Ghisellini et al., 2016; Boons & Ludeke-Freund et al., 2013). The role of digital technologies in forming a circular economy, the dependence of the effectiveness of any Internet business model (platform) on the emerging network effect is clarified. The factors that complicate the transition to a waste-free economy, driven by a business based on social and environmental responsibility principles, are disclosed.

3. Conceptual framework and methodology

The conceptual foundations of the study are the documents of the United Nations (UN), Organization for Economic Co-operation and Development (OECD) (OECD, 2009; UN, 2011; UN, 2021), ISO 14001 (ISO 14001: 2015) standards system. The international standard for measuring and interpreting indicators of innovative behavior in the business sector contains methodological principles, a conceptual framework, a complex system of definitions, algorithms for formulating questions, and interpreting answers for analyzing innovative activities (OECD, Eurostat, 2018).

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Analysis of domestic and foreign publications shows that the methodological foundations for the inclusion of environmental aspects in the enterprise's strategic plans have not been sufficiently developed. The need for and importance of developing a methodology for constructing a complementary environmental management system are determined by the sustainable development tasks of entrepreneurship. The systematic and process approaches, the method of expert assessments, and the grouping and classification constitute the methodological basis of the study. The systematic approach is the basis for analyzing environmental management as a complex socio-economic phenomenon that integrates business management's organizational, technological, environmental, and social components. Eco-innovation from a systematic approach is presented as the integration of product, process, and organizational innovations, making it possible to identify synergistic effects in the environmental management system.

4. Results

Environmental management system. Environmental management regulates the business relationship with the natural environment, in which the enterprise, acting as an object of management, ensures a coordinated interaction with the natural environment. Further development of environmental management in Russia is due to the following reasons. First, it is the need to meet the requirements of the green economy as a strategic goal. Secondly, it is the strengthening of economic and administrative sanctions for violation of legislation requirements in the field of environmental protection and environmental standards. Thirdly, environmental and economic indicators of Russian enterprises' efficiency of economic activities are becoming an increasingly important factor in the competitive struggle. Fourth, Russia's expanding international cooperation and its commitments to harmonize Russian legislation and the legislation of the Organization for Economic Cooperation and Development (OECD) member countries require the use of generally accepted effective management methods and procedures.

As a basis for solving environmental problems of industrial production, we can accept the international standards of the ISO (International Standard Organization) series. ISO 14000 series standards focus on improving an enterprise's environmental performance and provide recommendations for creating an effective environmental management and audit system. Expediency improving the environmental friendliness of modern industries, compliance with international environmental standards can also be substantiated by the economic effect that will comply with the principles of resource conservation, their secondary use against the background of rising prices for natural raw materials. In addition, the integration of Russian enterprises in the global economy requires compliance with environmental standards and rules.

The ISO 14000 family of standards (includes ISO 14001, ISO 14004) is a universal basis for forming an environmental management system (Environmental Management Systems, EMS). Organizations worldwide that design and implement effective environmental management systems use this basic set of rules. ISO14001 is the most common mechanism for improving the environmental performance of organizations, confirming the compliance of products with the current requirements of the international standard and the effective operation of the environmental quality management system. ISO14001 does not set requirements for environmental performance but outlines a framework that a company or organization can follow to establish an effective environmental management system. ISO 14001 can be used by any organization, regardless of its type of activity or industry.

The benefits of efficient EMS are not limited to a mechanical build-up of environmental performance. Their use can help increase the efficiency of operations, reduce costs, and positively affect employees interested in preserving the environment. External benefits can include, for example, expanding the business by strengthening the reputation and improving the company's image (Alum et al., 2020; Abd Razak et al., 2016; Chen, 2013; DEFRA, 2011; White & Lomax 2010).

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Environmental governance is on the agenda of many organizations. Its goal is to reduce and further minimize harmful effects on the environment with the broadest interpretation of environmental requirements and the means necessary to meet them. Table 1 (See the Appendix, Table 1**)** presents publicly available excerpts from environmental strategies and statements from several organizations. Their analysis demonstrates a significant coincidence of positions concerning environmental management, its optimization, and integration with the strategic management of the enterprise.

In the context of technological and social changes, business is faced with the challenges of a more complex operating environment. It requires new strategies that take into account the unprecedentedly broad scope of emerging factors: (Milovidov, 2020; Schwab, 2019; Johnson et al., 2008). The problem of integrating environmental management with the enterprise management system arises from the conflict between economic and environmental goals. While traditionally strategic management aims to obtain economic benefits in the long term, environmental protection often requires additional costs. Therefore, to solve this problem, it is necessary to develop an environmental strategy of the enterprise, in which economic and environmental goals should be equal and complementary. The resulting synergistic effect is manifested in an increase in the enterprise's competitiveness based on the formation of a new potential for success in the market, including an environmental component. With the introduction of environmental goals into an enterprise's strategic planning, its complexity increases since it considers the uncertainty of the natural environment development as far as the uncertainty of the market.

Environmental management involves determining the environmental potential for success, for the creation of which and ensuring competitive advantages on this basis, offensive and innovative actions of the enterprise are required. On the one hand, these are actions to ensure environmentally friendly products and processes. On the other hand, these are activities to reduce costs due to new and increasing environmental requirements. The ecological potential for success is also achieved by creating new product consumer properties based on ecological differentiation. The space for choosing a strategy of competitive advantages is determined by three vectors of possible enterprise behavior: leadership in the environmental field, leadership in costs, and differentiation. Three equal components of a competitive strategy determine the integrated nature of optimizing an enterprise's ecological and economic goals. An assumption is made that concerning all three components, at least the minimum state must be achieved to ensure the enterprise's existence in the long term. It is also evident that only limited opportunities can be achieved simultaneously in each strategy component. The space between the maximum and minimum results is the area of possible enterprise strategies. It is possible to identify the strategic behavior of the enterprise for each of the three dimensions, which is determined depending on the value of costs, the possibility of differentiation, and the environmental burden, which, in turn, are directly related to value creation processes.

When defining the company's strategy, the market opportunities offered by environmental protection (the result of an analysis of the external environment) and the risks concerning the environment (the result of an internal analysis) are opposed. Market opportunities cover all environmental areas of development, thanks to which the company can provide and increase its profit. Risks combine internal weaknesses and weaknesses of the enterprise, which, combined with unfavorable changes in the environmental sphere, can lead to loss of profits and even liquidation of the enterprise. In response, four environmental strategies can be created (Fig.1).

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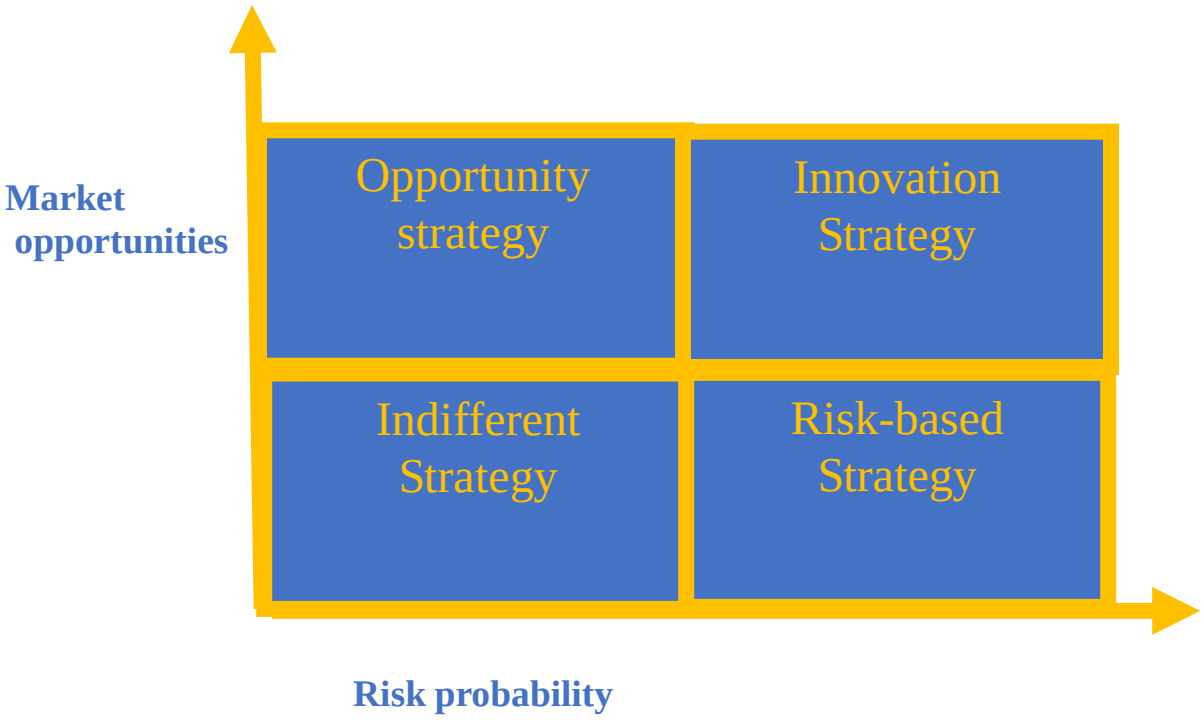

Figure 1. Diversification of environmental strategies

Source: the authors

1. Indifferent Strategy. If market opportunities and risks are not large, the enterprise can treat the relevant environmental issues indifferently and continue to work as before. In this situation, it is impossible to talk about an environmental strategy since managers do not realize the need for strategic requirements.
2. Opportunity Strategy Opportunity-oriented strategy. If market opportunities in the conservation area are high and the likelihood of risks is still low, then an opportunity-based strategy may be chosen. By producing environmentally friendly products, an enterprise can ensure an increase in its profits (profit-oriented environmental management)
3. Risk-based strategy. With low market chances and high environmental risks, an enterprise can define a risk-oriented strategy. The content of such a strategy is to decide whether the risks should be reduced, mitigated, and transferred by the enterprise's resources and to what extent a dialogue about risks with interested groups should be conducted. The decisive parameter of this strategy is "costs" (costly environmental management).
4. Innovation strategy. If both market opportunities and the likelihood of risk to the natural environment are high, there is a need for innovative solutions. A strategy focused on innovation allows in this situation to stabilize profits due to environmental innovations in production, reduce or eliminate risks through the introduction of environmental technology, and reduce apparent and possible costs. A deliberate choice of this strategy ultimately leads to developing an enterprise focused on environmental safety and environmental protection.

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The Role of Eco-Innovation in Building a Sustainable Economy. The innovation strategy reflects the main trends in the greening of enterprises in the paradigm of sustainable development. From this point of view, in the structure of environmental management, a unique role belongs to innovation management strategies. Implementing environmental innovation (eco-innovation) in the various components of EMS allows companies to follow the principles of sustainable development. In the documents of the European Commission, eco-innovation is defined as "any innovation resulting in significant progress towards the goal of sustainable development, by reducing the impacts of our production modes on the environment, enhancing nature's resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources" (Eco-innovation, 2013). Eco-innovation may be any new or significantly improved products (goods or services), processes, organizational changes or marketing solutions that reduce the consumption of natural resources (including materials, energy, water, and land) and reduce emissions of harmful substances in throughout the life cycle.

Sustainable business development involves harmonizing relations between the economy, the natural environment, and society. The circular economy model has a high potential for creating innovations that contribute to the development of new markets and solve the problems associated with conserving the planet's resources. It is aimed at a comprehensive solution to economic, social, and environmental problems. The circular economy is defined as a system based on business models (Bressanelli et al., 2018). The emphasis is shifted towards reducing or reusing material and energy consumption, recycling and recovering them in production, distribution, and consumption (Kirchherr et al., 2017). Many approaches to its formation are associated with specific business models, which are outlined in the EU's Circular Economy Action Plan (EU, 2020), in the UN Green Economy Program (UN, 2021). Eco-innovation contributes to the transition of a linear economy to an environmentally sustainable or circular closed one, which is based on the principle of the three Rs - Reduce, Reuse, Recycle (Bourguignon, 2016). Successful implementation of eco-innovation depends on an ecological culture and the responsibility of producers and consumers. According to numerous studies, the prerequisites for the transition to a circular economy are companies' establishment of environmentally responsible production and consumers' consideration of environmental aspects when choosing goods and services.

The Circular Economy (CE) is based on the ecosystem principle. The main goal is to remove the dependence of economic growth on the depletion of natural resources through the creation of innovative technologies, models, and services. This goal is closely related to solving the problem of gradation of ways of using waste - preventing waste generation, recycling, and reusing products. EZC opens up new opportunities for diversifying the economy, creating value, forming relevant competencies, and developing entrepreneurship. It involves the introduction of eco-innovations, which, depending on the areas of activity of companies, can be divided into three groups: product, process, and organizational.

Product eco-innovations. Product eco-innovations are the ecological modernization of products and services, as well as the creation and provision of new goods and services with better environmental performance, or the improvement of existing ones (Figure 2). They involve the production of goods and services sustainably and include a variety of activities.

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Figure 2. Product eco-innovation

Source: the authors

A shift towards product-based service systems has been proposed as one of the critical solutions to accelerate the transition to CE, and digitalization is a significant driver of this process (Pagoropoulos et al., 2017). The environmental load characterizes the interaction with the environment throughout the entire life product cycle. The innovative approach of DfE (Design for Environment) is aimed at creating products considering the reduction of the burden on the environment throughout the entire life cycle. DfE ensures the environmental neutrality of products, accounting for the gradation of waste, simplifying their recycling, saving resources through appropriate product design, and proper resource use. At the same time, costs mean the costs of producing a product, and differentiation means the degree of a product's uniqueness. An integrated accounting of all components makes it possible to assess their connections. Not all companies voluntarily introduce such innovations. The market context that should favor DfE is critical.

In all its phases, the product's environmental friendliness is becoming an ever-increasing argument for its sale. The preservation of nature, acceptable for the life of future generations, becomes an integral part of the "set of goods" offered by the goods. Therefore, environmental management presupposes taking on social responsibility and participating in reconciling the interests of entrepreneurship and the environment. Product innovations are

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designed to complement the objective consumer properties of products with a value dimension, which increases their relevance. The result of such innovations is the optimization of the aggregate social benefit, and the product turns into a mechanism of social self-identification, joining the group. Profit growth has given way to a new target function - total social benefits maximization (Milovidov, 2020). Endowing consumer value with social content requires a set of broad measures from businesses that go beyond marketing goals and take into account the nonlinear patterns of complex systems.

With the mutual interest of consumers and manufacturers in the application of eco-innovations, certain contradictions arise in each party's positions in obtaining and using environmental, social, and economic benefits. The use of organic products brings a variety of benefits to consumers. It means reducing costs and energy consumption, improving the quality and reliability of products, expanding opportunities for its repair, modernization, and disposal, and reducing harmful effects on health. The demand for organic products is growing, and buyers are willing to pay more for such products (Chen, 2013). New needs encourage companies to behave in an environmentally responsible manner (Asdal et al, 2021). Manufacturers need to ensure that products are designed, manufactured, sold, and recycled appropriately to green demand (Sarkar, 2013). However, the consumer value of eco-innovation does not necessarily guarantee an economic bonus to producers. The introduction of eco-innovation can reduce costs by reducing material and energy consumption and increasing manufacturers' efficiency and competitiveness, which is not always evident to them. However, the prospect of optimizing costs (in particular, for energy and materials) most often stimulates investment in eco-innovation (Belin et al., 2011; Huddart et al., 2019).

Process eco-innovations. Process eco-innovation is the greening of production processes, improving technologies at all stages, and introducing innovative business models (Fig. 3). Despite the ambiguity of empirical results, most researchers indicate that thanks to process eco-innovation, significant savings are achieved (Triguero et al., 2013). The use of environmentally efficient green technologies leads to a reduction in operating costs.

The introduction of innovative business models will transform the entire manufacturing process. As part of the circular economy direction, innovations in business models are being developed. The transition to a circular economy involves the sharing model, based on extending a product's life and (or) reusing it and sharing it multiple times to minimize resource consumption and waste generation. Sharing appears to be one of the possible tools for the transition to a closed cycle and recycling of waste.

Digital technology can be seen as an essential contributor to the development of a circular economy through its ability to provide up-to-date information about products and assets. Digitization enables fewer resources to be used more efficiently. Intelligent solutions help to reduce energy consumption, more efficient use of logistics routes and capacities. Digitalization provides transparent access to data on the consumption of product resources and also allows to optimize product life cycles. In addition, digital technologies allow the creation of cyclical business models through automated monitoring, control, and optimization of resources (Pagoropoulos et al., 2017; Kirchherr et al., 2017; Bourguignon, 2016).

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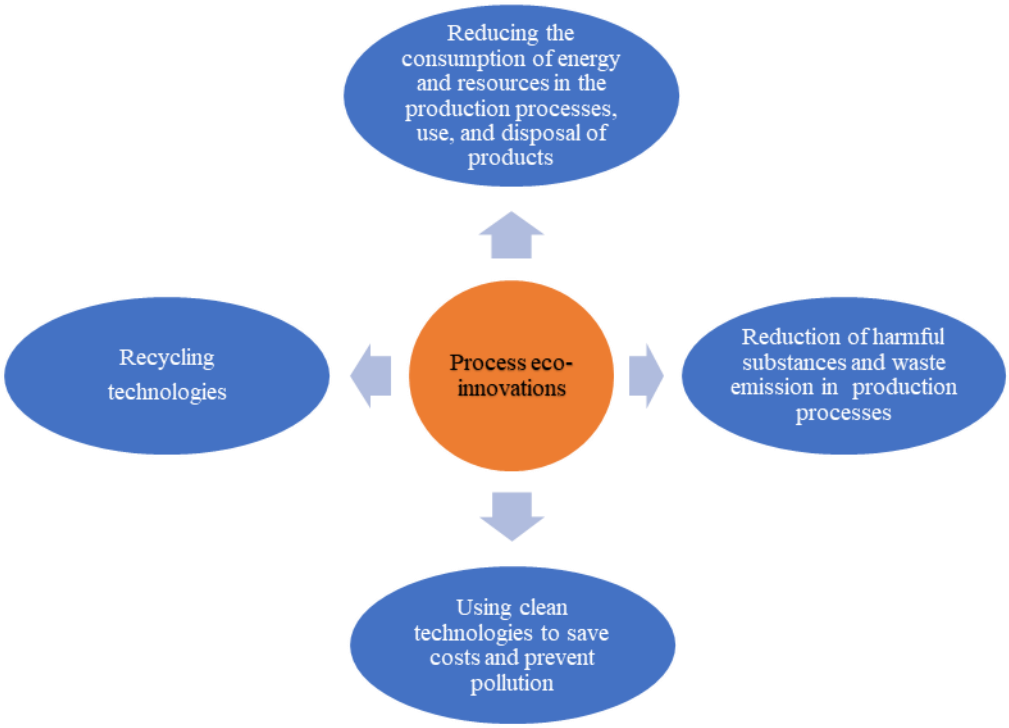

Figure 3. Process eco-innovation

Source: the authors

Cyclical business models can be divided into three groups depending on the direction of technological processes: slowing down, closing, and narrowing the cycle loop. Cycle deceleration is based on the idea of extending the product life cycle through design and maintenance. The closed-loop concentrates on efficiently recycling materials and can be realized, for example, by industrial symbiosis. Narrowing the cycle aims at using fewer resources per product and can be significantly enhanced by intelligent technology. Because they are closely related, cyclical business models are often combined.

Cyclical business models are network-based in nature and thus require different network participants to work together to achieve common goals. The idea behind a circular business model is that the cycle is not completed by one company but by an entire ecosystem. Therefore, networking and collaboration with stakeholders and new partners are needed to create circular business models. Digital collaboration platforms with virtual technologies play a significant role in networking and co-creation (Gawer, 2021; Pagoropoulos et al., 2017; Kirchherr et al., 2017; Bourguignon, 2016; Ghisellini et al., 2016). Consumers play an essential role in the transition to CE as adopters of new products and services. Accordingly, achieving a certain level of digitalization will allow strengthening the feedback from consumers, which will also contribute to strengthening the company's competitive position in the CE environment.

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Changes in value creation for a wide range of actors must also be considered (Pagoropoulos et al., 2017). The effectiveness of the Internet business model in creating new value is primarily determined by its attractiveness to new users or developers and the possibility of obtaining a network effect. Platforms integrate knowledge from various sources, including user experience, to create an environment for the co-production of new value, creating a network effect. Business model innovation implies creating economic value for companies and stakeholders, including environmental and social value. In this way, innovative business models can contribute to the sustainable development of a company.

Organizational eco-innovations. Organizational eco-innovation involves the formation of institutions that promote the environmentally responsible behavior of manufacturers (development of environmental auditing, environmental management) (Fig.4).

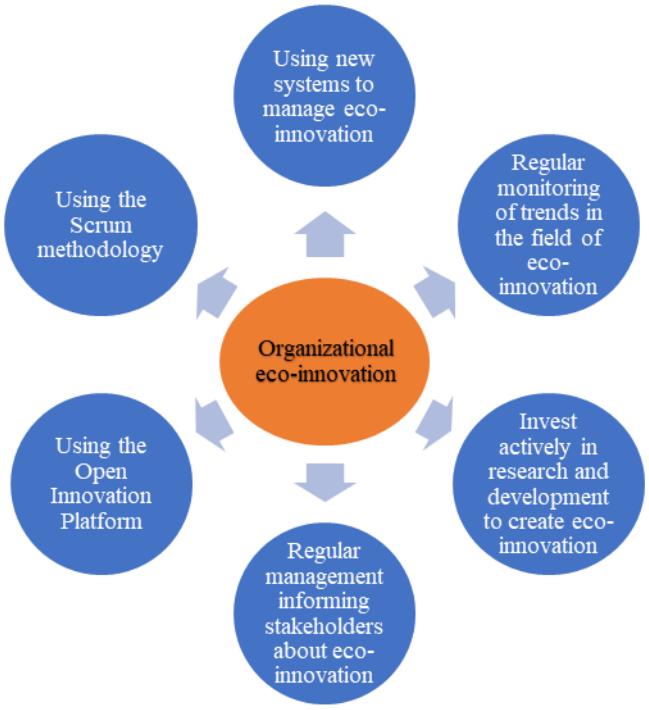

Figure 4. Organizational eco-innovation

Source: the authors

They are aimed at:

• setting priorities and rationalizing environmental costs,

• establishment of critical "ecological" points of production processes and their management in the current mode,

• regular monitoring of the primary sources of environmental hazards.

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It is believed that if innovatively active enterprises derive additional benefits from process eco-innovation, then organizational eco-innovation benefits any company, regardless of their innovative potential. Organizational innovation is the least complex form of eco-innovation since it requires fewer financial and human resources to create and implement (Hojnik et al., 2017).

The primary trend in organizational innovation is open innovation platforms based on modern digital management tools. They form a qualitatively new space for co-production. The platform approach expands the knowledge base to provide user-oriented services based on open innovation. It goes beyond the living lab and experiment environment concepts to prioritize service and management aspects in the context of the digital platform economy. Therefore, the platform can be defined as a mechanism for coordinating open innovation. Management of joint activities as the basic model of the virtual economy period assumes that the consumer no longer owns the goods - they remain the producers or intermediaries who organize their everyday use. Any platform presupposes openness of the process, the involvement of a wide range of participants, the use of new forms and methods of value creation.

The novelty of this business model is in the virtual space, which opens up a wide range of opportunities. Unlike traditional organizational models, it allows the exchange of labor, information, cultural products, data storage and evaluation systems without space and time limitations. It is not limited to consumer goods and services but allows the exchange of labor, information, cultural products, data storage, evaluation systems, etc. The virtual context guarantees individuals greater freedom in choosing the time and place of work, but at the same time, responsibility for organizing the production process increases communication with other members of the project team and adherence to information policy. The virtual production context increases the requirements for the qualifications and flexibility of workers, project management skills, the ability to adapt to constantly changing conditions, and the composition of work teams throughout their professional life.

Organizational innovations aim to improve monitoring, analysis, and control of resource use, reduce the production cycle, organize resource recycling, and develop measures to save resources and minimize waste.

A particular project approach is used to form an integrated model of greening. This project considers all aspects of the enterprises' activities that synthesize all innovative processes.

6. Conclusion

Greening as a direction of sustainable development imposes new requirements on the business management process. In the modern period, the concept of sustainable development has acquired a complex - socio-ecological-economic - character. The environmental dimension is increasingly coming to the fore in companies' activities as a strategic goal. The fundamental elements of the ISO 14000 series of environmental management systems can become the basis for developing an enterprise's environmental strategy. The range of environmental strategies from the perspective of environmental potential can be presented on the basis of the opposition of two factors: market opportunities and environmental risks. Depending on the ratio of these factors, the following enterprise strategies are identified: Indifferent Strategy, Opportunity Strategy, Risk-based strategy, and Innovation strategy.

The need for innovative solutions arises when both market opportunities and the likelihood of risk to the environment are high. The choice of such a strategy is relevant to the imperatives of sustainable business development. The innovation strategy is most consistent with the "green economy" principles. It allows solving both the problem of maintaining dynamic economic growth and the problem of preserving the natural environment. The circular economy model has a high potential for creating innovations (product, process, organizational) that contribute to the development of new markets and the solution of problems related to conserving the planet's resources. The circular economy is based on business models, in which the emphasis is

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shifted to the processes of reducing the consumption of materials and energy or their reuse, their recycling in the process of production, distribution, and consumption (Design for Environment, Sharing, digital technologies, open innovation platforms). Business model innovation contributes to sustainable economic development, as it involves creating economic value for companies, considering the value created for stakeholders, including environmental and social value.

Appendix

Table 1. Examples of declarations from economic strategies of the Russian Federation organizations

Organization	Declaration fragment
X5 Retail Group is one of the leading Russian food retail companies	Our global goals until 2030 are to reduce greenhouse gas emissions by 30%, reduce waste generation by 30%, and use 30% renewable energy in our own operating processes. A comfortable and safe environment for life is our contribution to the implementation of the national development goal of Russia until 2030. (X5 Retail Group).
ROS AGRO PLC - Russian agricultural and food company	In its activities, the company guarantees full and unconditional compliance with all the requirements of the current legislation in the field of nature protection and human health and tries in every possible way to minimize the impact of negative factors on people, natural resources, etc., and the environment. The principles of ensuring an ecological and economic balance between production and environmental safety form the basis of the company's activities and minimize financial and reputational risks, identify problematic issues at early stages and make the most effective decisions. Realizing its responsibility to society, the company expects its employees to understand the complexity and scale of the tasks it faces. The company's contribution to the preservation of a favorable environment is aimed at: reduction of negative impact on the environment in all segments; production of more environmentally friendly products, rational use of natural resources, both involved in the production and located in the regions of the company's operations. (Code of Business Conduct and Ethics ROS AGRO PLC).
ECOS Group is a group of specialized enterprises united by the management company "ECOS INVEST" LLC and working under a common brand in the field of treatment and reuse of municipal and industrial wastewater.	Professionals in our field undoubtedly bear social responsibility, which is why we see our development in the development of solutions filled with eco-innovations, especially relevant in the era of transition to an eco–economy. (ECOS Group).
Responsible Business Alliance - electronics industry	The company is aware of the total degree of responsibility before present and future generations for the company's activities' impact on the environment. The company consistently introduces production process technologies that reduce as much as possible the level of negative impact on the environment and ensure the minimum consumption of material and raw materials. Code of Business Conduct and Ethics (Responsible Business Alliance).
PJSC Gazprom	The company's large-scale production and gas transmission projects are implemented in regions with a high ecosystem vulnerability, which requires a cautious attitude. The company is aware of its responsibility to current and future generations for the impact on the environment t activities of the company and the legal entities under its control have. In its activities, the company adheres to the principle of dynamic economic growth with the most rational use of natural resources and preservation of a favorable environment for future generations. The company complies with national and international laws, standards, and environmental protection requirements related to its activities and products. The company's policy is also aimed at the most careful use of energy, water, land, and other natural resources in the production process, proper handling of industrial waste, careful and restrained use of hazardous materials and technologies. (Gazprom).

CJSC CUMMINS KAMA is a joint venture of such world leaders in the automotive industry as Public Joint Stock Company KAMAZ and Cummins Inc.	One of the priority tasks of the company is environmental protection and compliance with the company's current legislation and internal rules in this area. The company welcomes and supports the Employees' actions aimed at being environmentally conscious. The company consistently introduces new non-waste and low-waste technologies for the acture of products and production, as much as possible, reducing the level of negative impact environment and ensuring the minimum consumption of material and raw materials. (CUMMINS KAMA).
OJSC Enel OGK-5. Production, transmission and distribution of electricity, gas, steam and hot water	Solving environmental problems is one of the most important priorities of OJSC Enel OGK-5. In its work, the company adheres to the Environmental Policy approved in 2011, based on the principles of environmental safety and rational use of natural resources, expressing the intentions of OJSC Enel OGK-5 to improve the environmental performance of production branches constantly, to comply with federal and international standards. The company's main efforts in 2011 in the field of environmental protection were aimed at changing the structure of environmental protection processes management at the company's branches by bringing the environmental management system to the requirements of the international standard ISO 14001: 2004. (Enel OGK-5).

Source: authors

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ANALYSIS OF RISK FACTORS FOR APPLIED PROJECTS IN A DIGITAL ECONOMY

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Annotation. The article substantiates the relevance of the processes of digitalization and informatization of the economy. The concept of applied projects and initiative of applied projects is considered. The relevance of the application of applied projects in the context of modern digitalization of the economy has been proved. The features of the functioning of applied projects are highlighted. Three categories of applied projects are considered, depending on the cost structure. Particular attention is paid to the risk factors that must be taken into account for full-fledged uninterrupted work on the creation and execution of applied projects. A set of universal risks was compiled for all three categories of projects. The need for an analysis of risk factors has been determined. Risk assessment models are proposed for applied projects requiring investment of capital costs both within and above the budget established by the organization, and operational applied projects. Practical testing of the proposed models is presented on the example of the "Smart City" applied project of PJSC "Rostelecom". The conclusions prove the feasibility of assessing risk factors in relation to a specific applied project. It has been established that without a systematic and regular analysis of the organization's activities for the execution of applied projects, as well as without identifying and promptly identifying risks to the organization's work at all stages of the life cycle of an applied project, it is impossible to implement applied projects as a whole.

Keywords: digital economy; applied projects; risks of implementing applied projects; applied projects requiring capital expenditures; applied projects requiring incurring operating costs

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JEL Classifications: G32, O22, O31

1. Introduction

The relevance of the chosen topic is due to the rapidly developing economy of the Russian Federation and its transition to a fundamentally new level - digital (Irtyshcheva, 2020; Backhaus, 2021). The current foundations of doing business do not always allow to quickly respond to changes in the external environment of the organization. The digital economy makes new demands on organizations in terms of restructuring the entire business infrastructure to make optimal and effective decisions (Florio, 2014). The main task of the transition to the digital

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economy is a gradual transition to digital transformation and obtaining the required result as soon as possible (Miroslavskaya, Kozyrev, 2021; Garcez, Silva, Ricardo, Franco, Mário, 2021). The use of modern digitalization tools ensures the stability of the company's existence in new conditions (Rincón-Moreno, Ormazábal, Jaca, 2021). These tools are applied projects (hereinafter AP).

Applied projects are aimed at promoting software and hardware solutions and services for the automation of various projects of public authorities, as well as projects of the industrial market segment. Applied projects are the missing link in creating a chain of business transformation on a digital innovation basis in the current realities. Thanks to regular analysis and assessment of the feasibility of implementing applied projects, individual business processes and the economy as a whole are being improved.

An applied project is a system of unique solutions for an organization, therefore, a set of risks is formed based on the characteristics of each applied project and the conditions for its implementation (Bychkova, Butina, 2018). Not only the specificity of applied projects plays a key role in determining the most important financial risks for an enterprise, but the scope of implementation of applied projects is also important. Depending on the conditions and directions of the execution of applied projects, the composition of the conditions of the factors influencing the activities of the enterprise also changes. Moreover, with the same composition of risk factors, the degree of their influence can differ significantly when an applied project gets into one or another environment of the digital economy.

In this study, the following scientific methods were applied: analysis and synthesis, induction, systematization. The purpose of this study is to develop a methodology for analyzing and assessing risks by types of applied projects, which contributes to the safe functioning of the organization, as well as the prevention of external and internal factors of threats. These developments allow the company to determine the value of the applied project for the organization and, in the future, analyze and predict its state in the content of the digital economy.

2. Typology of applied projects

All applied projects that can be implemented in a company as part of the development of the information society and the digital economy, according to the types of financial resources, can be conditionally divided into 3 categories (Bychkova, Gogua, Butina, 2019):

- Applied projects requiring capital expenditures in excess of the organization's established budget;
- Applied projects requiring capital expenditures within the budget established by the organization;
- Applied projects requiring investment of operating costs.

Applied projects should be characterized as projects with a high degree of implementation and execution uncertainty. This means that the development and design of applied projects cannot be imagined without a risk factor. The more innovative the solution for applied projects and the longer the planning horizon covers the entire process of creation and implementation, the higher the risk. Applied projects, like no other projects, are subject to the influence of risk factors, since they are a direct tool for the development of the digital economy. The instability of external factors also gives rise to a high degree of uncertainty.

In the process of analyzing and assessing possible risks, the main goal is to determine the likelihood of a threat, assess its possible impact and calculate the duration of the impact of these risks on the organization's work on applied projects. The likelihood of the occurrence of risk factors is directly related, first of all, with the general position of the company in the market, with its financial stability, as well as with the market situation and the prospects for its change.

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The stability of the organization is determined by the ability of the firm to compensate for risk circumstances and continue to develop and execute applied projects (Malladi et al., 2021). The presence of a sufficient amount of resources allows neutralizing threats.

The authors identified the following as the main universal risk factors associated with the development and implementation of applied projects:
1. Insufficiently high values of the main technical and economic indicators of the effectiveness of an applied project, for example, payback period, profitability, etc.;
2. Impossibility to execute applied projects due to lack of technical capability (lack of required equipment, impossibility to ensure implementation and maintenance of an applied project);
3. Insufficiently complete and objective assessment of the significance of applied projects for the organization in the medium and long term, taking into account the further implementation in the digital economy markets;
4. Lack of reliable data for the formation of forecasts regarding the occurrence of receivables during the execution of applied projects;
5. Incorrect analysis and assessment of the forms, methods and means of interaction between the main subjects and participants in the creation and implementation of applied projects.

The degree of uncertainty and the possibility of the appearance of risk factors directly depends on the state of the organization, including the financial one, on the stability in the market, as well as on the conditions of the external environment, which is strongly influenced by the digital economy. Application projects can be implemented as a whole as a single service, or a part of an application project can act as an independent service. Initiative is a part of an application project that can be implemented as a constituent element of an application project, or be independent of it and be implemented as a finished product for the consumer. Not only the applied projects themselves, but also their initiatives are analyzed and evaluated for effectiveness from the moment the concept was created to the direct conclusion of a contract for their implementation and subsequent maintenance and support. At the same time, the changing market conditions influenced by the digital economy should be taken into account when forming a conclusion regarding the viability of projects in various segments.

When analyzing and assessing the occurrence of risk factors, it is advisable to identify the strength of the possible influence of these circumstances on the organization's work on an applied project in particular and the entire company as a whole. In addition to the degree of the impact, it is necessary to take into account the likelihood and duration of the impact of external and internal risks. Moreover, within the framework of making a management decision regarding the feasibility of introducing an applied project into the product portfolio of an organization, it is necessary to forecast the dynamics of changes in the main technical and economic indicators, which are most strongly influenced by risk factors. Forecasting is carried out on the basis of analysis and assessment of the financial condition and sustainability of the organization itself.

From the point of view of the most rational planning of further work on applied projects, it is necessary to carry out the forecasting process taking into account the occurrence of all possible risks that can significantly affect the activities of the enterprise, especially under the influence of the changing conditions of the digital economy. Significant risks should be understood as a certain set of factors, both external and internal, that negatively affect the organization's capabilities in terms of the development and execution of applied projects. With critical values of their possible occurrence, these risk factors can significantly affect the economic performance of the organization in the chosen direction (Bychkova, Butina, 2019).

The authors identified the following significant risks for the company in the implementation of the AP:
• increase in terms of implementation of the project or its components;
• increased volume of implementation costs;
• non-observance of the criteria for the quality of services provided under the project;

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• decrease in the interest of potential consumers of the selected segment to the services of the new project;
• decrease in the profitability of the project.

The implementation of an applied project should be based on a full analysis and assessment of the effectiveness and profitability of this project for the enterprise, both in the short and long term. Subject to significant changes in the processes of implementation and execution of applied projects, such a development option is possible as a complete or partial rejection of the selected project, or re-consideration for making adjustments both to the basic concept and to individual components and initiatives.

For each type of applied projects, there are several universal risk factors that are likely to have an impact on the life cycle of applied projects (Sorescu, Schreier, 2021). These factors are not final, since each applied project has unique specific characteristics and the composition of risk factors directly depends both on a separate project and on the conditions for its implementation in the digital economy markets.

3. Analysis and assessment of risk factors for applied projects that require incurring capital costs in excess of the organization's budget

A set of risk factors for applied projects requiring capital expenditures in excess of the budget established by the organization is shown in Figure 1.

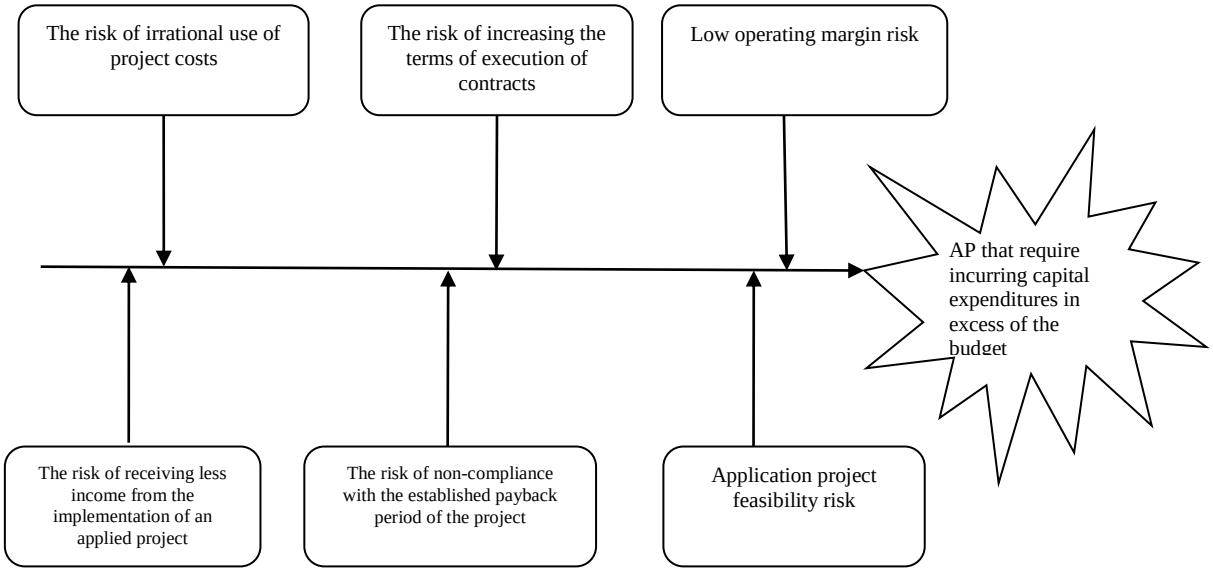

Figure 1. Risks for applied projects requiring capital expenditures in excess of budget
Source: developed by the authors

For the primary analysis of applied projects of all types, a model for determining the degree of risk and the possibility of its occurrence can be proposed. Within the framework of this model, it is proposed to divide the values of risks on a 5-point scale, where 1 - the risk is maximum, 5 - the risk is insignificant. Also, each risk is assigned a weight coefficient, which indicates the importance and significance of this risk for the project and for the financial stability of the enterprise as a whole (Nagy, 2020). Based on the results of applying this multi-criteria method for analyzing the risks of applied projects, it is necessary to calculate the total risk assessment of the project to determine the feasibility of introducing it into the organization's product portfolio.

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The risk of a low level of operating profit margin from the execution of an applied project in excess of the budget indicates an insufficient amount of cash receipts. Each organization independently sets the threshold value of this indicator based on the current position of the company in the market, as well as based on data on changes in environmental factors and risk components.

Figure 2 shows the conditions for scoring the risk factor "operating profit margin" for applied projects in excess of the established budget.

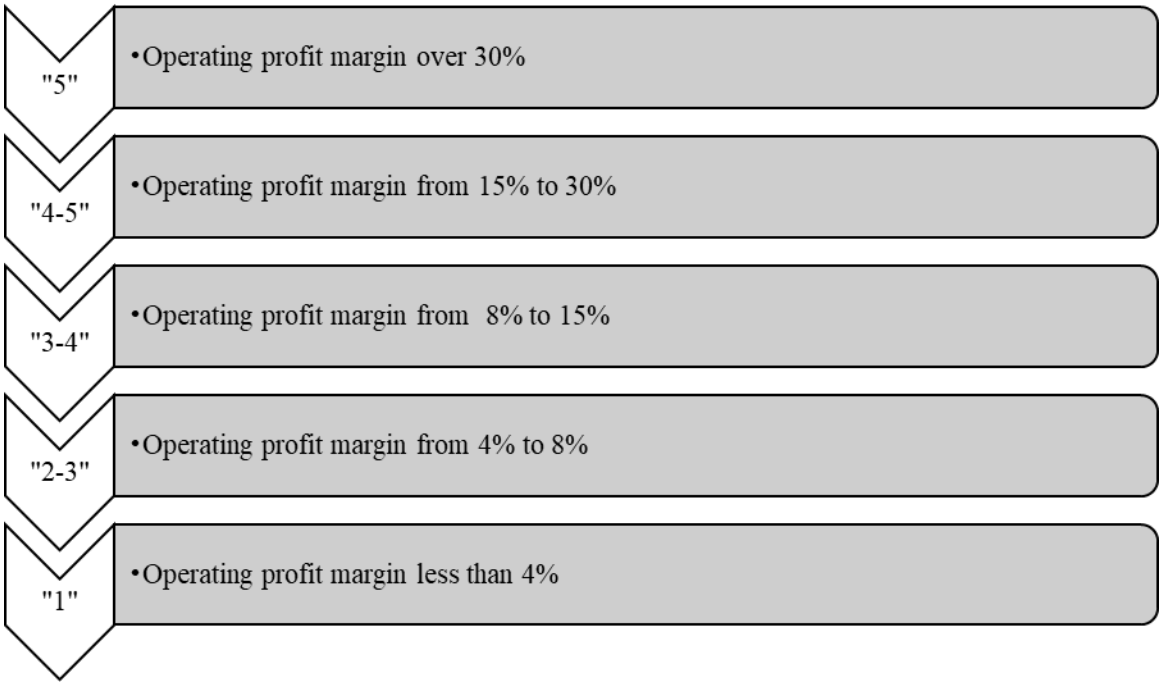

Figure 2. Conditions for scoring the risk factor "operating profit margin" for applied projects requiring capital expenditures in excess of the established budget
Source: developed by the authors

In general, it can be noted that if the level of the operating profit margin is in the range from 10% to 30%, then the effect of the project implementation may be positive and an additional assessment of the possible profitability indicators of the applied project is required. Moreover, based on these values of the operating profit margin, it is necessary to predict the receipt of additional income for the planned implementation period. If the values of the gross margin level are less than 10%, the project should be abandoned or significant changes to the terms of reference of the developed project should be made. However, it should be noted that in cases of special value of an applied project for an organization or for society as a whole, a decision may be made to continue the implementation of this project.

Within the framework of the risk of implementation or feasibility of an application project that requires incurring capital costs in excess of the budget, it is advisable to determine the conditions under which the analyzed application project can be accepted for execution or rejected due to the impossibility of implementation (Wirtz, Müller, Schmidt, 2020).
Figure 3 shows the rules for scoring the feasibility risk factor for projects over budget.

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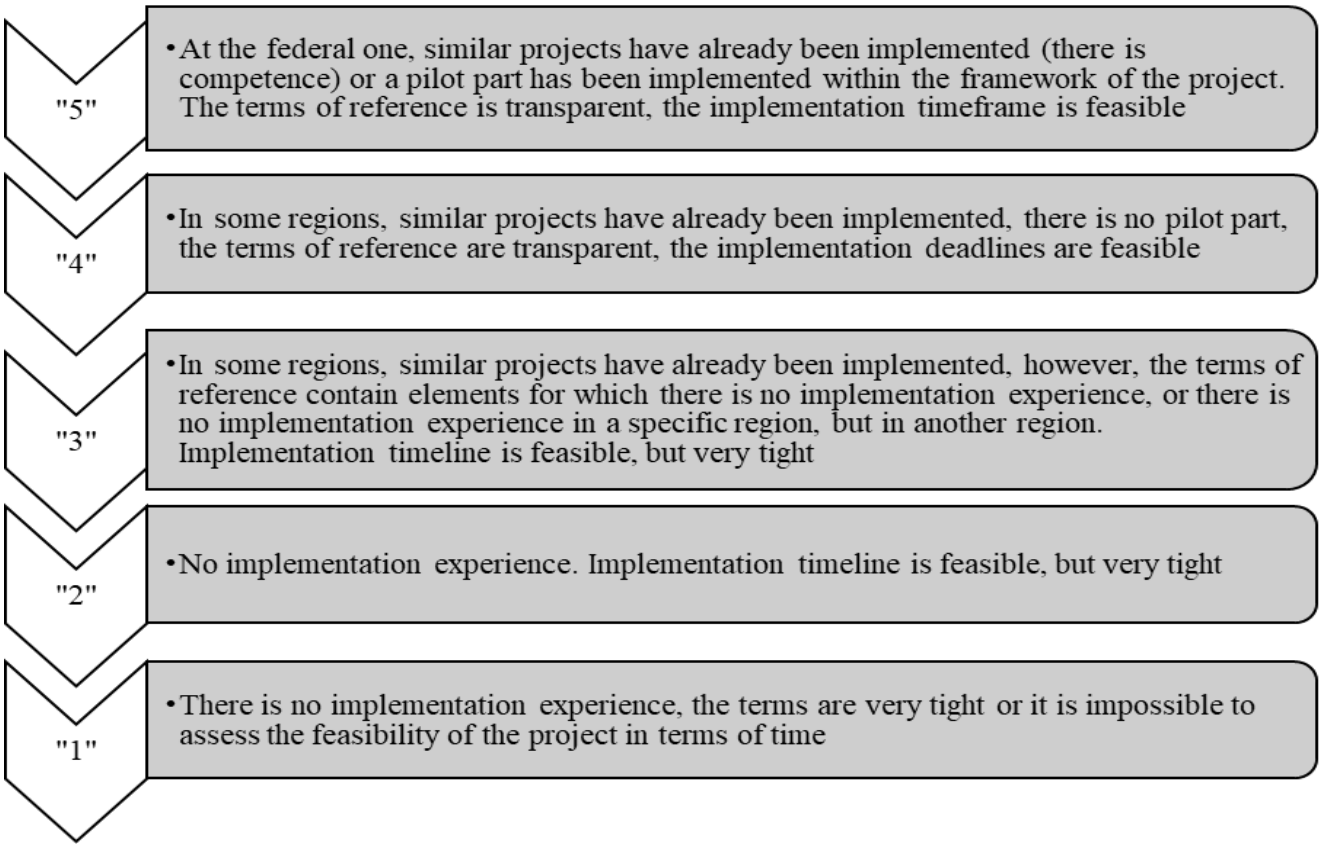

Figure 3. Conditions for scoring the "feasibility of an applied project" risk factor for applied projects requiring capital expenditures in excess of the established budget
Source: developed by the authors

In cases where the organization has experience in the execution of projects of this kind and their economic efficiency and profitability are proven by positive values of the main technical and economic indicators, then this initiative or the project itself can be implemented in the organization's portfolio.

If the pilot part of the applied project has already been implemented in the course of assessing the possible prospects of the project itself as a whole and the results of this implementation did not have a negative impact on the activities of the organization and the implementation conditions were acceptable and acceptable for the selected project, then the above risk cannot be considered significant (Ganichev, Koshovets, 2021). This means that further work with an applied project is possible for this factor. It should also be taken into account that the terms of reference for both the pilot part and the full-fledged project should be worked out in detail to simplify the process of putting into practice and operation. To level this risk factor, the timing of the implementation of the applied project is of great importance. If the terms are feasible, then there is a safety reserve for making a decision to eliminate negative factors affecting the result of work on an applied project.

In the absence of experience in the execution of applied projects in the branches of individual regions, however, there is experience of working with a similar project at the head office and the terms of reference were partially implemented in other regions, feasibility risk of the applied project is reduced. It should be noted that in this case, a qualitative detailed analysis of the experience of project execution, as well as the possibility of applying and adapting the concept to certain conditions in which it is planned to work with this applied project, should be

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carried out. Moreover, the time frame for implementation should be sufficient to make it possible to promptly make changes to the current terms of reference for the most productive and efficient execution of projects. The most undesirable result of working with the risk of feasibility of an applied project is a complete lack of experience in project execution and a very long payback period, the presence of which contributes to the receipt of negative cash flows from the implementation of such projects. In this case, a change in the plan or a complete refusal to work on this applied project is most acceptable. However, it should be noted that the high significance of this or that project for the further development of the organization, which does not exclude additional research on the feasibility and effectiveness of the development of an applied project.

The risk of an increase in the terms of execution of a profitable contract is directly related to the indicator of the payback period of applied projects. To eliminate difficulties with the discrepancy between the terms of the contractual relationship and the payback period of the applied project, it is necessary to take into account the following conditions, which are presented in Figure 4. Using these rules for scoring the above risk factor, the organization can fully make decisions on the methods and tools for project execution, taking into account possible negative influences from the external environment from the position of this risk.

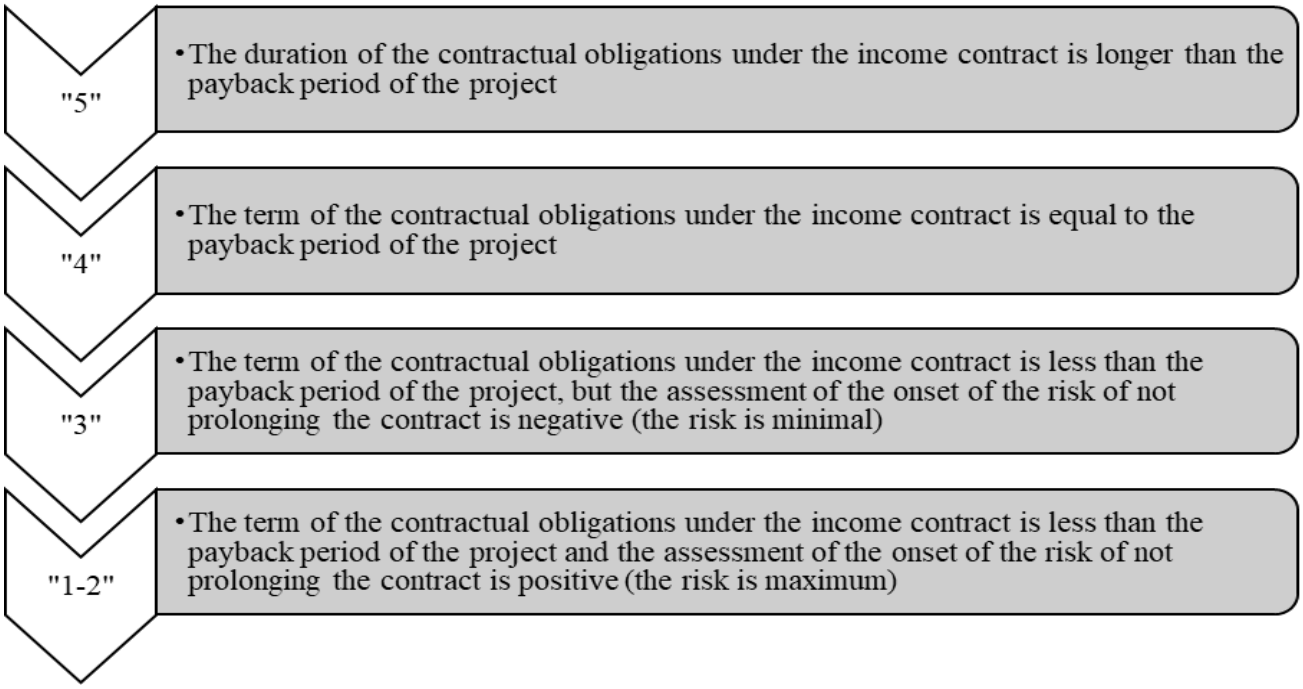

Figure 4. Conditions for scoring the risk factor "increase in the terms of execution of contracts" for applied projects that require incurring capital expenditures in excess of the established budget
Source: developed by the authors

The most preferable is the situation when the term of the contract significantly exceeds the payback period of the applied project. In this case, the project can be implemented in its original form without introducing fundamental changes to the structure of the terms of reference. With an increase in the payback period, both through the fault of the organization itself and due to independent circumstances, the risk of an increase in the terms of execution of contracts increases due to the need to combine the payback periods and the terms of profitable contracts in terms of prolongation of contractual obligations. The increase in the terms of the execution of contracts may negatively affect the work with potential customers and interested parties. If such difficulties arise, it is necessary to assess

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the applied projects that require incurring capital costs in excess of the budget established by the organizations. Analysis and evaluation of the effectiveness of the implementation of applied projects can be carried out using the methodology for calculating the net present value. With regard to the identification of this risk, the results of calculating the net present value indicator indicate the feasibility of further work with an applied project or an unequivocal refusal to execute it.

Payback time is one of the most important metrics for evaluating performance for application projects requiring capital expenditures, especially over budget. An increase in the payback period of an applied project can cause a loss of profitability from its implementation. Analysis of the possible time interval for the payback of an applied project allows the organization, as well as all interested parties, to make a decision about the viability of the applied project and the optimal timing of obtaining a financial result from its implementation. Positive cash flows that are remote from the fact of the beginning of the implementation of an applied project do not lend themselves well to accurate forecasting, which means they are more risky compared to receipts at the initial stages (Taburchak, Tebekin, Petrov, 2020b). Therefore, the shorter the payback period, the less risky an applied project can be considered. Moreover, applied projects are implemented in sectors of the digital economy that are subject to rapid technical and technological changes with a high degree of probability. This means that the management of the organization is interested, first of all, not in the profitability of the applied project, but in the liquidity of capital investments, that is, in accelerating the terms of recovering investments in the project. (Taburchak, Tebekin, Petrov, 2020a). Thus, the determination of the approximate payback period of an applied project is an integral procedure for analyzing the effectiveness of the execution of an applied project. From the point of view of assessing the possibility of the occurrence of this risk, one can consider the conditions for issuing estimates for it. The conditions for setting assessments for the risk factor “failure to comply with the established payback periods of the project” are shown in Figure 5.

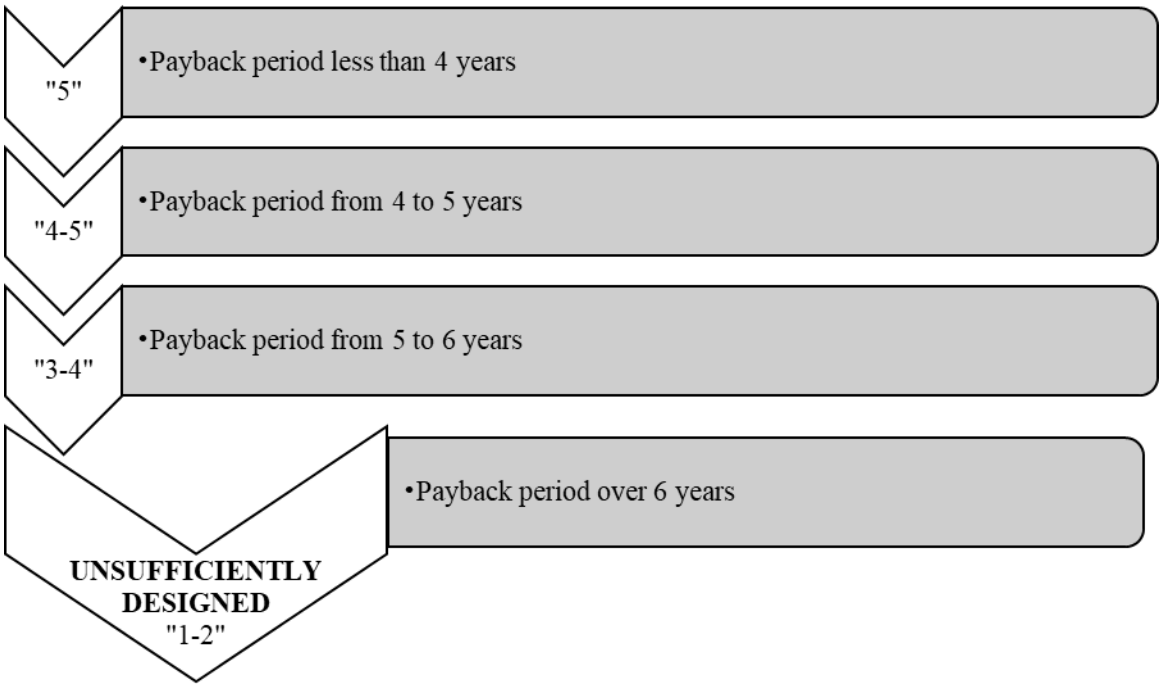

Figure 5. Conditions for scoring the risk factor "failure to comply with the established payback period" for applied projects requiring capital expenditures in excess of the established budget
Source: developed by the authors

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If the payback period of the applied project is less than 4 years, then this project can be unambiguously accepted for execution, since the probability of occurrence of super-risks is relatively low, therefore, the planning and implementation of the applied project can be considered reasonable and expedient.

If the payback period exceeds 6 years, then this project in the long term will not be effective and desirable for implementation. In this case, it is required to change any aspects of the formation of an applied project due to the impossibility of application and implementation in the proposed form on the current market conditions. After the adjustment, the applied project is again sent for re-analysis and examination. It can also be either agreed and accepted for work, or sent for additional correction, or rejected.

If the project is completely unsuitable, a decision is made to refuse implementation due to excessively high risks of both economic and legal nature (Osipov, Yudina, Geliskhanov, 2019). The analyzed project can bring additional costs to the company, even unreasonable ones, which can adversely affect the dynamics of the organization's life cycle.

When assessing the risk factor "payback period", it is necessary to apply the scenario method. Organizations need to develop coherently consistent scenarios based on combinations of key driving forces. The digital economy offers more and more new forms and methods of implementing business processes and changes in the conditions of their implementation.

Therefore, it is advisable, within the framework of the analysis of this risk for applied projects, to consider 3 possible scenarios for the development of events: pessimistic, realistic and optimistic in order to obtain a comprehensive picture and possible forecasting of results. Based on the comparison of the results of all three scenarios, the management of the organization can make competent management decisions regarding the likelihood of risks occurring in a particular scenario. Decision making should be based on the availability of resources and reserves to continue working on applied projects, taking into account the possibility of adverse market conditions. In the event of a pessimistic scenario, as a result of work on the projects under consideration, there will be no margin of safety for obtaining positive results from the implementation of applied projects.

The risk of irrational use of project costs arises if the organization does not have experience of practical work with this kind of applied projects or in the main technical documentation there is no full specification of all stages of development, execution and further maintenance with the obligatory clarification of the units responsible for each stage (Ivanov, Malinetskiy, 2017).

Figure 6 shows the main conditions for scoring to analyze the risk of misuse of costs for applied projects that require capital expenditures in excess of the budget.

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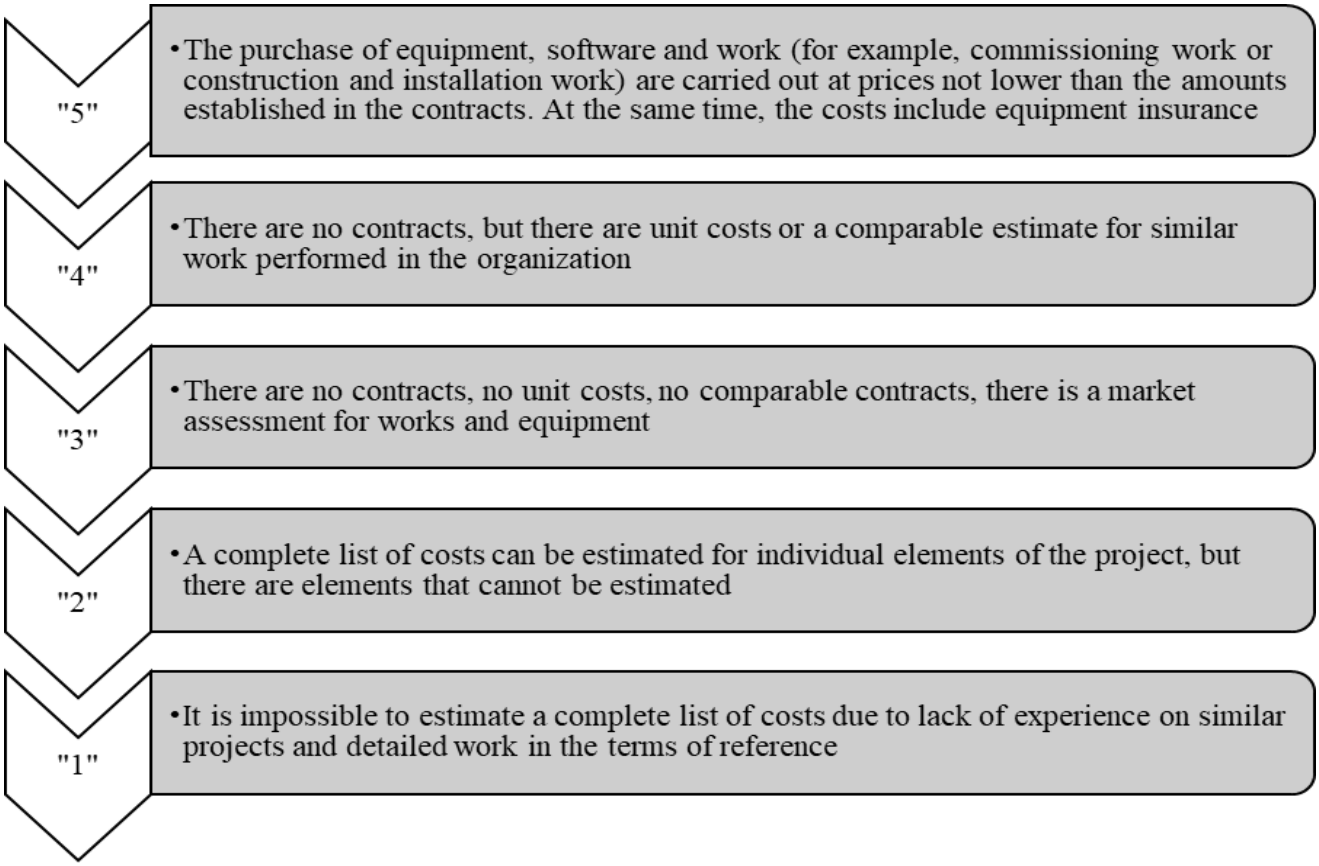

Figure 6. Conditions for scoring according to the risk factor of "irrational use of project costs" for applied projects requiring capital expenditures in excess of the established budget
Source: developed by the authors

In the absence of experience with the project, the organization can analyze and make a forecast of changes in the main technical and economic indicators (including the amount of costs for each event) of the organization from the implementation of this project, in this case the likelihood of the risk of irrational use of costs is noticeably reduced.

The degree of an increase in the likelihood of the occurrence of the risk factor of irrational use of project costs directly depends on the organization's ability to determine the exact cost and amount of all costs both for development and for the execution and support of an applied project at all stages of its life cycle. The risk is considered minimal for the organization in the case when the sum of all possible costs are determined and fixed by contractual obligations. The costs include software, equipment required to create an application project, commissioning, and so on. Moreover, it should be noted that the prices at which the necessary equipment and tools are purchased must not be lower than those specified in the contract. In the case when the contract takes into account not only the minimum costs for the purchase of equipment and components, but also their insurance, as well as the cost of spare parts in case of equipment failure or its modernization.

The risk of not receiving income from the implementation of an applied project directly depends on such components as various sources of income generation. If positive cash flows from the implementation of an applied project are based on fixed guaranteed payments, the amount of which is established by contractual obligations, for example, lease payments, then the above risk is minimal and does not affect the activities of the organization.

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The main conditions for assessing the risk of losing income from the execution of applied projects are presented in Figure 7.

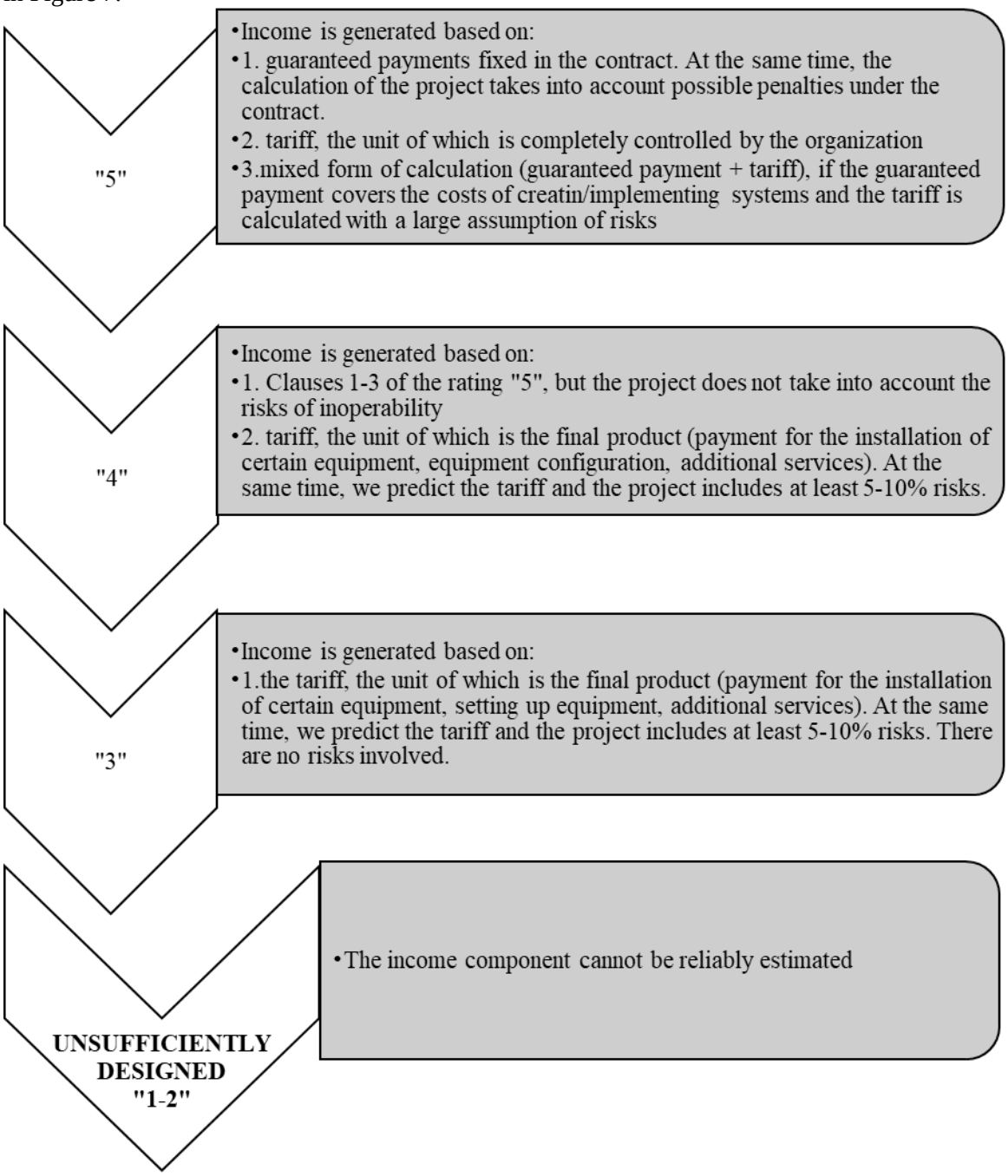

Figure 7. Conditions for scoring the risk factor of "shortfall in income from sales" for applied projects requiring capital expenditures in excess of the established budget
Source: developed by the authors

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The likelihood of a negative impact on the organization's activities from the risk of income shortfall increases proportionally with a decrease in confidence in the planned results of work with an applied project (Pakhomov, 2021). The projected profitability indicators of the organization must take into account a certain safety margin, that is, the risks of loss of profitability in an amount that is safe for the further uninterrupted operation of the organization as a whole should be included in the revenue component of the implementation of applied projects.
The above-described set of risk factors for application projects that require investment of capital costs in excess of the budget established by the organization is not final and can be changed or supplemented for a specific application project, since their specificity may cause the current models of work to be adapted in accordance with current conditions.
Table 1 presents a model for analyzing and assessing risks for projects requiring capital investments in excess of budget.

Table 1. Model for the analysis of risk factors for applied projects requiring capital investments in excess of the budget established by the organization

Risk factor	The weight	Grade					Total
		1	2	3	4	5	
Low operating profit margins	0,20						
Application project feasibility risk	0,15						
The risk of an increase in the terms of execution of the contract	0,15						
The risk of non-compliance with the established payback period of the project	0,15	-	-				
Risk of misallocation of project costs	0,20						
The risk of receiving less income from sales	0,15	-	-				
Overall project risk assessment							

Source: developed by the authors

Risks that have been identified for application projects requiring capital expenditures in excess of budget are ranked according to the likelihood of their occurrence.
Each risk is assigned a weight coefficient, which indicates the importance and significance of this risk for the project and for the financial stability of the enterprise as a whole. Weighting factors are set individually by organization, depending on the specific features of each analyzed application project.
Table 1 shows examples of the application of weights for various risk factors for applied projects that require capital investments in excess of the established budget.
After receiving the results of the summary risk assessment of the project, the organization's management decides on the possibilities of working on this applied project in the current economic conditions.

4. Analysis and assessment of risk factors for applied projects requiring capital expenditures within the budget of the organization

Risks for application projects requiring on-budget capital expenditures are partially identical to those for over-budget projects. However, it should be noted that the degree of possible emergence of risk factors for this category of projects is less high. (Viola, Rainer, 2021) This is due to the fact that financing of projects is carried out only at the expense of the internal funds of the enterprise and does not require the investment of borrowed funds. Therefore, the risks associated with investing do not have a decisive influence on the development and execution of such projects.

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Risks for application projects requiring capital expenditures within the established budget are presented in Figure 8.

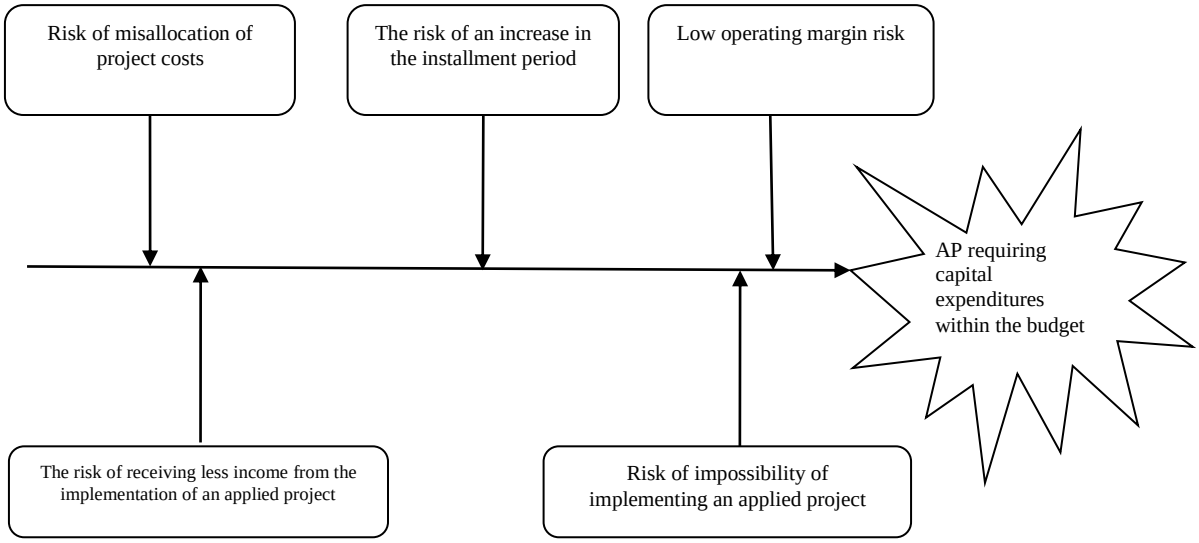

Figure 8. Risks for applied projects requiring capital expenditures within the established budget
*Source***:** developed by the authors

For projects implemented within the budget, the risk of a low level of operating profit, the risk of the impossibility of implementing an applied project, the risk of irrational use of project costs, the risk of not receiving income from the implementation of an applied project coincide with the risks of projects in excess of the established budget.

The risk of an increase in the installment plan period may have an adverse effect both on the developed application project within the budget, and on the forecast technical and economic indicators of the organization as a whole. (Novikova, 2009). Since applied projects requiring capital expenditures are large-scale in nature and their implementation affects the entire work of the organization, any changes from the point of view of creation, maintenance can affect the entire company.

The conditions for scoring the risk factor "increase in the installment plan" for applied projects requiring capital expenditures within the established budget are shown in Figure 9.

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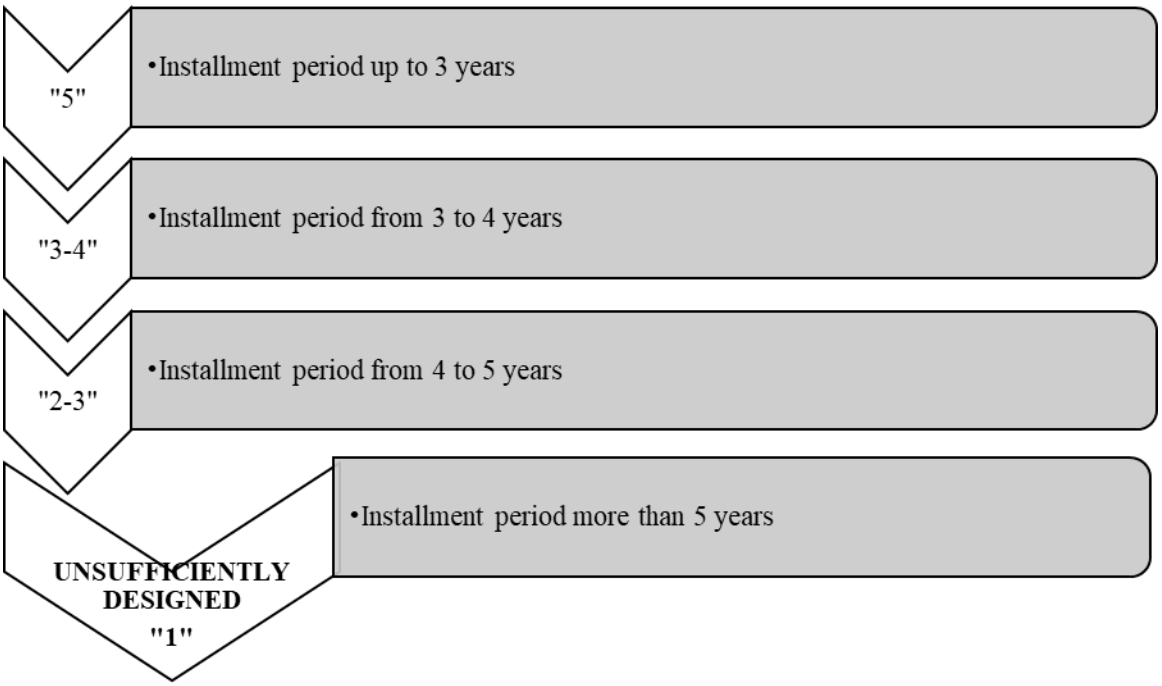

Figure 9. Conditions for scoring the risk factor "increase in the installment plan" for applied projects requiring capital expenditures within the established budget
Source: developed by the authors

If, for the applied project under consideration, the installment period does not exceed 3 years, then the above risk is not critical and does not have a strong impact on the technical and economic indicators. The installment period of more than 5 years does not allow the organization to work with an applied project, since in the long term this risk can become critical and the likelihood of economic losses is very high. In this case, the organization's management may decide to refuse to work with such a project. In accordance with the conditions presented in Figure 9, the risk is considered acceptable when the installment period is from 3 to 5 years.

Table 2 presents a model for analyzing and assessing risks for projects requiring capital investments within the budget established in the organization, within which estimates are given for each value of the applied project.

Table 2. Risk analysis model for applied projects requiring capital expenditures within the budget

Risk factor	The weight	Grade					Total
		1	2	3	4	5	
Low operating profit margins	0,2						
Risk of impossibility of implementing an applied project	0,15						
The risk of an increase in the installment period	0,3	-					
Risk of misallocation of project costs	0,2						
The risk of receiving less income from sales	0,15	-	-				
Overall project risk assessment							

Source: developed by the authors

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In the model for the analysis of risk factors for applied projects that require investment of capital costs within the budget, as in the model presented in Table 1, the weighting factors are set based on the specifics of working with a specific applied project.

After calculating risk indicators for applied projects within the budget and having received the primary result of the planned efficiency of work with applied projects, the organization necessarily conducts an additional analysis to confirm the assumptions obtained during this assessment regarding the specific features of working with AP.

5. Analysis and assessment of risk factors for applied projects that require incurring operating costs

Applied projects that require the organization to incur operating costs are not of particular importance for the organization's business as a whole, therefore, the analysis and assessment of risks is carried out after the study of risk factors for applied projects that require capital expenditures for their execution. Operational application projects are coordinated in most cases at the level of the management of the responsible unit, since they only affect the current costs of providing support processes for creating application projects. Such costs can be called ordinary, everyday, not carrying radical changes in the organization's budget.
Risks for application projects requiring operational costs are presented in Figure 10.

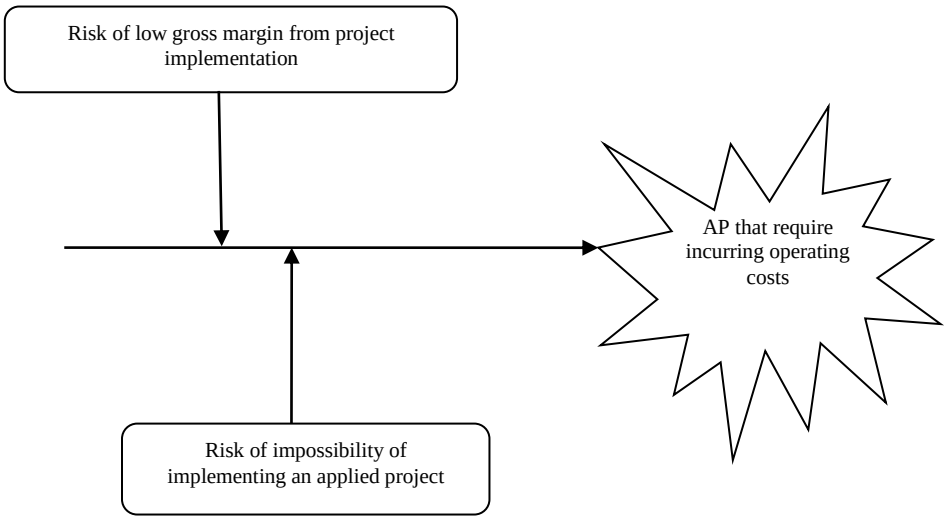

Figure 10. Risks for applied projects requiring operational costs
Source: developed by the authors

One of the risks for operational applied projects is an insufficiently high level of gross margin values from their implementation. The minimum acceptable level of gross margin is set in the organization at regular intervals (Rujoiu, 2019). This threshold value is set by the organization independently and is included in the budget for the billing period, based on the specific features of each developed application project, the internal state of the organization and the external environment. Therefore, other things being equal, a larger gross margin is the most preferable. The higher the actual value of this indicator in comparison with the minimum value, the more profitable and expedient for execution the operational applied project (Sviridenko, 2017). A positive value indicates the stability and sustainability of the financial component of the organization as a whole. When this category of projects has been implemented for more than one year, the planned values for approval in the

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organization's budget are also formed under the influence of the average level of gross margin in this sector of the digital economy.
The conditions for assessing the risk factor “low level of gross margin from project implementation” for applied projects requiring incurring operating costs are presented in Figure 11.

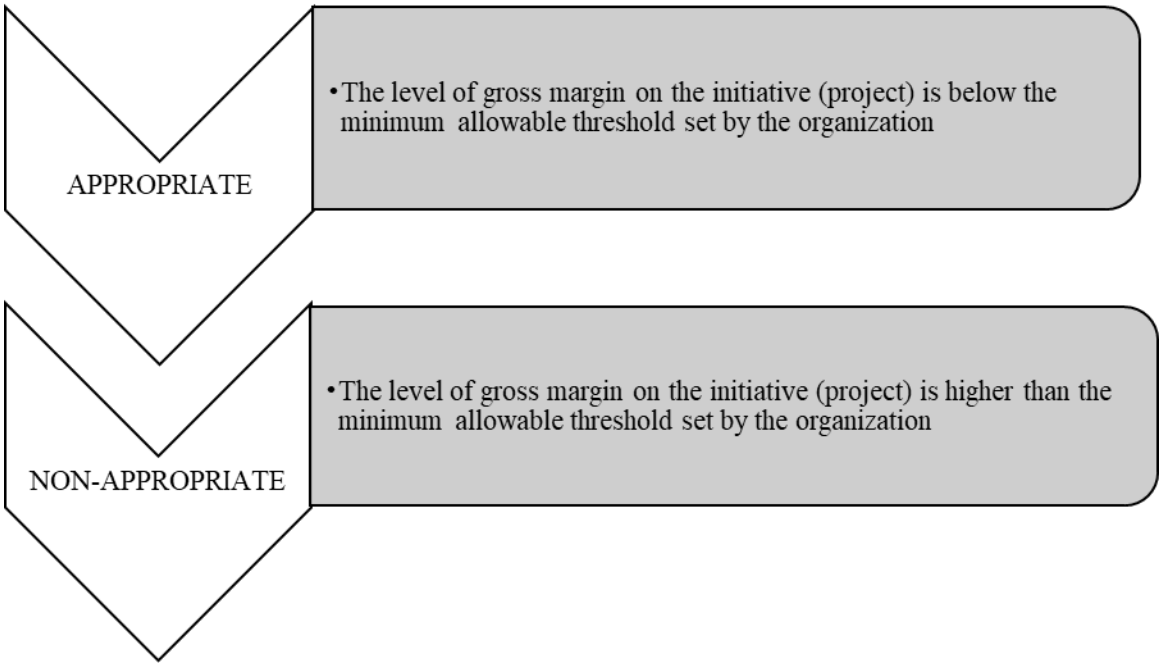

Figure 11. Conditions for scoring the risk factor "low level of gross margin from project implementation" for applied projects that require incurring operating costs
Source: developed by the authors

The risk of the impossibility of executing operational applied projects consists in identifying a number of factors that impede the development of applied projects. This factor is, first of all, the ability of the organization to fulfill all obligations to business partners within the terms established by contractual obligations. If the project cannot be fully implemented or there are difficulties in implementation and the terms of practical implementation increase, then the risk of impossibility of implementation may become critical. In case of significant values of the risk of impracticability, it is advisable to completely abandon this project or send it for revision and re-examination of the revised terms of reference for assessing this risk.

The conditions for scoring the risk factor "impossibility of implementing an applied project" for applied projects requiring incurring operating costs are shown in Figure 12.

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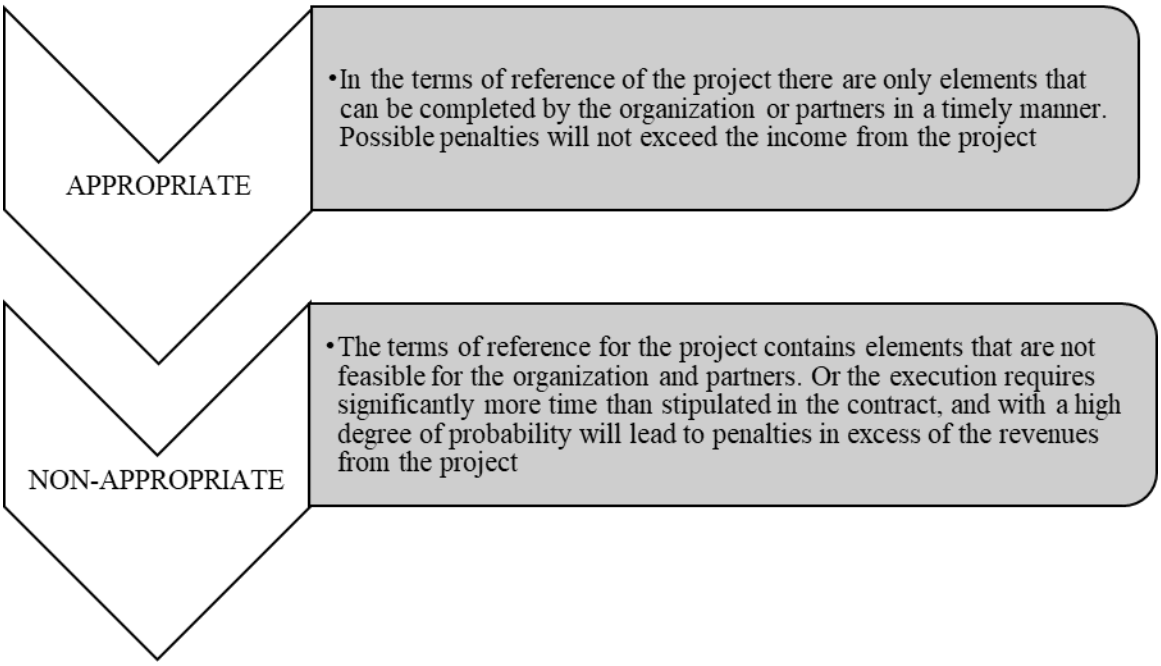

Figure 12. Conditions for scoring the risk factor "impossibility of implementing an applied project" for applied projects that require incurring operating costs
Source: developed by the authors

In the case when the prolongation of the terms is the reason for the imposition of fines or sanctions in the direction of the organization developing the applied project, it is necessary to conduct an analysis and comparative assessment of the compliance of the forecast profitability and possible penalties. The risk can be considered insignificant if the income exceeds the possible economic loss.
Table 3 presents a model for analyzing and assessing risks for projects that require an investment of operating costs.

Table 3. Model for the analysis of risk factors for applied projects that require incurring operating costs

Risk factor	Grade	
Risk of low gross margin from project implementation	Gross margin level does not match NON-APPROPRIATE	The gross margin level corresponds to APPROPRIATE
Risks of impossibility of implementing an applied project	The risk is high NON-APPROPRIATE	Medium to low risk APPROPRIATE

Source: developed by the authors

The risk analysis model presented above does not take into account the weights of factors for the assessment, since both risk data are, on an equal basis, the most decisive for determining the feasibility of implementing a project. As in the models designed for projects requiring capital investment, the presence of at least one risk with a critical value for an operational project indicates the need to abandon implementation.

6. Practical implementation of the proposed methodology for the Smart City applied project

The applied project, which was selected as the object of research, is being implemented by an organization operating in the telecommunications industry - the Applied project "Smart City", including Electronic Government" (hereinafter referred to as the "Smart City") of PJSC Rostelecom.
PJSC "Rostelecom" is actively pursuing the development of applied projects within the telecommunications industry as part of its strategy. PJSC Rostelecom is implementingthe development of Smart Cities, which include

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a set of smart solutions that allow a city to be called “smart”. The Smart City project includes various systems for monitoring, analysis, forecasting, and management of almost all types of risks and possible threats typical of a particular city and urban infrastructure (Taburchak, Bychkova, Butina, 2019). As an example of innovative solutions as part of this project, one can single out "Video surveillance", "Smart intercom", "Digital accounting of utilities", "Smart barrier", "Smart home", "Safe roads", "Warning systems", "Electronic education "," Smart lighting ", etc.

Applying the classification of applied projects described in clause 1.1 of this study, the “Smart City” applied project of PJSC “Rostelecom” can be classified as applied projects requiring capital expenditures for development and implementation in excess of the established budget.

The risk factors analysis model for the Smart City applied project is presented in Table 4.

Table 4. Model of analysis of risk factors for the applied project "Smart City"

Risk factor	The weight	Grade					Total
		1	2	3	4	5	
Low operating profit margins	0,20			**3** (5,49%)			0,6
Application project feasibility risk	0,15					**5** (yes)	0,75
The risk of an increase in the terms of execution of the contract	0,15					**5** (yes)	0,75
The risk of non-compliance with the established payback period of the project	0,15	-	-		**4** (4,33 years)		0,6
Risk of misallocation of project costs	0,20					**5** (yes)	1
The risk of receiving less income from sales	0,15	-	-			**5** (yes)	0,75
Overall project risk assessment							4,45

Source: developed by the authors

The total risk assessment for an applied project can vary in the range from 1 to 5. The results of the construction of the above model are based on the statistical reports of PJSC Rostelecom for 2020.

In general, the value of the total assessment of the risk factors of the “Smart City” project was 4.45 points. This means that the risks are for the most part not critical from the point of view of their possible appearance and the strength of the impact both directly on the applied project itself and on the activities of the organization. The materiality of the risks was determined based on the weighting factors for each risk factor. The risk of a low operating profit margin has the most negative impact on the development and execution of the selected applied project. For the “Smart City” applied project, the value of this factor was estimated at 3. As a recommendation for leveling the above risk, one can single out the need to build rational forecasts for obtaining positive cash flows. Another risk that may subsequently become tangible for the organization was the risk of non-compliance with the established payback periods of applied projects in excess of the established budget. At the time of the calculations, the payback period for the “Smart City” applied project was 4.33 years. From the point of view of business processes, such a payback period is acceptable for any organization. However, this project is being implemented in the context of the development of the digital economy, therefore, the uncertainty and risk of occurrence increase significantly in proportion to the increase in the duration of this applied project. The rest of the risks at the time of the calculations do not affect the organization, which does not mean that one should not ignore their ability to force the current and forecast performance indicators of this applied project to be adjusted.

This applied project is significant for business and society as a whole, as it contributes to the development of informatization and digitalization, therefore, the feasibility of implementing the project is beyond doubt.

Conclusions

Within the framework of the execution of applied projects, various categories can be distinguished, depending on the costs incurred by the organization. Each category of applied projects has specific risks that, to a greater or lesser extent, restrict an enterprise's ability to implement projects. Prioritization of applied projects is required, taking into account the applicable risk factors by type of applied project (Karen Elliott et al., 2021). There are also risk values that, at the stage of evaluating applied projects, can unambiguously signal the inexpediency of considering the possibility of implementing applied projects in the existing form without any changes. (Buteau, Sharon, Rao, Preethi, Valenti, Fabrizio, 2021).

A methodology for analyzing and assessing risks by types of applied projects has been developed. Depending on the type of applied project, the set of risk factors changes, since the larger the scale of a particular project, the larger the horizon for analysis and planning of development and implementation, the higher the likelihood of risk occurrence (Pan'shin, 2016). For each type of applied project, a set of universal risk factors is proposed that can be adapted to the needs of a particular firm. By analyzing these factors, the organization receives operational information regarding the threats and difficulties in the implementation of applied projects from the market and the digital economy as a whole.

The developed methodology for analyzing the risks arising for an organization during the execution of applied projects makes it possible to analyze, rank and identify the risk factors of the digital economy that most affect the organization's activities. In this case, it is necessary to take into account the importance of each factor for the financial condition of the company.

Despite the relevance and obvious advantages of the proposed methodology for analyzing and assessing the risk factors of various types of applied projects, it should be noted the limitations that can affect the work with projects in general. As such restrictions, one can single out a high probability of changes in environmental conditions and the need for prompt adaptation of existing analytical mechanisms. You should also pay attention to the significant speed of improvement of technologies and tools for analyzing applied projects. All of these limitations and difficulties contribute to motivating and energizing organizations when working with innovative products such as applied projects.

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FINANCIALIZATION: CURSE OR SALVATION? THE CASE OF LATVIA, A SMALL AND POST-TRANSITION ECONOMY*

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Abstract. The role of financial sector has increased significantly since the 1980s, introducing a new term or phenomenon i.e. the financialization of the economy. There is still some imprecision about the nature and dynamics of financialization, including its impact on the economy. The main task of the financial sector is to allocate funds for its most productive use, while ensuring sustainable development. Recent studies show that excessive financial deepening negatively impacts the economies of developed countries, but is this true for post-transition economies? The aim of this paper is to look into the relationship between financialization and the state of a small and post-transition economy, the Latvian economy. Using a European database and methodological framework we analyze this relationship in Latvia between 1999Q1 and 2017Q4. In our study, we apply the standard Vector Auto-Regressive model (VAR). Our research results do not indicate that financialization causes significant changes in the state of the Latvian economy. The interpretation of this result is related to the degree of financial deepening in Latvia.

Keywords: financialization; post-transition economy; sustainable development; small and open economy; economic policy

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JEL Classifications: G2; F63; F65; F43; P20

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1. Introduction

Financialization is a relatively new term that encompasses such a wide range of phenomena that it is difficult to give a precise definition. This term is most often used by researchers and economists trying to understand the contemporary rise of finance and its powerful role. Finance and technology have had a profound influence on our everyday life as a consequence of financialisation. A financial market's expansion is not just about the increase in volume, but also about the diversity of transactions and actors on the market and their exposure to all types of economic and societal elements. It is important to understand the term "financialization" as a radical change within the financial market that has affected whole economies, from households to business, to real markets and monetary systems. Financialisation is multifaceted. The Jamaica Accords greatly facilitated the movement of funds across borders, and internal restrictions on financial flows were eased. As a result, it became easier for banks to lend and borrow, creating the potential for unlimited liquidity. The variety of financial instruments offered by financial institutions and their clients is becoming more and more diversified as institutions and clients are constantly looking for new profit opportunities. Moreover, thanks to the Internet and FinTech, more people have access to the financial market than ever before.

The COVID-19 crisis has placed government finances under strains since the governements support costs (health care, protection of firms from bankruptcy and wages of employes, protection of unployees) that conduct to an upward on bond issuance and give further impetus to the scale growth of the global financial markets (Lysandrou and Ranjbaran, 2021). The debt-based financial chains contribute to exacerbate existing economic and social disparities (Sokol and Pataccini, 2020). Finally, nowadays concerns about environmental sustainability can not be separated from financial development since there can exist a long run association (positive) between economic development (GDP per capita) and financial development (Nasir et al., 2021).

However, despite the increasing importance of financialization in our daily life, there is still no clear consensus about its impact on the economy. Much of the macroeconomic literature on financialization concerns the impact of financialization on economic growth, investment, productivity growth, employment, stability and income distribution. This literature has assessed the impact of an evolving financial sector on advanced economies and some developing countries. However, it fails to address the peculiar features of financialization in small and post-transition economies. Even if, following the classification of international institutions as IMF, OECD, UNCTAD, Latvia became an advanced or developed economy by joining the EU and the Euro area, it seems more accurate to characterize Latvia as a post-transition economy due to the essential and fast movement from a centrally planned economy to a market economy. Only three countries from the Soviet Union joined the European Union, which provided a powerful incentive for reforms and led to the liberalization and deregulation of the financial system, with the formation of banking sector and conditions that allowed the development of financialization. Latvia's uniqueness lies in its geographical and geopolitical position; it is also part of the European Single Market, and on the other hand, it is located close to the Nordic countries and the Commonwealth of Independent Countries. The literature on financialization in small and post-transition economies is relatively new, and to the best of the authors' knowledge, it lacks systematic research and a rigorous theoretical framework, hence we are trying to fill this gap.

This research aims to look into the relationship between financialization and the state of the Latvian economy (a small and post-transition economy). We also seek to understand its strength of influence, namely, when the financialization variables reach their original levels after a shock. Since the measurement of financialization is still an issue in the literature, we propose less explored measures of financialization that allow to capture the input and the output side of this process. Despite the lack of a clear consensus regarding the precise definition of the financialization process, this phenomenon needs to be evaluated. The most traditional measure is the ratio of financial assets or banking assets to GDP (Battiston, 2018; Mhadhbi, 2014). Other popular proxies are the gross value added of financial activities, the size of the economy's banking sector (loans, deposits, and bank

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concentration ratio), short-term and long-term interest rates; stock market capitalization and volume traded, and many other indicators (Assa, 2012; R. Barradas, 2018; R. Barradas, Lagoa, S., Leão, E., Mamede, R. P., 2018; Mhadhbi, 2014; Pagano, 2014; Svilokos, 2017).

One of the most important issues in assessing the relationship between financialization and economy is how to obtain a satisfactory empirical measure of financialization. Based on the literature review, we selected two variables to measure the financialization:
1. share of employment in the financial sector of the economically active population (L); it represents the workforce employed in the financial sector and represents a proxy of financialization (Assa, 2012; Svilokos, 2017);
2. financial sector real assets per capita at constant (2016Q4) prices (A); this variable relates the value of the assets of the financial sector (financial sector size) to the size of the population, as a proxy of financialization.
We suppose these proxies are better indicators of financialization of small and post-transition economies because they capture the effect of modern growth, which many consider more unequal at present.
The literature review shows that there is no clear answer about the effect of financialization on the state of the economy, especially in the case of small and post-transition economy. We contribute to this strand of literature with the study of the Latvian economy and while using new measures of financialization.

We apply a VAR model and analyze impulse response functions and the error decomposition variance to find the effects of the selected financialization variables in the state of the Latvian economy. The empirical evidence does not support that financialization causes significant changes in the economy of Latvia which is compatible with the balanced level of financialization revealed by this economy. This can be explained by the fact that Latvia may not yet have reached the level of excessive financial deepening, the point beyond which the financial sector is damaging the economy. We cannot confirm the positive impact of finance on the state of economy, but we found that GDP per capita in Latvia affects financial asset values and employment in the financial sector. We also discovered that proxies of financialization (employment (2.3%) and assets in the financial sector (7%), in total about 9.3%, can be used to forecast the state of the economy in the long-time horizon.

The remainder of this paper is organized in the following manner. In Section 2, we present the theoretical background and set up the hypothesis we want to test econometrically. In Section 3 we analyze the key statistical facts that have been associated with the financialization process in Latvia. In section 4 we present the data and the econometric approach. Section 5 analyzes and discusses the results and section 6 contains conclusions.

2. Theoretical background

The literature on financialization has focused on two important questions. The first is the definition and measurement of financialization and the second is the role that financialization plays in the economy. Kim (2013) and Wisniewski (2012) see financialization as a process in which the financial markets, institutions and elites are gaining increasing influence in economic policy and economic performance. According to Seccareccia (2012), it takes over the leading role in the economic systems through the financial markets based so far on bank financing. Among the main sources of financialization are listed the deregulation of the financial system, the processes of concentration in the financial sector, the increasing size and share of institutional investors in the financial market, and the dominance of the neoliberal model of monetary, fiscal and economic policies (Tomaskovic-Devey, 2012). Barradas (2016) argues that the liberalization and deregulation of the financial sector, accompanied by the idea, supported by empirical findings, that financial development contributes positively to economic growth contributed to excessive financial deepening. According to Palley (2007), the causes and sources of financialization can be found in the process of transformation of the financial sector's interests. They drive changes in the structure and functioning of financial markets, solutions for socio-economic policy, as well as the

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behavior of companies. These causes of financialization are called leading channels of distribution. Between these channels, there are interactions based on a feedback mechanism.

Adams and Glück (2015) note that the distribution effects of financialization are the basis of economic growth. They help to change the behavior of companies and households, which are caused by the growth of significance of the financial sector. Ease of obtaining credit money led to the development of the real estate market, which has a positive impact on economic growth. King and Levine (1993a) assert that financial markets facilitate the financing and the efficient allocation of investment and there is a positive correlation between the development and accumulation, growth and efficiency of financial markets. Beck, Levine and Loayza (2000) argue that the development of financial markets is expected to have a positive impact on growth by fostering an increase in total productivity. Love (2003), Beck and Levine (2004), Gilchrist and Himmelberg (1995), Merton (1995) and Levine (2005) argued that development of financial markets facilitates the efficient allocation of investment resources and alleviates financing constraints of enterprises, which in turn allow them to reach higher levels of efficiency and growth that lead to higher economic growth.

Financialization effects that influence economic growth are also related to the decisions of the central bank and the government as part of the monetary and fiscal policy (policy mix) (Stawska, Mourao, 2021). Monetary and fiscal policy certainly affect economic growth, for example, through the level of investment. Stawska (2012) analyzed the impact of the policy mix on the economy through the investment channel during the 2008-2009 financial crisis in the euro area. Stawska (2012) noted that gross investment declined significantly despite expansionary monetary policy and high government spending. Stawska (2012) associates this observation primarily with the increased level of risk in the euro area financial markets, and not with the failures of policy mix decision-makers. On the other hand, Malinowska (2016) studied the combined impact of monetary policy and public debt on the level of non-financial investments of enterprises in the EU in 1999-2014. She noted the impact of monetary policy on corporate investment in the euro area and that the cash flow generated by corporate-held financial assets could have served as an internal source of investment financing that is heavily influenced by monetary policy.

However, a negative assessment of financialization has followers of heterodox economics (interventionism with views similar to Keynes) see a significant problem in it (Vercelli, 2013). Barradas (2016) reports that financialization has negative impacts on the real economy, economic agents and macroeconomic outcomes, arising from the strong growth of the financial sector. Tomaskovic-Devey, Lin and Meyers (2015) have a negative perception of financialization associated with a fear of over-investment in the financial activity, rather than in the production of goods and services. They believe that this leads to a reduction in overall economic growth and wider social inequalities. The view of the centrality of finance in the modern economy and the separation of finance from real economic output is also accepted by Hardt and Negri (2011). From their perspective financialization shifts the forms of governance from democracy to plutocracy and results in financial pressure of "parasitic" representatives of the financial sphere on legislation and law. Problems associated with the phenomenon of financialization are issues of information asymmetry and the complexity of financial instruments, which make it more difficult to assess the risks involved. Another problem is the real economy that is owned by a growing share of financial entities and the increasing amount of financialization assets in the economies (Wigan, 2009).

Many economists looked into the correlation between the development of the financial market and economic growth, wondering about the cause and the effect. They analyzed data at the level of countries, industries and companies (Beck, 2016; Guiso, 2003; King, 1993a, 1993b; Porta, 1996). Pagano (2014) notes that the impact of financial market development on economic growth exists up to a certain level of the credit to GDP indicator. Above this level not only does it have no positive effect, but also a negative effect can exist (Pagano, 2014). Pagano and Pica (Pagano, 2012), based on data from UNIDO (United Nations Industrial Development

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Organization) on an annual added value of 28 industries and 63 countries covering the period 1970-2003, noted that there is evidence that the development of the financial market is beneficial for economic growth in non-OECD countries because it contributes to an increase in access to finance. Barradas (2018) based on an empirical reassessment of the finance-growth nexus by performing a panel data econometric analysis for all 28 European Union countries from 1990 to 2016, concluded that finance has been detrimental to economic growth in the EU countries. Cecchetti and Kharroubi (2012) studied the complex real effects of financial development and concluded that financial sector size has an inverted U-shaped effect on productivity growth. It means that there is a point where further enlargement of the financial system can reduce real growth. Furthermore, financial sector growth is found to be a drag on productivity growth. They underlined that the financial sector competes with the rest of the economy for scarce resources. Barradas (2020) does not find evidence on the finance-growth nexus for Portugal, except for the stock market capitalisation that seems to impact positively the economic growth. The estimation of non-linear models highlight the existence of a concave/convex quadratic relationship between financial variables/stock market capitalisation and Portuguese economic growth. According to Cecchetti and Kharroubi (2012), financial booms and more finance are generally not growth-enhancing. A summary of the literature review on defining and measuring financialization and its role in the economy is presented in Table 1.

Table 1: Summary of Literature Review

Author	Sample	Title	Source	Findings
King and Levine (1993a)	Cross-section data 80 countries for the period 1960-89	Finance and Growth: Schumpeter Might Be Right	The Quarterly Journal of Economics	The level of a country's financial development helps predict its rate of economic growth for the following 10 to 30 years.
Gilchrist and Himmelberg (1995)	A cash flow framework	Evidence on the role of cash flow for investment	Journal of Monetary Economics	The results clarify the role of cash flow in investment equations and provide support for the existence of a financial accelerator.
Beck, Levine and Loayza (2000)	Data for 63 countries over 1960-95	Finance and the sources of growth	Journal of Financial Economics	Main findings: (1) financial intermediaries exert a large, positive impact on total factor productivity growth, which feeds through to overall GDP growth and (2) the long-run links between financial intermediary development and both physical capital growth and private savings rates are tenuous.
Beck and Levine (2004)	Panel data set for the period 1976-98	Stock markets, banks, and growth: Panel evidence	Journal of Banking & Finance	Main findings: stock markets and banks positively influence economic growth and these findings are not due to potential biases induced by simultaneity, omitted variables or unobserved country-specific effects.
Palley (2007)	Data set of U.S., 1959-2005.	Financialization: What It Is and Why It Matters	The Levy Economics Institute Working Paper	Financialization operates through three different conduits: changes in the structure and operation of financial markets, changes in the behavior of nonfinancial corporations, and changes in economic policy.
Wigan, (2009)	Theoretical framework	Financialisation and Derivatives: Constructing an Artifice of Indifference	Competition & Change	Financialisation proceeds via the construction of indifference to the exigencies of 'real' economic competition.
Seccareccia (2012)	Canadian macroecinomic data from 1990–2008	Financialization and the transformation of commercial banking: understanding the recent Canadian experience before and during the international financial	Journal of Post Keynesian Economics	Highlights some of the important transformations in the role played by the banking sector in the economy.

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		crisis		
Tomaskovic-Devey (2012)	Data set of U.S., 1998-2009	Income Dynamics, Economic Rents, and the Financialization of the U.S. Economy	American Sociological Review	The institutional and income dynamics are associated with the financialization of the U.S. economy, advancing a sociological explanation of income shifts into the finance sector.
Kim (2013)	Data set of U.S. output and household debt	Household debt, financialization, and macroeconomic performance in the United States, 1951-2009	Journal of Post Keynesian Economics	The authors found structural differences between earlier and later business cycles for the U.S. household sector and its relation to the macroeconomy.
Vercelli (2013)	Theoretical framework	Financialization in a Long-Run Perspective: An Evolutionary Approach	International Journal of Political Economy	This paper argues that there is a secular tendency toward financialization that is intrinsic in the development of market relations.
Adams and Glück (2015)	Daily returns and risk spillovers over the period 1994 to 2013	Financialization in commodity markets: A passing trend or the new normal?	Journal of Banking & Finance	Quantify the impact of financialization on the dependence structure between commodities and stocks
Tomaskovic-Devey, Lin and Meyers (2015)	Data set of U.S., 1970-2008	Did financialization reduce economic growth?	Socio-Economic Review	The declining value added produced by financialization was born most strikingly by labour and the state, while increasing value was channelled to corporate debt and equity holders.
Barradas (2016)	A systematic literature review	Evolution of the financial sector – three different stages: Repression, development and financialisation	Working paper DINÂMIA'CET	The large growth of the financial sector and its deleterious effects are commonly referred as financialisation… it is necessary to engage in definancialisation in order to re-establish a more supportive relationship between the financial sector and economic growth.
Malinowska (2016)	EU macroecinomic data in the 1999–2014 period	The Impact of the Monetary-fiscal Policy Mix and Financialisation on Fixed Asset Investment in the EU in 1999–2014	Argumenta Oeconomica Cracoviensia	Despite the detrimental effects of financialisation, the findings highlight that cash flows generated from the sector's financial assets might serve as an internal source of FAI funding that strongly correlates with monetary contractions.
Shkolnyk, Kozmenko, Kozmenko, Mershchii, (2019)	Panel data Ukraine Moldova, Georgia 2007-2017	The impact of the economy financialization on the level of economic development of the associate EU member	Economics and Sociology	The relationship between economic growth and indicators of financialization of the economies. The fixed-effect regression model, the statistical adequacy of which was confirmed by indicators (R squared coefficients, the Breusch-Pagan test). The examined indicators had a positive influence on economic growth.
Maxime Fajeau (2020)	Cross-country regressions	Too Much Finance or Too Many Weak Instruments?	International Economics	Financial depth tends to affect growth adversely, the relationship between finance and growth may not depend on the unconditional level of financial development but rather on the economy's general level of development.
Matei (2020)	Non-linear dynamic panel models; 11 EE Countries 1995-2016	Is financial development good for economic growth? Empirical insights from emerging European countries	Quantitative Finance and Economics	Financial development produces positive effects on economic growth only in the short-run horizon. Financial development exerts a positive effect on the economic activity until a certain threshold and after that, the link becomes negative).
Zhang, Zhou	Microfounded	Financial Development	The North	In the long run, the welfare maximizing level of

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(2021)	model in a small open economy 52 countries 52 long periods US over 22 years short periods	and Economic Growth in a Microfounded Small Open Economy Model	American Journal of Economics and Finance	financial development is lower than the growth-maximizing level. In the short run, the price channel dominates the quantity-channel (through financial productivity. No country can be an island and it is vital to fight against financial instability with international cooperation.
Wen, Mahmood, Khalid, Zakari (2021)	System GMM estimation technique. Panel: 120 countries, 1997- 2017	The impact of financial development on economic indicators: a dynamic panel data analysis	Economic Research-Ekonomska Istraživanja,	Financial development is found to be positively associated with inflation and employment growth. There is need to reform and strengthen the supervision of financial intermediaries to ensure sound prudential lending practices. Credit needs to be allocated to highly productive firms.

Therefore, we hypothesize as follows:
H1: Change of financialization causes changes in the state of the economy.

As a measure of the state of the economy we use GDP per capita (Y); this variable reflects the general state of the economy and its sustainable development. According to UN Division for Sustainable Development GDP per capita is a very important measure for the economic and developmental aspects of sustainable development, including people's consumption patterns and the use of renewable re-sources. However, the United Nations system currently is developing transparent measurements of progress on sustainable development that go beyond GDP per capita, and that account for the social, economic and environmental dimensions of development (*United Nations, International Cooperation to Accelerate Sustainable Development in Countries and Related Domestic Policies*, 2020). GDP per capita is highly relevant for understanding current well-being, as individuals use their income to purchase all sorts of things that enhance their well-being (*United Nations Economic, Measuring Sustainable Development*, 2009).

Both variables selected to measure the financialization reflect a different aspect. Variable L is related to employment in the financial sector and variable A reflects changes in the size of the financial sector. A literature review suggests that there may be a relationship between financial sector size and sector employment (Cavusoglu et al., 2019; Ernst, 2019; Kaur et al., 2021). Based on the literature analysis, we assume that these variables can also influence each other. The mechanism of the impulse propagation between A and L is also considered in the study, since they carry different information. From the perspective of the production function of the financial sector, both variables represent different factors of the production involved in the production of the financial output. Thus, we also test:
H2: Financialization (A) is significantly responsive to changes in financialization (L)

H3: Financialization (L) is significantly responsive to changes in financialization (A)

To correctly verify the presented hypotheses, it is necessary to take a closer look at the selected key statistical variables and economic processes that took place in Latvia and certainly influenced the studied variables in the discussed period.

3. The evidence of financialization in Latvia

Latvia is a country of the former Soviet Union, with an economy which, starting from the early 1990s, has undergone important transformation and change, especially due to the transition to a market economy. In 2004 and 2014 it joined the EU and the Euro area respectively. The evolution and development of Latvia that started in the 90s is characterized by the following main features: first, the transition from a centrally planned to a market economy in Latvia, together with two other Baltic countries, was extremely fast compared to other former

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republics of the Soviet Union. In 1992 Latvia exited the Russian ruble zone and joined the domestic monetary system. This was supported by the tight budget policy of the government, which led to budgets with a small deficit or even a surplus, and restricted lending to banks from the state bank by increasing interest rates on loans. Secondly, Latvia created its national financial market by the legal framework in Western Europe, faced with the strong development of the banking sector and the privatization of banks, as well as the need to respond to the internal banking crisis in 1994-1995(Rupeika-Apoga & Wendt, 2021). The development of the financial sector was marked by the liberalization of financial services, the cancellation of restrictions on currency exchange and administrative regulation of banks' interest rates, the liberalization of capital and current accounts and the opening of the market to foreign competition.

Thirdly, 1995 marked the beginning of a new era in the banking sector of Latvia, when some foreign banks opened their branches and others became shareholders of Latvian banks. Over the next five years, the assets of commercial banks grew by an average of 28%. The expansion of the activities of foreign banks in Latvia was accompanied by a sharp increase in the lending rate, banks were able to issue loans in larger amounts and attract domestic deposits. In the period between 2000 and 2004, loans to residents increased from 20% to 50% of GDP, with a rise in the loan to deposit ratio from 1,0 to 1,7, and about 40% of all bank loans financed with foreign capital (Bitans, 2012). Growth occurred in all categories of loans, but the main growth was due to mortgage loans: the share of mortgage loans in the total volume of loans for this period increased from 10.9% to 32.4%, as a result of which mortgage loans became the main category of loans.

Fourth, due to the historical and geopolitical situation in Latvia, the existing banking industry is unique, as it consists of banks pursuing two different business models: the domestic customer banking segment and the international customer banking segment. The domestic customer banking segment is dominated by subsidiaries of larger banking groups, mainly of Scandinavian origin. These banks are active in providing a wide range of general banking services to domestic businesses and domestic private individuals. The international customer banking segment consists of several independent banking groups, mainly of Latvian origin. These banks offer a wide range of services to international customers. In asset terms, both segments amount to approximately 50% of total assets.

The development of the financial sector of Latvia contributed to its role as a regional financial center of the Baltic States. However, when compared to the EU28 and leading European centers, financial deepening in Latvia is modest. This is not due to their limited access to finance, as it is usually the case in countries with limited financial deepening, but because Latvians choose not to run into excessive debt. For many years, the country was highly regarded by international ratings that assess the availability and affordability of finance (Doing Business and The Global Competitiveness Report) and the studies by Rupeika-Apoga & Solovjova (2016) show that finance is available and also affordable.

This process of evolution from a stage of financial repression to a stage of financial liberalization and deregulation that characterized the financial sector of Latvia happened in similar ways in many countries and was reported and described by Barradas (2016). He also reports the features of the following stage, the financialization stage and the negative effects of the excessive rise and deepening of the financial sector. Next, we describe the main aspects of the stage of financialization in Latvia.

The over availability of foreign capital, mainly from the rich countries of Northern Europe, has made the Latvian economy very vulnerable and dependent on international financial capital flows. However, their private sector debt, including non-financial institutions and households, is one of the smallest in Europe and far behind the

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EU28 (see Figure A1[†]). This can be partly explained by the cultural characteristics of Latvians who do not like to be indebted, even if there is a wide offer of credit from commercial banks. Its public debt is also one of the lowest in Europe. This allows us to conclude that the level of financialization in terms of debt in Latvia, together with Estonia and especially Lithuania, is low.

As can be seen from Figure A2, the financial sector's assets exceed GDP and reached its highest value shortly after the last global financial crisis. This is explained by the sharp GDP decline in these years, stronger than the financial sector's asset growth. Later, we can observe a stabilization of the ratio that can be explained by a faster GDP growth compared with asset growth. Even if financial assets in Latvia have significantly increased since 1995, the financial sector is still very small compared to the EU25 average[‡].

As for the gross value added and income of "Financial and insurance activities" (Figure A3) to GDP, it is rather stable, fluctuating around 3.5% since 1995. However, it shows an increase from 2003 to 2008 followed by a sharp decrease in 2009/10, which can be explained by the huge losses that Latvian banks were suffering due to the global financial crisis. Although the average indicator over the past 14 years in Latvia is 3.9%, compared with 3.8% in Estonia and 2.2% in Lithuania, it is less than the value of 4.9% of the 28 EU countries, not to mention the leading countries like Luxembourg (24.2%) and Cyprus (8.4%).

From the 1990s until now, banks have played a major role in the financial market of Latvia with a market share in total assets close to 90%. The securities markets in the Baltic countries are very small, and when a company needs funding, its main source is the bank credit. According to Pagano (Pagano, 2014), the European banking sector remains very large compared with international peers (including total assets, loans and deposits). The level of financialization, measured by banking assets as a percentage of GDP in Latvia, lags significantly behind the average of European indicators (see Figure A4). That allows us to conclude that financial deepening in Latvia is modest.

Arcand, Berkes & Panizza (Arcand, 2015) found that the positive association between finance and growth decreased over time, with a negative and significant correlation between private credit to GDP and GDP growth when the credit-to-GDP ratio exceeds 100% of GDP. The analysis of the behavior of the credit to GDP ratio shows that it increased to a level of above 100% of GDP in 2009, but with the financial crisis it decreased and nowadays it is below 60% (see Figure A5). Looking at this ratio there is no evidence of excessive financial deepening in Latvia. Meanwhile, the number of deposits attracted was growing during the period under analysis, providing banks with cheap money (see Figure A6). Also, the average gap between new deposits and loans granted as a percentage of GDP in the EU28 is 55%, and in Latvia, it is much more narrow, only 11% for the analyzed period, which once again proves that Latvian banks with foreign capital had access to the financial resources of the parent banks on more favorable terms than direct borrowing on the domestic market.

Finally, the Latvian bank concentration ratio, measured as the share of assets of the five largest commercial banks in total bank assets was 74% in 2017, which represents an oligopoly, but it is smaller compared to Lithuania (99%) and Estonia (96%) (Laidroo et al., 2021). The Baltic countries are examples of a very high level of bank concentration in relation to the EU28 average (i.e. below 65%). Since the Latvian largest banks are mainly of Scandinavian origin, this makes the banking system dependent on foreign capital inflows and management.

[†] This and other figures also show progress in the variables of Lithuania and Estonia, the two other Baltic countries which are Latvia's neighbours and show many historical, economic, political and cultural similarities.
[‡] The countries with large financial sectors (Luxembourg, Malta and Ireland) were excluded from the EU28. Compared with these the financialization degree of Latvia is even more modest.

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Barradas et al. (2018) found that the signs of financialization for example in the Portuguese economy are different from the processes that characterize more advanced economies. Latvia, a small and post-transition economy, also has its features. In short, the financial sector in Latvia, since early the 90s, has shown evidence of strong development. Yet, compared to EU28, the financial deepening in Latvia is still modest. Other features that characterize the Latvian financial sector are the key role played by banks (like Portugal and other Southern European economies) and the dependence of foreign capital flows. This dependence contributed to the evidence that, following the financial crisis, private sector debt as a percentage of GDP and the financial sector assets as a percentage of GDP follow a path different from the average EU28.

4. Data and Methods

4.1. Data presentation

As discussed above, we propose a model which consists of three variables:

- GDP per capita at constant (2016Q4) prices (Y); this variable reflects the general state of the economy.
- Share of employment in the financial sector of the economically active population (L); it represents a proxy of financialization.
- Financial sector real assets per capita at constant (2016Q4) prices (A); it represents a proxy of financialization.

These two measures of financialization (L) and (A) allow us to estimate the financialization from both the output and input sides of the economic process. The financial sector assets provide economic output, while employment in the financial sector is the labor input into this industry. They are both related to the population and measured in real terms, thus relating to the financial sector with the ultimate beneficiaries of the financialization process. The database consists of 76 quarterly observations, from 1999Q1 to 2017Q4. The original data was obtained from the Eurostat database (*Eurostat Database*), Central Statistical Bureau of Latvia (*Central Statistical Bureau database*) and the Bank of Latvia (*Bank of Latvia database*).

The three variables chosen for analysis are presented in Figure A7, in the Appendix. During the analyzed period the growth of the GDP per capita was positive, excluding the years of the 2008/09 crisis. The period from 1999 to 2007 was marked by buoyant growth of Latvia's economy and the banking sector, characterized by investment inflows, lending boom and very low exposure to non-performing loans in the loan portfolios. In 2006-2007 Latvia was actively working on the introduction of the euro and the reduction of high inflation[§]. Starting from the third quarter of 2008, the first signs of growing stress became apparent mainly as a result of the shrinking economic activity, drying-up lending and an ever-accelerating fall in real estate prices. In the second half of the year, access to loans deteriorated against the background of the collapse of Lehman Brothers and the subsequent liquidity squeeze and deterioration of the external economic environment. In Latvia the situation became complicated with the take-over of JSC Parex Banka in 2008 and the government turning to international donors for assistance. Only in 2012 was the situation considered to be back to normal and the financial sector real assets per capita (A) stabilized.

The number of employees in the financial sector was growing before the crisis with some fluctuations between 2002 and 2003. There is no logical explanation why 12,300 people worked in the financial sector in 2002Q1, 9,300 in 2002Q2 and 15,800 in[**] 2002Q3, as this is a stable period in the Latvian financial sector. In the authors'

[§] Latvia has set up a working group which published an anti-inflation plan in early March 2007.
[**] The ARDL model could be another choice, but the results obtained with the VAR model, since the degrees of freedom allow it, will provide more interesting information.

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opinion, it can be explained by incorrect data representation, which was obtained from the Central Statistical Bureau of Latvia and is the only available recourse of such data in the period.

We also include dummy variables in the analysis: three seasonal dummies, EU dummy to capture the effects of the entry into the EU (since the second quarter of 2004), the FC dummy for financial crisis period (from 2008Q4 to 2010Q4, when GDP growth was negative) and the CR dummy for the period time when the euro was the official currency in Latvia (from 2014Q1 to 2017Q4).

4.1. Econometric methodology

We researched the links between financialization and the state of the economy, applying a standard Vector Auto-Regressive model (VAR). The choice of the research method was based on the literature review (Ederer, 2013; Narsimhulu, 2016). The VAR models are multi-equation models developed by Sims (1980), in which each variable is explained by its past values and by past values of other explanatory variables. The relationship between individual equations in the VAR model is only evident in the relationships between the random components of these equations. VAR models are usually utilized to create forecasts, to study relationships between variables, to test the general economic theory and to carry out multiplication analyzes and cointegration studies (Kusideł, 2000; Lütkepohl, 2013; Chamalwa, Bakari, 2016; Rossi, Wang, 2019).

First, we tested the stationarity of all variables and considered the possibility of cointegration with Engle-Granger and Johansen procedures. After that, we analyzed Granger-causalities between differentiated variables. Finally, we checked the optimal number of lags and estimated a VAR model with dummy variables, we analyzed impulse response functions and variance decomposition.

A stable VAR needs the variables to be stationary. To confirm the integration order of analyzed variables, we performed both ADF (with the trend and constant, with constant and without trend and constant) and KPSS tests. In the ADF we tested up to 10 lags, and in the KPSS test, we used 3 lags and considered seasonality in every test. The results, shown in Table 2, confirm that Y and L are most likely I(1), but their first differences[††] are I(0). The third variable, A, turns out to be I(2). Therefore, we consider its second difference in VAR model, which is a stationary variable.

Table 2. Results of the stationarity tests

	ADF, trend and constant	ADF, constant	ADF, without trend and constant	KPSS, trend and constant	KPSS, constant
Y	-2,16025	-1,06781	2,273955	0,195644**	1,53745***
L	-1,55189	-1,94318	0,300381	0,417905***	1,09108***
A	-1,53216	-1,98517	-0,227220	0,419421***	1,61105***
dY	-3,45227**	-3,48242***	-3,49485***	0,130029*	0,130974
dL	-2,87629	-2,63993*	-2,64489***	0,0823977	0,316057
dA	-3,45454**	-1,80456	-1,645109*	0,142235*	0,560056**
d^2A	-8,07544***	--8,13205***	-9,97245***	0,0523781	0,0520199

Source: The authors' calculations. *, **, *** highlight significance at 10%, 5%, 1%, respectively.

Further, the time series cannot be cointegrated, otherwise, VECM should be used. We performed Johansen and Engle-Granger cointegration tests. Both show that variables Y, L and dA are not cointegrated. Test results (Tables 3 and 4) allow us to use the standard VAR model.

[††] We highlight the first difference of a given variable X as dX.

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Table 3. Results of the Johansen cointegration test

Rank	Eigenvalue	Trace test	p-value	Lmax test	p-value
0	0.20642	23.049	0.2517	16.415	0.2095
1	0.088675	6.6332	0.6259	6.5928	0.5463
2	0.00056889	0.040403	0.8407	0.040403	0.8407

Source: The authors' calculations

Table 4. Results of the Engle-Granger cointegration test – ADF for residuals

Estimated parameter	Test statistics	Asymptotic p-value
-0.00622929	-0.128774	0.9955

Source: The authors' calculations

5. Results and discussion

We began with a test of the optimal number of lags. With 76 observations, 3 variables in the system and 6 dummies, the maximum number of lags compatible with the number of degrees of freedom was 4. Therefore, we performed tests of the optimal lag structure. Likelihood test, Forecast prediction error and AIC indicate three lags and BIC and HQC indicate one lag, therefore we used three lags in the VAR model (see Table 5).

Table 5. Results of the optimal number of lags in the VAR model test

Lags	Loglikelihood	p(LR)	FPE	AIC	BIC	HQC
1	-658.764		71569.32	19.678982	20.642623*	20.061752*
2	-649.463	0.02879	71560.83	19.670375	20.923108	20.16798
3	-636.228	0.00171	61766.11*	19.549379*	21.091205	20.16181
4	-630.204	0.21059	71849.33	19.634402	21.465319	20.36167

Source: The authors' calculations

The Granger causality test, typically used in a VAR model framework, is a standard analysis technique for determining whether one - time series is useful in forecasting another. In the next step, we perform Granger causality tests for six pairs of endogenous variables. Table 6 presents the test statistics for these tests.

Table 6. VAR Granger Causality/Block Exogeneity Wald Tests

dY cause dL	dL cause dY	dY cause d^2A	d^2A cause dY	dL cause d^2A	d^2A cause dL
3.8109**	0.14089	3.2149**	0.60589	0.12201	0.10683

Source: The authors' calculations

The Granger causality test brought some information – there is only a sign of causality from dY to dL (significant at 5%) and from dY to d^2A (also significant at 5%). Other pairs do not show any significance of Granger

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causality. This means that GDP per capita helps to predict employment in the financial sector and financial sector real assets per capita, but not vice versa, or the GDP per capita is a cause for the employment in the financial sector and financial sector real assets per capita in Latvia, in the sense of Granger. Therefore, based on Granger causality test results, we assume that the change in GDP per capita implies changes at the level of employment and in the value of assets in the financial sector. As discussed in the introduction, the relationship between finance and the state of the economy or economic growth does exist. Nevertheless, from both a theoretical and an empirical point of view, the dominant view of the causal relationship between the two indicators is still unclear. It is argued that finance plays an important role as a catalyst for economic development (Love, 2003; Beck, 2004; Gilchrist, 1995; (Merton, 1995; Levine, 2005). On the other hand, other scientists Barradas (2016), Tomaskovic-Devey, Lin and Meyers (2015) and Hardt and Negri (2011) reports that financialization has negative impacts on the real economy, arising from the strong growth of the financial sector. The Granger causality test shows that the state of the economy implies changes in the variables of financialization. We do not confirm any positive or negative impact of financialization on the Latvian economy.

As a result, we decided to estimate the VAR model with three lags for all variables and with 3 seasonal dummies, EU dummy, Financial Crisis dummy and the Euro area dummy. We also used robust standard errors. Figure A6 shows impulse response functions and Table 7 contains variance decomposition of all variables in the model[‡‡]. The Cholesky decomposition contains dY as a first variable, dL as a second and d^2A as a third. Table 6 contains the results of the autocorrelation tests. We conclude that there is a lack of autocorrelation in all equations.

Table 7. Ljung-Box autocorrelation test results

Equation 1 test statistic	p-value	Equation 2 test statistic	p-value	Equation 2 test statistic	p-value
0.346495	0.987	3.6062	0.462	0.35935	0.986

Source: The authors' calculations

As for the impulse analysis, it should be pointed out that:

1. The impulse impact on GDP per capita in Latvia (see Figure A8):
a. from GDP per capita expires less than 10 quarters after the shock started;
b. from employment in the financial sector starts to expire at around 10 quarters;
c. from assets of the financial sector expires at around 10 quarters;

2. The impulse impact on financial sector employment (see Figure A8):
a. from GDP per capita side expires after more than 10 quarters;
b. from employment in the financial sector expires at around 10 quarters;
c. from assets of the financial sector expires after more than 10 quarters;

3. The impulse impact on financial sector assets (see Figure A8):
a. from GDP per capita starts to expire around 10 quarters after the shock starts;
b. from employment in the financial sector expires before 10 quarters;
c. from assets of the financial sector expires after 10 quarters.

If the Impulse Response Function (IRF) values are convergent, i.e. the impulse is not held indefinitely by variables but is suppressed after several periods, it means that the modelled system is stable and the variables that

[‡‡] The estimation results are available to readers upon request.

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make it stable are sturdy. Analyzing the charts (Figure A8), we note that for the longest period the impulse is maintained for the variable - employment in the financial sector caused by the disruption of GDP and assets in the financial sector; as well as an impulse on assets of financial sector caused by the disruption of GDP and financial sector assets.

The next step was to carry out the prediction error variance analysis. The variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. It shows what share of the explanation of variance of the prediction error of the variable under test is in other variables included in the model (see Table 8). According to the results presented below, the shares of error variance stabilize, in most cases, at around 10 quarters.

Table 8. Variance decomposition

Quarter	Standard error	dY	dL	d^2A
Decomposition of dY				
1	353.428	100	0	0
2	368.545	98.6131	0.3869	1
5	402.801	91.2563	2.0071	6.7366
10	405.001	90.6637	2.3025	7.0338
20	405.246	90.5822	2.3245	7.0933
Decomposition of dL				
1	0.001023	2.6168	97.3832	0
2	0.001197	7.2489	91.9587	0.7924
5	0.001339	12.2297	86.2726	1.4977
10	0.001384	13.3856	84.9381	1.6763
20	0.001389	13.5261	84.7628	1.7111
Decomposition of d^2A				
1	362.243	8.0442	1.0166	90.9391
2	462.482	4.9377	1.0209	94.0414
5	518.783	11.3387	1.6701	86.9911
10	538.708	11.3128	1.7306	86.9566
20	541.415	11.3295	1.7184	86.9521

Source: The authors' calculations

Table 8 also shows the decomposition of the error variance of the model equations, on the 20th quarter of the forecast horizon. It is as follows: the error variance of GDP per capita depends 90.6% on its values, around 2.3% on employment in the financial sector and about 7% on the assets of the financial sector. We found the weak influence of both financialization proxies on the GDP per capita forecast but comparing both proxies, the financial size proxy plays a more important role than the labor market proxy. That the error variance of the share of employment in the financial sector in the active population depends about 84.7% on its values is explained by 13.56% by GDP per capita, and the influence of financial assets is insignificant, only 1.7%. As for the financial sector assets, the error variance is explained in more than 86.95% by its values, around 11.3% by GDP per capita and only 1.7% by the share of financial sector employment in the active population.

Summarizing, we found that the variable financial sector assets is more responsive to changes in GDP per capita than financial sector employment. Also, employment in the financial sector reacts to GDP per capita to a greater extent than to assets in the financial sector. GDP per capita is the most responsive to changes in its values while

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responding to changes in assets in the financial system to a greater extent than to changes in employment in the financial sector.

According to Pagano (Pagano, 2014), financial development beyond a certain point does not appear to contribute significantly to real economic activity. The finance has a positive impact on the economy in countries where financial development is at a relatively early stage when the financial deepening improves access to finance for local firms. However, reaching a certain point of the development, for instance when credit to the private sector grows above 100% of GDP (Arcand, 2015) or when financial development exceeds the growth of real-sector industries by 4.5% (Ductor, 2011), this correlation becomes negative. In theory, financial sector development has a positive and significant effect on SMEs' growth. Numerous papers found that a country's financial development significantly influences firm growth (Beck et al., 2008; Arellano et al., 2012), but the sign of this relationship is still inconclusive. Beck et al. (2008) found that financial sector development has a positive and significant effect on SMEs' growth. A high level of financial development facilitates firm growth by encouraging competition, supporting entrepreneurship, decreasing the cost of capital, and reallocating capital to high-growth industries. On the other hand, Arellano et al. (2012) found that in less financially developed economies (countries with low private credit to GDP ratios) from Europe, small firms grow faster than large firms. Also, on the particular case of transition economies from Central and Eastern Europe, a negative and statistically significant relationship between financial development and firm growth has been found (Anton, 2019). Empirical evidence in our study does not support that financialization is causing significant changes in the state of the economy of Latvia. The interpretation of this result is related to the degree of financial deepening in Latvia, it is not too excessive to have a negative effect, at the same time it is of such size that not to have a positive impact on the Latvian economy. It can be stated that Latvia has reached a balanced level of financialization.

It is also worth noting that during the global financial crisis of 2008-2009, problems with financial stability appeared. This is because investors were becoming skeptical of the fair value of the longer-term assets, prompting them to withdraw funds. At the height of the crisis, so many investors withdrew their funds from the financial markets that many financial institutions ran into serious difficulties, affecting the stability and sustainability of the economy (Gabbi, 2013). The crisis may stimulate the growth of phenomena related to the fragility of the financial sphere and the likelihood of crisis contagion, and thus may limit sustainable development.

The empirical results show that the actors of the economic process, like policymakers, in well-developed financial sectors, should focus mostly on the growth of the economy and identifying the sources of economic growth beyond the financial sector. Additionaly, more research proves necessary in order to find other measures of financialization to assess the relationship between economic development and the financial sector.

6. Conclusions

We have studied the relationship between financialization and the state of the economy of a small and post-transition economy – Latvia - from 1999 to 2017. The empirical results indicate that both financialization proxies have an insignificant effect on the GDP per capita of Latvia. This means that we cannot confirm our hypothesis H1, according to which a change in financialization leads to changes in the state of the economy. This may indirectly reflect a healthy level of financialization for the Latvian economy.

We have not found clear evidence supporting the hypothesis on the finance-growth nexus stating that there is a positive association between finance and economic growth (Adams, 2015; Beck, 2000, 2004; Gilchrist, 1995; King, 1993a; Levine, 2005; Love, 2003; Merton, 1995). We also have not found a negative association between finance and the state of the economy (Barradas, 2018; Barradas, Lagoa, Leão, Mamede, 2018; Cecchetti, 2012; Hardt, 2011; Tomaskovic-Devey, 2015; Vercelli, 2013; Barradas, 2020).

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Our interpretation is that Latvia has not reached the level of excessive financial deepening, the point beyond which the finance sector harms the economy. At the same time, the financial market is quite developed and a positive impact of finance on the economy has also not been confirmed - we found a weak influence of both financialization proxies on the GDP per capita forecast. Research results also show that GDP per capita in Latvia, during the analyzed period, affects the value of assets and employment in the financial sector in the Granger test sense and according to the VAR model. Based on the IRF analysis, we have noted that impulses caused by the variables GDP per capita, employment and assets in the financial sector were suppressed over about 10 quarters (2.5 years), which means that the modelled system is stable. We have also found that proxies of financialization (employment (2.3%) and assets in the financial sector (7%), in total about 9.3%, can be used to forecast the state of the economy in the long-time horizon. The employment in the financial sector responds more to changes in GDP per capita than to changes in assets of the financial sector (and this response is very small), allowing us to reject the H3 hypothesis. The same is true for the effect of the employment on the assets in the financial sector: it is possible to reject the H2 hypothesis that financialization (A) is significantly responsive to changes in financialization (L).

The main limitation of this research is the use of a restricted number of variables as proxies of the process of financialization. Further research on this topic could assess the financialization process using different variables (e.g. real interest rate, the size of domestic credit, number of financial institutions, or similar ones). Additionally, an interesting development to be made is to compare the process of financialization and its relationship with the growth of the economy in several post-transition countries. This comparison could help to clarify the causality mechanisms that are the main objective of this work.

Appendix

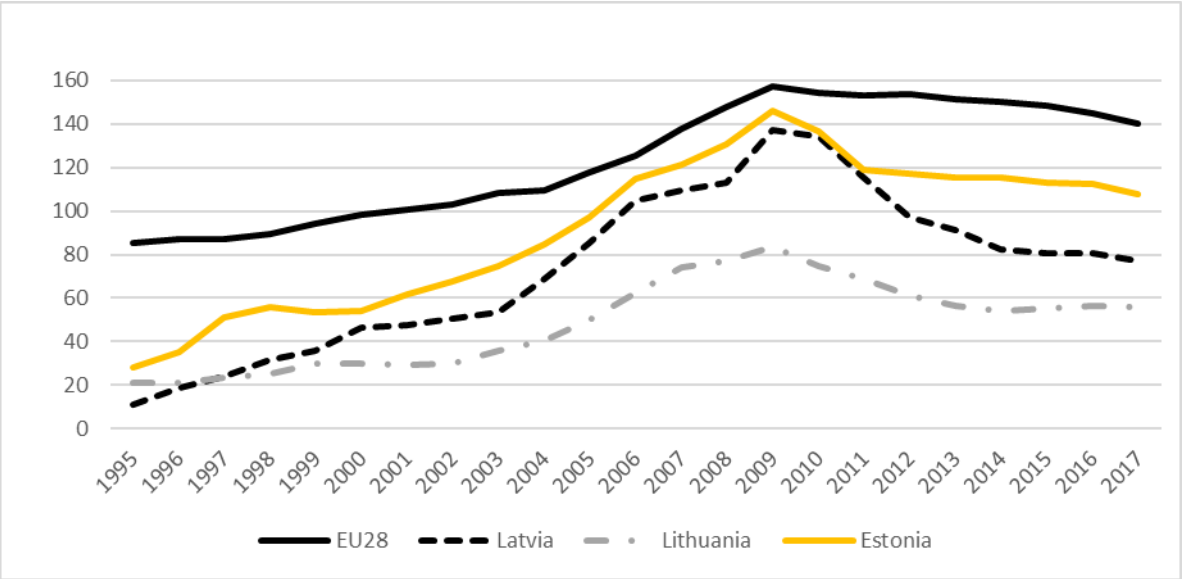

Figure A1. Private sector debt as a percentage of GDP, %, 1995-2017

Source: The authors` calculations based on Eurostat data (*Eurostat Database*)

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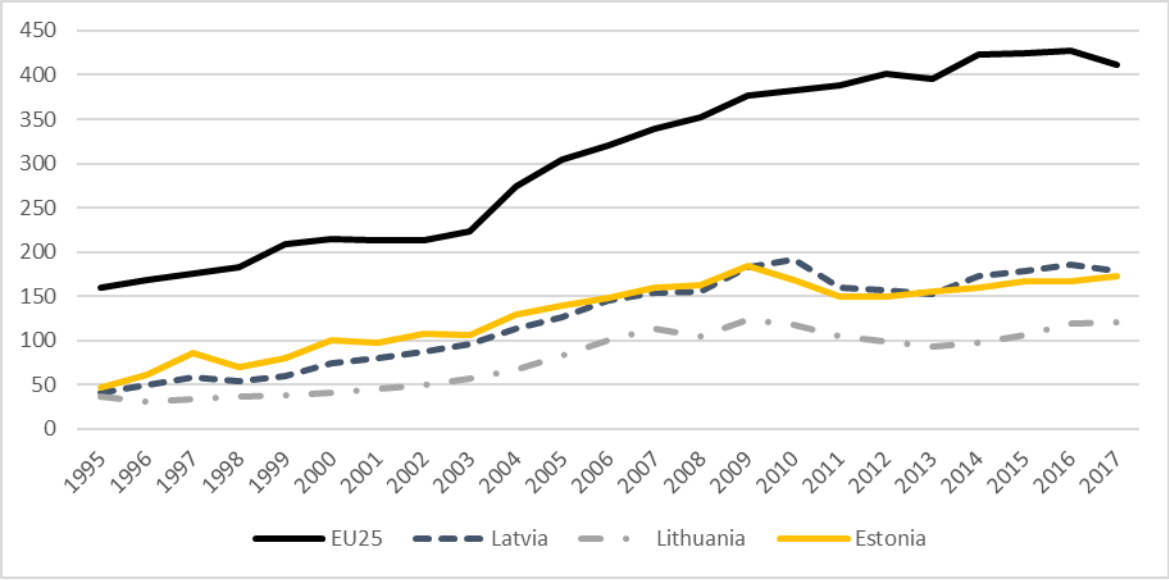

Figure A2. The ratio of the financial sector's assets as a percentage of GDP, %, 1995-2017

Source: The authors` calculations based on Eurostat data (*Eurostat Database*)

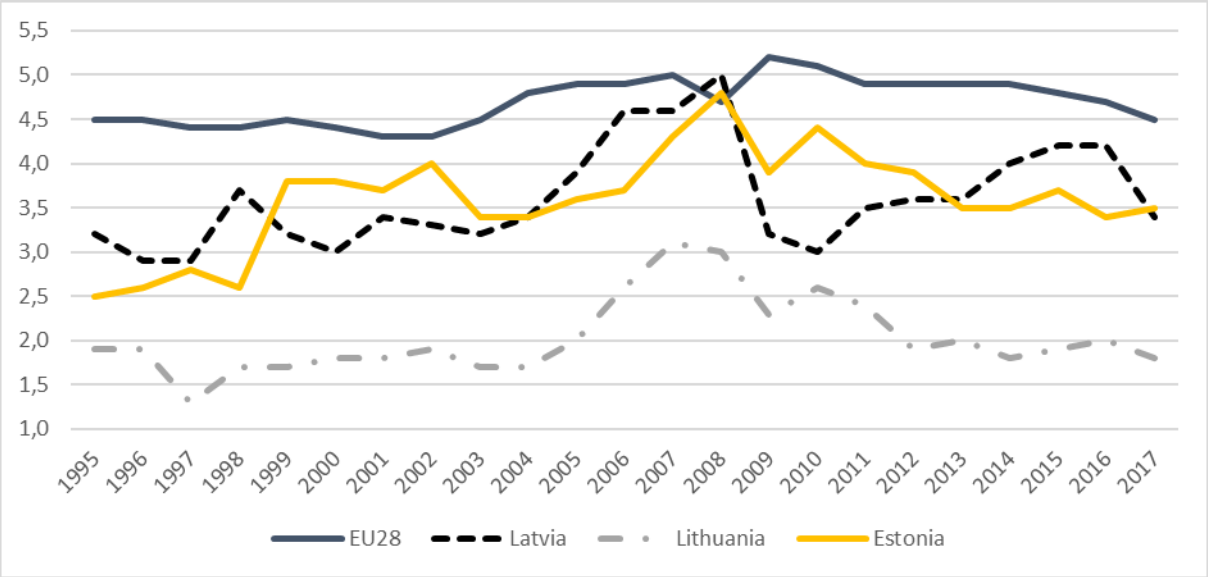

Figure A3. Gross value added and income of "Financial and insurance activities" in GDP (%), 1995-2017

Source: The authors` calculations based on Eurostat database (*Eurostat Database*)

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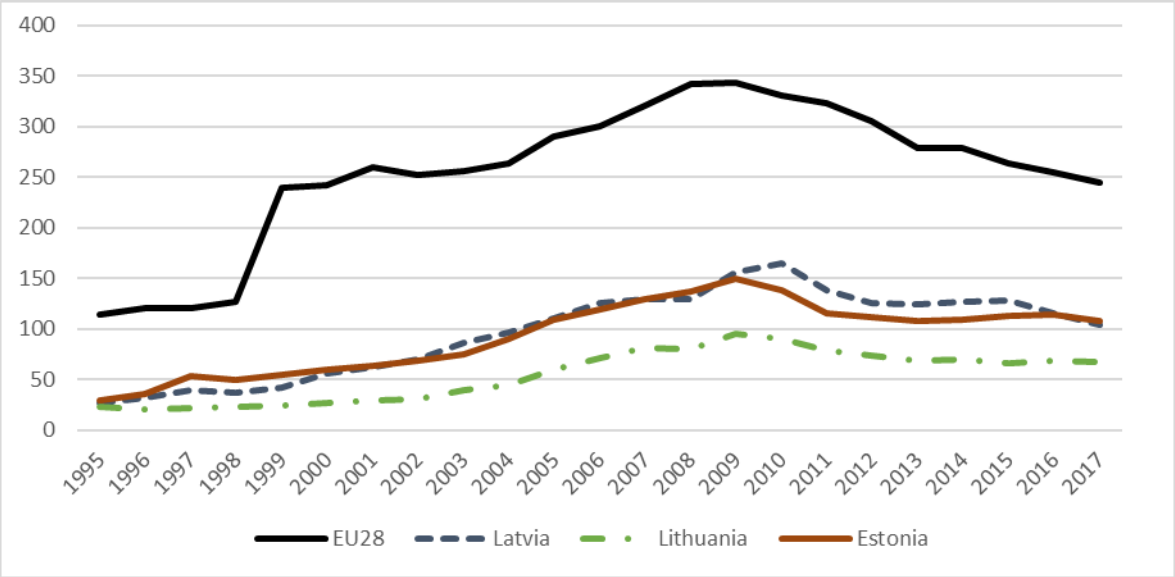

Figure A4. The ratio of bank assets as a percentage of GDP, %, 1995-2017

Source: The authors` calculations based on Eurostat database (*Eurostat Database*)**.**

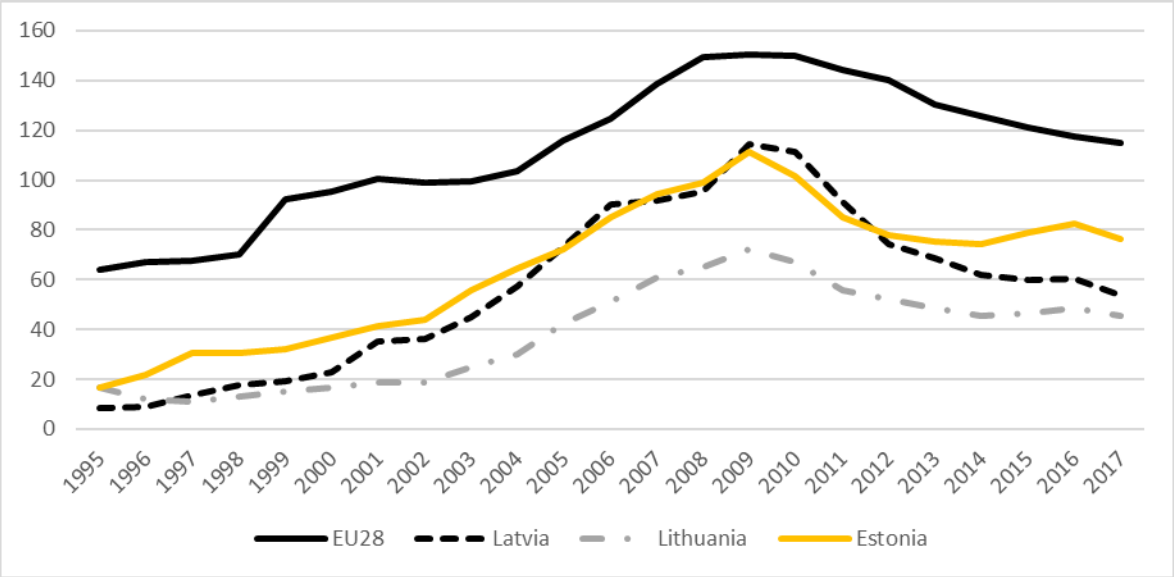

Figure A5. The ratio of bank loans as a percentage of GDP, %, 1995-2017

Source: The authors` calculations based on Eurostat database (*Eurostat Database*).

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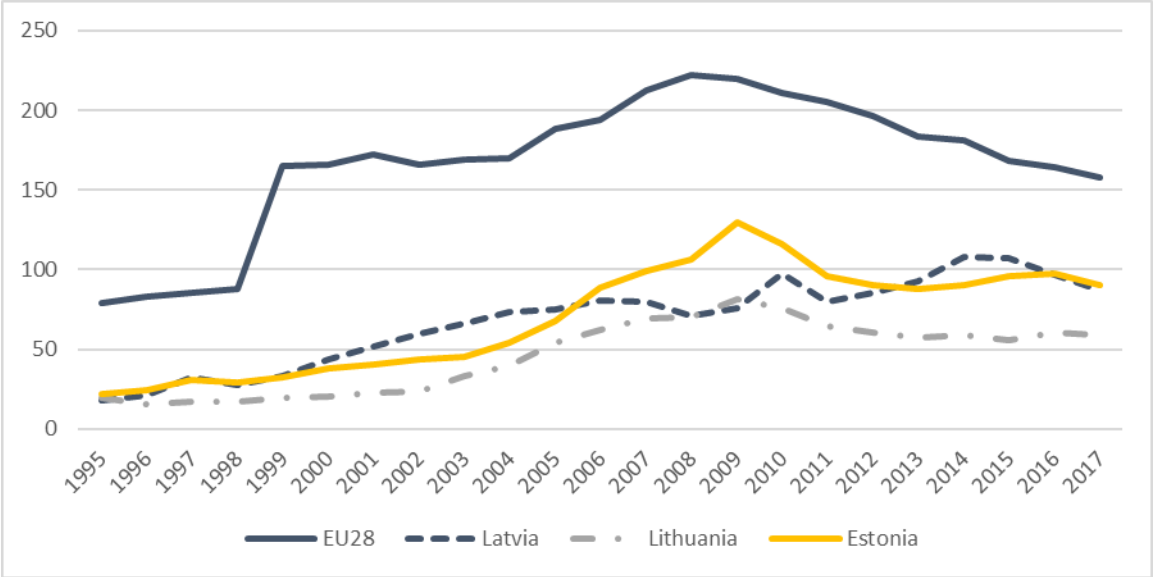

Figure A6. The ratio of bank deposits as a percentage of GDP, %, 1995-2017

Source: The authors` calculations based on Eurostat database (*Eurostat Database*)**.**

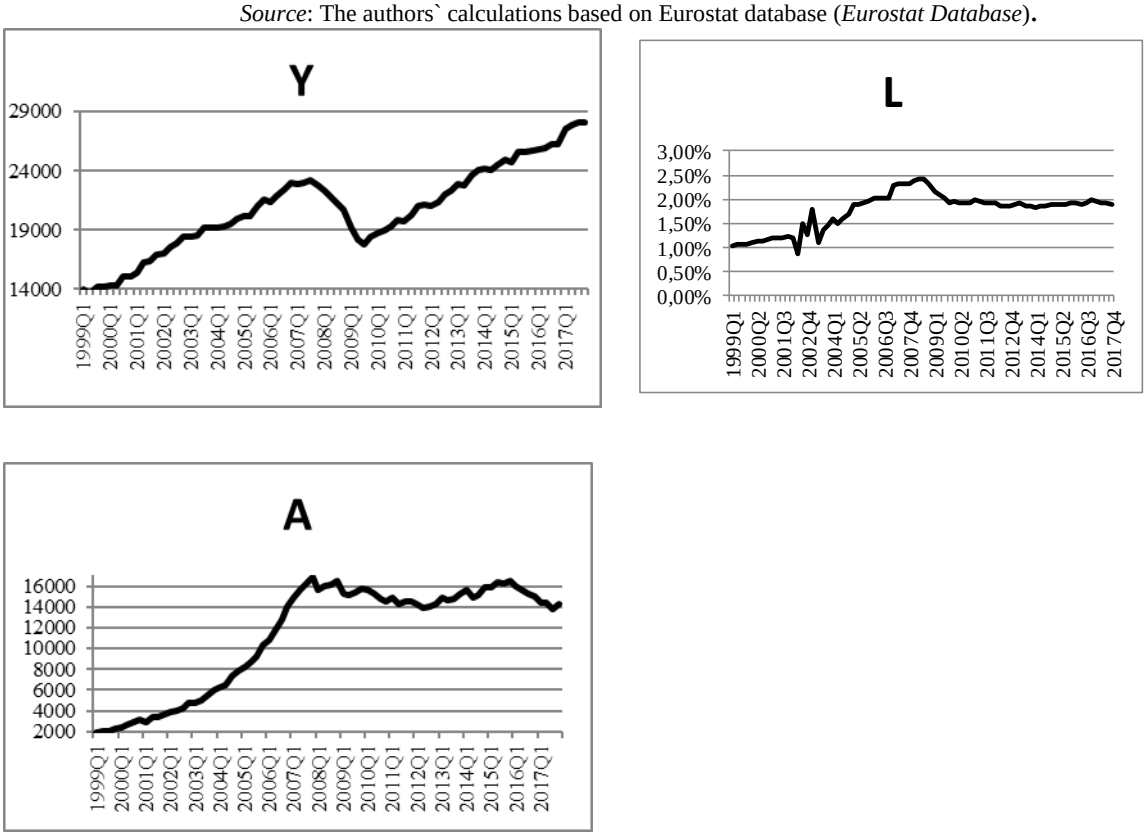

Figure A7. The time series of GDP per capita in constant (2016Q4) prices (Y), Share of employment in the financial sector in the active population (L) and MFI real assets per capita in constant (2016Q4) prices (A) from 1999 till 2017

Source: The authors' own calculations (*Central Statistical Bureau database*)

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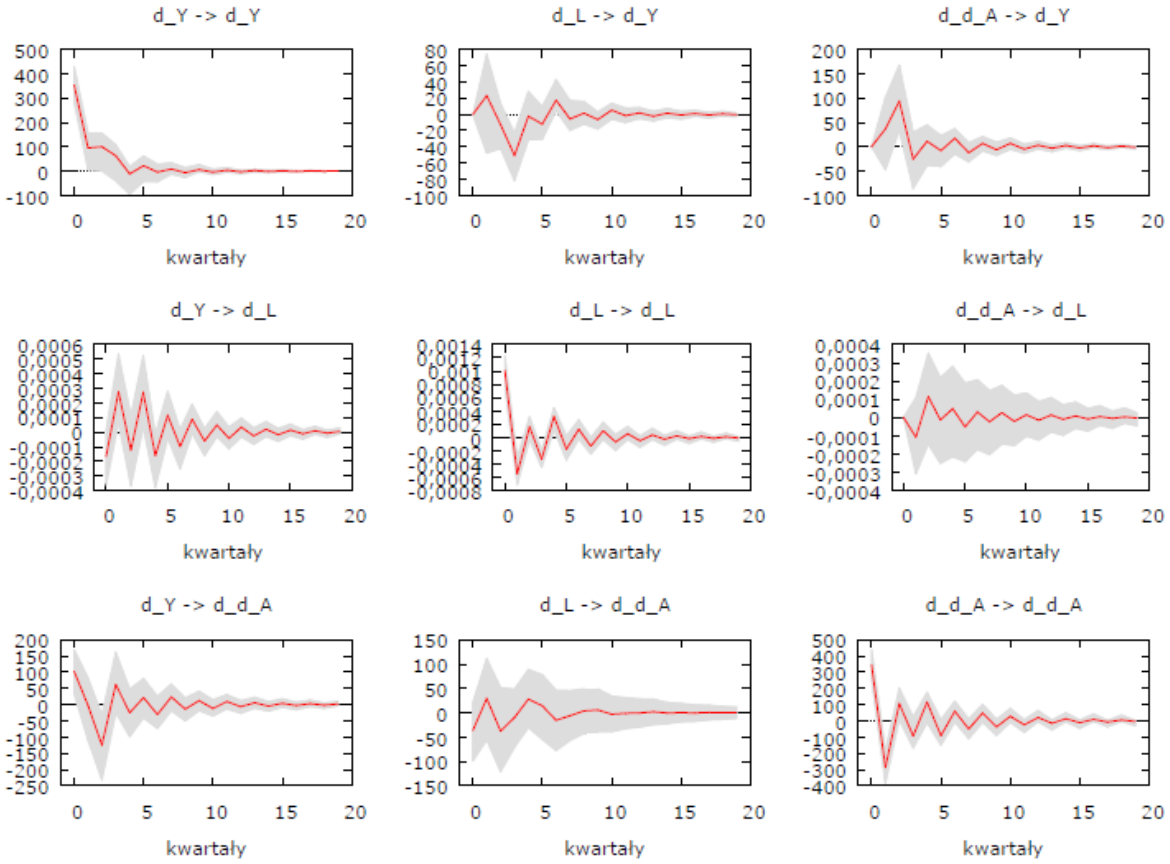

Figure A8. Impulse response functions

-"kwartały" - [transl.] quarters

Source: The authors' calculations

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DEVELOPING A NEW MODEL OF ETHICAL LEADERSHIP*

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Abstract. Previous studies in Middle East countries missed to find out the influence of ethical leadership on counterproductive workplace behaviors in higher education. Therefore, this study was carried out to close the gap in this regard, as it is meant to be used in the education sector, one of Saudi Arabia's most significant service sectors. The human relations theory of management concept was utilized to build a theoretical model of ethical leadership and a management paradigm based on human relationships. Personal attributes, administrative qualities, human relationships, teamwork, and relationships with managers and colleagues were revealed as key elements in the hypotheses of the research model. The data gathering method was a questionnaire survey based on the human relations theory of management. SPSS and Structural Equation Modelling (SEM-PLS) were used to examine the data. The findings revealed a positive effect between personal attributes and teamwork factors, which all have positive effects on administrative qualities and human relationships. Administrative qualities and human relationships had a positive impact on relationships with managers and colleagues too. Therefore, this finding contributes to the validation of the extended human relations theory of management by demonstrating that the model predicts university employees improving relationships with managers and colleagues through personal attributes, administrative qualities, human relationships, and teamwork.

Keywords: Ethical leadership; Human Relations Theory of Management; Structural Equation Modeling; Middle East countries; Higher Education

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JEL Classifications: O35, O15

1. Introduction

The word governance has arisen in recent years in all sectors, notably administrative ones, and has expanded to include themes and terminology in other domains such as administration and leadership. When applied to the university system, the phrase "administrative leadership" is used to characterize the process. As a result, to conduct organizational research, the concept of leadership must be understood as a well-established phenomenon

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inside a culture (Gadelshina, 2016). Leadership has always been described by active research and theoretical work as having a positive influence on subordinates and society, rather than the negative or dark side of leadership (Mergen & Ozbilgin, 2021). Experts have begun to acknowledge that they may not always have the essential talents to embrace this leadership component as the number of claims and principled trouble-making to leaders has risen (Nauman et al., 2018). According to leadership studies, a leader may engage in both beneficial and harmful behavior (Robert & Vandenberghe, 2021). For example, effective leadership techniques are prevalent, at least in their milder forms. According to the authors, undesirable effects generated by abusive leadership include organizational unproductive work conduct, supervisor-directed counterproductive work behavior, and interpersonal counterproductive work behavior (Arici et al., 2021). Because leaders sway their followers through social exchange and social learning. As a result, the ethics of the leaders are passed down to the followers at a lower level (Wang et al., 2021). As a result, it is argued that the activities of leaders influence followers' behavior at various levels of the company. Furthermore, ethical leadership is described as the capacity to guide and advise people of an organization to achieve goals and objectives that benefit the firm, its members, other stakeholders, and society as a whole (Christensen-Salem et al., 2021). Surprisingly, in their research, Marquardt et al. (2021) found no link between ethical leadership and unproductive work behavior. Ethical leadership in the public sector improves subordinates' willingness to reveal ethical problems, increases organizational involvement, and reduces absenteeism (Young et al., 2021). Ethical leaders also strive to establish an ethical environment to limit the chance of unethical behavior. Ethical leadership has an impact on work relationships as well as other organizational outcomes and is expected to have a positive impact on employee engagement (Kerse, 2021). It asserts that ethical leadership encompasses a variety of qualities that are evident in the trusting relationship between a leader and a follower, and asserts that ethical leadership encompasses a variety of qualities that are evident in the trusting relationship between a leader and a follower (Kerse, 2021). The purpose of ethical leadership is to communicate and clarify the ethical aspects of all management acts, as well as to set ethical standards that drive company decision-making (Buonomo et al., 2021). Communicative ethics aims to increase communication between managers and employees while also maintaining job satisfaction. Employees are more inclined to trust a leader who is upfront with them about their values and communicates well with them (Buonomo et al., 2021). According to a study, a leader's behaviors have an influence on how much human interaction an employee has (Ashfaq et al., 2021). This is because it entails the use of both human and material resources to achieve an organization's goals and objectives, which is especially important in an academic community where intellectuals such as teaching and non-teaching staff, administrators, and even students all have changing needs and aspirations. As a result, a new model for measuring and assessing the human relations theory of management is necessary, as well as research into ethical leadership in higher education (Alotaibi et al., 2020; Fatehi & Choi, 2019). To fill this void, the paper set out to create a new model of ethical leadership and management in higher education that was focused on human interactions.

2. Management Theories of Human Relationships Development

The researchers wanted to examine if lighting intensity affected worker productivity and if human interactions affected job behavior. The old methods' perceived harsh comprehensive approach, such as scientific and administrative management philosophy, sparked this battle for an adequate management style. The human relations approach to organizational analysis was created in the 1930s as an alternative to the classical technique of organizational analysis as a result of the failure of classical ideas (Omodan et al., 2020). According to Manoj (2016), it was briefly explained in the Hawthorne studies that non-economic rewards and sanctions have a significant impact on workers' behavior, morale, and output and that both social and psychological factors at work, as well as the physical conditions of the workplace, determine employee morale and output. According to the research, employees are not inert or isolated, disconnected individuals; they are social beings who, as a consequence, form little groups within the firm, such as informal organizations. Finally, according to the Hawthorne study, leadership style, supervisory style, communication, and engagement all influence employee behavior, satisfaction, and productivity (Manoj, 2016). Douglas McGregor, like Hurt Lewin and Jacob Moreno,

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was interested in organizational motivation (Yacoub, 2016). Douglas McGregor's book "The Human Side of Enterprise," released in 1960, provided a new perspective on human relations management.
Research model is presented below in Figure 1.

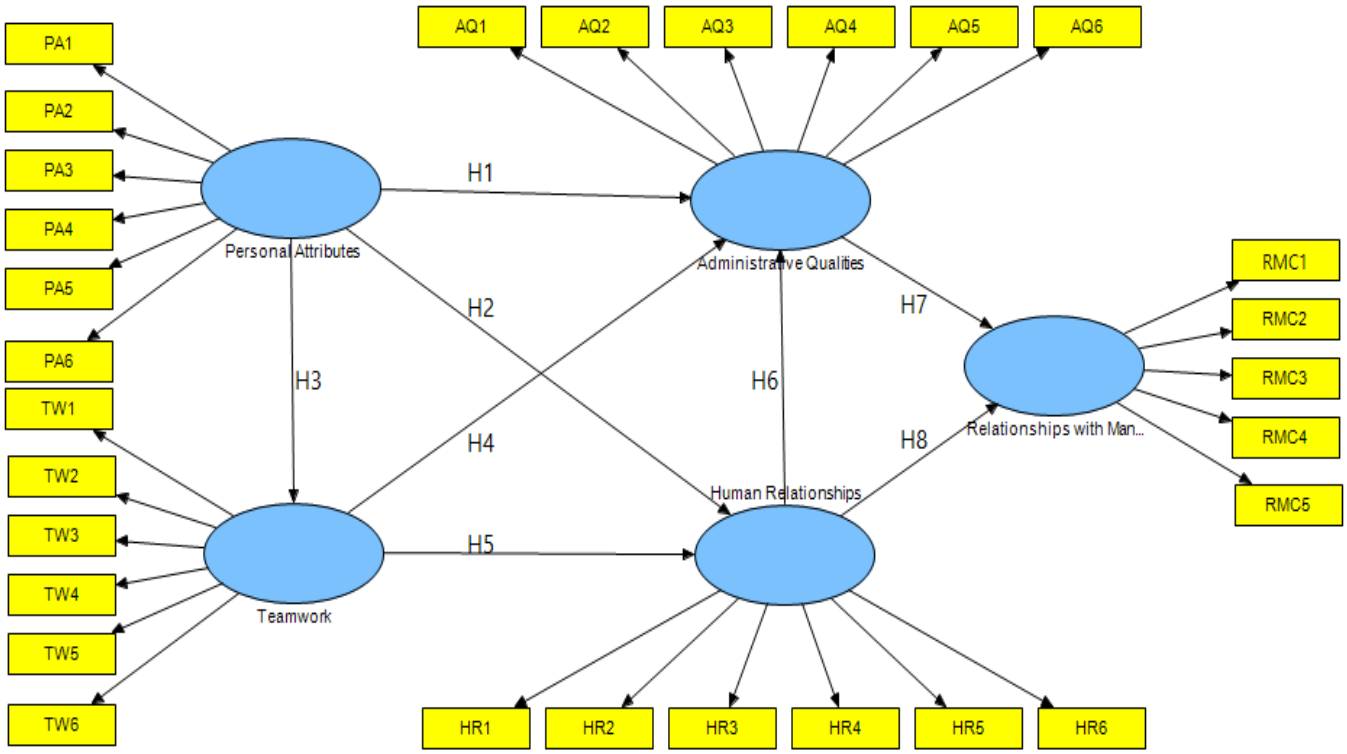

Figure 1. Research Model
Source: Author

2.1. Personal Attributes

These interpersonal traits are likely to influence instructors' and supervisors' internal working models, resulting in relationship perspectives that are either stable or changing. Among teacher features, demographic variables and social-emotional behaviors in class have perhaps attracted the most research attention (Zee and Koomen2017). However, defining what constitutes a "good" teacher or teacher effectiveness remains a challenge (Rice et al. 2017). In studies on teacher quality, personal traits (beliefs, attitudes, and dispositions) such as self-awareness, adaptability, motivation, and personality have been highlighted (Durksen and Klassen, 2018). In light of these findings, teacher personality traits, particularly when it comes to teacher motivation, should not be neglected. Unfortunately, little research have been conducted to determine how teachers' personality traits influence their motivation. As a result, this subject must be looked at as one of the most essential factors influencing learning. This study will help language teachers better comprehend classroom behavior by highlighting the role of personality in second language learning and motivation. More specifically, the study identifies which personality traits are linked to higher or decreased teacher motivation (Khalilzadeh and Khodi, 2021).

2. 2 Administrative Qualities

Each institution requires managers with distinct personal characteristics in a variety of full-time professions to fulfill its goals. The most significant position at the university is university administration (Sidrat and Frikha, 2018). Leadership has been demonstrated to have a positive influence on the event team's performance (Osman, 2020) and employee willingness to collaborate to achieve the event's objectives (Maqbool et al., 2017). Excellent leadership, in the long run, makes an event's team more competitive in education (Shibru et al., 2017), as well as

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assisting in the formation of more resilient event teams (Shibru et al., 2017). (Visone, 2018). Leading, instructing, and managing a team are just a few of the characteristics that distinguish a good manager (Maqbool et al., 2017). Event planners employ a range of leadership styles. The most successful leadership style in the context of events is one that has a positive overall impact on the team (Giudici and Filimonau, 2019), such as visionary, affiliative, democratic, and coaching leadership (Alotaibi et., al 2020). Organizational culture may impact event managers' leadership styles, and national cultures can influence event managers' and event employees' leadership behavior (Fatehi & Choi, 2019). The value of management concern for people as a component of effective leadership is underlined even further by (Rahbi et al., 2017). According to these studies, a manager's concern for people has an impact on an event's success since it enhances the efficacy of intra-team contact, allowing for better team performance. According to McClelland (1994), effective leadership necessitates the development of cognitive, social, and emotional intelligence for managers to identify the needs of all team members, predict changes in motivation, and act appropriately. Managerial measures to increase employee engagement need open communication, emphasizing the importance of communicative skills for event team leaders (Leung et al., 2018).

2. 3 Human Relationships

One of the criteria that tend to predict teachers' organizational silence is the university environment. The term "university climate" refers to the condition of human relationships inside the functioning environment of a learning institution (Nwangwu, 2017). Multifactor leadership theory is one of the most researched theories in the social sciences since it focuses on leadership and organizational effectiveness. As a consequence of the complex domain of leadership, new methodologies and developments have evolved, revealing that leadership is dependent on human traits and changes as several criteria are determined. The behavioral approach says that leadership behaviors may be taught later; the modern leadership approach stresses the significance of human interactions in the organizational structure; and the conditional approach asserts that various circumstances need different leadership styles (King & Vaiman, 2019). Environmental aspects of university quality, instructor qualities, facilities and equipment, university principal, student characteristics, human interactions in university, family, and other variables, according to Pahang et al. (2017), are the most critical factors determining university quality. The educational objectives and content were resources (human interactions) and instructional methodologies. As a result, these elements are linked directly or indirectly in various stages of the teaching and learning processes in the context of educational efficiency. If the human connection quality approach focuses just on strengthening certain human relationships rather than all of them, it will be impossible to ensure that all of the components and human relationships contribute to the overall internal quality of education.

2. 4 Working in Teamwork

Communication with group members, building a trusting relationship, recognizing group members who do not contribute, and so on are all difficult components of cooperation (Andrade & Zeigner, 2021). Collaboration among teachers in academic programs is difficult, according to research (Lau and Jin, 2019). The existence of these obstacles does not undermine the need of incorporating cooperative projects into college teacher curricula, as these projects allow academics to combine their studies with the opportunity to develop collaborative abilities (Andrade & Zeigner, 2021). Furthermore, detailed rules and standards describing the optimal structure of group connections as well as group work expectations must be developed (Lakkala et al., 2017). According to certain research, models of collaboration and teamwork should be integrated into teacher education programs to give instructors the capacity to operate as a team (Carson et al., 2018). According to Voogt, Pieters, and Handelzalts, little is known about the complexity of task design that teacher teams can and should manage (2016). Their assertion, on the other hand, implies that past cooperative experience among teachers improves their effectiveness in school teams functioning in this manner. Teamwork, on the other hand, is difficult to describe since it is based on a variety of interrelated actions and attitudes. This makes it difficult for teachers and administrators to assess collaboration's progress and effectiveness in the classroom. Furthermore, there is a lack of consistency in how collaboration is perceived, making measurement and assessment more difficult (Fox et al., 2021). The term "teamwork" is technically ambiguous, as it may refer to a wide range of tasks in various contexts. Teamwork has

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been conceptualized within a variety of theoretical frameworks for organizational growth, and proof of teamwork's performance in businesses exists (Bashan and Holsblat, 2017).

2. 5 Relationships with Managers and Colleagues

Academic staff and administrators at universities play a critical role in achieving the instructional, research, and public service goals of higher education. From an organizational and structural viewpoint, academic staff and administrators may be seen as two cultural groups that regularly engage and interact with one another, through which relationships are established and regenerated (Whang, 2021). Academic personnel and administrators, on the whole, respect and collegiality for each other's intellectual and professional accomplishments. Meanwhile, as a consequence of their various commitments and duties, which influence how they create and keep their connections, both organizations encourage autonomous and unique cultures (Lou et al., 2018). even though there are both agreements and conflicts between academic staff and administrators, the study question is motivated by relationship dynamics in higher education (Campbell and Bray, 2018). Based on reflections on the need to innovate professional training at the graduate and undergraduate levels in the business field, I propose to use the term education in management to identify the professional development of people who act correctly managing organizations, as well as in individual or collective entrepreneurship, in teaching, research and planning the search for solutions to societal problems. This implies a set of learning processes in management education that must be mediated by activities and lived experiences. This strategy is implemented through a collection of activities developed by academic managers and lecturers in the context of courses to satisfy the educational goals outlined in course curricula, the syllabus, and extracurricular activities selected to enhance academic talents (Da Silva, 2016). The lecturer's role as a manager of important aspects of the connection he or she develops with the teachers, as well as the suitability of the teaching strategies that he or she selects for the course, will be examined in depth. The findings of this research might be utilized to provide realistic recommendations for politicians and university executives like deans. As a result, lecturers in higher education must be knowledgeable with a variety of teaching strategies, as well as the method and key components of putting them into practice, as well as the environment in which they must be used (Hernández-López et al., 2016). It will also have a positive influence on school practice and aid in the creation of a conducive teaching and learning environment. Teachers with a positive attitude are more likely to speak out in staff meetings and collaborate when the senior management team asks for it (Getie, 2020). As a result, the senior management team's and instructors' attitudes are critical. Because of the good influence of the senior management team, educators will take a positive attitude toward accomplishing the school's goals. It has the potential to create an excellent learning and teaching environment. Instructors' attitudes about achieving high performing school status will be impacted by their perceptions of their senior management team, which will be crucial factors in deciding whether teachers have a good or negative attitude toward achieving this status (Foltz-Ramos et al., 2021).

3. Research Methodology

The study looked into the topic and developed hypotheses based on existing theory and data. As a result, the research employs a deductive approach, beginning with a general theory and refining it down to specific hypotheses that can be tested (Sekaran & Bougie, 2016). This is a quantitative study, and the survey technique was used as the research tool. Academic managers who are now lecturers or department directors at a university are among the study's participants. Each notion is evaluated on a five-point Likert scale, with responses ranging from strongly disagree to strongly agree (Husain, Javed, & Araimi, 2021). The data was analyzed using SPSS version 21 and the Smart PLS tool due to the study's quantitative nature (Javed, Malik, & Alharbi, 2020). Mean central tendency metrics, as well as dispersion and variance indicators, were used in the descriptive analysis. The Cronbach's alpha coefficient and Composite reliability measures were employed to examine the inter-item consistency of reliability, a frequently used measure of internal consistency. The replies of 207 academic staff members were imported using the SPSS computer suite. This study involves academic staff at Majmaah University who have interactions with supervisors and colleagues. In this study, Structural Equation Modelling

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(SEM) was utilized, which is far more effective in terms of inferential analysis than multiple regression analysis (Hair et al., 2021). The descriptive and inferential statistical methodologies were used in the statistical study. The descriptive portion describes the characteristics of research variables, and the inferential phase uses the Structural Equation Model (SEM) and Smart PLS software to examine the found research routes following the conceptual model. Smart PLS version 2 was used to create the confirmatory factor analysis and structural equations model, while SPSS version 23 was used to generate descriptive statistics (Hair et al., 2021). It's worth noting that the PLS method was chosen due to the multi-level model and a huge number of questionnaire indicators. The questionnaire used in this study was adapted from previous research that looked at ethical leadership factors to find relevant independent variables: personal attributes (PA), administrative qualities (AQ), human relationships (HR), and teamwork (TW), each of which was measured by six items adapted from previous research (Mahmoud 2014). The RMC (relationships with managers and coworkers) was the dependent variable, which was measured using five questions modified from (Almahdi et al, 2015).

4. Data Analysis and Results

Throughout the evaluation of the measurement model, the present study paradigm was assessed for reliability and validity (Hair et al., 2021). Based on a rule of thumb, every item's loading was judged to be much beyond the 0.50 level in terms of reliability. The current study looked at the framework's composite reliability in addition to internal consistency and dependability (Hair et al., 2021).

4.1 Validity of Construct Measurement

The use of Smart PLS 2.0.0 is the first step in ensuring that this model is valid. The model's dependability was assessed in two steps before the assumptions were tested using partial least square structural equation modeling (PLS-SEM). Construction validity refers to the degree to which anything that has to be assessed can be measured by a test. The three main types of validation proof are construct validity, material validity, and criterion validity (Hair et al., 2021). Item loading and cross-loading were both found to be high in the variables' analysis (Table 1).

Table 1. Variables' Analysis and Cross Loadings *Source:* Authors

Factors	Items	Administrative Qualities	Human Relationships	Personal Attributes	Relationships with Managers and Colleagues	Teamwork
Administrative Qualities	AQ1	0.819097	0.627230	0.437811	0.522037	0.448383
	AQ2	0.832997	0.634473	0.429244	0.490532	0.441508
	AQ3	0.697713	0.428098	0.427307	0.363022	0.442755
	AQ4	0.842639	0.545296	0.518140	0.533771	0.515603
	AQ5	0.832577	0.543677	0.544799	0.549372	0.535844
	AQ6	0.832677	0.559883	0.517347	0.545174	0.515806
Human Relationships	HR1	0.523498	0.807543	0.358074	0.459436	0.379449
	HR2	0.577386	0.856340	0.422724	0.506895	0.459288
	HR3	0.601562	0.866297	0.385617	0.479041	0.424395
	HR4	0.580381	0.839106	0.436806	0.500845	0.455200
	HR5	0.586768	0.834817	0.558302	0.574227	0.548958
	HR6	0.592735	0.826844	0.572484	0.574367	0.569962
Personal Attributes	PA1	0.536406	0.506924	0.851204	0.589873	0.698051
	PA2	0.529203	0.484578	0.873451	0.589494	0.702449
	PA3	0.528944	0.508958	0.862612	0.574709	0.697517
	PA4	0.488781	0.432842	0.848301	0.526040	0.711462
	PA5	0.481321	0.446518	0.862218	0.542471	0.798239
	PA6	0.482455	0.458677	0.854919	0.542444	0.746593
Relationships with	RMC1	0.491257	0.525879	0.527927	0.822186	0.547828

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Managers and Colleagues	RMC2	0.462107	0.463985	0.565591	0.804800	0.569297
	RMC3	0.494357	0.499635	0.553328	0.822825	0.552319
	RMC4	0.537079	0.526219	0.505401	0.825736	0.525789
	RMC5	0.542875	0.501470	0.513189	0.795986	0.523775
Teamwork	TW1	0.515620	0.457623	0.700117	0.539693	0.814843
	TW2	0.415261	0.398745	0.546195	0.499534	0.735025
	TW3	0.470618	0.467902	0.594965	0.538945	0.796011
	TW4	0.477304	0.459669	0.637939	0.542763	0.830537
	TW5	0.495558	0.506311	0.674749	0.539744	0.828204
	TW6	0.481321	0.446518	0.862218	0.542471	0.798239

4.2 Convergent Validity of the model

The reliability testing results are shown in Table 2. Composite Reliability Measures were used to examine the model's internal consistency and reliability (Hair et al., 2021). Cronbach's Alpha and composite reliability ratings both above the 0.7 threshold (Hair et al., 2021). As a consequence, the realism of the model is satisfactory. The model's convergent validity was tested using the AVE values of the questions; the AVE value benchmark is 0.50. Because the AVE values are more than 0.5, convergent validity has been demonstrated (Hair et al., 2021). The composite dependability scores varied from 0.907792 to 0.944017 as a consequence of the study. Cronbach alpha scores ranged from 0.873111 to 0.928824, all of which met the criteria of being larger than 0.60. Table 2 shows that the average variance extracted (AVE) values ranged from 0.641794 to 0.737581, all over the minimum limit of 0.50.

Table 2. The Measurement Model's Confirmatory Factor Analysis

Factors	Items	Administrative Qualities	AVE	Composite Reliability	R Square	Cronbachs Alpha
Administrative Qualities	AQ1	0.819097	0.658030	0.920004	0.546248	0.895314
	AQ2	0.832997				
	AQ3	0.697713				
	AQ4	0.842639				
	AQ5	0.832577				
	AQ6	0.832677				
Human Relationships	HR1	0.807543	0.703434	0.934315	0.341969	0.915830
	HR2	0.856340				
	HR3	0.866297				
	HR4	0.839106				
	HR5	0.834817				
	HR6	0.826844				
Personal Attributes	PA1	0.851204	0.737581	0.944017	0.000000	0.928824
	PA2	0.873451				
	PA3	0.862612				
	PA4	0.848301				
	PA5	0.862218				
	PA6	0.854919				
Relationships with Managers and Colleagues	RMC1	0.822186	0.663233	0.907792	0.456177	0.873111
	RMC2	0.804800				
	RMC3	0.822825				
	RMC4	0.825736				
	RMC5	0.795986				
Teamwork	TW1	0.814843	0.641794	0.914769	0.714611	0.888288
	TW2	0.735025				
	TW3	0.796011				
	TW4	0.830537				
	TW5	0.828204				
	TW6	0.798239				

Source: Author

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4.3 Model of measurement with discriminant validity

Discriminant validity refers to how different a latent variable is from other latent variables. Discriminant validity was determined using the Hair et al. (2021) criterion. "The square root of AVE of each latent variable should be greater than the correlations among the latent variables," (Hair et al., 2021) noted. As seen in Table 3, the components in the matrix diagonals, which indicate the AVEs' square roots, are always larger than the off-diagonal elements in their respective row and column. This data supports the discriminant validity of the measures.

Table 3. Discriminant Validity and Latent Variable Correlations

Factors	Administrative Qualities	Human Relationships	Personal Attributes	Relationships with Managers and Colleagues	Teamwork
Administrative Qualities	1.000000				
Human Relationships	0.689781	1.000000			
Personal Attributes	0.591423	0.551122	1.000000		
Relationships with Managers and Colleagues	0.622348	0.619275	0.653262	1.000000	
Teamwork	0.595910	0.570347	0.845347	0.666746	1.000000

Source: Author

Multiple regression analysis with moderation testing was used in this study, while Smart PLS Software was used for data analysis. The tests in the analysis phase are as follows: 1) A construct validity test assesses if the questionnaire's question items are feasible or accurately reflect the variables being studied. The question is valid if the resulting outside loadings are at least 0.5. (Hair et al., 2021). 2) Reliability test: This is a test that assesses if the respondent's response is consistent, allowing the answer to be reliably appraised. Respondents' responses are regarded trustworthy if the composite reliability, Cronbach alpha, and rho score are all at least 0.7, as well as the average variance extract (AVE) value of at least 0.5. (Hair et al., 2021). 3) To assess how the endogen variable explains the variance of the exogen variable, the coefficient of determination test is utilized. The coefficient determination (R2) is shown in the smart output line (Hair et al., 2021). 4), Figure 2 demonstrates that the P-value (0.005) is statistically significant within a 5% confidence range, indicating that the model is statistically significant. Structural equation modelling (SEM) was used to validate the measurement model and analyze the assumptions (Hair et al., 2021).

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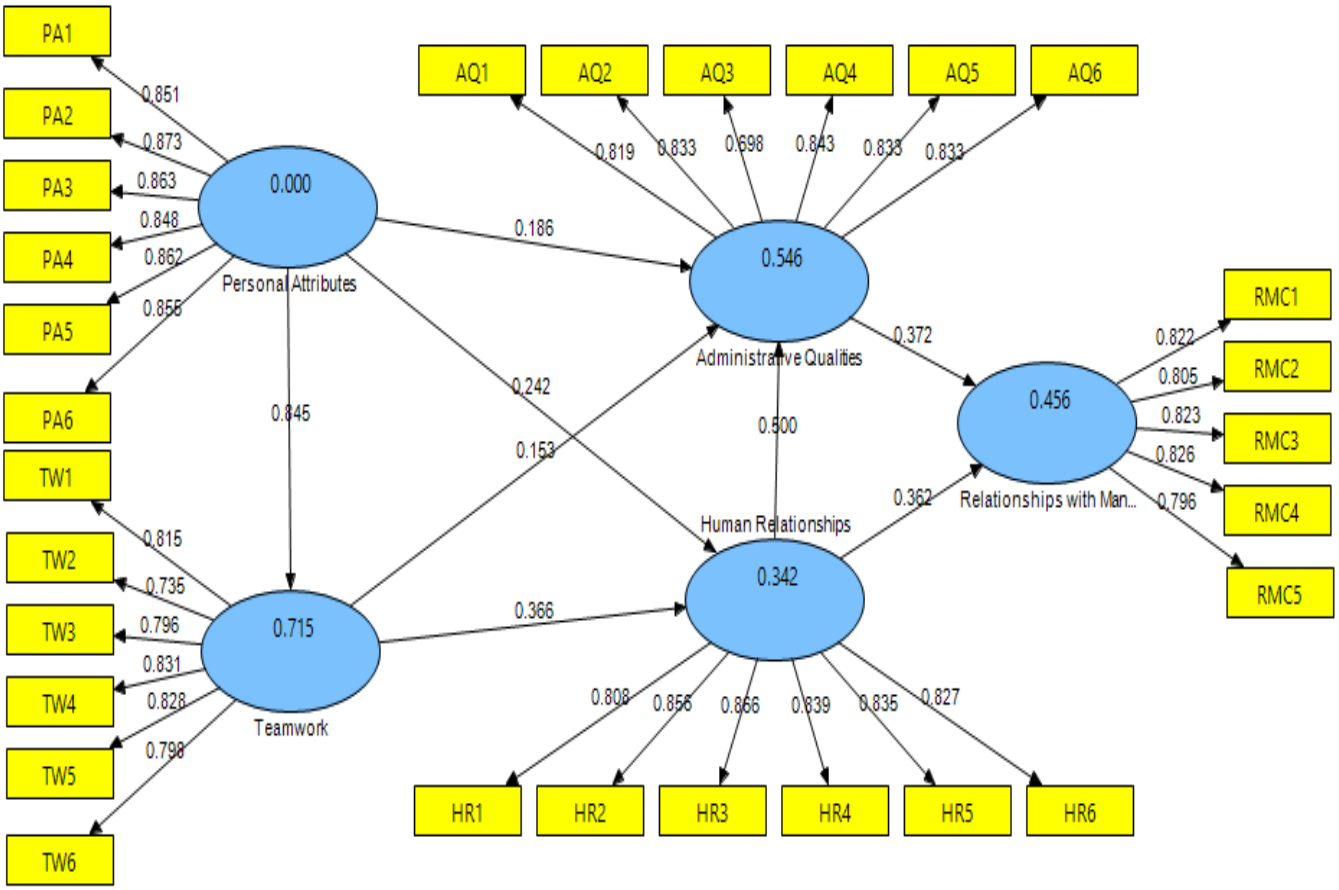

Figure 2. Measurement Model Findings
Source: Author

The regression test is used to examine both the direct and the moderation hypotheses. The hypothesis may be accepted by looking at the two outputs of clever pls, namely the t value of statistics and the value of the degree of significance. The hypothesis is supported if the statistical t value is more than 1.96 and the significance level is less than 0.05. (Hair et al., 2021). The hypothesis testing and structural model outcomes are shown in Figure 3 and Table 4, with the beta values of the route coefficient reflecting the direct influences of the predictor on the projected latent components.

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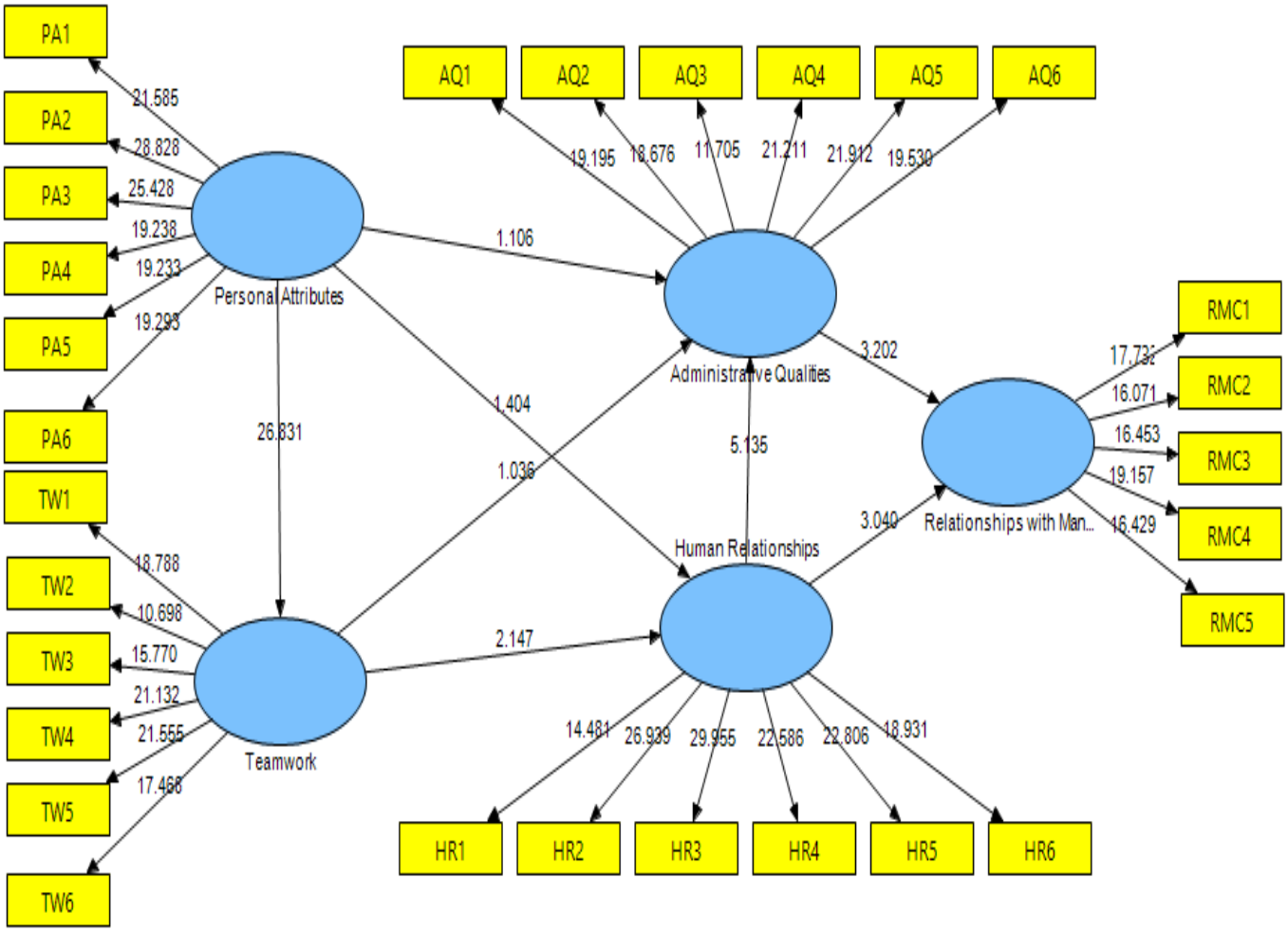

Figure 3. Structural Model Findings
Source: Authors

Table 4. Hypotheses Testing

Relationships Hypotheses	Path Coefficients	Sample Mean	Standard Error	T Statistics	Results
Administrative Qualities -> Relationships with Managers and Colleagues	0.372346	0.367513	0.116294	3.201756	Accepted
Human Relationships -> Administrative Qualities	0.499542	0.502349	0.097279	5.135122	Accepted
Human Relationships -> Relationships with Managers and Colleagues	0.362440	0.547767	0.095867	3.040842	Accepted
Personal Attributes -> Administrative Qualities	0.186423	0.589266	0.087420	1.106270	Accepted
Personal Attributes -> Human Relationships	0.242122	0.552610	0.086433	1.404290	Accepted
Personal Attributes -> Teamwork	0.845347	0.847577	0.031506	26.830979	Accepted
Teamwork -> Administrative Qualities	0.153215	0.326737	0.176155	1.036636	Accepted
Teamwork -> Human Relationships	0.366019	0.348735	0.170468	2.147140	Accepted

Source: Author

As shown in Table 4, all hypotheses were accepted since all five variables were statically important. The relationship between administrative qualities and relationships with managers and colleagues was accepted (β= 0.372346, t= 3.201756). Moreover, the relationship between human relationships -> administrative qualities was accepted (β= 0.499542, t= 5.135122). In addition, the relationship between human relationships -> relationships

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with managers and colleagues was accepted (β= 0.362440, t= 3.040842). As well, the relationship between personal attributes -> administrative qualities was accepted (β= 0.186423, t= 1.106270). Similarly, the relationship between personal attributes -> human relationships was accepted (β= 0.242122, t= 1.404290). Likewise, the relationship between personal attributes -> teamwork was accepted (β= 0.845347, t= 26.830979). And the relationship between teamwork -> administrative qualities was accepted (β= 0.153215, t= 1.036636). Finally, the relationship between teamwork -> human relationships was accepted (β= 0.366019, t= 2.147140).

5. Discussion and Implementations

The main goal of this study was to look at the impact of ethical leadership on relationships with managers and co-workers. In addition, the goal of this research was to look at the function of administrative traits and human interactions in mediating this model. We used PLS-SEM to evaluate our study hypotheses on a sample of Saudi academic employees. Personal characteristics, collaboration, administrative traits, and human interactions all have an impact on relationships with supervisors and co-workers, according to the findings. The association between ethical leadership behavior of higher education faculty administrators and academic staff behavior, as well as its level and manner, were explored in this study. First, the attitudes of academic staff were detected; it was discovered that academics demonstrate personal characteristics and teamwork, and how this affects administrative qualities and human interactions. Furthermore, academics demonstrate administrative skills and human interactions, as well as how this affects relationships with supervisors and co-workers.

5.1 Implications for Theory

Our findings contribute to the field of ethical leadership by adding to the body of knowledge on the subject. As previously noted, past research has linked ethical leadership to a range of positive outcomes (Zaim et al., 2021). However, to our knowledge, this is the first study to look at the effect of ethical leadership on relationships with management and co-workers. As a consequence, the current research contributes to existing human connections development management theories of ethical leadership and provides new insights on this expanding concept. Employee connections are now commonly understood to be influenced by leadership practices (Dietz et al., 2020). However, little is known about the underlying mechanisms via which leaders influence the administrative features and interpersonal relationships of their followers (Khan et al., 2021). By examining the mediating function of administrative qualities and human relationships, this study adds to our understanding of how and why ethical leadership is linked to the two indicators of administrative characteristics and human connections, which influence interactions with managers and colleagues. Finally, our research adds to the leadership literature in two ways. First, the strong link between ethical leadership and the two personal attributes of teamwork supports the notion that leadership and employee management are essential drivers of academic staff at universities. Second, previous research has mostly focused on the role of ethical leadership in fostering positive health and well-being outcomes (Almaaitah et al., 2020). However, our findings imply that ethical leadership behaviors on administrative qualities and human interactions impact academic staff's relationships with managers and colleagues at universities.

5.2 Implications for Practice

The study's findings might have far-reaching implications for corporations and colleges. Our findings reveal that promoting ethical leadership may improve administrative traits and human interactions, as well as how it influences relationships with management and co-workers. As a result, businesses and colleges may wish to consider hiring more ethical leaders and providing training to those already in place. Organizations can use selection procedures such as integrity examinations, organized interviews, and assessment center activities that focus on ethical concerns to find and pick ethical leaders (Anser et al., 2021; Yam et al., 2021). Organizations and colleges may also want to consider developing ethics training programs to urge their leaders to act ethically. Emphasizing the importance of ethics, rewarding and promoting ethical academic personnel, and serving as

ethical role models might all be part of training programs. Personal characteristics, collaboration, administrative traits, and human connections all affect interactions with supervisors and co-workers.

5.3 Conclusion and Future Work

The current research yielded eight ideas, all of which were backed up by evidence. The hypothesized factors were shown to be related substantially. This research provides preliminary evidence that ethical leadership and management in higher education are based on human interactions. According to the findings, personal traits, administrative qualities, human interactions, and collaboration can strengthen relationships with managers and coworkers. This research, like many others, has some flaws. Because the findings were based on a sample of academic staff at a university, their application to other occupations is restricted. Future research should aim to test our study model in diverse work situations to increase the external validity of the findings stated here.

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THE IMPACT OF IFRS ADOPTION ON COMPANIES' FINANCIAL RATIOS: EVIDENCE FROM LITHUANIA

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Abstract. According to previous research, a company's choice to adopt International Financial Reporting Standards (IFRS) may change accounting quality, comparability of financial statements, transparency, cost of capital, foreign investments, financial ratios and many other aspects. The main objective of this study was to evaluate the impact of the adoption of IFRS on financial ratios of Lithuanian state-owned companies. The study investigated financial ratios (profitability, liquidity and leverage) from the financial statements of 15 state-owned companies which adopted IFRS in the last decade. Data were manually collected from the companies' financial statements on websites, and statistical analysis was performed for the empirical study. The research results showed that IFRS adoption is related to decreased profitability (ROA, ROE, gross margin ratio, net profit margin) ratios, and liquidity ratios (current ratio and quick ratio), but none of these changes was significant. Leverage ratios (financial dependency ratio, debt ratio) varied differently: the financial leverage ratio had a statistically significant decrease, while the debt ratio had a significant increase. Comparing the obtained results with the results of other studies, it can be seen that similar results are obtained only with leverage ratios.

Keywords: IFRS adoption; financial ratios; impact; Lithuania

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1. Introduction

Each country in the world regulates its accounting system independently. The main idea of creating and issuing International Accounting Standards, later International Financial Reporting Standards (IFRS), was to harmonize accounting in the world, and to improve the comparability and transparency of financial statements so that users of financial statements can more easily compare companies in their investment process when making financial and economic decisions, although other economic consequences are also expected after this process. Now IFRS are mandatory, implemented in 87 percent of jurisdictions (Ball, 2016; International Financial Reporting Standards Foundation, 2017), mostly for listed companies. But other companies may choose an accounting regulation system between domestic accounting standards and IFRS. Therefore, companies may voluntarily use IFRS according to their accounting practice, characteristics, and needs of the users of accounting information.

As the main purpose of the International Accounting Standards Committee was to develop IFRS that bring transparency, accountability and efficiency to financial markets around the world (International Financial Reporting Standards Foundation, 2017), a very important issue is to explore what is the actual impact of IFRS adoption on a company's activity. With the transition to other accounting regulations, the numbers of the financial statements may be accounted for and measured differently, as a result of which the financial ratios derived from them and used for the financial analysis may also undergo certain changes. Therefore, the impact of IFRS adoption on accounting quality, comparability of financial statements, transparency, cost of capital, foreign investments and many other aspects has been examined in the context of the widespread implementation of IFRS worldwide. Opare et al. (2021) found that IFRS adoption has increased financial reporting comparability and market liquidity, and reduced the cost of equity. The impact on the financial performance of companies is not as widely examined in the literature as the impact on the quality of accounting or the comparability of financial statements, because IFRS adoption was not focused on changes in financial performance. But the impact on financial ratios is also an important economic change for a company, as they are the main indicators of the company's financial position, and are used by the company's managers and employees, investors, creditors and regulatory institutions. Therefore, it is necessary to examine the impact of IFRS adoption on the company's financial performance, as their changes affect the actions and decisions of users of external and internal financial statements.

Many studies on changes in the financial performance of European, African, Asian and North American companies that have adopted IFRS can be found in the literature. Changes may differ from country to country, depending on differences between national standards and IFRS. The impact of IFRS adoption in Europe on the numbers of financial statements and related aspects has been further explored since the European Union (EU) Regulation no. 1606/2002, when the mandatory application from 2005 of IFRS affected many listed companies in EU countries. Studies by Chan et al. (2015) and Utku & Kaya (2019) investigated the impact of IFRS adoption in more than 5 European countries, mostly in Western Europe. But if we consider that accounting systems in Western Europe and Eastern (post-Soviet) Europe differ, we may conclude that the impact of accounting change from domestic standards to IFRS should differ too. We found only a few investigations in Eastern European countries: Vellam (2012) researched the impact of IFRS adoption on financial ratios of Polish companies; Munteanu et al. (2014) and Neag (2014) in Romanian companies; and Jindřichovská & Kubíčková (2014) in Czech companies. Gastón et al. (2010) argue that the simultaneous adoption of new common accounting standards by different countries to obtain comparable financial information raises the question of how this change affects the financial statements issued by companies in each country. Therefore, the choice to research the impact of IFRS adoption in Lithuanian companies may be a good example of economic consequences of the change of accounting systems in the further evolution of knowledge in the Eastern European region which had the same features of accounting earlier, but now the accounting system is mixed.

In Lithuania, as an EU member state, the adoption of IFRS was mandatory for listed companies before 2005 or even earlier. Other companies have a choice to apply domestic Business Accounting standards (BAS) or IFRS

according to the LR Law on Accounting (2011). State-owned enterprises (SOEs) have been recommended to start applying IFRS since 2010, but this recommendation has a mandatory aspect because there is the requirement to "apply or explain" – if the enterprise does not switch to IFRS it should present arguments to explain why. Then, we have one more "mandatory" recommended case for exploring the impact of IFRS adoption on financial ratios in the last decade – with quite new and publicly available data. Besides, SOEs are quite large companies which play an important role in the country's economy. This is why this topic is relevant today. Moreover, accounting standards are the same for private companies and SOEs, therefore, we may conclude that the impact of IFRS adoption should be the same.

In much research, the impact of IFRS adoption on a company's financial ratios is not clear. Some research results do not show any significant change in financial ratios after IFRS adoption (Abdul-Baki et al., 2014; Abdullahi et al., 2017; Blanchette et al., 2011; Dimitrios et al., 2013; Ibiamke & Ateboh–Briggs, 2014; Jindřichovská & Kubíčková, 2014; Munteanu et al., 2014; Paulinus et al., 2018; Shukla, 2015). Many studies show that IFRS adoption has undergone significant changes (Achalapathi & Bhanusireesha, 2015; Callao et al., 2007; Gastón et al., 2010; Istrate, 2013; Lantto & Sahlström, 2009; Lueg et al., 2014; Moura & Coelho, 2016; Stent et al., 2010; Utku & Kaya, 2019). Hence, we need further evidence from an Eastern European country to assess the latest implications of IFRS adoption on financial ratios in a globally harmonized accounting world.

The main objective of this study was to evaluate the impact of IFRS adoption on the financial ratios of Lithuanian state-owned companies (SOEs).

The methods of this study. The researchers used systematic and comparative analysis of scientific literature, synthesis, generalization, and induction method for the analysis of empirical research. Secondary data were manually collected from the SOEs' websites, and statistical analysis was performed for the empirical study. To evaluate the impact of IFRS adoption on financial ratios, researchers applied descriptive statistics measures (averages, medians), Gray's Comparability Index, Shapiro Wilk test, F-test, t-test and non-parametric Wilcoxon Signed Rank test of selected financial ratios computed under IFRS and BAS by using Statistical Package for Social Science (SPSS) software.

The remainder of the paper is organized as follows. Section 1 provides a literature review for the proposed research framework. This is followed by a detailed description of research methodology and research findings of consequences of the IFRS adoption in Lithuanian SOEs. Finally, the last section presents and discusses conclusions and research limitations.

2. Literature Review

External and internal users of a company's financial statements use not only the numbers from the financial statements, but also the calculated financial ratios, which more accurately describe the company's financial and economic performance. When a company changes its accounting policy from domestic accounting standards to IFRS, it has changes of values in financial statements and, therefore, changes in the company's financial ratios, which are the main means of financial analysis.

As the impact of the IFRS adoption on a company's financial ratios is not one of the main issues in recent research, most investigations were more focused on qualitative features (comparability, transparency, accounting quality). But the impact of IFRS adoption remains also an important object of the studies worldwide, and we can find many studies with this research object in different countries, though these are mostly single-country studies. Stent et al. (2010) investigated 56 listed New Zealand companies in 2005–2008 and found the median for each of four ratios (return on equity – ROE, return on assets – ROA, leverage and return on sales – ROS) increases and decreases for asset turnover. Blanchette et al. (2011) identified that the distribution of means and medians of financial ratios suggests that IFRS does not affect significantly the financial condition of 9 listed Canadian companies in 2007–2009.

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Ibiamke & Ateboh–Briggs (2014) found that IFRS adoption has caused a statistically insignificant negative impact on the financial ratios (profitability, liquidity, leverage, market) of 60 Nigerian listed firms in 2010–2012. Abdul-Baki et al. (2014) analyzed changes of financial ratios in 2004, 2010 of one company and did not find a significant difference between Nigerian GAAP and IFRS. The research results of Abdullahi et al. (2017) showed that IFRS adoption has no significant positive association with 8 Nigerian oil and gas companies' performance (profit margin, ROA and ROE ratios) in 2012–2013. Paulinus et al. (2018) revealed that IFRS adoption by 104 listed entities in Nigeria has effects on firm profitability. The results of the study in 2012–2017 also showed that, statistically, the differences between both standards are not significant.

Achalapathi & Bhanusireesha (2015) studied the financial ratios of 10 Indian companies in 2008–2014 and defined that IFRS adoption has led to a statistically significant increase in liquidity, profitability and valuation ratios. Shukla (2015) researched the financial ratios of 10 Indian listed companies in 2010–2011 and 2014–2015 and found there is no significant improvement in financial risk, investment activities, operating activities and debt covenant. Debt ratios after IFRS adoption by 78 Brazilian firms in 2008–2015 were investigated by Moura & Coelho (2016) and they found evidence of significant changes in the debt ratio towards both higher and lower debt with predominance of greater ratios.

Analyzing performed investigations in European countries, we may see the important impact of EU Regulation no. 1606/2002 on the IFRS adoption process. Much research has begun to examine IFRS adoption made after the mandatory application in EU listed companies from 2005. The financial statements of 26 listed companies in Spain were investigated by Callao et al. (2007). They found cash, solvency and indebtedness ratios, as well as the ROA and ROE, varied significantly as a result of the changes in the balance sheet and income statement. They concluded that the economic and financial positions of Spanish firms, reflected in accordance with IFRS, are significantly different from the picture presented by local accounting standards.

The results of the Lantto & Sahlström (2009) study indicate that IFRS adoption changes the magnitudes of the 2002–2005 period key accounting ratios of 91 Finnish companies by considerably increasing the profitability ratios and gearing ratio moderately, and considerably decreasing debt and liquidity ratios.

The Gastón et al. (2010) study showed IFRS application for 74 Spanish and 100 UK first-time adopters in 2004 caused a higher value on assets and liabilities, lower equity and higher income in UK. A worse financial position referred to solvency and indebtedness in both countries, liquidity in Spain, but better profitability in the UK. The quantitative impact is significant in Spain and the UK and, against what was expected, it is higher in the UK. Lueg et al. (2014) investigated 101 UK companies from the FTSE 250 in 2005 and revealed that profitability and liquidity ratios increased significantly and were substantial in magnitude. Sovbetov (2015) studied 80 of the largest firms from the UK FTSE 100 in 2003–2006 and found that IFRS had affected profitability and capital structure ratios of the firms, but had not affected all efficiency and liquidity ratios. Therefore, Lueg et al. (2014) concluded that these differences in the UK have the same causes as in a creditor-oriented code law regime, i.e., an increase in operating income, net income, current liabilities and invested capital, as well as a decrease in shareholder equity.

No statistically significant difference between Greek GAS and IFRS was found in Greek companies in 2004–2010 (Dimitrios et al., 2013). Also, the changes in all examined indicators (firms' value, performance, and stability) of Czech firms did not prove to be statistically significant in 2004–2005 (Jindřichovská & Kubíčková, 2014).

Vellam (2012) analyzed IFRS adoption impact in 40 listed Polish companies in 2004–2005 and found that slightly more companies increased their profits and fewer decreased their profits, but the variation in the median of the earnings index was not significant for the large and small company sample. The findings for a sample of companies showed that equity increased significantly on the adoption of IFRS pointing to the significant difference between Polish accounting and IFRS. The impact of IFRS adoption on equity was considerably greater than on profits.

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Two research studies of the IFRS adoption impact on financial ratios of Romanian listed companies in 2011–2012 were found. The results of the Munteanu et al. (2014) study reveal that no statistically significant differences at median and mean level were observed, but when the variance was analysed, solvency ratios and ROE were found relevant. Neag (2014) defined that the net income and equity under IFRS were lower than provided under Romanian accounting regulations. Therefore, the application of IFRS had a small effect on net income and shareholders' equity in Romanian listed companies.

We found only a few studies which analyzed the impact of the IFRS adoption in more than one country. Istrate (2013) researched financial ratios of 593 companies listed on Euronext markets in 2005 and concluded that: 1) for equity, the IFRS numbers are a little greater than the ones in the former GAAP, except for the Netherlands; 2) for net income, the transition to IFRS determined its significant increase, on average; 3) the leverage ratio changes very little; 4) for the modifications of returns (ROE and ROA), a significant increase generated by transition to the IFRS. Also, after the analysis of 384 companies in 11 European countries in 1995–2014 Utku & Kaya (2019) concluded that profitability ratios showed a significant change in more countries in the short-term rather than in the long-term, and statistically significant differences of structure and operational ratios have occured in the long term.

Summarizing results of research studies on the impact of IFRS adoption on financial ratios, the following groups of financial ratios are commonly used by authors in their studies: first, profitability ratios mostly increased, especially ROE and ROA; second, liquidity ratios show a change, but both positive and negative, which does not allow one-sided conclusions to be drawn; third, leverage ratios almost always increase.

The studies also sometimes include solvency, operating, investment valuation and coverage indicators, but they were applied in only a few studies, which does not allow a common opinion on the impact on them after IFRS adoption. Several studies also show different conclusions that IFRS adoption does not have a significant impact on a company's financial ratios at all. Different research findings may be due to the fact that many other things can affect financial performance. Jindřichovská & Kubíčková (2014) concluded that transition of Czech statements to IFRS may cause changes in the values of financial indicators without relationship to the real change in the firms' value, performance, and stability. Gastón et al. (2010) expected the quantitative impact of IFRS to be significant due to differences between local and international standards, and that this impact would be higher in Spain because IFRS have always been considered close to the Anglo-Saxon accounting model and distant from the European continental accounting model. However, the results of their research revealed that the quantitative impact has been significant in both countries, though it has been higher in the UK. So, different national accounting standards and accounting practices in each country may cause the extent of changes after IFRS adoption, which may or may not affect changes in financial ratios. In summary, changes in financial ratios may be caused by economic events or company performance, but the change also is possible, according to the authors' research, from changed accounting standards, although not in all countries or companies.

3. Research Methodology

Choosing to investigate the impact of IFRS adoption on financial ratios we need to choose those ratios that best describe a company's financial performance and meet the needs of users, as it is important to consider the impact on such ratios, which are the most necessary for decision-making. The authors analyzed state that they choose to consider these financial ratios, because they are the most widely used in analyzing a company's performance and financial position, described as the main indicators (profitability, liquidity and leverage) of interest to investors, analysts, business leaders and creditors. Table 1 shows which financial ratios were chosen by the authors discussed.

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Table 1. Financial ratios analyzed in other research

Authors, year	**Financial ratios**
Callao et al. (2007)	CR, QR, Cash ratio, solvency, D/E, ROA, ROE
Lantto & Sahlström (2009)	CR, QR, E, GR, OPM, P/E, ROE, ROIC
Gastón et al. (2010)	CR, solvency, D/E, ROA, ROE
Stent et al. (2010)	ROE, ROA, D/E, asset turnover, ROS
Blanchette et al. (2011)	CR, QR, D, E/A, IC, cash flow coverage, operating cash flow, ROA, GPR, EBITDA, asset turnover
Vellam (2012)	Equity, ROE
Istrate (2013)	Equity, D, income, ROE, ROA
Dimitrios et al. (2013)	CR, QR, D, E, E/D, ROA, ROE, ROIC, EBITDA, GPR, ROS, turnovers (equity, assets, fixed assets)
(Ibiamke & Ateboh–Briggs, 2014)	EPS, ROA, ROE, CR, NCFO, D/E, D, P/E
Lueg et al. (2014)	OPM, ROE, ROIC, CR, P/E
Munteanu et al. (2014)	CR, solvency, D/E, ROA, ROE, ROS, autonomy
Neag (2014)	Net income, equity
Abdul-Baki et al. (2014)	GPR, ROS, ROIC, CR, QR, CRA, D, GR, Cash Flow ratio, EPS, DPS, dividend payout
Jindřichovská & Kubíčková (2014)	ROE, ROA, ROS, ROCE, CR, QR, Cash ratio, D, E, D/E, IC, turnovers (assets, inventory, receivables, liabilities)
Chan et al. (2015)	IC, ROA, COD, IC
Sovbetov (2015)	ROE, ROCE, ROA, PM, CR, QR, GR, book-to-market value, turnovers (net assets, stock)
Achalapathi & Bhanusireesha (2015)	D/E, D, E, IC, Cap ratio; CR, QR, CF/NA, CF/NW, CF/CL, CF/TL, GPR, NPR, OPR, ROA, ROAE, ROACE; EPS, B/M, M/C, P/E
Shukla (2015)	QR, ROE, D/E; ROA, fixed asset turnover, debt to total capital, debt to EBITDA, IC
Moura & Coelho (2016)	D/E, D
Abdullahi et al. (2017)	ROS, ROA, ROE
Paulinus et al. (2018)	EPS, ROA
Utku & Kaya (2019)	CR, QR, Cash ratio, financial leverage; ROA, ROE; turnovers (net fixed assets, asset, inventory, accounts receivable)

CR – current ratio, QR – quick ratio, CF/NA – cash returns to net assets, CF/NW – cash returns to net worth, CF/TL – cash returns to total liabilities, CF/CL – cash returns to current liabilities, GPR – gross profit ratio, OPR – operating profit ratio, ROAE – return on average equity, ROACE – return on average capital empoyed, OPM – operating profit margin, ROIC – return on invested capital, NCFO – net cash flow from operation to current liabilities, P/E – price-to-earnings ratio, IC – interest coverage ratio, GR – gearing ratio, ROS – return on sales, ROCE – return on capital employed, Cap ratio – capitalization ratio, B/M – book-to-market ratio, M/C – market-to-cash ratio, BVPS – book value per share, EPS – earnings per share before extraordinary items, D/E – leverage, D – debt ratio, E – equity ratio, COD – interest expense divided by interest bearing debt.

Source: compiled by authors according to the listed in the table sources.

Profitability ratios show how effectively a company is able to earn revenue and use it to make a profit. The authors mostly examined these ratios: ROE, ROA, return on invested capital (ROIC), gross and net profit margin and return on sales (ROS). Results of research by Abdul-Baki et al. (2014), Abdullahi et al. (2017) and Paulinus et al. (2018) stated that profitability ratios did not change significantly after the IFRS adoption. Research results of Callao et al. (2007), Jindřichovská & Kubíčková (2014), Neag (2014), Ibiamke & Ateboh–Briggs (2014) stated that profitability ratios decreased after the IFRS adoption, but most studies show different results. Results reported by Callao et al. (2007), Stent et al. (2010), Achalapathi & Bhanusireesha (2015), Istrate (2013) and Gastón et al. (2010) (except results in UK) found that profitability ratios increased after IFRS adoption; findings by Sovbetov (2015), Munteanu et al. (2014), Blanchette et al. (2011) and Utku & Kaya (2019) showed significant change of profitability ratios. Hence, the following hypothesis was formulated for further analysis:

H1: IFRS adoption significantly increases profitability ratios of Lithuanian companies.

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Liquidity ratios show whether a company has sufficient highly liquid assets and liabilities that could be used to meet the company's activities and liabilities in the short term. The authors mostly examined the indicators current ratio (CR) and quick ratio (QR). Liquidity ratios varied in the results of previous studies in different countries. Results of research by Callao et al. (2007), Istrate (2013) and Achalapathi & Bhanusireesha (2015) revealed that liquidity ratios increased after IFRS adoption, but Gastón et al. (2010), Ibiamke & Ateboh–Briggs (2014), and Jindřichovská & Kubíčková (2014) found a decrease of liquidity ratios. For Blanchette et al. (2011) the results of their study showed increased volatility of indicators, Utku & Kaya (2019) found a significant change of these ratios, and for Dimitrios et al. (2013), Abdul-Baki et al. (2014) and Sovbetov (2015) the results of their research did not show any change in liquidity ratios after IFRS adoption. Hence, the following hypothesis was formulated for analysis:

H2: IFRS adoption significantly decreases liquidity ratios of Lithuanian companies.

Leverage ratios are used to evaluate a company's debt levels. The authors mostly examined the indicators leverage coeficient (D/E) and debt ratio (D). Leverage rates in previous studies tended to increase. The results of the study by Moura & Coelho (2016) showed inconsistent results (both significant and insignificant change for different leverage ratios). Abdul-Baki et al. (2014) found no significant change in the leverage ratios after IFRS adoption, but Callao et al. (2007), Stent et al. (2010), Gastón et al. (2010), Istrate (2013), Ibiamke & Ateboh–Briggs (2014) revealed that leverage ratios increased after IFRS adoption. Sovbetov (2015) determined the significant changes in leverage ratios, and Blanchette et al. (2011) concluded increased changes in leverage ratios after IFRS adoption. Hence, the following hypothesis was formulated for analysis:

H3: IFRS adoption significantly increase leverage ratios of Lithuanian companies.

Table 2 shows the profitability, liquidity and leverage ratios which were selected for the research. The choice to analyze the relevant financial ratios in Lithuanian companies is based on financial ratios used in previous research and the frequency of their usage in practice.

Table 2. The financial ratios and their formulas

Financial ratio	Formula
Return on assets (ROA)	Net profit/assets
Return on equity (ROE)	Net profit/equity
Gross margin ratio (ROS)	Gross profit/Revenue (net sales)
Net profit margin (NPM)	Net profit/Revenue (net sales)
Current ratio (CR)	Current assets/Current liabilities
Quick ratio (Acid test) (QR)	(Current assets-inventories)/Current liabilities
Debt-to-equity ratio (D/E) (leverage ratio)	Debt/Equity
Debt ratio (D)	Debt/Assets
Equity ratio (E)	Equity/Assets

Source: compiled by authors.

Further research will be conducted in the following stages based on the research methods in previous research. Two-year financial ratios (before and after IFRS adoption) are calculated and descriptive statistics, which include averages, medians and their changes, are analyzed. Data are measured using the Gray Comparability Index to estimate the relative change of financial ratios after the IFRS adoption. Vellam (2012), Istrate (2013), Ibiamke & Ateboh–Briggs (2014), Achalapathi & Bhanusireesha (2015), Paulinus et al. (2018) used Gray's Comparability Index in their research, or sometimes referred to relative impact, which was used by Gastón et al. (2010). The index measures the extent to which the financial results reported under different accounting practices would provide a ratio about the measurement behaviour (Ali et al., 2016). The Gray Comparability Index is calculated using a formula (Istrate, 2013):

$$\text{Gray's Comparability Index (CI)} = 1 - \frac{\textit{previous numbers} - \textit{IFRS numbers}}{\textit{previous numbers}} \quad (1)$$

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According to Achalapathi & Bhanusireesha (2015), consistent with previous studies, an index value larger than 1 suggests that the financial ratio under IFRS is higher than the financial ratio under domestic accounting standards; a value lower than 1 suggests that the financial ratio under IFRS is lower than the financial ratio under domestic accounting standards, and an index value of +1.0 is neutral, suggesting no change.

The advantage of this index is that it prevents any problems related to financial statements drafted in difference currencies (Gray et al., 2009). But the big weakness of the index is that it shows only the relative change; it does not show whether or not the difference if any is significant (Achalapathi & Bhanusireesha, 2015; Ibiamke & Ateboh–Briggs, 2014). This may be calculated with descriptive statistics.

Furthermore, we need to analyze whether the financial ratios are distributed normally. To determine the distribution of the means of financial ratios, Stent et al. (2010), Blanchette et al. (2011), Dimitrios et al. (2013), Munteanu et al. (2014) relied on asymmetry and excess coefficients and the Jarque-Bera test; Callao et al. (2007), Gastón et al. (2010), Abdul-Baki et al. (2014), Achalapathi & Bhanusireesha (2015) relied on Kolmogorov-Smirnov and Shapiro-Wilk tests; Sovbetov (2015) relied on Shapiro-Wilk and Lilliefors tests. Razali & Wah (2011), Saculinggan & Balase (2013) agreed that the Shapiro-Wilk test is more suitable for the analysis of various data distributions and data amounts compared to the Lilliefors, Kolmogorov-Smirnov tests.

The Shapiro-Wilk test is used to verify normality in subsequent statistical analysis. If the resulting p-value is less than the significance level (1% or 5% levels are used in the studies), the hypothesis that the data are distributed normally is confirmed, and vice versa.

The next step of the authors of previous studies was to determine whether the change in financial ratios after the IFRS adoption is statistically significant. The methods that help to determine statistical significance can be divided into two groups: 1) if it is a normal distribution, parametric tests are used; 2) if it is not the normal distribution, non-parametric tests are used.

A parametric t-test was used by Callao et al. (2007), Blanchette et al. (2011), Dimitrios et al. (2013), Jindřichovská & Kubíčková (2014), Ibiamke & Ateboh–Briggs (2014), Munteanu et al. (2014), Shukla (2015), Sovbetov (2015), Achalapathi & Bhanusireesha (2015), Paulinus et al. (2018) and Utku & Kaya (2019). A non-parametric Wilcoxon test was used by Callao et al. (2007), Stent et al. (2010), Gastón et al. (2010), Blanchette et al. (2011), Dimitrios et al. (2013), Munteanu et al. (2014), Sovbetov (2015) and Achalapathi & Bhanusireesha (2015). We may conclude that the basic parametric test of the normal distribution is the t-test**,** and the basic non-parametric test is the Wilcoxon test, which uses the median to calculate statistical significance.

The t-test and Wilcoxon test analyze the hypotheses, comparing the selected financial ratios (average and median respectively) before and after IFRS adoption:

- H0 – the averages (medians) of the two samples do not differ;
- H1 – the averages (medians) of the two samples differ significantly.

The t-test and Wilcoxon test evaluate by p-value. If the value is higher than the chosen significance level, hypothesis H0 can be rejected and it can be stated that the differences in financial ratios before and after IFRS adoption exist and are significant. The obtained results of changes in financial ratios and statistical analysis will show the rrectness of the statements of hypotheses H1, H2, H3, which can be accepted or rejected.

4. Research Results

Companies listed on the NASDAQ OMX Vilnius Stock Exchange adopted IFRS before 2005. Therefore, Lithuanian SOEs that have adopted IFRS during the last decade were selected for this research. SOEs are such companies in which the Republic of Lithuania holds a majority or all of the shares. Most of these companies are not listed on a regulated market and were therefore not required to adopt mandatory IFRS in 2005. SOEs,

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according to the Government of the Republic of Lithuania 2010 July 14 Resolution no. 1052 "On the Approval of the Description of the Guidelines for Ensuring the Transparency of the Activities of State-Owned Enterprises and the Designation of the Coordinating Authority" (LRV2010, 2010), had to keep their accounts in accordance with IFRS. However, as these guidelines are only indicative, companies could choose not to apply IFRS in accordance with the "comply or explain" principle, based on the Government of the Republic of Lithuania Resolution no. 1052, "Derogations from or non-compliance with the Transparency Guidelines are only possible if the reasons for this are necessary (appropriate)." As a result, enterprises that ignore the application of IFRS must justify the non-application of the standards for an important reason, and may proceed before those standards at a later date when their application would be appropriate for the entity. Thus, from 2010, SOEs have been switching to the application of IFRS.

At the beginning of 2021, 20 out of 49 SOEs applied IFRS. As the study requires financial ratios before and after IFRS adoption, those enterprises are selected that have previously applied BAS and whose financial statements prepared in accordance with BAS are publicly available. Of the 20 companies, 5 are non-compliant companies that do not have publicly available reports prior to IFRS adoption, or have applied IFRS only in their accounts. As a result, the sample of the research includes 15 Lithuanian SOEs that adopted IFRS in the 2011–2018 period. Most of these enterprises operate in the transport, financial, service and television services sectors, and there are several manufacturing companies. Since at the beginning of 2015 there was a change of operating currency in the Lithuanian market, when all companies changed their accounting numbers from Litas to Euros, and some (3) enterprises from the research sample present their financial statements in Litas and Euros. However, this will not distort the research results, as the financial ratios, as relative numbers, from financial statements prepared in Litas are calculated with the data from financial statements in the same currency.

We calculated the financial ratios for the 15 enterprises from their annual financial statements before IFRS adoption based on domestic accounting standards and the first year of IFRS implementation. The data of descriptive statistics are presented in table 3.

Table 3. Descriptive statistics of financial ratios changes after IFRS adoption

Ratio	Minimum		Maximum		Change of average	Change of median	Gray's index
	BAS	IFRS	BAS	IFRS			
ROA	-4.65%	-7.48%	13.64%	15.54%	-24,19%	-70.46%	0,76
ROE	-9.05%	-20.81%	15.21%	16.67%	-50.32%	-78.30%	0,50
ROS	15.97%	4.21%	109.59%	124.14%	-0.78%	-0.01%	0,99
NPM	-5.87%	-34.69%	98.74%	98.53%	-30.45%	-85.15%	0,70
CR	0.52	0.63	20.73	13.76	-8.44%	-48.8%	0,92
QR	0.47	0.56	19.10	12.81	-12.97%	-59.19%	0,87
D/E	0.03	0.05	9.86	3.62	-21.26%	159.76%	0,79
D	0.03	0.05	0.91	0.78	47.20%	169.02%	1,47
E	0.09	0.22	0.95	0.95	0.09%	4.05%	1,001

Source: Own calculations based on conducted research.

The values of all profitability ratios decreased after IFRS adoption: the largest change in the average is in the ROE (-50.32%), and the largest change in the median is in the ratio of NPM (-85.15%). The smallest change in the average and median is in the ROS. The value of the Gray CI shows that the profitability ratios of Lithuanian SOEs decreased after IFRS adoption, as the values of all indicators are lower than 1. The largest change in return is shown in ROE (0.5). The smallest change is seen in the ROS, whose value (0.99) is very close to 1 and shows that it has hardly changed.

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Liquidity ratios decreased slightly after the IFRS adoption: the average of QR decreased the most (-12.97%), and the median of quick liquidity also decreased the most (-59.19%). The same result is shown by the values of Gray's CI which are lower than 1 for all ratios. The largest change is seen in the CR, as its value deviates the most from 1.

Leverage ratios changed in various ways after IFRS adoption: the average of D/E ratio decreased (-21.26%), the D ratio increased (47.20%) and the E ratio remained almost unchanged (0.09%), the median of all leverage ratios increased with IFRS adoption, but this change of D/E and D ratios was the largest (159.76% and 169.02% respectively). The D/E ratio is the only one with a value of Gray's CI of less than 1, and it shows a decrease after IFRS adoption. The value of the E ratio is almost equal to 1, which means that it has hardly changed. The D ratio shows the highest value of all calculated selected financial ratios of the company – 1.47. This shows that after IFRS adoption, this ratio had the largest change – it had increased.

Table 4 shows the p-values obtained from the Shapiro-Wilk test with the chosen level of significance and the compliance with the hypothesis in selected financial ratios of companies before and after IFRS adoption.

Table 4. The results of Shapiro-Wilk test

Ratio	p-value		Hypothesis test
	BAS	IFRS	
ROA	0.151	0.288	H0
ROE	0.460	0.500	H0
ROS	**0.002***	**0.020****	H1
NPM	**<0.0001***	**0.007***	H1
CR	**0.000***	**0.002***	H1
QR	**0.000***	**0.001***	H1
D/E	**<0.0001***	**0.000***	H1
D	**0.001***	0.249	H0 IFRS, H1 BAS
E	0.119	0.244	H0

* p < 1%; ** p < 5%.
Source: Own calculations based on conducted research.

The numbers in bold in the table indicate that the calculated p-value is less than the selected significance level, which means that the data are not normally distributed. From the results of the tests, it can be stated that the ROA and ROE are normally distributed, while return on sales ROS and NPM are not normally distributed. All liquidity ratio data for both the years before and after IFRS adoption are not normally distributed. The p-values obtained are less than both significance levels. The distribution of leverage data is different. The values of the leverage ratio p-value indicates that the data are not normally distributed. D ratio data for BAS are not normally distributed, but for IFRS are normally distributed. E ratio data are distributed normally.

Furthermore, appropriate tests are used to determine the significance of the changes. Table 5 shows financial ratios' averages and medians before and after IFRS adoption and t-test and Wilcoxon test p-values.

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TABLE 5. The results of t-test and Wilcoxon test

Ratio	Results of t-test			Results of Wilcoxon test		
	Average		p-value of t-test	Median		p-value of Wilcoxon test
	BAS	IFRS		BAS	IFRS	
ROA	0.04	0.03	0.36	0.019	0.005	0.524
ROE	0.053	0.026	0.24	0.058	0.012	0.330
ROS	0.42	0.417	0.872	0.273	0.273	0.975
NPM	0.148	0.103	0.174	0.070	0.010	0.277
CR	4.532	4.149	0.572	3.192	1.634	0.421
QR	4.114	3.581	0.407	3.043	1.242	0.252
D/E	0.897	0.706	0.677	0.12	0.32	**0.083*** **
D	0.211	0.311	**0.057*** **	0.09	0.24	**0.048** **
E	0.687	0.687	0.959	0.73	0.76	0.978

** p < 5%, ***p < 10%.
Source: Own calculations based on conducted research.

The results show that the p-values for all profitability, liquidity and leverage ratios, except for the D ratio, are higher than the significance levels. Therefore, hypothesis H0, which states that the ratios of the two compared samples do not differ, cannot be rejected. The results of the t-test show that all profitability, liquidity and debt ratios, with the exception of one D ratio, did not change significantly after IFRS adoption. For the D ratio, hypothesis H0 is rejected and alternative hypothesis H1 is accepted. However, as the values of this ratio are not distributed normally for BAS and distributed normally to IFRS, based on data normality tests, additionally non-parametric tests should be applied to determine the significance of average differences, i.e., Wilcoxon test.

The analysis of Wilcoxon test shows that the p-values of all profitability and liquidity ratios are higher than the significance levels. This means that profitability and liquidity ratios did not change significantly after the IFRS adoption. Analysing leverage ratios, the p-value of the financial leverage ratio is less than the 10% significance level and the D ratio p-value is less than the 5% significance level. For these ratios, hypothesis H0 is rejected and the alternative hypothesis H1 is accepted, what means that the medians of the two samples differ significantly. As a result, IFRS adoption has led to a significant increase in the leverage ratio and the D ratio. The p-value of the E ratio is higher than the significance levels, therefore, hypothesis H0 cannot be rejected, and we may conclude that this ratio did not change significantly after the IFRS adoption.

Summarizing the results of statistical analysis of characteristics of the change in the values of financial ratios led to the **H1 hypothesis** (IFRS adoption significantly increase profitability ratios of Lithuanian companies) being **rejected**, as profitability ratios, although statistically insignificant, decreased. This is consistent with the results of Callao et al. (2007), Jindřichovská & Kubíčková (2014), and Ibiamke & Ateboh–Briggs (2014) who found that IFRS adoption has led to a decrease in profitability, but it was not significant.

The **H2 hypothesis** (IFRS adoption significantly decrease liquidity ratios of Lithuanian companies) **is rejected**, as liquidity ratios decreased statistically insignificantly after IFRS adoption. From their research, Gastón et al. (2010), Ibiamke & Ateboh–Briggs (2014), and Jindřichovská & Kubíčková (2014) found the same results, but other studies found no change in liquidity ratios after IFRS adoption (Dimitrios et al., 2013; Sovbetov, 2015), or the increase of liquidity ratios (Achalapathi & Bhanusireesha, 2015; Callao et al., 2007; Istrate, 2013).

The **H3 hypothesis (**IFRS adoption significantly increases leverage ratios of Lithuanian companies) **is accepted for the debt ratio (D)**. The E ratio had an insignificant very small increase. Also, the hypothesis H3 should be rejected for the leverage ratio because this ratio decreased significantly after IFRS adoption. In other similar studies, these ratios mostly showed an increase (Callao et al., 2007; Gastón et al., 2010; Ibiamke & Ateboh–Briggs, 2014; Istrate, 2013; Stent et al., 2010).

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Conclusions

Lithuania, as an EU Member State, adopted accounting regulation after the issue of EU Regulation No 1606/2002, which required accounting to be kept under IFRS in publicly listed companies. Other companies could voluntarily choose accounting standards between national or international. However, in 2010 the Lithuanian Government issued the recommendation for SOEs to implement IFRS in their accounting; if a company does not implement IFRS in accordance with this recommendation, it should explain why. Therefore, authors have chosen the sample of SOEs for this research because of their IFRS adoption in last decade and publicly available data from their financial statements.

After the analysis of research which investigated the impact of mandatory and voluntary IFRS adoption on companies' financial ratios in the world in recent decades, we may conclude that researchers mostly found significant impact of IFRS adoption on profitability, liquidity and leverage ratios. But there are investigations where this significant impact was not found. And we have no clear conclusions about this situation in one country or country group. Therefore, we need more evidence about the practice in the IFRS adoption implications on a company's financial performance.

The performed research in Lithuanian SOEs analyzed the impact of the IFRS adoption on three groups of financial ratios: profitability, liquidity and leverage. The research results showed that IFRS adoption is related to decreased averages and medians of profitability ratios, but some changes of ratios were stronger, some were very weak. But the change in profitability ratios after IFRS adoption was not significant. Liquidity ratios also decreased after IFRS adoption, but the change also was not statistically significant. Averages and medians of leverage ratios increased after IFRS adoption, except for the leverage ratio, which had a negative strong change of average. The results of the statistical analysis showed that the leverage ratio and the debt ratio had a statistically significant change: the debt ratio increased significantly, and the leverage ratio decreased significantly based on the change in the average and the Gray Comparability Index. The equity ratio had a very small insignificant increase.

Comparing the obtained results with the results of other studies, it can be seen that similar results are obtained only with leverage ratios. Profitability ratios in most previous studies increased, but there were some cases of decrease: the same result was obtained in this study. The decrease in liquidity ratios coincides with a third of the research of other authors discussed, but other authors also discussed the increase in ratios and the absence of change. Our results show a statistically significant increase in debt ratio, but the other two leverage ratios do not concur with the results of similar research.

The performed research has some limitations. First, it analyzed the IFRS adoption only of SOEs because their financial statements are available publicly. Moreover, they changed their accounting policy in the last decade, so this research was timely. But the population of SOEs is quite limited, because the number of such companies is not big. A larger population should include the population of private companies, but the data about the number of companies which voluntarily changed accounting policy from BAS to IFRS in last decade are not available. Only financial statements of listed companies are available, but they adopted IFRS before 2005. Therefore, the analysis of the impact of IFRS adoption on their financial ratios would be not timely and actual. Of course, accounting standards are the same for private companies and SOEs, therefore, we may conclude that the impact of IFRS transition should be the same, but it would be better to test financial ratios of private companies separately.

Second, we analyzed the impact of the IFRS change on financial ratios in two years – one year before and one year after – making the assumption that all economic circumstances were equal. Therefore, the change of financial ratios may be caused by factors other than IFRS adoption. Based on this fact, the users of financial statements should determine the causes of the numbers in companies' financial statements, because if a company changed

accounting policy from national accounting standards to IFRS it will have an impact on the company's financial performance, but this could be the consequence of other economic circumstances.

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R&D EXPENDITURE, INNOVATION PERFORMANCE AND ECONOMIC DEVELOPMENT OF THE EU COUNTRIES*

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Abstract. Innovation plays the key role in economic development and also in the growth of the wealth of countries. Innovation is the driving force of each economy, competitiveness of the economy and a main essential component of the knowledge economy, which is based on the production of higher added value and support of the research and development (R&D). Therefore, the European Union with an effort to compete with other world economies is creating the frameworks of innovation policy in order to implement, maintain and disseminate innovation and innovative potential in all areas of socio-economic life. However, the innovation performance and potential differ significantly among the EU countries, and so the wealth of the countries. The main objective of the research made was to identify and quantify the possible impact of R&D expenditure on innovation performance and possible impact of the innovation performance on economic development of the EU countries. To achieve this goal a set of statistical methods was used, main of which is regression and correlation. In the result of our research, we have shown a significant interdependence between R&D expenditure, innovation performance and level of economic development of the EU countries.

Keywords: economic impact; innovation performance; R&D expenditure; real GDP per capita; economic development of the countries; The EU

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1. Introduction to the topic of innovation

For more than 50 years, since the neoclassical theory of economic growth composed by Robert Solow was introduced, researchers and economists are still trying to find an answer to question of different levels of successful economic growth and prosperity (Baltgailis 2019).

A search for new ways of understanding growth followed, and out of this emerged a new perspective on economic growth, which put technology and innovation, rather than capital accumulation, at the front. According to Fagerberg (2010), the ability of a poor country to catch up with the rich was seen not only – or mainly – as a reflection of its ability to generate (or attract) sufficient investments, but also of its capacity to absorb existing and generate new technologies (e.g. innovate).

At the very beginning it is necessary to explain and closely characterize the main terms. The initiator of the innovation theory is considered to be J. A, Schumpeter, who in the thirties of the 20th century regarded innovations as a driving force of economy. According to him, innovations represent combination of factors of production influenced by enterprise activities (Baltgailis 2019). Rajapathirana and Hui (2018) stated that innovations are world-widely regarded as pinnacle success factor in highly competitive global economy. One of the most popular Slovak definitions of the first term - innovation can be found in publication "Innovation and Companies" – published by Trnava Self-Governing Region (2010), where innovations are defined as introducing and implementing of new, or much better product (goods or services), process, new marketing method or a new organizational method in company practice, working environment of all organizational parts or in external relations.

The most acclaimed form of explaining the term **innovation** is at present a comprehensive definition in the Oslo manual, which was published in 1997 by OECD: “Technological innovations of products and processes (abr. TPP innovations), which include new products and processes based on new technologies, or significant technical improvements of already existing products and processes. TPP innovation is implemented when the product is launched to the market (product innovation) or a new process innovation is introduced (process innovation)“.
This manual also defines next four basic categories of innovations:

1. Product innovation
2. Process innovation
3. Organization innovation
4. Marketing innovation

Thus, on the one hand there are innovation of products/services (and also innovation of the production processes/methods) and marketing/selling methods – these are closely connected to the processes of R&D, production and sales. On the other hand there are organization innovation which are connected to the internal company structures, values/ideas or in general, with strategic management tools.

Second important term is the **innovation performance**. Level of innovation performance can be expressed by comprehensive methodology, which is used by the European Commission to compare innovation performance of its member states and individual regions of the EU, while it also uses the scheme of several basic indicators, such as:

- European Patent Office, www.epo.org
- Human resources in the area of science and technology (% of population)
- Participation in lifelong education (age of 25-64)
- Public expenses for research and development (% GDP)

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- Company expenses for research and development (% GDP)
- Employment in medium-tech and high-tech production (% of overall work force)
- Employment in high-tech services (% of overall work force)
- European Patent Office patents (per one m. citizens)

A way how to measure the innovation performance at micro-economical level was identified f.e. by Gericke (2013), Lofsten (2014) or Kamasak (2015) and can be also implemented in the enterprises´ internal processes.

In this article, we are focusing on the possible relationship between the R&D expenditures (which are sometimes called R&D investments) and innovation performance and, subsequently, the relationship between countries' innovation performance and level of economic development (wealth).

2. Innovation performance, expenditure into R&D and wealth of the countries within the EU

Gok and Peker (2017) in their research indicated the positive connection between market performance and innovation performance. Innovation policy of the EU is based on the support of enterprise sphere. This helps to contribute towards better industrial performance and so to support meeting broader social objectives such as industrial growth, increased employment rate and competitiveness of the industry within society and its sustainability. One of the key documents supporting growth of investments into innovations and innovative solutions is Innovation Strategy 2020, approved by the Committee in 2010 and European Industrial Strategy, updated in 2020 with recovery goals after the COVID pandemic. The Strategy 2020 also confirmed the Lisbon Strategic Aim to increase the investment ratio into science, research and innovation at least on the level of 3% GDP of the member countries.

At present, except Sweden, Netherlands, Austrian and Germany, none of the member countries fulfils the set objective of the investment ration on science, research and innovation. To reach the set innovation goals the EU has proposed 10 following measures:

1) To continue in investments into innovation regardless of saving measures.
2) To improve the quality of Europe and individual state internal systems of research and innovation.
3) To modernize educational systems at all levels.
4) To use the EU research area for improving cooperation of innovators and researchers.
5) To simplify the approach towards European programs.
6) To commercialize innovations – improve the links among scientists and enterprises.
7) To dispose of the barriers restricting the introduction of new ideas into market – more functions for the SMEs sector.
8) To establish European partnerships this would support and accelerate the research, development and introduction of innovations to the market.
9) To improve innovations in the public sector.
10) To support the cooperation with international partners and open up the opportunity of the EU support programs.

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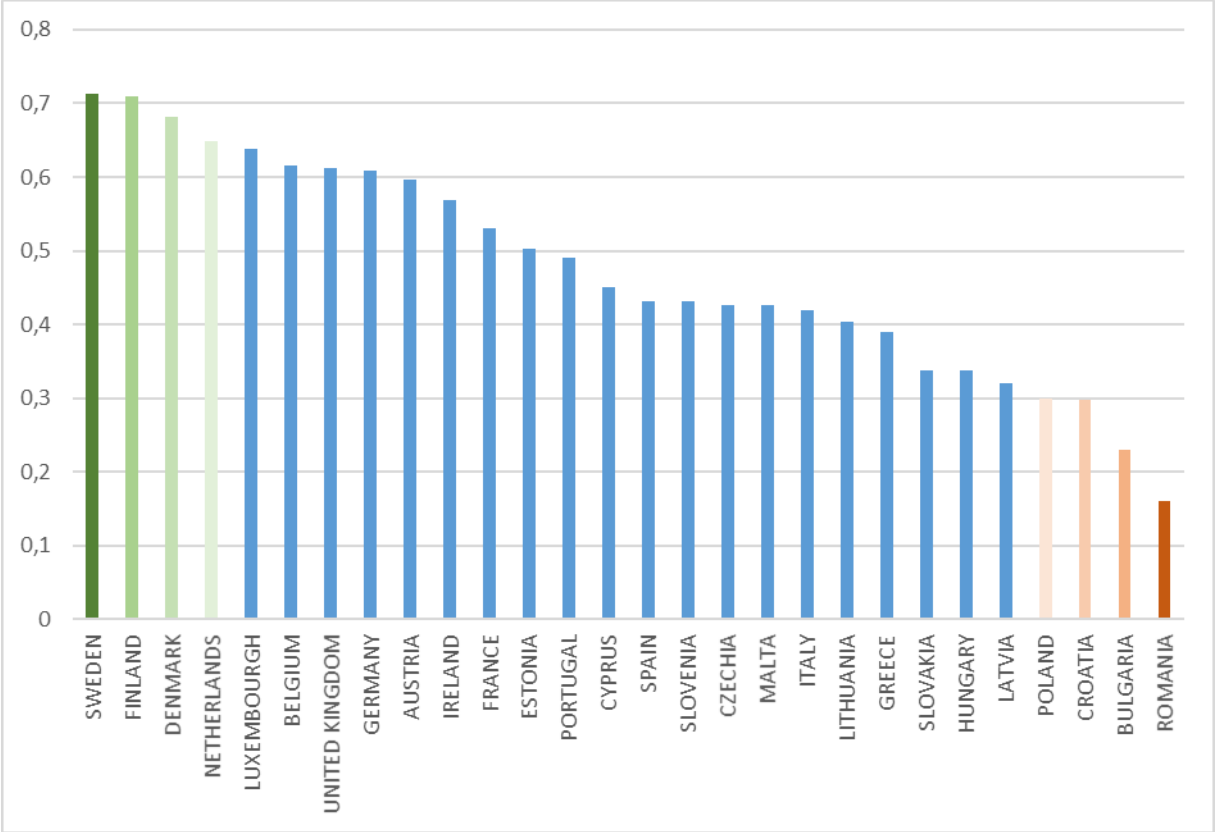

Figure 1. The innovation performance measured by Summary Innovation Index (SII) within the EU countries in 2019

Source: European Union, 2020

The graph (Fig. 1) shows us the innovation performance of the EU countries in 2019. The innovation leaders are Sweden, Finland, Netherlands and Denmark (in the shades of green). The least innovative countries (in the shades of orange) are Poland, Croatia, Bulgaria and Romania.

It is important to note that the economies of the greatest innovators among European countries are strongly focusing in their key strategic documents on sustainable and "green" economic growth. Globocnik, Rauter and Baumgartner (2020) also emphasize the importance of the sustainability-related innovation orientation of the economy. Sustainable economy plays an important role of the covid-recovery financial help from the European Union – f.e. in Slovakia, the largest amount of financial support of the Covid-recovery plan will be used for support of the sustainable and "green" economy projects. Childs and Triantis (1999) examined different R&D investment policies and their success in fulfilling the goals – results could be also used as basics for evaluation of the sustainability-related innovation policies. Carboni and Medda (2020) offer tools for the evaluations of internal enterprises´ policies on the micro-level. Baneliene and Melnikas (2020) modeled the impact of R&D expenditure on GDP growth in the EU under broad conditions of globalization. Regional development from the perspective of R&D expenditure was examined in the research made by Woo, Kim and Lim (2017). Hong (2017) in his research based on data from South Korea identified a link between the volume of R&D expenditure and the country's economic growth.

The state of innovation performance of the largest and smallest innovators in the years 2012-2019 is shown in the graph (Fig. 2) below.

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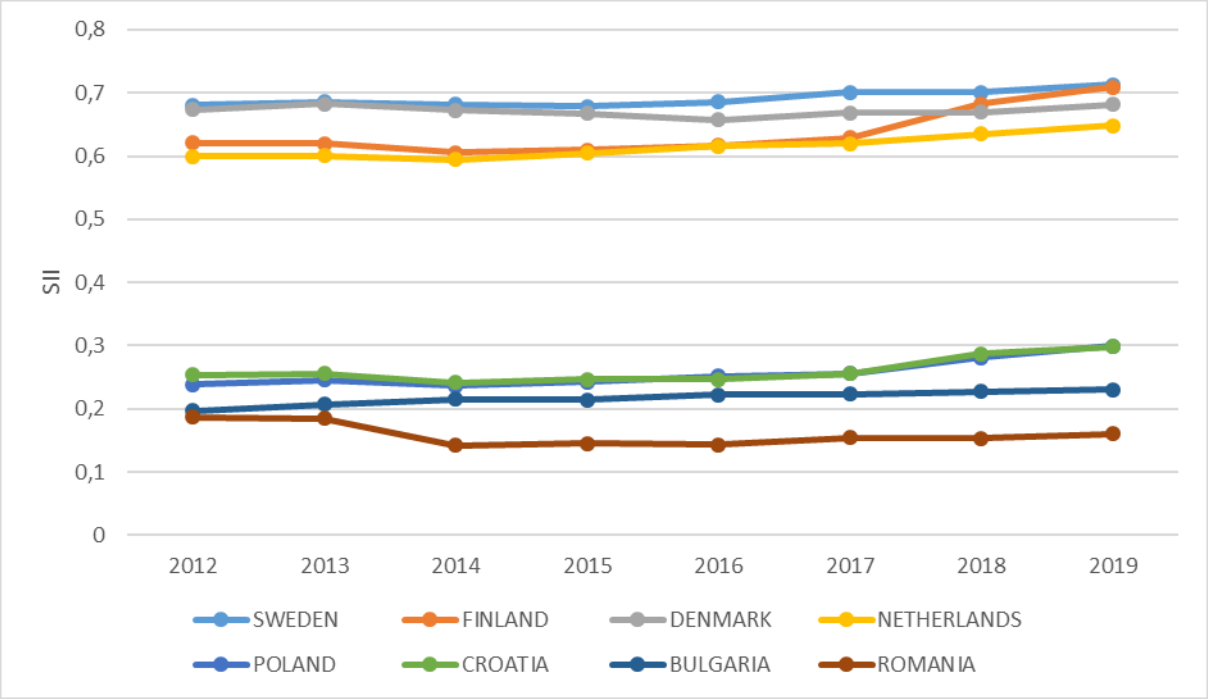

Figure 2. The state of innovation performance of selected countries in 2012-2019

Source: European Union, 2021

Among the expenditure into research and development and the innovation performance there is a precondition of correlation and therefore a higher % of expenditure into research and development should logically increases also the innovation performance of an individual country. A typical example is Sweden which in long term spends on research and development in the comparison with the GDP the largest financial amount and so it represents the leader in innovation performance among the EU member states.

The following graph shows the research and development expenditure (measured in % of total GDP) in selected EU countries (Innovation leaders and the least innovative countries). As we can see on the graph (Fig. 3), the innovation leaders are spending significantly more into R&D than countries, which are the least successful innovators. Wang and Guan (2017) identified a positive correlation between the state government subsidy of the enterprise sector and the innovation performance of this sector. Albulescu and Draghici (2016) pointed out that higher business support alone does not mean higher innovation performance.

From this perspective, it is crucial to support the R&D also by public funds and not only by private financial sources. Wang and Thornhill (2010) are focusing on ways how the R&D development could be financed on micro-level.

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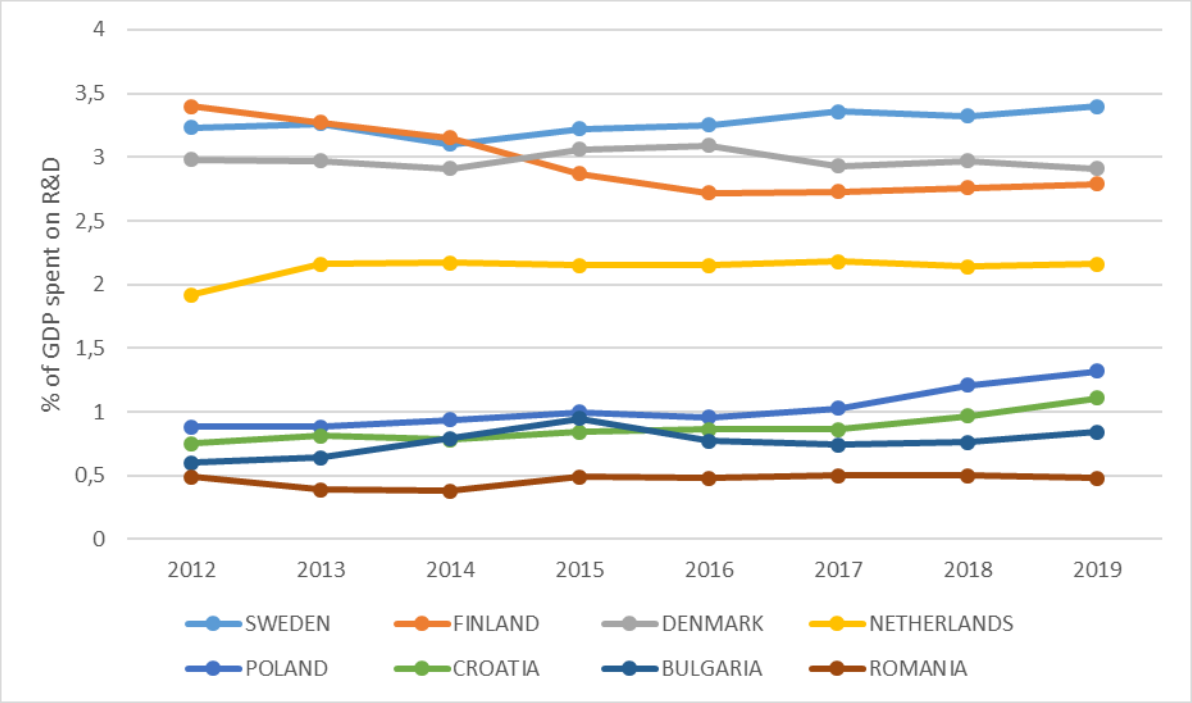

Figure 3. Expenditure into R&D of selected countries in 2012-2019

Source: EUROSTAT, 2021

Among the innovation performance and wealthyness of the countries there is a precondition of correlation and therefore a higher innovation performance leads to higher wealth of the country (measured by the real GDP per capita). Endo and Ikeda (2021) focused in their research on ways how the wealthy countries are reaching the already mentioned sustainable development. The issue of wealth inequality between countries was well examined in the research made by Pfeffer and Waitkus (2021). Orviská, Caplanová and Hudson (2014) perceive the higher level of countries´ wealth as an important part of the overall well-being of the country's population. Impact of the countries´ wealth on happiness of the population was assessed by Senik (2014). Ketchen, Ireland and Snow (2007) examined different types of enterprises and their contribution to total wealth by using collaborative innovation.

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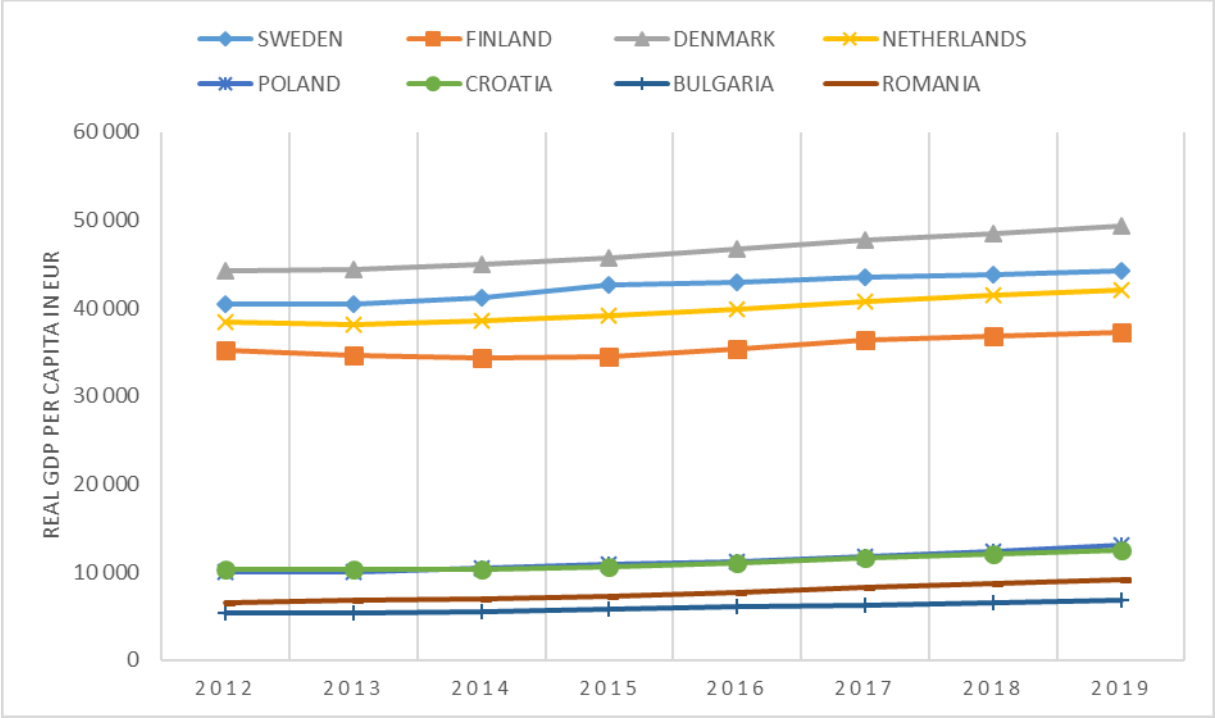

Figure 4. Wealth of the selected EU countries in 2012-2019

Source: EUROSTAT, 2021

The graph (Fig. 4) shows the wealthy of the selected EU countries. As we can see on the graph, the innovation leaders are also one of the most wealthy countries in the EU and le least innovative countries with lover innovation performance are one of the most poor countries in the EU. Azpitarte (2012) in addition to the countries´ wealth also examined the impact on salaries. Hamilton and Hepburn (2014) mentioned in their research that GDP per capita should not be the only one indicator of wealth. Fessler and Schurz (2018) pointed out that welfare state and its higher expenditures from public funds in fact goes along with an increase of observed wealth inequality.

The economic growth theories indicate that GDP growth depends on capital increase, investments and from the increase of the workforce through population growth. Modern economic theories of the 20th century attributed the important role of GDP growth to technological progress (Solow´s neoclassical growth model, Barro´s and Romer´s model). Romer (1993), within the endogenous growth theory, assumed that poor countries should adopt the technologies of better developed countries for faster economic growth. Higher R&D expenditures are a basic precondition for faster economic growth which is basically represented by GDP per capita. Technological progress has a significant impact on GDP and rapid/jump growth is not possible without innovation. These findings are the reason for the choice of 3 economic indicators that are used in comparison of selected EU countries in Fig. 3 and Fig. 4.

The literature sources mentioned above are focusing mostly monothematically:

a) on the innovation, how to measure it and its´ role in the national economies,
b) on the support of R&D,
c) wealth of the countries and well-being of their population,
d) connection between R&D and innovation performance.

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There are missing research outcomes on interconnection between all of those 3 indicators that could demonstrate the mutual force of their action. For the purposes of our research, GDP per capita is the best indicator of the countries´ wealth especially for its comparability between individual countries and the uniform methodology of its measurement.

3. Methodology

With regard to the identification of a possible relationship between the innovation performance and expenditure into R&D (expressed in % share of GDP), and between the innovation performance (expressed by Summary Innovation Index – SII) and wealth of the EU countries (expressed in GDP per capita), the set of hypotheses and goals shown below were set.

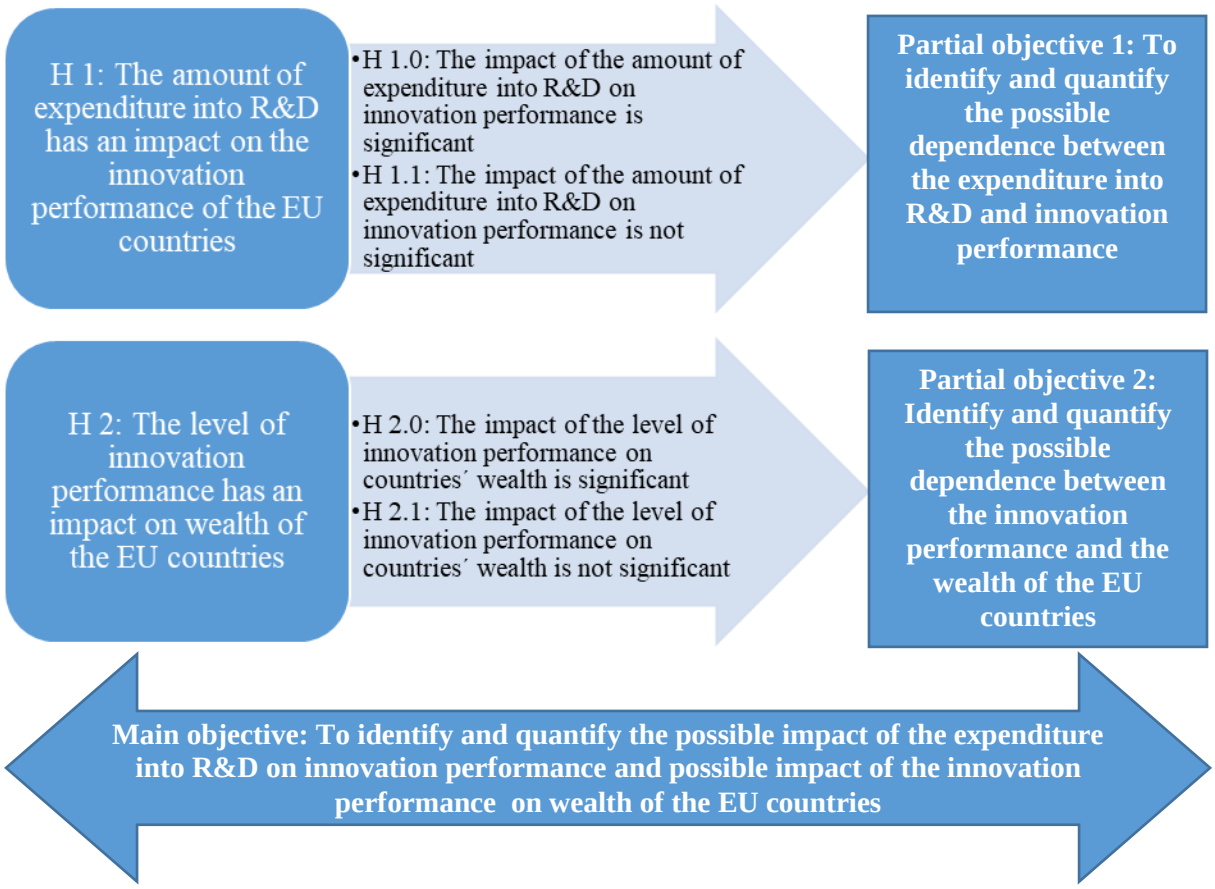

Figure 5. A set of partial objectives and set hypotheses

Source: Made by the authors

The research focuses on 3 main indicators: innovation performance, expenditure into R&D and real GDP per capita in the EU countries. The aim of the research is to find out whether the amount of expenditure into R&D has an impact on innovation performance and whether the level of innovation performance has an impact on the wealth of the EU countries.

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The main sources of information include the secondary data contained in the European Innovation Scoreboard 2020 (for the innovation performance levels within the EU countries) and the related EUROSTAT datasets within the EU countries (for the amount of expenditure into R&D and for the level of countries´ wealth). The limiting factor of the research made is a not too long timeline during which data from all EU countries were available and the number of EU member states was stable (f. e. BREXIT in 2020).

Empirical, exploratory, comparative and statistical methods of examining secondary data were used to meet the partial as well as main objectives of the research. The analytical tools used include the regression and correlation analysis. These analyses will allow us to confirm or refute the hypothesis. The regression analysis (in identified exponential and linear functions) examines a possible relationship between two variables, where we assume that:

A. the value of the dependent variable (Y – innovation performance) is affected by a change in the value of an independent variable (X – expenditure into R&D),
B. the value of the dependent variable (Y – GDP per capita) is affected by a change in the value of an independent variable (X – innovation performance).

Not every innovation or type of innovation contributes equally or equally to innovation performance or economic growth. From this point of view, we do not methodologically monitor the contribution of individual components of innovation or their number, but we monitor the contribution of the overall innovation performance of selected countries.

Limitations of the research made lies in the fact that the theory of economic growth is relatively complex, evolves over time and it is possible to express economic growth by many indicators or factors. This research abstracted from factors such as the quality of the environment, length of working time etc., and focus only on the basic key indicator expressing economic growth – the GDP. The limitation of its growth depends on technological progress, which is not possible without innovation.

4. Connection between R&D expenditure and innovation performance – analytical part

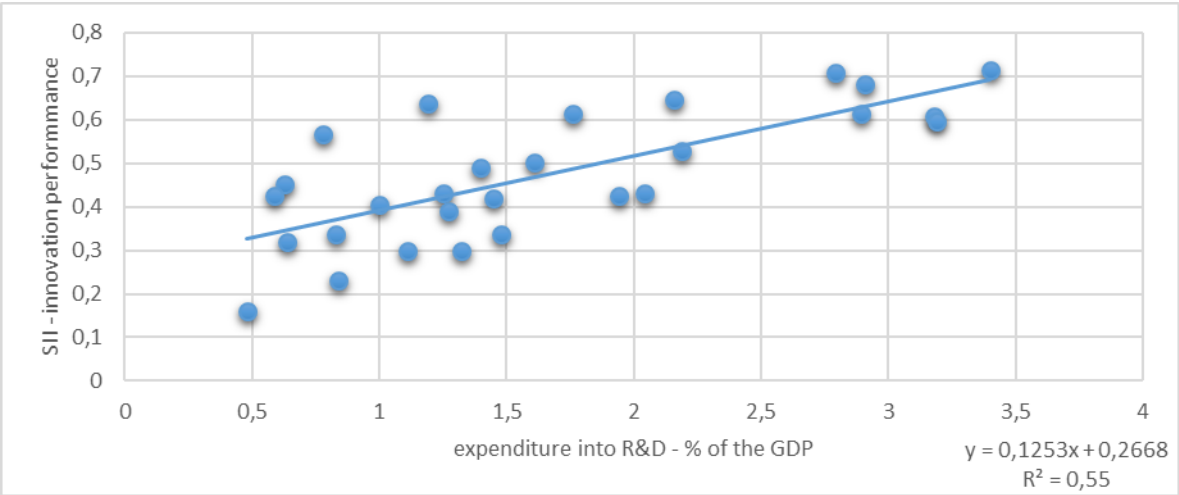

Figure 6. The Dependence of the investments in R&D and innovation performance

Source: Own research, 2021

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After the initial analysis through visual assessment using X to Y depending chart we chose a suitable mathematical function of which the curve best reflects the relationship between observed variables. In the case of dependence between expenditure into R&D and innovation performance, a linear function showed preferable, which suggests that innovation performance rise with rising expenditures in R&D in linear way. In the case of dependence between innovation performance and wealth of the EU countries, an exponential function has been used considering the nature of the data applied, which differs from the linear model by the type of mathematical curve used to quantify the relationship between variables. The principle of the rest of the analysis is identical as in any linear and nonlinear dependence.

Table 1. The regression and correlation relationship analysis of the expenditure in R&D and innovation performance

Regression Statistics	
Multiple R	0,741596021
R Square	0,549964658
Adjusted R Square	0,532655606
Standard Error	0,102127353
Observations	28

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,331394777	0,3313948	31,7732	6,3152E-06
Residual	26	0,271179902	0,01043		
Total	27	0,602574679			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	0,266834271	0,04152885	6,4252748	8,3E-07	0,181470498	0,352198	0,1814705	0,35219804
% of GDP invested to R&I	0,125294482	0,022228041	5,6367757	6,3E-06	0,079604089	0,1709849	0,07960409	0,17098488

	GDP invested to R&D	*Innovation performance*
GDP invested to R&D	1	
Innovation performance	0,741596021	1

Source: Own research, 2021

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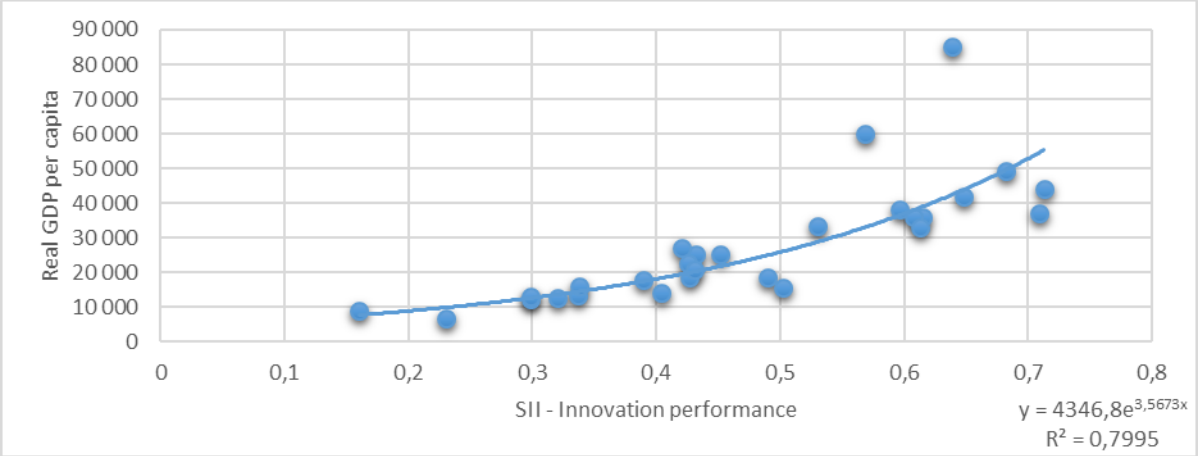

Figure 7. The Dependence of the innovation performance and wealth of the countries

Source: Own research, 2021

Table 2. The regression and correlation relationship analysis of the innovation performance and wealth of the countries

Regression Statistics	
Multiple R	0,781367104
R Square	0,610534551
Adjusted R Square	0,595555111
Standard Error	11059,89313
Observations	28

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	4985589532	4,99E+09	40,75817	9,207E-07
Residual	26	3180352136	1,22E+08		
Total	27	8165941668			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	-15168,94956	7070,921708	-2,14526	0,041445	-29703,437	-634,46183	-29703,4373	-634,461829
Innovation perform	90960,49624	14247,72393	6,384212	9,21E-07	61673,88	120247,11	61673,88027	120247,1122

	Innovation performance	*Real GDP per capita*
Innovation perform	1	
Real GDP per capita	0,781367104	1

Source: Own research, 2021

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Table 3. Summary of correlation and regression analysis output

HYPOTHESES	CONFIRMATION / REFUSAL	CORRELATION VALUE	R-SQUARE	SIGNIFACANCE-F
H1	**YES**	**0,74**	**0,55**	**0,000006315**
H 1.0	**YES**			
H 1.1	**NO**			
H2	**YES**	**0,78**	**0,61**	**0,000000921**
H 2.0	**YES**			
H 2.1	**NO**			

Source: Own research, 2021

According to Pearson's correlation coefficient and Cohen's interpretation of the correlation coefficient, there is:

1. a big positive dependence between amount of expenditure into R&D and level of innovation performance,
2. a big positive dependence between the level of innovation performance and GDP per capita/wealth of the countries.

The linear model used to analyse the dependence between amount of expenditure into R&D and level of innovation performance has proved to be statistically significant (Significance F – F test for statistical significance of the model is at 0,000006315, which is considerably less than 0.05, therefore we accept the hypothesis of the model significance). The strength and suitability of the model is evaluated by correlation coefficient (0.74) and R-SQUARE (0,55 – 55% of innovation performance changes could be explained by changes of the R&D expenditure).

The exponential model used to analyse the dependence between the level of innovation performance and GDP per capita has proved to be statistically significant (Significance F – F test for statistical significance of the model is at 0,000000921, which is considerably less than 0.05, therefore we accept the hypothesis of the model significance). The strength and suitability of the model is evaluated by correlation coefficient (0.78) and R-SQUARE (0,61 – 61% of GDP per capita changes could be explained by changes of the innovation performance).

Conclusion and discussion

Globally it can be stated that the situation of the innovation support policy in public as well as in private sector is more than alarming. In the long term, the new EU member states lag behind the average of the EU-28. The largest innovators among the countries are spending the largest amount of funds on R&D and at the same time they are also among the countries with the highest GDP per capita. Thus, innovation not only contributes to the higher competitiveness of the economy but also to a better well-being of its population.

Innovation performance depends highly on the amount of expenditure (of private and also public funds) into R&D and the wealth of the countries depends highly on the innovation performance. In fact, this is a circle of 3 factors that interact together. Growth of one factor increasing the growth of the other and multiply the positive impact on the national economy.

It is important, as a first step towards the higher innovation performance, to adopt comprehensive measures of a legislative nature, containing clear development objectives that will not only be declaratory. The fulfillment of economic strategic objectives (that leads to higher innovation performance) must be regularly assessed and, if necessary, corrected, mainly due to the constantly changing global economic environment. Support of R&D on

public and private seems to be crucial essence for higher innovation performance and secondary also for higher wealth of the country. Within the scope of the research, it is possible to work with a multifactor model in the future, which can extend the analysis by other indicators of modern economic theory in connection with economic growth.

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STRATEGIC DECISION MAKING AND INNOVATIVE PERFORMANCE OF MICRO AND SMALL ENTERPRISES*

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Abstract. The aim of the study is to examine the relationship between strategic decision speed and innovative performance of micro and small enterprises. Attention is focused not only on the direct effect of these two variables, but also its mediation by sharing information and at the same time moderating this effect on the one hand by the polychronicity of managers in strategic decision-making, goal congruence and trust in companies. The sample consisted of 244 respondents. Processing using PLS-SEM method in SmartPLS 3.0 software. The direct relationship between strategic decision speed and innovative performance of micro and small enterprises has not proved significant. Information sharing plays an important role in this relationship. The overall positive effect is also amplified by the effective goal congruence and organizational trust in the role of moderators. The importance of polychronicity on the intensity of the investigated relationship was not confirmed.

Keywords: micro and small enterprises; strategic decision making; speed; innovative performance; information sharing; polychronicity; Slovakia

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1. Introduction

Innovation is becoming a gradually significant factor in the success of business in the context of increasing globalization and digitalization. They provide companies with the creation of new markets, increase efficiency, competitiveness and even survive in the current pandemic. According to the SBA report (2020), the innovation

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performance of Slovak small and medium-sized enterprises lags behind the innovation activity of enterprises in Western Europe, especially in the area of skills and the amount of innovation.

During the Covid-19 pandemic, innovation activity became essential as the need to respond quickly and flexibly to market changes grew rapidly. Studies show the significant impact of strategic decision-making in innovation processes (Kwaku & Li, 2004; Souitaris & Maestro, 2009; Ghonim, 2020), with its speed dominating strategic decision comprehensiveness, based on the systematic collection and processing of information from the external environment in receiving strategic decisions. The concept of strategic alignment is very often discussed in connection with the implementation of strategy and the dynamics of change (McAdam et al., 2019; Ghonim et al., 2020; Street et al., 2018). This concept seeks to achieve the compatibility of strategic goals with different organizational elements (Chi et al., 2020; Sharma and Behl, 2020) and creates the need for a deeper examination of the relationship between strategic decision speed and innovative performance of small businesses. Goal congruence and trust in the company are variables that can ensure strategic alignment and mediate the effect of strategic decision speed on innovative performance. At the same time, given the size of the surveyed enterprises (micro and small enterprises), it is important not to underestimate the importance and role of an innovative leader (usually owner, manager or expert) and his ability to think polychronely in a dynamic, rapidly changing and stressful environment. We accept the upper echelons theory, which is applicable especially in small businesses, operating in a very complex, ambiguous environment, full of diverse stimuli with the need for rapid response.

The central concept of our study is based on the above facts, the aim of which is to fill the research gap in the knowledge of organizational and individual possibilities of increasing the innovative performance of micro and small enterprises. The main goal is to examine the context of strategic decision speed and innovative performance of these companies. We are interested not only in the direct effect of two main variables, but also in its mediation by sharing information and at the same time in moderating this effect by the polychronicity of managers in strategic decision-making, goal congruence and trust in companies.

2. Theoretical background

2.1 Innovative performance and strategic decision-making

Innovation is a key driver of companies´ economic performance (Yang, 2011; Wang et al., 2008; Love and Roper, 2015). Studies have shown their positive correlations with various output variables such as productivity and profit growth (Bowen et al., 2010; Evangelista and Vezzani, 2010), organizational performance (Kim et al., 2018). Their significance is therefore undeniable. Therefore, it is important to examine the factors influencing innovative capability and especially innovative performance.

Strategic decision-making is cited as an important factor influencing innovative performance (Martin-Rios & Ciobanu, 2019; Wei et al., 2019; Gallowaya et al., 2017). However, in micro and small enterprises, strategic decision-making is significantly different from the strategic decision-making of medium and large enterprises. It is significantly associated with the personality of the manager (owner, manager) and is based on the principle of satisfaction, while it is rather a passive, unsystematic and often value and emotional decision-making process (Jankelová et al., 2013). Jocumsen (2004) states that micro and small enterprises use the incremental and Garbage can model in strategic decision-making, which is associated with high time pressure and high environmental complexity.

The results of the Corchuelo Martínez-Azúa et al. (2020) study demonstrate the importance of management and its dynamic response to environmental change in achieving innovation performance. Among other factors Speed plays an important role in strategic decision-making. (Eisenhardt, 2017; Treffers et al., 2020). Other authors (Souitaris & Maestro, 2009, Van de Calseyde et al., 2021; Shepherd et al., 2021) confirmed the important link

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between strategic decision speed and firm performance and built on older existing research in this area (Baum and Wally, 2003), according to which faster strategic decision making increases competitive performance in international markets, supports the timely adoption of new products and services and leads to competitive advantage (Cerrato and Piva, 2015; Bakker & Shepherd, 2017; Dykes, et al., 2019).

Similarly, Petrou et al. (2020) state that procedural rationality, which is related to lower strategic decision speed, has a negative effect on the internationalization processes of small and medium-sized enterprises and their innovative performance.

Hypothesis 1: We assume that strategic decision speed is positively related to innovative performance of micro and small enterprises.

Mediation effect of information sharing

Information sharing is an effective tool for small business managers to implement innovations (Pfeffer, 2010). Just the employees who are informed can promote the implementation of changes related to therealisation of innovations in the company (Pfeffer, 2010). Aragon-Correa et al. (2013) even confirm the direct link between activities that promote information sharing and organizational innovation. Information sharing is thus a crucial process because if information is not shared and adapted in the enterprise, then the resources of individuals remain underused in implementing innovative approaches (Srivastava et al., 2006; Vainieri et al., 2010). The study by Gibson et al. (2007) and Roohi et al. (2020) confirmed that information sharing has a unique place among different management practices.

Information sharing influences feelings of belonging and common purpose (Lee and Markham, 2013), and helps build psychological security and trust at the enterprise level, as employees feel important contributors to strategic decision-making processes. On the other hand, it allows this decision to be accelerated (Mesmer-Magnus et al., 2011; Mesmer-Magnus and DeChurch, 2009). Information sharing is presented in many studies in a positive context with effective individual and organizational performance (DeChurch and Mesmer-Magnus, 2010), but also with creativity and innovation (Hu et al., 2018). At the same time, information sharing plays a key role in times of uncertainty, turbulence or lack of resources (Katakam et al., 2012; Ley et al., 2014; Uitdewilligen and Waller, 2018), which are attributes characteristic of the current pandemic situation. Some authors approach the task of sharing correct and up-to-date information as a tool for achieving business competitiveness and sustainability, while enabling a rapid strategic response to environmental changes and unexpected situations (Ramakrishna, 2016; Ciccullo et al., 2018). Alzoubi (2018) and Alzoubi and Ramakrishna (2020) combine effective information sharing with business agility and flexible and rapid strategic decision-making.

Hypothesis 2: There is a positive link between strategic decision speed and innovative performance of micro and small enterprises, which is mediated by information sharing.

The moderating effect of polychronicity

Research results reflecting the perspectives of strategic leadership suggest that key managers in the creation of strategies and innovation outputs of companies are top managers (Elenkov et al., 2005; Chen, 2020). It is the characteristics of the top manager (e.g. temporal and regulatory focus, positive affect) that are a critical factor in the innovative success of companies (Tang, Li, & Yang, 2015; Tuncdogan, Van Den Bosch & Volberda, 2015; Zhang, Ou, Tsui & Wang, 2017). One of them is polychronicity – a term related to the ability to perform multiple tasks simultaneously. In the case of micro-enterprises and very small enterprises, owners are also managers, often responsible not only for strategic but also for many operational tasks and are in constant time pressure. Chen (2020), Mohammed & Nadkarni (2014) consider polychronicity in terms of managers‘ preference for multitasking

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as the basis for strategic decision-making of small businesses and a factor influencing firm performance. On the other hand, there are also negative views on polychronicity in decision-making (Chen, 2020; Mohammed & Harrison, 2013), which are in line with the comprehensive understanding of this concept in psychology and cultural anthropology, where the concept was first introduced. These risks need to be eliminated in order to avoid fragmented and rather superficial evaluation of problems and to make full use of the positives of polychronicity in strategic decision-making. Chen (2020) e.g. considers polychronicity as a factor influencing innovative performance. Due to the possible dual function of polychronicity, a moderator in the form of operating environments of a firm is needed in this relationship, which determines the increase or decrease of the relationship between polychronicity and innovative firm performance. Some authors consider a mediation model, where the transfer of the effect of polychronicity on the company's performance mediates the speed of strategic decision-making (positive) and its comprehensiveness (negative) (Souitaris & Maestro, 2009). Existing studies also point to the fact that polychronicity, which is closely related to the dynamics and turbulence of the environment, predicts the speed of decision-making (Kantrowitz & Kinney, 2009; Kantrowitz et al., 2012). On the other hand, the results of Chen (2020) show that specifically, the polychronicity of managers is positively associated with firm innovation, especially in larger companies and dynamic environments.

Hypothesis 3: Polychronicity of managers will moderate the effects of strategic decision speed on innovative performance of micro and very small enterprises; specifically, the effects will be stronger when polychronicity is high.

The moderating effect of goal congruence

The concept of strategic alignment is very often discussed in connection with the implementation of strategy and the dynamics of change (McAdam et al., 2019; Ghonim et al., 2020; Street et al., 2018). This concept represents an effort to achieve the compatibility of strategic goals with various organizational elements (Chi et al., 2020; Sharma and Behl, 2020). In micro and small enterprises, knowledge of the vision by all employees includes participation in goal setting and problem solving, as well as the likelihood that individuals will be based on corporate goals when setting individual work goals (Anthony & Govindarajan, 2007). Our intention is to examine this variable from the point of view of effective communication about goals, about their understanding and creating a certain culture that supports the congruence of goals. Merchant and Van der Stede (2012) state that for companies it is employees and their perception that is the key for their ability to achieve financial and also non-financial goals. At the same time, they present several aspects necessary for congruency goals, namely communication and understanding, create direction, motivation, incentives, connection and short-term behavior. According to De Clercq et al. (2011) goal congruence positively affects firm performance and firm innovativeness. Their findings show that the positive impact of flexible strategic decision-making on product innovation increases at a higher level of congruence of objectives. They are also based on the fact that in line with the objectives and the so-called dominant logic leads to better sharing of information and knowledge and thus to increasing innovation. It follows that if there is a goal congruence in the company, the relationship between managers and employees and employees each other are characterized by a higher level of communication and thus higher efficiency in terms of their use in innovation.

Hypothesis 4: Goal congruence will moderate the effects of strategic decision speed on innovative performance of micro and very small enterprises; specifically, the effects will be stronger for higher levels of goal congruence.

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The moderating effect of organizational trust

Organizational trust is based on the essence of interpersonal trust, which includes the individual's confident and positive expectations of the behavior of other employees (Dirks & Skarlicki, 2004). Trust in a small business creates a common attitude and is focused on the whole team. Individuals have more opportunities to interact with each other and with appropriate leadership, trustworthy ties are created that encourage the effort and collaboration needed for high performance (Drescher et al., 2014). The relationship between leadership and trust has been documented in may studies, along with tools for building it (Lau & Liden, 2008; Boies et al., 2015). One of the important tools is communication which according to the study of Boies et al. (2015) creates preconditions for creativity and innovation. Trust plays a strong supporting role in implementing strategic decisions. Wai et al. (2013) point out that organizational trust can bring benefits related to strategic flexibility. With an organizational trust, the manager may make less effort on operational control and focus on strategic processes, seizing opportunities, identifying risks and innovating. Sividas & Dwyer's (2000) perceive behavioral integration as a consequence of organizational trust, which strengthens the quality and quantity of information exchange, collaborative behavior and speed of strategic decision making processes. Chenli et al. (2019) perceive the organizational trust as a mediator for the relationship of team processes on the decision performance.

According to Atuahene-Gima and Murray (2007) and Dayan et al. (2009) organizational trust increases the willingness of managers to implement risky actions, due to solid foundations it contributes to faster decision-making and transformation of new ideas into concrete actions focused on innovation.

Hypothesis 5: Organizational trust will moderate the effects of strategic decision speed on innovative performance of micro and very small enterprises; specifically, the effects will be stronger for higher levels of organizational trust.

The research model of our study is shown in Figure 1.

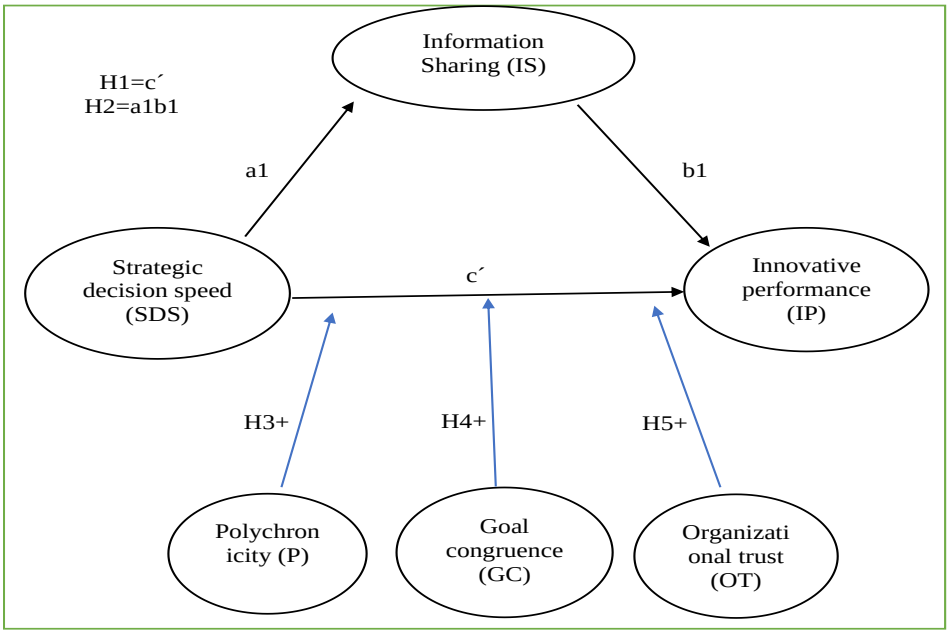

Figure 1. Research model of the study

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3. Research objective and methodology

3.1 Data collection and research sample

The business sector in Slovakia is characterized by a high proportion of micro-enterprises, which in 2019 represented 96,9% of all active business entities. More than three quarters (76,1%) of SMEs in 2019 carried out their main business activities in the business services, construction, trade and industry sectors. The number of SMEs increased year on year in all major sectors except trade. Their number increased most dynamically in construction, other services and in the transport and information sector.

All data were collected in the form of a questionnaire survey in micro and small enterprises in Slovakia in February 2021. The managers of these companies were asked to take part in the study and they were acknowledged by the meaning and purpose of the study . The questionnaire was sent to them via the Google Form link and by filling out and submitting it, they agreed with the data processing. Of the 1 600 companies contacted, 244 responses were obtained, representing a return of 15,25%. The average number of employees in enterprises included in the examined sample was 10,28 (min. = 4, max. = 19, SD = 2,91). The representation of sectors was as follows – services 52%, trade 28%, construction 12%, industry 8%. The companies were almost evenly represented from all 8 regions of Slovakia. Their average duration of operation on the market was 13,6 years (min. = 2, max. = 32, SD = 7,56). The average age of managers was 43,3 years (min. = 28, max. = 65, SD = 11,03), 29% of them had a secondary education, 56% a university degree and 15% a third degree university education. In terms of gender, 80% of managers were men and 20% women.

3.2 Measures

The survey was conducted in the conditions of Slovakia.

For establishing semantic equivalence, we used back-translation before administering an instrument (Schaffer & Riordan, 2003). It was translated by bilingual experts from English to Slovak and vice versa subsequently in the event of inconsistencies, the individual items were reworded to establish compliance connotation. Fruthermore we prefered using short and simple sentences and repeatedly used nouns instead of pronouns.
Innovative performance (IP) was determined by a variable designed by Cabell et al. (2006). It includes three elements, concerning the 1) introduction of technologically new products developed by the company (totally or partially) into the market, 2) frequency of replacement of old products with others that have undergone significant change and 3) proportion of technologically new or improved products in the turnover of the company. A 5-point scale was used, ranging from (1) for less than the competition to (5) for more than the competition. The reliability and validity of the scale was in their study established.

Information sharing (IS) is operationalized as a scale constructed from thestatements of managers on the items, adapted from the study of Ketokivi and Castañer (2004). They evaluated general information sharing and communication of corporate priorities with employees. The intermediate variable IS contains 5 items that are scaled using 5-point Likert type scale (1 – disagree at all, 5 – strongly agree). The validity and reliability of this tool has been verified in many other studies.

Polychronicity is a term that describes the ability to work on multiple activities simultaneously. To measure this variable, we used items from The Polychronic-Monochronic Tendency Scale research, developed by Lindquist and Kaufman-Scarborough (2007). Although the 10-item Inventory of Polychronicity Values (IPV) tool (Poposki

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& Oswald, 2010), developed by Bluedorn et al. (1992) and validated in further studies (Hecht & Allen, 2005), we chose the PMTS Scale. The reason is the criticism of IPV because it focuses on the cultural rather than the individual dimension. This tool contains 5 items that explore 2 dimensions, namely preference and belief. A 5-point Likert type scale (1 = strongly disagree; 5 = strongly agree) was used.

Strategic decision speed (SDS) is a variable that we obtained from Schriber & Gutek's (1987) concept of measuring speed in strategic decision making. It contains 3 items, aimed at examining the speed with which companies carry out all aspects of the decision-making process at the strategic level. The variable has been validated by several studies and its excellent psychometric properties have been demonstrated (Souitaris & Maestro, 2009). The Likert scale from 1 to 5 (1 = strongly disagree; 5 = strongly agree) was used for the first two items; at the third item 1 = not at all; 5 = a great extent).

Goal congruence. To measure the variable, we used the tool of Tsaia and Ghoshala (1998) validated in further studies (De Clercq et al., 2011) containing 4 items. Respondents expressed a degree of agreement with the congruence of goals within their company. A 5-point Likert type scale (1 = strongly disagree; 5 = strongly agree) was used.

Organizational trust. This variable was measured using OTI (Organizational Trust Inventory), which was developed by Nyhan and Marlowe's (1997). It contains 4 items related to trust in the company. The authors present this tool as fast and simple with high homogenity and convergent and discriminatory validity. The Likert scale is from 1 = very low to 5 = very high.

Control variables were as follows: age (in years), management experience (in years), gender (male = 0, female = 1), highest completed education (0 = university no, 1 = university yes), focus (production, services, trade), length of market presence (in years), which were nominated as control variables because of their theoretical relevance and the possibility of their influence on the assessed relationships. CEO polychronicity will be related to firm innovation for larger firms in a positive way, but negatively related to firm innovation for smaller firms (Chen, 2020).

The questionnaire contained a set of 24 indicator variables (Table 1 in Appendix) for the measurement model. We have taken several steps to avoid common method bias as it is a frequent and serious problem in research, . The entries in the questionnaire were randomly scattered and mixed, and the scales of a few answers were reversed and we also divided the questionnaire and organized each part in a different context to facilitate the situation where the respondents were not affected by their previous answers and their thought of the results. Furthermore, we used the calculation of the VIF indicator. In case the VIF occurred greater than 3.3 it is suggested as an indicator of pathological collineraity and moreover an indication that a model may be contaminated by common method bias. Therefore, in case each VIFs result from a full collinearity test are equal to or lower than 3.3, the model can be percieved free of common method bias (Kock, 2015, p.7). After realizing the statistics ofcollinearity in SmartPLS we discovered that the inner VIF values are all lower than 3.3.

3.3 Data gathering and data analysis

To assess our research model and suggested hypotheses to laterinvestigate the relations between the selected constructs, we used the PLS-SEM method (partial least squares structural equation modeling) (Hair et al., 2014). This method makes it enables the testing of several hypotheses simultaneously within direct and indirect impacts in a complex system (Hair et al., 2011; Ringle et al., 2012; Ringle et al., 2018). We had several motives to decide for it . The first reason we used it is the relatively small size of sample (244). Further motives include the the complexity of the research model, the focus of the study on predicting dependent variables and the use of latent variable scores for predictive purposes. We used the SmartPLS 3.3 software (Roldán and Sánchez-Franco, 2012)

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for the assessment of both the measurement model and the structural model. The advantage of this software is that it simultaneously evaluates both models.

4. Results

The PLS model analysis involves of two consecutive stages (Henseler et al., 2015). In the first stage it verifies the reliability and validity of the measurement model and the second stage includes the evaluation of the structural model, which was shown in Figure 1. The models show connections between constructs via a set of paths, which reflects the established hypotheses. The relationships between constructs illustrate the direct, indirect and interaction effects.

4.1 Measurement model

The proposed model meets all the common requirements. The first is the reliability (Table 2 in Appendix), which is met for the reason that all the standardized loadings are higher than 0,70 (Chin, 2010). Simultaneously, the requirement of internal construct reliability is also met. This reliability was monitored by Cronbach's alpha (from 0,936 to 0,949), composite reliabilities (CR) in margin from 0,940 – 0,950 and rho_A (margin from 0,939 to 0,949), all values being greater than 0,70 and less than 0,95 (Hair et al., 2017) and at the same time, the rho_A ranged between Cronbach's alpha and CR (Ringle et al., 2018).

We also assessed the convergent validity by calculating the average variance extracted (AVE), which in our model reaches the level of 0,5 (Chin, 2010) for all constructs, which indicates that the construct explains an average of at least 50% of its item's variance. Finally, we as well subjected our model to a discriminant validity analysis, which we measured with three tools to obtain satisfactory results with at least one of them. For the Fornell-Larcker criterion, not all diagonal values were higher than the off-diagonal elements and for the HTMT criterion a value above 0,9 was also found. Therefore, we also implemented cross loadings (Hair et al., 2012), used in case of problems with discriminant validity. Through crossloading, we verified the loading of factors into parent constructs. We conclude the establishment of discriminant validity.

4.2 Structural model

The structural model illustrates the paths hypothesized in the research framework. The model is evaluated on the basis of R2 and Q2 values, which evaluate predictive significance (Hair et al., 2017) and significance of paths. The goodness of the model is determined by the strength of each structural path determined by the R2 value for the dependent variable (Bernal-Conesa et al., 2017). The predictive capability is established because the value of R2 for all variables are over 0,1. Further Q2 proved the predictive relevance of the endogenous constructs. A Q2 over 0 demonstrates that the model has predictive relevance. Our findings show significance in the prediction of the constructs. Moreover, the model fit was measured using SRMR. The value of SRMR was 0,152. SRMR values should be less than or equal to 0,100, indicating an acceptable model fit (Hair et al., 2017).

The direct and indirect effects are recorded in Table 3.

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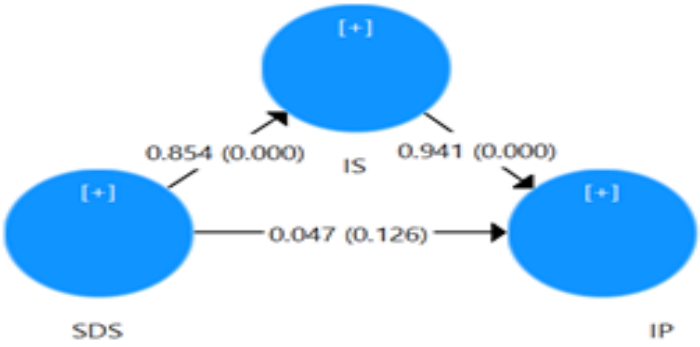
Table 3. Path coefficients, total, direct, and indirect effects

Direct effect SDS and IP – H1						
	Original Sample (β)	Sample Mean (β)	Standard Deviation	T Statistics	P Values	**not supported**
SDS -> IP	0.047378	0.050500	0.029038	1.631589	0.103396	
1. mediation of IS between SDS and IP – H2						**supported**
	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values	
IS -> IP	0.940509	0.937656	0.025092	37.482120	0.000000	
SDS -> IP (direct effect)	0.047378	0.050500	0.029038	1.631589	0.103396	
SDS -> IS	0.853986	0.853378	0.017414	49.040176	0.000000	
SDS -> IP (total effect)	0.850559	0.850583	0.019117	44.492614	0.000000	
SDS -> IS -> IP (indirect effect)	0.803181	0.800082	0.024088	33.343026	0.000000	

Notes: IP = Innovative Performance, IS = Information Sharing, SDS = Strategic Decision Speed, p < 0,05



Notes: IP = Innovative Performance, IS = Information Sharing, SDS = Strategic Decision Speed, p < 0,05

Figure 2. Results of the study mediation model

Hypothesis 1 proposed that SDS is positively associated with IP. The hypothesis has no support. Thus, the direct relationship between SDS and IP was not confirmed in our study. H2 on the positive relationship between SDS and IP, which is mediated by IS has support. The total effect is ß = 0,850, the direct effect ß = 0,05 and the indirect effect ß = 0,80. It is therefore a complete mediation.

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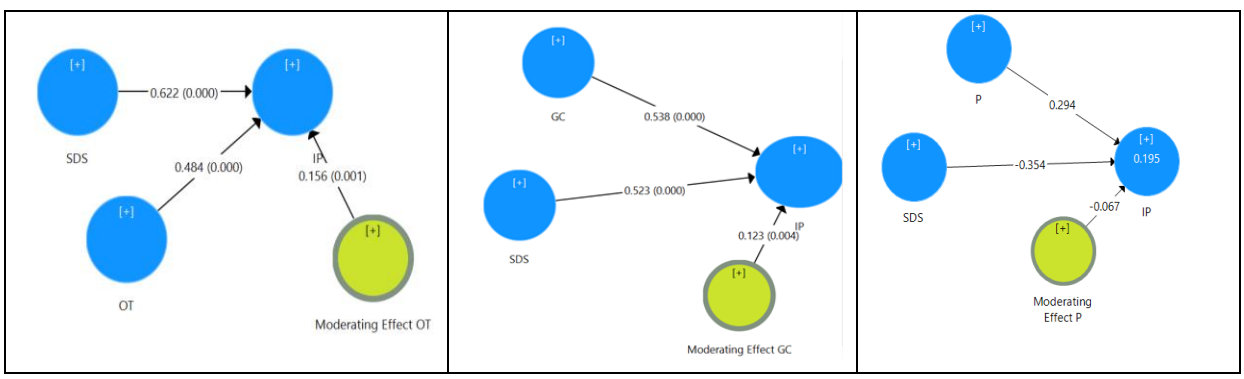
4.3 Moderation effects

Moderation analysis was performed to evaluate the moderating role of OT, GC and P (Table 4). The results revealed an significant moderating role of OT (ß = 0,156087, t = 3,412530, p = 0,000696) and GC(ß = 0,122712, t = 2,756047, p = 0,006064) on the relationship between SDS and IP. Hypotheses H3 and H4 thus have support. The variables OT and GC increase the intensity of the relationship between SDS and IP. The moderating effect of P was negative, but was not confirmed to be significant (ß = -0,067271, t = 0,944354, p = 0,346501). Hypothesis H5 has no support.

Table 4. Moderating effects in the investigated model

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values	
Moderating Effect OT -> IP	**0.156087**	**0.151363**	**0.045739**	**3.412530**	**0.000696**	supported
OT -> IP	0.484203	0.487590	0.042659	11.350417	0.000000	
SDS -> IP	0.621805	0.615034	0.060777	10.231010	0.000000	
Moderating Effect GC -> IP	**0.122712**	**0.125371**	**0.044525**	**2.756047**	**0.006064**	supported
GC -> IP	0.537524	0.535818	0.055583	9.670646	0.000000	
SDS -> IP	0.523345	0.526328	0.071998	7.268900	0.000000	
Moderating Effect P -> IP	**-0.067271**	**-0.038295**	**0.071453**	**0.944354**	**0.346501**	not supported
P -> IP	-0.354294	-0.251547	0.258536	1.371582	0.171145	
SDS -> IP	0.294009	0.296812	0.070107	4.175302	0.000000	

Notes: IP = Innovative Performance, P = Polychronicity, IS = Information Sharing, SDS = Strategic Decision Speed, GC = Goal Congruence, OT = Organizational Trust, p < 0,05



Notes: IP = Innovative Performance, P = Polychronicity, IS = Information Sharing, SDS = Strategic Decision Speed, GC = Goal Congruence, OT = Organizational Trust, p < 0,05

Figure 3. Results of study moderation effects

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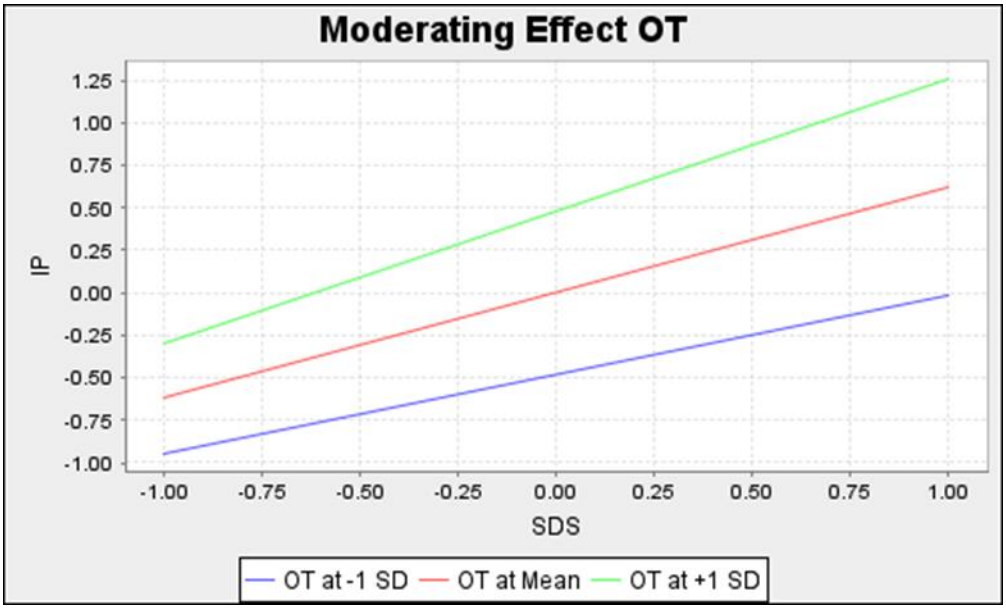

Figure 4. Moderating effect OT → IP

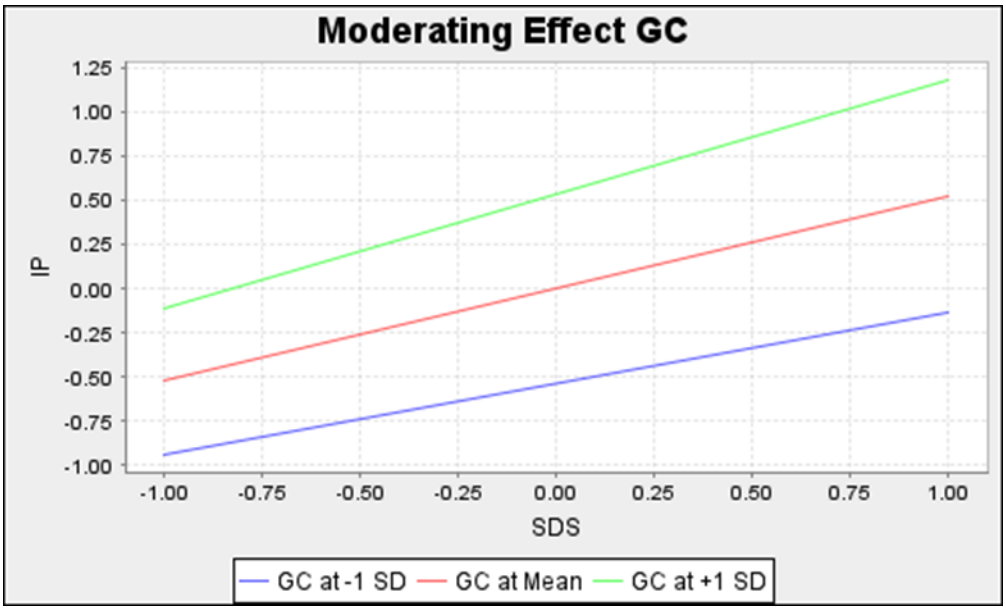

Figure 5. Moderating effect GC → IP

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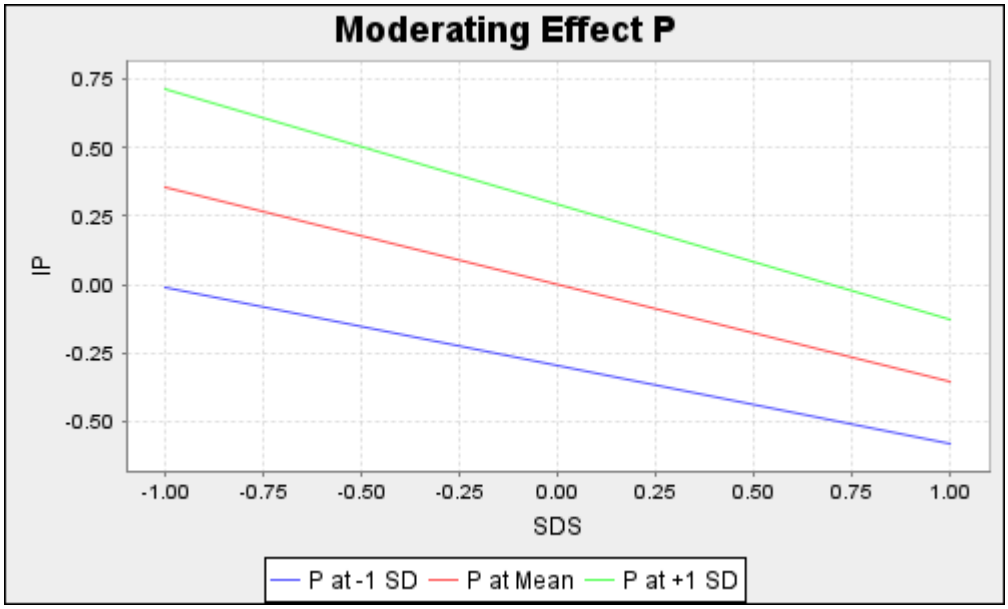

Figure 6. Moderating effect P → IP

A strong and significant moderating effect was identified in the case of OT and GC. These variables act on the relationship between SDS and IP, so with their higher values, the positive effect between SDS managers and the IP of the companies managed by them also grows. The role of P in the examined relationship was not confirmed, which means that the intensity of the relationship between SDS and IP is not affected by the ability of managers to solve several tasks simultaneously.

We were also interested in the extent to which the age and length of the manager's practice can affect the relationships examined. The results shown in Table 5 show that both variables act as moderators in the relationship between SDS and IP. Although their influence on the intensity of the examined relationship is not very large, it has been proven to be significant. Older managers and managers with longer experience can make better use of SDS to support their own company's IP.

Table 5. Moderating effects of tenure and age in the investigated model

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values	
Moderating Effect tenure -> IP	**0.074997**	**0.073620**	**0.030097**	**2.491851**	**0.013031**	**supported**
SDS -> IP	0.862276	0.864260	0.018869	45.698053	0.000000	
tenure -> IP	0.023725	0.024498	0.036637	0.647562	0.517565	
Moderating Effect age ->IP	**0.057623**	**0.055921**	**0.028899**	**1.993974**	**0.046698**	**supported**
SDS -> IP	0.856937	0.859328	0.016325	52.492845	0.000000	
age -> IP	0.027623	0.026519	0.033649	0.820901	0.412094	

Notes: IP = Innovative Performance, SDS = Strategic Decision Speed, $p < 0,05$

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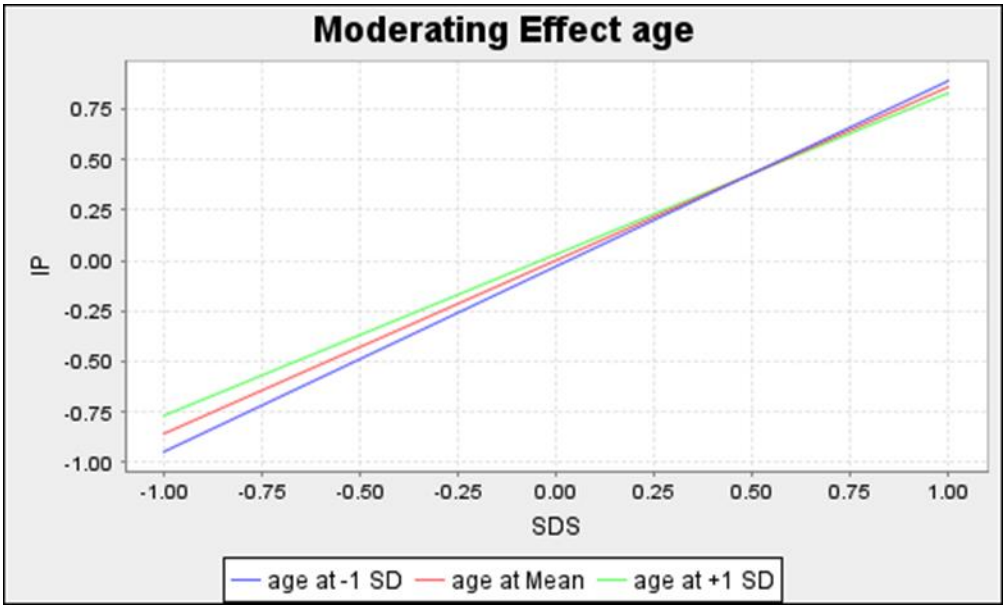

Figure 7. Moderating effect **age → IP**

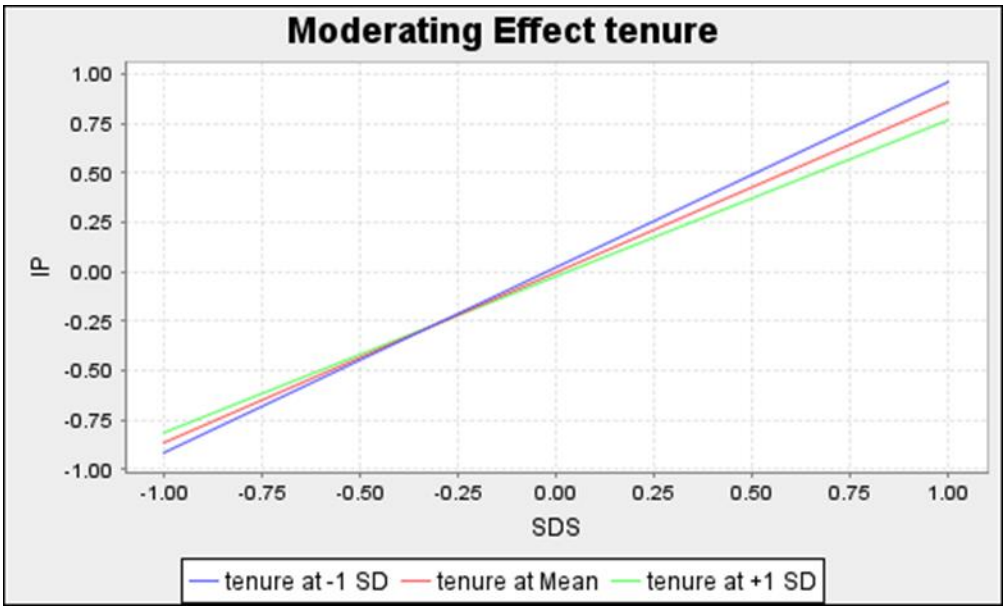

Figure 8. Moderating effect **tenure → IP**

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5. Discussion

Micro and small businesses are often referred to as the „backbone“ of the global economy. The strategic decision-making of micro and very small enterprises is significantly complicated by resource constraints, their low-staff organizational structure and the use of more tacit than explicit knowledge (Shafi, 2020; Marzo & Scarpino, 2016; Fernandes Crespo et al., 2021). Strategic decision-making can help them ensure greater prosperity and sustainable development, either by working together and strengthening their external relations (Shafi et al., 2019), developing innovation capabilities and inner potential (Shou and Shao, 2017; Shafi, 2020; Kim et al., 2018; Liu et al., 2013).
The aim of this study is to enrich existing knowledge in several ways. The first is to point out the need for strategic decision-making in the environment of micro-enterprises, which often do not apply it in its rational form (Jocumsen, 2004). Therefore, further dissemination of knowledge about variables and the links with their performance can be beneficial for their sustainable development. Slovakia, as one of the important V4 countries, is not sufficiently cited in the literature in the field of sustainability of micro-business. Our study bridges these gaps in research.

We agree with Kim et al. (2018) that innovation is significantly linked to organizational performance. De Clercq et al. (2011) when examining product innovativeness, they found significant correlations with the size of the company and its age, while higher innovativeness was demonstrated in smaller and younger companies. According to Martin-Rios & Ciobanu (2019) and Wei et al., (2019) strategic decision-making is a significant factor influencing a company’s innovative performance. In the case of strategic decision-making, speed plays an essential role, because according to Cerrat and Piva (2015), faster strategic decision-making supports the timely adoption of new products and services and thus leads to a competitive advantage. In our study, the direct relationship of SDS to the IP of micro and small enterprises was not confirmed, but in this relationship, full mediation was identified through information sharing. This means that if management regularly provides employees with information about their own intentions and policies and shares with them information about important changes and achieved results, this has a positive effect on strengthening the innovative performance of the whole company. This is achieved, especially in small companies, by direct involvement and involvement of employees. A probable characteristic of innovation processes in micro and small enterprises is the low degree of formalization. Small and medium-sized enterprises rarely have explicit innovation procedures. Decisions tend to depend directly on the owner and formal planning is also difficult to implement. Knowledge is transferred in the course of work and depends on the abilities of employees (Terziovski, 2010). The opportunities for innovation for SMEs are also shaped by their ability to collaborate and „learn interactively“ (Lundvall & Lorenz, 2007) with other agents in the environment, such as clients, providers and training centers. Therefore, it is extremely important to support employees in participating in business events and interest in innovative development. This fact is also supported by other findings of the research study. According to them, OT, and GC play an important role in the relationship in the role of moderators. A culture of trust promotes open communication, which according to o Boies et al. (2015) a prerequisite for innovation. Our findings are consistent with the claims of Atuahene-Gima and Murray (2007) and Dayan et al., (2009), according to which organizational trust increases the willingness of managers to implement innovations, contributes to faster decision-making and transformation of new ideas into concrete actions. Information sharing in micro and small businesses involves all employees knowing the vision and goals, participating in solving business problems, which supports the likelihood that individuals will be based on business goals when formulating their own goals (Anthony & Govindarajan, 2007). It was in the case of congruence of goals that its positive moderating effect on the examined relations was confirmed. Our findings are consistent with De Clercq et al. (2011), according to which goal congruence positively influences firm innovativeness and supports the knowledge about the positive impact of flexible strategic decision-making on innovation at a higher level of goal congruence.

The role of the third moderator examined, polychronicity in the relationship between SDS and IP was not confirmed. At this point, our results contradict the findings of Chen (2020), Souitaris & Maestro (2009) and

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Mohammed & Nadkarni (2014), who consider polychronicity to be the basis of small business strategic decision-making and a factor influencing firm performance. Based on the results, we assume that the polychronicity of the manager can affect innovation results rather negatively. Mohammed & Harrison (2013) also draws attention to the risk of polychronicity in decision-making. In our study, the role of polychronicity was not confirmed to be significant, but the negative moderation effect rather points to its hindering effect in the relationship between SDS and IP in small firms.

We agree with Merchant and Van der Stede's (2012) assertion that, for businesses, it is employees in particular who are critical to the ability to achieve stated goals. This is even more true in the micro and small business environment. If they want to survive in a competitive environment, they should observe the innovative activity of their own employees and their involvement in strategic processes. Promoting a culture of openness, enabling the sharing of information and employee participation in corporate affairs, seem to be appropriate tools. This approach also results in goal congruence, which has also been confirmed as a factor with a positive impact on a firm's innovation performance. The implementation of all these factors and their interaction can contribute to a synergistic effect in the environment of small enterprises, which will result in an increase in their innovative activity.

Conclusions

An important aspect of this paper is that it offers new contexts for decision speed with innovative performance. Previous theory has mainly focused on the relationship with firm performance. Although the study did not confirm a direct relationship between SDS and IP, so the speed of strategic decision-making alone is not sufficient to support innovation performance, it showed that by involving information sharing into the strategic processes of small enterprises, it is possible to influence their innovation activity. At the same time, the results of our study confirm that the intensity of the relationship between SDS and IP can be further positively influenced through organizational trust and congruence of goals. For small businesses, this is a challenge to implement a culture of openness and trust, from which they can significantly benefit from supporting their own innovation activity.

At the same time, the study contributes to evolving research in the field of strategic decision-making for micro and small enterprises by examining the polychronicity of top managers as individuals. Previous studies (e.g. Souitaris & Maestro, 2009; Ling et al., 2016) have addressed polychronicity as a feature of a senior management team in the context of strategic decision-making in large companies and highlighted its positive effects. Our findings did not demonstrate the effect of polychronicity on the relationship between SDS and IP. Its importance in the role of moderator has not been confirmed as significant, but the negative moderation effect draws attention to the risk of using polychronicity in the case of serious strategic decisions.

Despite their key role in economic development, micro-enterprises remain under-represented in the scientific literature on strategic decision-making. The results of our study therefore partially contribute to filling this gap and at the same time open prospects for further research in this area.

Limitations

Our research study has several limitations. The first is a relatively small sample of respondents (244) and its limitation to Slovak conditions. On the other hand, it includes companies from all over Slovakia, which could support the generalization of results for this region. At the same time, given the content of the discourse and the reflection of global challenges in the small business sector, we assume that our study can also enrich the scientific discussion within the wider space. A limitation of the research may as well be the non-use of the pilot survey as one of the best practices for the verification of the validity and methodological soundness of the

constructs used. Though, we used additional recommendations that we percieved sufficient. Even though we used several measures to mitigate common method bias, they did not use data from various sources. We obtained the data from the managers of the companies and we are aware that collecting data from numerous sources, i.e. asking not only managers but also employees, could raise the objectivity of the research. Finally, in addition to the factors concerned in this study, there may be other factors that may affect the examined relationships. Our model operated with sectional rather than longitudinal data, which may be not be able to reflect the real causal relationship due to the time-lag effect and the usage of panel data may well be the future direction.

Despite these limitations, we consider that the gained results contribute to the extension of knowledge in several ways. Our findings broaden our understanding of how IS fundamentally affects the relation of SDS and IP, in additionto the role of GC and OT in maintaining the innovative performance of small businesses. Building a culture of trust and honesty seems to be a highly functional strategy in encouraging their innovation and competitiveness.

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Appendix

Table 1. Researched variables and their items

Innovative performance (IP)		**Polychronicity (P)**	
IP1	Introduction of technologically new products developed by the company (totally or partially) into the market.	P1	I prefer to do two or more activities at the same time.
IP2	Frequency of replacement of old products with others that have undergone significant change.	P2	I typically do two or more activities at the same time.
IP3	Proportion of technologically new or improved products in the turnover of the company.	P3	I am comfortable doing more than one activity at the same time.
		P4	I like to juggle two or more activities at the same time.
		P5	Doing two or more activities at the same time is the most efficient way to use my time.
Information sharing (IS)		**Strategic decision speed (SDS)**	
IS1	The company's management regularly informs employees about important changes.	SDS1	I prefer and tend to take my time when making strategic decisions.(r)
IS2	The company's management regularly informs employees about the overall policies and goals.	SDS2	I generally believe in making quick strategic decisions.
IS3	The company's management regularly informs employees about the method of evaluating the company's performance and about the achieved results.	SDS3	Please tick the extent on which your company places on: speed when planning or thinking about strategies.
IS4	The company's management regularly informs employees about the plans of its departments.		
IS5	The company's management regularly informs employees about the requirements related to the performance of their work.		
Goal Congruence		**Organizational trust**	
GC1	In our company I and the employees have a similar vision regarding how things should be done in the organization.	OT1	My level of confidence that this organization will treat me fairly is high.
GC2	I and employees think alike on most issues with respect to the organization.	OT2	The level of trust between supervisors and workers in this organization is high.
GC3	Most of our objectives are fully aligned.	OT3	The level of trust among the people I work with on the regular basis is high.

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Table 2. Loadings, Reliability and Validity

	Construct/indicator	Factor Loading	Composite reliability (CR)	rho_A	Cronbach´s alpha	Average Variance Extracted (AVE)
IP	IP1	0.881	0.962	0.962	0.954	0.761
	IP2	0.902				
	IP3	0.911				
P	P1	0.907	0.940	0.924	0.920	0.759
	P2	0.913				
	P3	0.842				
	P4	0.813				
	P5	0.799				
IS	SI1	0.922	0.973	0.965	0.965	0.878
	SI2	0.928				
	SI3	0.937				
	SI4	0.942				
	SI5	0.956				
SDS	SDS1	0.912				
	SDS2	0.854				
	SDS3	0.913				
GC	GC1	0.912	0.933	0.911	0.903	0.776
	GC2	0.937				
	GC3	0.838				
	GC4	0.832				
OT	OT1	0.893	0.954	0.935	0.935	0.838
	OT2	0.940				
	OT3	0.944				
	OT4	0.875				

Notes: IP = Innovative Performance, P = Polychronicity, IS = Information Sharing, SDS = Strategic Decision Speed, GC = Goal Congruence, OT = Organizational Trust

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PERCEIVED CREATVITY AND THE BIG FIVE PERSONALITY TRAITS OF SPECIALISTS TRAINED FOR PROFESSION: TRENDS IN THEIR INTERACTION

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Abstract. The expression of personality traits and creativity of students in different study programmes may differ. The goal of the research is to investigate and compare differences in the expression of personality traits and perceived creativity and their links in two groups of research participants: 1) where the study programmes do not include study subjects for promotion of creativity expression, and 2) where the study programmes include the study subjects that promote the expression of creativity. The research methods: the NEO Five Factor Inventory (Costa, Mc.Crae, 1992) was used to investigate the students' personality traits. Perceived creativity was analysed applying the Questionnaire for Personality Creativity (Petrulis, 1988). The data collected during the research was processed using the method of statistical analysis. The analysis of comparing the values of the components of the personality traits and perceived creativity was conducted applying the *Student-t* test. Investigation of the correlations of perceived creativity with the indicators of the personality traits was carried out using the Pearson's correlation coefficient. The research results showed that significantly higher average values in the scales of originality, childishness and pursuit of creativity were observed among students from the study programmes, which included the study subjects that enhance the expression of creativity, compared with those of students, who chose the study programmes without the study subjects that promote the expression of creativity. However, criticality was stronger expressed among the latter students. Evaluation of the expression of personality traits disclosed significantly higher average values of openness to experience and neuroticism in the group of students from the study programmes with the study subjects that promote creativity compared to the students from the study programmes without such study subjects. However, the level of extraversion expression was characteristic of the students in the latter group. The conducted correlation analysis of the interaction of perceived creativity and the Big Five personality traits disclosed different results of strength and quantity of links between the indicators of personality traits and perceived creativity in the different participants' groups. The research results will have enduring value in the scientific debate about the peculiarities of the expression of the components of students' perceived creativity and the personality traits and their interrelations, their practical significance foreseeing conditions and possibilities for efficiency of creativity expression in higher education.

Keywords: perceived creativity; personality traits; students

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1. Introduction

Living under conditions of constant transformations, the individual's creativity is becoming an increasingly necessary condition for successful integration into the labour market, generation of new ideas and implementation of innovations (Vaičiūnienė, Mažeikienė, 2014). There is also a growing need for business and the market to have employees, who are able to produce new and original ideas and find solutions to complex problems. The demand for an ability to generate new and original ideas, to offer non-standard solutions to problems is likely to increase in the future, because this is the way to build up competitiveness of organisation and to increase the value created for the market. Creativity is a relatively broad concept and various authors give different definitions. Some researchers define *creativity* as an ability of a person to generate original thoughts, which play a role in problem-solving and finding unique solutions and have expression of tangible and intangible gain (Puccio, 2001, cited in Rakauskaitė, 2014). Creativity may also refer to the ability to create new (i.e. original, unexpected), high quality and suitable (i.e. useful, within or exceeding the boundaries of an assignment/target) works (Sternber, 2005, cited in Vaičiūnienė, Mažeikienė, 2014). Other researchers link creativity to personality traits such as vivid imagination, ingenuity, curiosity, a wish to experiment, ability to approach things from different perspectives that require more than one answer (Grakauskaitė-Karkockienė, 2010; Beresnevičius, 2010), receptivity to information, initiative, emotionality, sensitivity to problems, flexible mind (Torrance, 1986), openness to innovations, ability to produce new ideas and to show easy orientation in problem situations (Sternberg, 1990). Thus, personality traits can influence the expression of the individual's creativity. Understanding the importance of a creative personality under the conditions of marker economy, the qualities of creative personality that reflect the level of creativity strongest have been discussed and attempts have been made to explain the influence of the most significant personality traits on the expression of creativity. It should be acknowledged that over the last several decades the number of studies on the analysis of the phenomenon of creativity has increased and the main focus has been laid on the personality-related and non-cognitive components of creativity. However, in Lithuania the research studies, which seek to clarify the peculiarities of perceived creativity and personality traits and their correlation in the groups of students from the study programmes, which include the study subjects that encourage expression of creativity and the ones that do not include such study subjects, have been scarce in Lithuania. Moreover, the results of research on differences in the expression of creativity components among students from various study programmes obtained by foreign researchers are rather controversial. Therefore, it is important to identify differences in the expression of personality traits and perceived creativity according to the different dimensions as well as differences in their correlations in the sample of students from various study programmes. This would allow for a better understanding of the problem of the unity or specifics of the links between creativity and personality traits and would contribute to the improvement of study organisation quality in higher education institutions seeking to enhance the expression of student creativity.

Taking into consideration the relevance of the theme, the article discloses differences in the peculiarities of perceived creativity and personality traits and their correlations among students from different study programmes in Lithuanian higher education institutions, i.e. with or without the study subjects that promote creativity.

The research problem is defined by the following question: How do peculiarities of personality traits and perceived creativity and their correlations differ in two groups of research participants: 1) where the study

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programmes do not include study subjects that enhance for promotion of creativity expression, and 2) where the study programmes include the study subjects that promote the expression of creativity?

The goal of the research is to investigate and compare the differences in the peculiarities of personality traits and perceived creativity, their correlations in the two groups of research participants, who study from in the study programmes, which do not include study subjects that strengthen the expression of creativity and which include the study subjects that promote the expression of creativity.

The research results:

1. To conduct the analysis of scientific research on the analysed theme theoretically substantiating the expression of creativity on the basis of the personality traits.
2. To identify differences in the peculiarities of perceived creativity and personality traits in two groups of Lithuanian higher education students.
3. To disclose differences in correlations of indicators of personality traits and perceived creativity in two groups of research participants.

2. Theoretical background

With the increasing prevalence of artificial intelligence and technological changes in the labour market, when most of the areas are managed by smart technologies or robots, employees' creativity has received more and more attention (Kryshtanovych et al., 2021). This characteristic is frequently seen as the main component of entrepreneurship that predetermines the success of organisations (Karimi et al., 2021). Other authors (Zhao et al., 2018) perceive creativity as an essential quality of an entrepreneur. It should be noted that demand for a creative employee is also expressed in the learning guidelines prepared by EBPO "*The Future of Education and Skills. Education 2030*", when next to individual and collective wellbeing, self-regulation and tension management, the emphasis is also laid on creative thinking. The Strategy *Future Work Skills* (2020) expresses the significance of creativity on the basis of new and adaptive thinking and creation of meaning. The fact that employees' creativity is a part of not only present but also of future labour sector is also mentioned by Leopold et al. (2016), who emphasise that a creative personality will be an integral part of the future labour market. Although personalities distinguished by creativity are very welcome, it has to be pointed out that such individuals are rarely found among business specialists (Levy, Cannon, 2016). It is obvious that the lack of creative employees is a serious issue in the labour market, when instead of creative, resourceful, open to innovations employees with original thinking, who are able to make innovative decisions and achieve publicly significant and qualitatively new results, stereotypically and traditionally thinking individuals are faced, who, according to Rogers (2005) are distinguished by regulated thinking and even standard-based group activity. At the same time, Sitar et al. (2016) point out that in the rapidly changing working environment a lot of people want to be creative in their workplace but only some of them are able to disclose their creativity. The need for and significance of promoting the expression of creativity in such a situation is obvious perceiving that the person's creativity development to a large extent depends on the direction of the individual's activities, the created atmosphere and the way the obtained knowledge and skills are implemented. On the basis of the aforesaid thoughts, it can be assumed that development of creativity, which ensures formation of a creative specialist, should be included both into the process of studies and the professional growth of employees. The fact that creativity is a result of education and development is confirmed by the insights of other authors (Burch et al., 2006 (cit. in Sapranavičiūte, Permina and Šinkariov, 2010), which reveal that originality of thinking, ability to generate more and innovative, exceptional and useful ideas throughout a certain period of time is stronger expressed by persons, whose creative expression is promoted compared to the ones, whose activities are less related to creation. The fact

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that creativity can be developed is also confirmed by the authors (Puccio, 2001, cit. in Rakauskaite, 2014), who define *creativity* as the ability of an individual to generate original thoughts that serve a certain purpose while solving problems and making unique decisions and have tangible and intangible gains (Puccio, 2001, cit. in Rakauskaite, 2014) and to create new (i. e. original, unexpected), high quality and appropriate (i.e. useful and in line with or exceeding the limits of assignment or goal) works/products (Sternber, 2005, cit. in Vaičiūniene, Mažeikiene, 2014). Creativity as a value-based personal category is an essential reserve for individual's self-realisation (Kryshtanovych et al., 2021). Grakauskaitė-Karkockienė (2010) also states that creativity is an inseparable trait of an individual. Beresnevičius (2010) links creativity with such personality traits as vivid imagination, ingenuity, need for experimenting, ability to approach things from different perspectives, which call for more than one answer. Sosa, Kayrouz (2020) refer to the need of constant curiosity promoting search for new opportunities; paradoxical nature, which predetermines flexible and open mindset that supports possibilities of radical changes; embodied experience formulating a thought that a person is creative in ways and methods that are appropriate and known only to him/her; emphatic collaboration evaluating diversity and promoting collaboration based on collective intelligence, as to the main aspects of creativity.

Thus, factors and environmental impact undoubtedly influence manifestation of the individual's creativity. However, the individual traits of a person play the most significant role for creativity and creative achievements. Considering the fact that creativity is not only an outcome of education and that individual traits serve as a relevant indicator forecasting achievements in the person's creative activity, different research studies have also been carried out up to now aiming to identify the personality traits that reflet creativity strongest as well as clarify the extent of the influence of various personality traits on various aspects of creativity.

Different personality traits predetermine the extent of personality's creativity, therefore the research studies, where the five-factor model of personality traits is employed to forecast creativity, that is, to evaluate, which personal qualities are favourable for creativity expression and formation, are most relevant. The research prevails in the scientific space, where the links among the dimensions of creativity and the Big Five personality traits, including such features as *openness to experience, extraversion, conscientiousness, neuroticism, agreeableness* are disclosed. Analysing how personality traits of the five-factor model forecast employees' creativity, Yao and Li (2021) discloses that openness to experience, extraversion and conscientiousness correlates with creativity. The research conducted by Kaspi – Baruch (2017) also models a picture of a creative individual, and simultaneously an employee, namely on the basis of the dimensions of the Big Five personality dimensions, when it is stated that the most creative individuals are distinguished by low conscientiousness, high level of extraversion, openness and emotional stability. Other researchers (Hong et al., 2020), who investigate the links between personality traits and creativity, point out that high level of creativity can be foreseen when neuroticism is low and indicators of openness to experience are high. Meanwhile, Hsu (2019) presents conclusions that agreeableness has a weaker predicted effect on creativity compared to openness, whereas emotionally stable individuals, according to the researcher, are more benevolent and adapt easier; all this has a negative impact on imagination and, thus, negatively influences creativity.

Analysing the importance of the personality traits to manifestation of creativity, the majority of research studies show that *openness*, as one of the Big Five personality dimensions, has the strongest impact on the individual's creativity expression. Open people are known as having lots of interests, eager to learn new things and enjoying new experience. Openness reveals the person's insight, imagination, susceptibility to

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innovations, interest in the surrounding environment as well as inclination to solve situations in non-traditional ways. Namely openness, as a dimension of constructive creativity is emphasised by Rogers (2005) and it is seen as openness to experience, ability to spontaneously play with ideas, colours, forms and relations by raising brave hypotheses and performing unexpected transformations of situations. Thus, openness to experience, according to Batey et al. (2010), has a strong predicted effect on creativity in various fields. The research conducted by Kaspi – Baruch (2017) confirms the aforesaid and states that openness may be the only reliable indicator for predicting creativity. The research data obtained by other researchers (Yao, Li, 2021) also show that openness to experience is a personality trait, which is directly related to creativity. Openness receives a special place in the research of Werner et al. (2014), who point out that openness is the only variable out of all the five personality indicators, which positively correlates with almost all indicators of creativity. Analysing the significance of openness to the expression of creativity, the research conducted by Y. Hsu (2019) should be mentioned because the results reveal that individuals, who are characterised by openness, are able to express originality while making decisions or transforming problems. This assumption is supplemented with the data presented by Pociūtė, Isiūnaitė (2011), which disclose that open individuals tend to choose various ways and means for acquiring new material, strive for freedom in activities and are willing to openly express themselves and to arrive at original solutions. Namely openness to experience results in disassociation from preconceived perception and makes it possible to have an innovative glimpse at various phenomena and ideas without leaving place for rigidity. According to Rogers (2005), this spontaneous game and explorations evoke intuition, enable to see the life in a creative way, in a new light and meaning. Thus, summarising the insights and research results of researchers all over the world, it can be stated that openness should be a characterising feature among representatives of various professions.

Analysing the importance of *conscientiousness* to creativity, this feature reflects the person's diligence, intention to act persistently, peculiarities of self-regulation and stronger expression of achievement motivation. Frequently the Big Five personality dimension links with reliability, good organisation, methodical approach, minuteness, when, according to Soto (2018), conscious individuals prioritise order and structure, work persistently to reach heights and are committed to their duties. Therefore, it can be assumed that persistence, as a trait that expresses conscientiousness, can be important in the process of creative thinking pursuing the set goals, making new plans and expanding limits of their possibilities. The insights of Batey et al. (2010) are important discussing conscientiousness, which express an idea that conscientiousness allows forecasting creative results, but the direction of this forecast depends on activities. For example, in scientific activities person's conscientiousness has a positive predicted power, whereas in arts it is negative (Dean et al., 2006; Batey and Furnham, 2006; Feist, 2010; Furnham, 2016). Meanwhile, the results of the research carried out by Werner et al., 2014) show that conscientiousness does not significantly correlate with all the indicators of creativity. However, the most unexpected is a negative correlation between conscientiousness and creativity (Jirásek and Sudzina, 2020). Thus, the research results disclose the unavailability of a unified opinion about the links between conscientiousness and manifestation of creativity.

Considerable attention is allocated to *extraversion*, one more dimension of the Big Five personality. It is stated that individuals characterised by extraversion gain energy from communication with others. They are determined, ambitious and search for inspiration in group situations, which inspires such people to create, generate new ideas and search for non-traditional solutions. Extraversion embraces such qualities as eloquence, friendliness, activity and search for inspiration. Extraverts feel better while communicating and are more eager to engage in experiences that exceed the framework of traditional thinking compared to people with low level of extraversion. According to Soto (2018), this feature of extraversion shows individuals'

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social activity, assertiveness and level of energy. Thus, knowing that extraversion is connected to inclination to take risk, to search for new information as well as to active lifestyle, engagement in activities, pursuance of better results, which formulates assumption that in some activities the feature of extraversion is important allowing an individual to express himself or herself through creation. However, evaluating the importance of the feature of extraversion to manifestation of person's creativity, it is impossible to make a unified conclusion because some research results show that creative individuals are more introverts, who prefer individual activities. Referring to extraversion, the results of some research show that it has a minor predicted impact on originality, so it should be acknowledged that creative people are frequently introverts (Hsu, 2019). The results of research conducted by Werner et al. (2014) prove that extraversion slightly strengthens creativity. According to Jirásek and Sudzina (2020), the reason for this this may lay in the fact that two aspects of extraversion, i.e. assertiveness and activity, do not explain creativity. In their research Zare and Flinchbaugh (2019) demonstrate an opposite position regarding extraversion, stating that extraversion, just like openness to experience and conscientiousness, allows forecasting creativity. Although scientific studies, which analyse the links between agreeableness and expression of individual's creativity are few, it can be assumed that this trait can be one of the indicators forecasting the individual's creative achievements. Individuals distinguished by a*greeableness* are friendly, kind, even affectionate, tend to collaborate and emphasize with others. According to Hana and Pistole (2017), such people appreciate and recognise others, including employees. Even a deeper thought about people distinguished by agreeableness is expressed by Soto (2018), who points out that such people are emotionally concerned about other people and care of their wellbeing and they in general positive evaluate others. It can be assumed that individuals, who possess higher level of agreeableness, also have a stronger expressed favourable attitude towards others and activities performed with others as well as creative activities. So agreeableness can be one of the significant determinants of creativity. Moreover, *neuroticism* is another equally important dimension of the Big Five personality, which is linked to emotional stability and extent of expressing emotions. People, who demonstrate high levels of neuroticism, usually experience emotional instability and negative emotions, anxiety. Their mood swings and tension are stronger expressed (Mammadov et al., 2019) as well as sensitivity and strong feelings when difficulties are encountered. Such people also tend to lack self-confidence, they tend to doubt their powers and abilities, are afraid of violating rules, are passive searching for different solutions. All this is believed to limit expression of creativity and has negative influence on results of creative activities. Analysing the importance of *neuroticism* to the individual's creativity, some authors emphasise that stronger expressed level of neuroticism may lead to inclination to live through negative emotions in activities and to having fear of deviating from norms and rules (Pacevičius, 2005). According to the research of other authors, individuals with higher level of neuroticism more passively engage in activities and face difficulties making decisions and do not show initiative searching for solutions (Wang et al., 2006), what undoubtedly refers to aspects of creativity. However, there are authors, who state that individuals, who link themselves with creative activities, are also characterised by stronger anxiety and emotional sensitivity, face difficulties controlling stress and emotion differently from individuals, who are less related to creative activities (Feist, 1998, cit. in Charyton, Snelbecker, 2007). Following the latter results, it can be stated that creativity embraces the element of indefiniteness, which can evoke stress and anxiety; then difficulties are coped with employing creative abilities.

The analysis of scientific research according to the analysed theme showed that individual personality traits are some of the most relevant factors of person's creative achievements. Summarising the essential insights, it is obvious that the person's openness to experience is mostly related to creativity and is one of the main characteristics of a creative personality (Leung and Maddux, 2008; Garkauskaitė-Karkockienė, 2013;

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Pociūtė, Isiūnaitė, 2011; McCrae and Costa (1997) (cit. in Sánchez-Ruiz et al., 2011)). However, it should be acknowledged that the works of researchers do not present a unified opinion about what features are characteristic of a creative personality, how components of personality traits and creativity correlate and the available research results are rather contradicting: some research studies disclose relationships between creativity and personality trait, whereas others do not identify any.

3. The research methodology

The research participants. The total sample of the quantitative research included 287 students from higher education institutions in Lithuania (from 18 to 40 years old): 162 (56.4 %) of them were students from the study programmes without the study subjects for strengthening the expression of creativity and 125 (43.6 %) students enrolled in the study programmes, where the study subjects that promote the expression of creativity were included. The convenient research sample was chosen. The ethical principle of free consent to participate in the research was observed in the survey. For confidentiality reasons the names of higher education schools are not indicated in the article.

The research methods. *The analytical descriptive method* was applied for the analysis scientific publications related to the analysed theme while studying the peculiarities of creativity and personality traits and their interrelations. *The quantitative research method* was used to analyse the components of student creativity and peculiarities of personality traits, their correlations and the expression of creativity on the basis of personality traits. ***The NEO Five Factor Inventory*** (Costa and Crae, 1992) was used to investigate the personality traits of students. The questionnaire is designed to evaluate the personality according to five dimensions or the big factors: *neuroticism* (Cronbach's α = 0.90), *extraversion* (Cronbach's α = 0.88), *openness to experience* (Cronbach's α = 0.77), *agreeableness* (Cronbach's α = 0.82), *conscientiousness* (Cronbach's α = 0.88). Worrell and Cross (2004) characterise every trait stating that extraversion embraces such features as sociality, activity and positive emotionality. Neuroticism is related to undesirable behaviour of an individual, negative emotions, worry, experiencing disturbing emotions (anxiety, hostility, insecurity, guilt, etc.). Conscientiousness refers to behaviour, which targets at the pursuit of goals, the person's ability to control impulsivity, discipline and good organisation. Agreeableness is characterised as concern for people, which manifests in altruism, affection, compassion, non-conflict, nurturance of relation. Openness to experience is described as an ability of a person to accept new ideas and experiences without giving priority to ordinary and practical things. Žukauskienė and Barkauskienė (2006) conducted the analysis and standardisation of psychometric indicators of the Big Five Model (NEO–PI-R test) and proved that the Lithuanian version of NEO PI-R is reliable, valid and may be used for scientific research in Lithuania. The creativity of students is investigated applying ***the Questionnaire for Personality Creativity*** (Petrulis, 1988). The questionnaire consists of 64 statements, where the respondent is requested to provide the answer "Yes" or "No" to every statement. The results are analysed according to 9 sub-scales: intuition, phantasy, inclination to creativity, inclination to innovation, flexibility, originality, criticality, inversion and childishness. The results of statistical data analysis shows that the internal consistency of all the scales of *the Questionnaire for Personality Creativity* is good and rather high; according to separate scales the Cronbach alpha varies from 0.75 to 0.85: *intuition* (Cronbach's α = 0.85), *phantasy* (Cronbach's α = 0.82), *pursuit of creativity* (Cronbach's α = 0.75), *pursuit of novelty* (Cronbach's α = 0.83), *flexibility* (Cronbach's α = 0.82), *originality* (Cronbach's α = 0.77), *criticality* (Cronbach's α = 0.81), *inversion* (Cronbach's α = 0.79) and *childishness* (Cronbach's α = 0.81). *The statistical method*. The methods of statistical analysis are applied to process the data collected during the research: Student-*t* test (for comparison of mean values of two

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independent samples) aiming to identify differences in several independent populations. The received results are perceived as statistically significant when they meet the level of significance p. The Pearson's correlation coefficient is used to evaluate the links of the respondents' perceived creativity with the indicators of personality traits. The statistical analysis of data was carried out applying Version 17 of the Statistical Package for Social Sciences.

4. The research results and their analysis

Since a big number or authors claim that the choice of the profession or the study field is predetermined by certain personality traits, professional interests and combination of ways of thinking (Ackerman and Beier, 2003) and that students with strongly expressed creativity tend to choose studies related to creative activities (Myers and McCaulley, 1985, in Pringle et al., 2010), this research aims to identify differences in the peculiarities of personality traits, the expression of perceived creativity and their correlations in the group of students learning in the study programmes, which include study subjects that promote the expression of creativity and in the group of students from the study programmes without such study subjects.

Peculiarities of personality traits. The students' personality traits were identified using the NEO-FFI Five Factor Questionnaires (Costa and McCrae, 1991). The sub-scales of *neuroticism, extroversion, agreeableness, conscientiousness* and *openness to experience* were used in the research.

The applied *Student-t* test allowed establishing statistically significant differences in mean values of the sub-scales of *openness to experience* (t=3.684, p=0.001), *neuroticism* (t=3.89, p=0.001) and *extroversion* (t=-2.863, p=0.005). The established significantly higher mean values showed that curiosity about new ideas, inclination to test new conceptions, to show interest in the inner and outer world and in nurturance of new ideas were stronger expressed (M=51.8, SD=9.6) among students from the study programmes that include study subjects promoting the expression of creativity compared to students from the study programmes without such study subjects (M=49.7, SD=9.3). However, stronger orientation to people, sociality and ability to easily establish a contact were characteristic of the latter (M=47.8, SD=10.3) compared to the students from the study programmes that embrace the study subjects promoting the expression of creativity. The students from such programmes demonstrated a significantly lower value in the scale of *extraversion* (M=46.1, SD=9.2), what refers to their seclusion, weaker inclination to social community and difficulties in establishing contacts with people.

On the other hand, the significantly higher mean values in the sub-scale of *neuroticism* (M=56.2, SD=9.8) disclosed by the research among the students from the study programmes with the study subjects that promote the expression of creativity demonstrate greater vulnerability and psychological fatigue sensitivity, difficulties experienced in controlling stress situations and emotions compared to the research participants studying in the study programmes without the study subjects that encourage the expression of creativity (M=52.3, SD=9.6).

Statistically significant differences were not established among the research participants, who study in the study programmes without the study subject that promote the expression of creativity and, the ones enrolled in the study programmes with the study subjects that promote expression of creativity while analysing the expression of *agreeableness* (t=-1.265, p=0.208) and *conscientiousness* (t=0.139, p=0.872).

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Table 1. The mean values of the expression of personality traits (M), standard deviations (SD) and the level of differences in significance (p) among the students from the study programmes that include the study subjects promoting the expression of creativity (n=125) and without such study subjects (n=162)

Scale	**With study subjects promoting creativity**		**Without study subjects promoting creativity**		t	p
	M	SD	M	SD		
Neuroticism	56.2	9.8	52.3	9.6	**3.89**	**0.001**
Extroversion	46.1	9.2	47.8	10.3	**-2.863**	**0.005**
Openness to experience	51.8	9.6	49.7	9.3	**3.684**	**0.001**
Agreeableness	47.6	10.8	48.6	10.2	-1.265	0.208
Conscientiousness	53.4	9.7	52.2	9.3	0.139	0.872

The generalised results disclosed that the students in the research, who were enrolled in the study programmes with the study subjects promoting the expression of creativity, tend to be more interested in the surrounding environment, allocate more significance to innovations and diversity, are less constrained and ready to nurture new ideas compared to the students in the study programmes without the study subjects that promote the expression of creativity. However, the latter are characterised by stronger sociality, energy as well as ability to control stress situations and manage emotions in them. Meanwhile, the levels of features of agreeableness and conscientiousness did not differ significantly.

Peculiarities of expression of perceived creativity. Although creativity manifests itself in various areas of life, more and more often attention is allocated to differences in creativity manifestation considering the performed activity. Taking this into consideration, attempts were made identify differences in the indicators of perceived creativity in the two groups of students learning in the study programmes with and without the study subjects that promote the expression of creativity. The Questionnaire for Personality Creativity was used (Petrulis, 1988). The data was calculated according to the sub-scales of *intuition, phantasy, pursuit of creativity, pursuit of novelty, flexibility, originality, criticality, inversion* and *childishness*.

The calculations of the *Student t-test* allowed identifying statistically significant difference in the sub-scales of *childishness* (t=2.819, p=0.001), *originality* (t=2.08, p=0.047), *pursuit of creativity* (t=2.402, p=0.022) and *criticality* (t=-2.32, p=0.031). The established statistically significant mean values show (see: Table 2) that perceived originality and uniqueness of thinking, ability to find as many non-traditional solutions as possible, to generate unusual, authentic and rare ideas, unpredictable products and to make non-standard solutions (*component of originality* (M=5.85, SD=1.72)), naivety, emotionality, impulsivity, lively imagination and openness (*component of childishness* M=6.27, SD=1.64) and self-perception related to a stronger expressed need for more creative solving of problem situations and finding non-traditional solutions (*component of pursuit of creativity* (M=5.11. SD=1.69)) are stronger expressed among students from the study programmes including the study subjects that encourage the expression of creativity compared to the ones from the study programmes without such study subjects ((M=4.52, SD=1.57), (M=4.89, SD=1.24) and (M=4.16, SD=1.39) respectively). The statistically lower value in the sub-scale of *criticality* (M=3.12, SD=1.27) in the group of students from the study programmes with the study subjects promoting creativity evidence that the latter tend to make spontaneous conclusions, to follow their intuition without linking facts

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with long considerations and their argumentation compared to students, who do not learn study subjects promoting creativity. Significantly statistically stronger expressed *criticality* (M=3.47, SD=1.41) shows that the latter tend to think, to make well-considered decisions and to foresee their consequences. Thus, students in the study programmes with included study subjects for promotion of the expression of creativity show higher indicators of divergent thinking, when the latter consider the expressiveness of their perceived creativity to be better. They also think that they are more original and strive for creativity. The students learning in the study programmes without the study subjects that promote creativity perceive themselves as more critical personalities.

The research on the expression of the sub-scales of students' perceived creativity revealed no statistically significant differences ($p > 0.05$) in the sub-scales of *intuition* (t=0.613. p=0.541), *flexibility* (t=1.16, p=0.185), *phantasy* (t=1.007, p=0.421), *inversion* (t=-1.1, p=0.308) and *pursuit of novelty* (t=1.2, p=0.198) (see: Table 2). The statistically insignificant differences in the mean values show that the perceive creativity of students is evaluated at the similar level regardless of whether the study programme they are enrolled in includes the study subjects that promote creativity or not.

Table 2. The mean values of the expression of perceived creativity (M), standard deviations (SD) and the level of differences in significance (p) among the students from the study programmes that include the study subjects promoting the expression of creativity (n=125) and without such study subjects (n=162)

Scale	**With study subjects promoting creativity**		**Without study subjects promoting creativity**		*t*	*p*
	M	SD	M	SD		
Intuition	1.46	0.8	1.39	0.86	0.613	0.541
Phantasy	1.54	0.91	1.37	0.82	1.007	0.421
Pursuit of creativity	5.11	1.69	4.16	1.39	2.402	**0.022**
Pursuit of novelty	6.23	1.87	6.14	1.7	1.2	0.198
Flexibility	3.54	1.49	3.42	1.31	1.16	0.185
Originality	5.85	1.72	4.52	1.57	2.08	**0.047**
Criticality	3.12	1.27	3.47	1.41	-2.32	**0.031**
Inversion	2.66	1.04	2.74	1.07	-1.1	0.308
Childishness	6.27	1.64	4.89	1.24	2.819	**0.001**

Generalising the results, higher mean values are observed in the sub-scales of childishness, pursuit of creativity and originality in the group of students from the study programmes that include study subjects promoting the expression of creativity, which means that the latter see themselves as original individuals, who strive for creativity, are not afraid of experimenting, can be characterized by features of childishness and consider the expression of their creativity. However, higher values of expression of criticality are typical of the students, who do not learn study subjects that promote the expression of creativity. The obtained results confirmed the statement once again that the phenomenon of creativity is observed in various activities but the level of its expression differs. On the other hand, the received results contribute to the discussion about the extent to which creativity is inborn and/or acquired and developed by creating the most favourable environment for the revelation of the person's creativity, about what chosen and applied teaching methods in the process of education foster the development of the person's imagination, stimulate divergent and critical thinking, the desire of students to search for new solutions to assignments.

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Correlations of students' personality traits and perceived creativity. The works of researchers all over the world do not contain a unified opinion about what traits are characteristic of a creative personality and what correlations between personality traits and creativity components can be identified.

Seeking to more comprehensively analyse the obtained research results, the relationships between the separate dimensions of personality traits and the values of perceived creativity in the student groups from the study programmes with the study subjects that promote the expression of creativity (see: Table 3) and the study programmes without such study subjects (see: Table 4).

Analysing the relationships between the personality traits and perceived creativity, the research results showed: the stronger the *openness to experience* (r=0.328, p=0.001) and *extraversion* (r=0.19, p=0.012) among students in the study programmes that include the study subjects that promote the expression creativity, the higher *the overall creativity*. Slightly weaker but also statistically significant correlations were established among *the indicator of overall creativity* and *extroversion* (r=0.185, p=0.006) and *openness to experience* (r=0.206, p=0.001) in the group of students from the study subjects that do not include the study subjects encouraging the expression of creativity. This allows stating that regardless of their study programme, which includes more or fewer study subjects, the students who prefer diversity, are not constrained and nurture new ideas and are also pro-active, full of energy and are characterised by a higher level of sociality, also show slightly higher general indicator of creative personality. Also, only negative correlations were identified between *the general indicator of perceived creativity* and the feature of *conscientiousness* among students in both study programmes with the study subjects promoting the expression of creativity (r=-0.336, p=0.001) and without such study subjects (r=-0.264, p=0.001), what shows that the higher general perceived creativity, the weaker the expression of the person's inclination to plan, organise, set assignments and goals. The results of correlation analysis revealed no statistically significant correlations between *the general indicator* of perceived creativity and such traits as neuroticism bei agreeableness (see: Tables 3 and 4).

The correlation analysis of personality traits and the sub-scales of creativity in the group of students enrolled in the study programmes that include the study subjects that encourage the expression of creativity revealed positive relationships between *extroversion* and such sub-scales of creativity as *intuition* (r=0.21, p=0.002), *phantasy* (r=0.25, p=0.002), *pursuit of innovation* (r=0.294, p=0.001) and *pursuit of creativity* (r=0.18, p=0.003) and *childishness* (r=0.382, p=0.001) (see: Table 3) . After the calculation of the Pearson's correlation coefficients in the group of students from the study programmes that do not include the study subjects promoting the expression of creativity, positive only weaker correlations are observed between *extroversion* and *phantasy* (r=0.193, p=0.004), *pursuit of creativity*(r=0.176, p=0.009) and *innovation* (r=0.201, p=0.002) as well as *childishness* (r=0.274, p=0.001). *Intuition* does not significantly correlate with *extraversion* (see: Table 4). The latter results show that the person's inclination to be pro-active and communicate with others as well as sociality, energy, talkativeness and optimism (*dimension of extroversion*) is linked with perceived intuition among the students from the study programmes with the study subjects promoting creativity. Regardless of the study programme, extraversion positively correlates with a need for creative thinking and seek innovations and with stronger expressed traits of phantasy and childishness. The established fairly strong significant positive relationships show that in the group of students from the study programmes with the study subjects encouraging creativity, desire for intellectual knowledge, stronger expressed interest in the inner and outer world and vivid imagination (*dimension of openness to experience*) show correlation with the stronger expressed *phantasy* (r=0.292, p=0.001),

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originality (r=0.342, p=0.001) and *pursuit of creativity* (r=0.28, p=0.001) and *innovation* (r=0.369 p=0.001). Moreover, the results of correlation analysis showed slightly weaker but significantly positive correlation between *openness to experience* and *flexibility* (r=0.214, p=0.001), *childishness* (r=0.221, p=0.001), *inversion* (r=0.18, p=0.014) and *intuition* (r=0.173, p=0.005). The analysis of correlations between the perceived creativity and personality traits in the group of students, who do not have study subjects related to the expression of creativity, disclosed statistically significant and fairly strong relationships between *openness to experience* and such indicators of perceived creativity as: *originality* (r=0.224, p=0.001), *pursuit of innovation* (r=0.248, p=0.001) and *creativity* (r=0.211, p=0.001), and *phantasy* (r=0.213, p=0.001). Slightly weaker but still significant correlations were identified with *flexibility* (r=0.179, p=0.007) and *childishness* (r=0.164, p=0.015). Thus, students' *pursuit of innovation* and *pursuit of creativity, originality, phantasy* and *childishness* positively correlate with *openness to experience* in both groups of participants. This allows stating the personality's openness to experience is related to the peculiarities of creative (divergent) thinking and such individuals are distinguished by stronger expressed flexibility of thinking, they have more vivid imagination, they are fond of new ideas, are tolerant to uncertainty and possess a broad range of emotions and thoughts. The conducted analysis of separate indicators of perceived creativity and personality traits revealed that *openness to experience* is not linked to *intuition* and *inversion* (see Table 4) in the group of students learning in the study programmes without the study subjects that promote the expression of creativity, what is opposite to the results in the group of students, who learn the study subjects that encourage the expression of creativity. Meanwhile, the trait of *openness to experience* is not significantly connected to *criticality* in both groups of research participants regardless of the study programme (with or without the study subjects that promote the expression of creativity.

According to the conducted research, weaker expressed orderliness, excessive scrupulousness, dutifulness, self-discipline and prudence as well as management of impulses and determination while pursuing goals (*dimension of conscientiousness)* negatively correlates with *flexibility* (r=-0.31, p=0.001), *originality* (r=-0.173, p=0.007), *inversion* (r=-0.296, p=0.001) and *childishness* (r=-0.271, p=0.001), which are more characteristic of the students from the study programmes with the study subjects promoting the expression of creativity, whereas the research participants' emotional instability and low ability to cope with stress situations (*dimension of neuroticism*) negatively correlates with *intuition* (r=-0.325, p=0.001) and *flexibility* (r=-0.197, p=0.015). Moreover, the weaker ability of an individual to emphasise with others and inclination to help them (*dimension of agreeableness*) relates to stronger *pursuit of innovation* (r=-0.241, p=0.001) and *criticality* (r=-0.141, p=0.024). Slightly fewer and weaker correlation links were established between the separate indicators of perceived creativity and personality traits such as: *agreeableness*, *conscientiousness* and *neuroticism* among students from the study programmes without the study subjects encouraging creativity (see Table 4).

The correlation analysis in this group of participants showed statistically significant negative relationships between *conscientiousness* and such sub-scales of perceived creativity as *originality* (r=-0.142, p=0.017), *inversion* (r=-0.192, p=0.009) *childishness* (r=-0.167, p=0.012). A*greeableness* negatively correlates with *criticality* (r=-0.156, p=0.019). Undoubtedly, individuals characterised by conscientiousness are responsible, goal-oriented and this results in better performance results. However, following the research results it can be observed that stronger expression of conscientiousness may lead to decreased expression of *creativity* aiming at activity outcomes, and creative individuals may have a slightly different understanding of moral norms compared to the majority people. Meanwhile, the significant and only positive correlations identified between *agreeableness* and *flexibility* in both groups of participants (with creativity-related study subjects

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(r=0.181, p=0.003) and without them (r=0.167, p=0.014)), allow assuming that students with stronger expressed agreeability and more helpful to others are also distinguished by higher level of flexibility. Additionally, the established negative correlation showed that weaker *intuition* (r=-0.204, p=0.002) is characteristic of participants, who tend to be emotionally instable and easily annoyed, experiencing negative feelings (*dimension of neuroticism*) and belong to the group of students, who do not study creativity-related study subjects.

Table 3. The results of correlation analysis of personality traits and perceived creativity among students from the study programmes, which include the study subjects that promote the expression of creativity (*p<0.01; **p<0.001)

	Neuroticism	**Extraversion**	**Openness to experience**	**Agreeableness**	**Conscientiousness**
Intuition	**-0.325** **0.001**	**0.21** **0.002**	**0.173** **0.005**	-0.093 0.158	0.098 0.146
Phantasy	-0.049 0.451	**0.25** **0.002**	**0.292** **0.001**	0.019 0.7	0.078 0.141
Pursuit of creativity	-0.075 0.39	**0.18** **0.003**	**0.28** **0.001**	-0.078 0.295	0.15 0.087
Pursuit of innovation	-0.082 0.152	**0.294** **0.001**	**0.369** **0.001**	**-0.241** **0.001**	-0.016 0.75
Flexibility	**-0.197*** **0.015**	-0.068 0.268	**0.214** **0.001**	**0.181** **0.003**	**-0.31** **0.001**
Originality	0.103 0.121	0.031 0.629	**0.342** **0.001**	-0.027 0.69	**-0.173** **0.007**
Criticality	0.039 0.473	-0.011 0.887	0.067 0.302	**-0.141*** **0.024**	-0.086 0.164
Inversion	0.084 0.156	-0.041 0.55	**0.18*** **0.014**	-0.062 0.171	**-0.296** **0.001**
Childishness	0.068 0.251	**0.382** **0.001**	**0.221** **0.001**	-0.14 0.082	**-0.271** **0.001**
Overall average	0.081 0.17	**0.19** **0.012**	**0.328** **0.001**	-0.082 0.153	**-0.336** **0.001**

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Table 4. The results of correlation analysis of personality traits and perceived creativity among students from the study programmes, which do not include the study subjects that promote the expression of creativity (*p<0.01; **p<0.001)

	Neuroticism	**Extraversion**	**Openness to experience**	**Agreeableness**	**Conscientiousness**
Intuition	**-0.204**** **0.002**	0.054 0.466	0.091 0.296	-0.038 0.52	0.083 0.319
Phantasy	-0.041 0.398	**0.193**** **0.004**	**0.213**** **0.001**	0.028 0.67	0.062 0.471
Pursuit of creativity	-0.057 0.39	**0.176**** **0.009**	**0.211**** **0.001**	-0.128 0.214	0.127 0.068
Pursuit of novelty	-0.079 0.354	**0.201**** **0.002**	**0.248**** **0.001**	-0.122 0.208	-0.014 0.68
Flexibility	0.096 0.247	-0.108 0.215	**0.179**** **0.007**	**0.167**** **0.014**	-0.122 0.071
Originality	0.116 0. 201	0.121 0.093	**0.224**** **0.001**	-0.037 0.575	**-0.142**** **0.017**
Criticality	0.125 0. 192	-0.092 0.337	0.094 0.291	**-0.156*** **0.019**	-0.071 0.408
Inversion	0.088 0.275	-0.073 0.425	0.069 0.294	-0.059 0.526	**-0.192**** **0.009**
Childishness	0.124 0.086	**0.274**** **0.001**	**0.164*** **0.015**	-0.113 0.218	**-0.167**** **0.012**
Overall average	0.136 0.207	**0.185**** **0.006**	**0.206**** **0.002**	-0.049 0.503	**-0.264**** **0.001**

The generalised results of correlation show that certain indicators of perceived creativity are related to personality traits. However, analysing the trends in corelation of perceived creativity and the Big Five personality traits, the correlation analysis disclosed noticeable differences in the strength and number of links between the personality traits and perceived creativity in different groups of the research participants. Following the research data, it can be stated that the personality traits correlate with the dimensions of perceived creativity in a statistically significantly stronger manner among students, who learn study subjects promoting creativity, compared to the students from the study programmes without creativity expression - related study subjects. The results of correlation analysis showed more (25 statistically significant) and stronger (from 0.382 to 0.141) correlations in the group of students learning in the study programme with the study subjects promoting the expression of creativity, whereas in the group of students in the study programmes without the study subjects promoting the expression of creativity only 19 statistically significant and rather weak (from 0.274 to 0.142) correlations were identified.

Summing up, it can be stated that evaluation of peculiarities of expressiveness of personality traits and perceived creativity and identification of differences among students, who chose different study programmes allowed for better understanding of the problem of integrity and specifics of creativity, correlations between the personality traits and creativity. The present research supplemented some results of other authors and disclosed a number of interesting differences in expression of personality traits and perceived creativity, as well as their peculiarities and correlations.

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Conclusions

1. Individual personality traits are some of the most important factors of individual's creative achievements. Creating favourable environment, choosing and applying teaching methods in the process of education, person's creativity, divergent and critical thinking are promoted, imagination is developed, curiosity and desire to search for new ways of solution are evoked.

2. The research established and evaluated differences in the expression of the Big Five personality traits and perceived creativity in the two groups of respondents:
2.1. evaluating the expression of personality traits, statistically significant higher values were identified in the sub-scales of openness to experience and neuroticism in the group of students from the study programmes, which include study subjects promoting creativity, compared to the indicators of the students from the study programmes without study subjects that promote creativity, where stronger expressed extraversion was recorded. Statistically significant differences were not identified in the sub-scales of agreeableness and conscientiousness in both groups of research participants;
2.2. the comparative data analysis disclosed that statistically significantly higher values according to the scales of originality, childishness and pursuit of creativity were observed in the group of students from the study programmes, which include study subjects promoting creativity compared to the students from the other group. The latter demonstrated higher values of criticism. Other values in the sub-scales of creativity (intuition, flexibility, phantasy, inversion and pursuit of novelty) did not significantly differ in both groups of research participants.

3. Using the Pearson' correlation analysis, the relationships between the personality traits and perceived creativity and their differences among students from different study programmes were established:
3.1. irrespective of the chosen study programme with or without study subjects that promote the expression of creativity, the students with stronger expressed openness to experience and extraversion are characterized by higher level of general creativity, whereas conscientiousness negatively correlates with the general index of perceived creativity;
3.2. the positive correlations identified in both groups of participants show that students with stronger expressed extraversion are also characterised by phantasy, pursuit for creativity and novelty and childishness, whereas the dimension of oneness to experience correlates with phantasy, childishness, flexibility, originality and pursuit of creativity and novelty. Openness to experience among the students in the study group with the study subjects promoting creativity correlates with intuition and inversion, which is contrary to the results in the group of students from the study programmes without study subjects related to creativity;
3.3. in the group of students, who learn in the study programmes that include the study subject promoting expression of creativity, it was established that conscientiousness negatively correlated with flexibility, originality, inversion and childishness and neuroticism negatively correlates with intuition and flexibility. Negative correlation was observed between agreeableness and criticism, whereas positive relationship was observed between agreeableness and flexibility;
3.4. statistically significantly negative correlations were established between conscientiousness and originality, inversion and childishness, whereas agreeableness negatively correlated with criticism in the group of students, who do not learn study subjects promoting creativity. Neuroticism also negatively correlated with intuition, whereas agreeableness was positively related to flexibility.

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FOREIGN EMPLOYMENT IN ENTERPRISES – EXAMPLES FROM COUNTRIES WITH DIFFERENT CULTURES

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Abstract. Migration has been a topic discussed across international boundaries especially the mobility of international workers. The purpose of this research was to conduct a comparative analysis of foreign employment in enterprises and firms operating in UK, Poland and UAE. The study was driven by the increasing rate of migration whether to look for better employment and life opportunities or simply a change of scenery abroad. The analysis was conducted using primary data collected from managers of the companies operating in these countries. The data were analyzed using descriptive statistics and comparative analysis technique of chi-square tests for independence. The findings indicated that there was a significant relationship between the country in which the companies operated and the age of foreign employees, type of contract, a common type of jobs foreigners are employed, and the reason why the company decided to employ foreigners. The study concluded that there is a similar trend in the increase in the number of foreign employees working in the three countries – the UK, Poland and UAE. The largest age group of foreign employees was 25-35 years. The highest type of contract was fixed-term full-time employment consented by 165 companies. The most common job was unskilled manual labour.

Keywords: migration; employment migration; foreign employment; comparative analysis

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JEL Classifications: J60, J61, J69

1. Introduction

Migration and the changes in its global trajectories have emerged as critical contemporary issues. In Europe, many governments have been overwhelmed by the current massive migration. As a result, the international community must confront this 21st-century challenge, which can only be accomplished by fully addressing its underlying reasons (Sokołowicz & Lishchynskyy, 2018). And as people, both oblivious and scoped, it is our responsibility to assist our leaders in making sound migration decisions. Simply put, migration is the act of

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relocating to a novel location to survive there. Hammarstedt and Miao (2020) state that individuals migrate for one of two primary reasons: they would like to migrate to improve their living conditions, or they are forced to migrate due to challenging circumstances. Migration incentivizes cultural pluralism, economic prospects and saves lives. It can also change the socioeconomic foundations and demography and support criminal activities like human smuggling and uncontrolled migration, prompting concerns about cultural identity and political sovereignty (Fitzsimmons et al., 2019).

Elevated migration is commonly objected to on the basic principle of concerns that large inflows of foreign laborers will eliminate jobs, drive down wages, and result in a drop to a downward trend in the employment of low-skilled nationals. According to Shirmohammadi et al. (2021), the impact of migration on the balance and complexities of the labor market is significantly more sophisticated; it cannot be comprehended with considerations of both the attributes of the migrants and the economic circumstances in the host country are excluded. The labor market impact of foreign employees' changes based on the stage of economic trade activity. Therefore, the evaluation period impacts the nature of the links between the number of migrants and the labor market (Chen et al., 2019). Long-term, migration may help alleviate the effects of population aging while also improving available personnel across industries. While in the short term, migration can be significant in alleviating downturns and labor market disparities.

Foreign employment is a buffer in the labor market's adaptation to cyclical fluctuations. Initiatives to implement migration policies whose primary goal is to adapt to the labor market's short-term necessities are not without difficulty. Fassio et al. (2019) assert that migration cannot be blamed for the labor market disequilibria. Migration's role in long-term growth is considered not only in its quantitative effect on labor-force increases but also in its qualitative influence on individual wealth generation. According to Martynowska et al. (2020), labor shortages in information and communications technologies are especially problematic acute in the current context of country growth. Some countries are also having difficulty employing low-skilled workers. Most countries have revised their legislation to make it easier to admit skilled and highly qualified migrant labor.

2. Theoretical background

As per the ILO Department of Statistics (2022), there were a projected 169 million migratory workers worldwide in 2019. Approximately two-thirds of all foreign laborers were centered in high-income nations, with about 60.6% centered in 14.3% in the Arab States, 22.1% in Northern America, and 24.2% in Western, Northern, and Southern Europe. The significance of these top-ranked three subdomains proportion to the proportion of foreign migrant workers they house has not waned. As predicted by prior projection, the same three subdomains housed the greatest proportion of all foreign laborers: 60.2 percent in 2013 and 60.8 percent in 2017.

In 2019, 70 million, an estimated 41.5 percent, of all foreign laborers worldwide were female (Bertolini & Clegg, 2020). Male migrant laborers covered 99 million of the totals estimated to be 58.5 percent. ILO Department of Statistics (2022) further state that women make up a lesser proportion of net global migrant workers since women make up a smaller proportion of all international migrants (47.9 percent) and have a lower labor market involvement than males (59.8 percent vs. 77.5 percent). Nevertheless, there were also substantial geographical differences in the proportion of women within overall migrant laborers. Moreover, the research suggests that women made up 50% of all migrant laborers in Northern, Southern, and Western Europe; in the Arab States, the figure was less than 20 percent.

Adults of peak working age (ages 25–64) made up 86.5 percent of all migrant employees. In 2019, around 10% of all foreign laborers were between 15 and 24. Among migratory workers, the proportion of elderly employees (aged 65 and above) was 3.6%. The services industry was the largest job provider of foreign laborers, employing 66.2 percent of all migrant employees and over 80 percent of all female migrant workers globally (Bak-Klimek et al. 2020). Increasing demand for labor in the economic sphere (encompassing medical and household duties),

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where the labor force is largely female, might account for a portion of the high proportion of female foreign laborers in the services sector. According to the ILO Department of Statistics (2022), the other migrant workers were employed in manufacturing (26.7%) and the agricultural sector (7.1%).

2.1 Reasons for Foreign Employment Migrants

In general, the population of foreign employees is not a homogenous group. Adjustments in the foreign labor force and its primary features (country of origin, expertise, workforce participation, sectoral dispersion, and unemployment rates) are caused by the credentials of new migration fluxes and any economic and structural modifications that occurred during the review process (Fitzsimmons et al., 2020). For example, any changes to the prerequisites for naturalization and any changes to the legislation limiting migrants' entrance to the labor market are anticipated to impact the volume of the foreign labor force significantly. Rodgers et al. (2019) argue that though the fraction of foreign nationals or migrant workers in the labor force can differ from that of the overall population for which they compensate, depending on factors such as the timing of consecutive influx of migrants, the magnitude of the household element in migrations, and selection criteria based on age or skills and experience, the ratios have primarily followed a similar pattern over the last decade.

Although new perpetual foreign worker admittance is now quite a few, transitory foreign worker employment looks to be getting more common; certain nations are implementing governmental steps to support it. The temporary employment of foreign workers adds versatility to the labor market and helps to alleviate sectoral labor scarcity in host countries (Muoka & Lhussier, 2020; Urbański, 2021). The latter is especially true in the latest technological segments, where numerous countries are experiencing a shortage of qualified and highly competent laborers. Enhanced temporary labor migration may also discourage employers from employing undocumented employees, especially those engaged in seasonal operations. Bertolini and Clegg (2020) and Androniceanu et al. (2021) point out that measures to facilitate the entry of temporary employees, particularly skilled and highly trained individuals, have recently been implemented in several nations. These policies are being implemented to increase economic development and labor shortages in specific industries.

Migration is the most efficient approach to eliminating poverty and sharing wealth by working and finding new employment, which is the World Bank's dual aim. Not unexpectedly, all historical development and growth cycles have featured a reallocation of labor across geography and industries within nations. According to Balezdrova et al. (2019), addressing these valid economic concerns is essential to making informative and successful policy decisions. The objective should be to cut the price of native-born employees' short-term displacements and spread the economic advantages of labor mobility more evenly. Aoki & Santiago (2018) believe that proactive actions to alleviate suffering and share the benefits of migration are required to prevent extreme migration restrictions that will harm everyone. It is therefore evident that people migrate a lot for employment purposes, in different countries. Therefore, the purpose of this article is to investigate and compare the aspects of migrants for foreign employment enterprises operating in Poland, the United Kingdom, and the United Arab Emirates. The hypothesis of this study is:

H1: There are significant similarities and differences in the migrants' foreign employments among UK, Poland, and UAE

The stated hypothesis was evaluated using the analysis of the data collected for people who have migrated to these countries for work.

2.2 Employee Migrants in UK, Poland, and UAE

2.2.1 United Kingdom (UK)

From 2004 (9.1 percent of the employed labor in Q1 2004) to 2019 (Q1), when they constituted 17.8 percent of the workforce, the proportion of employees born overseas has continuously risen (The migratory observatory, 2022). Wadsworth et al. (2018) state that there have always been more non-EU-born employees than EU-born employees, albeit the difference has shrunk between 2004 and 2017. Due to disruptions in data gathering, there is considerable doubt regarding how migratory labor has evolved throughout the epidemic. According to

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preliminary data, the number of EU-born employees in employment declined from 2.5 to 2.3 million between Q1 2020 and Q1 2021 (Shirmohammadi et al., 2021). In contrast, the non-EU-born working population was comparatively consistent at 3.7 million over the same time, as illustrated in Fig 1. Not all the decline in EU-born employees in 2020 can be attributed to EU migrants departing the UK. As detailed below, there was also a rise in the percentage of jobless EU migrant workers residing in the UK (The migratory observatory, 2022).

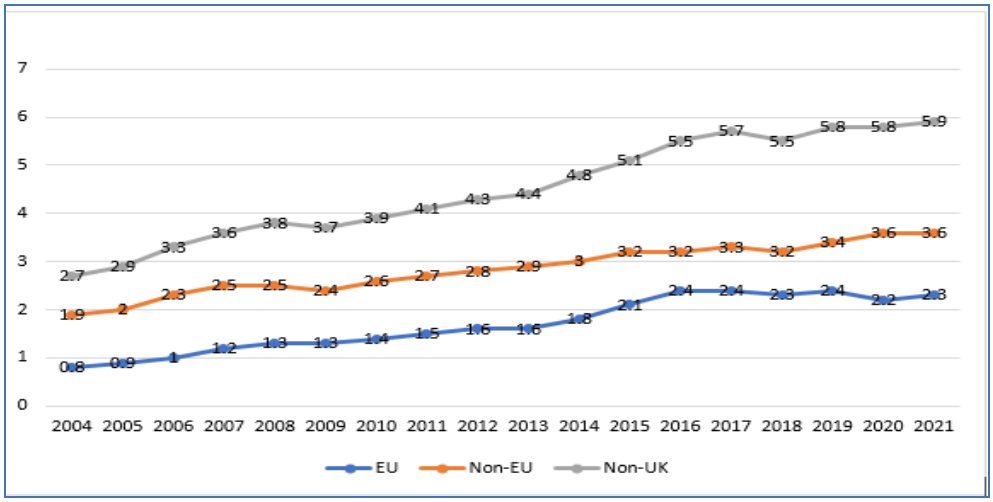

Figure 1. Number of Migrant Workers in the UK in Millions, 2004-2021
Source: The Migration Observatory

Numerous aspects influence migrant work opportunities and unemployment levels in the UK, including migrants' differing academic achievement and expertise, English language proficiency, household and caring obligations, interpersonal channels, the magnitude to which UK companies recognize their foreign certifications, and exclusion (Martynowska et al., 2020). Because of the economic slowdown in 2020 and the first half of 2021, unemployment levels for UK-born and foreign-born employees grew until the third quarter of 2021. The gender employment gap (the discrepancy between males' and females' employment levels) is least among working-age people born in the United Kingdom (6%), EU-14 nations (8%), and East and Southeast Asia (9%) and (8%) respectively (The Migratory Observatory, 2022).

The gender employment gap is greatest in migrants both in Pakistan and other South Asian countries, where women have a 47-percentage degree lower employment rate than males. The unemployment rate between many EU-born people rose from 3.6 percent in Q1 2020 to 6.5 percent in Q1 2021 before falling to 3.8 percent in Q3 2021 (Migrants in the UK Labour Market: An Overview, 2022). It grew from 5.2 percent to 6.7 percent for non-EU births throughout the same time, reaching 6.8 percent in Q3 2021. Research further states that non-EU migrants pursuing refuge in the UK have a greater jobless percentage and a reduced employment ratio than non-EU migrants (Migrants in the UK Labour Market: An Overview, 2022). For example, in 2020, the jobless rate across non-EU-born migrants who went to the UK seeking asylum was 14 percent. In contrast, the unemployment proportion between those who migrated for work reasons was 6 percent. Recent studies (Khalid & Urbański, 2021; Martynowska et al., 2020; Urbański, 2022; Wądołowska, 2021), indicate that these disparities in health status, particularly mental health, maybe one of the reasons contributing to these disparities.

2.2.2 Poland

The magnitude of the entry of foreigners into the nation in subsequent decades ranks Poland among the governments that are becoming more appealing to migrants. Notwithstanding the epidemic, the number of foreign workers working in Poland increased substantially last year. In December 2020, there were 725,173 foreigners enrolled in the nation's social insurance system (ZUS), an increase of 11.3 percent from the previous year (Wądołowska, 2021). Jacobs et al. (2021) assert that a rise in the number of foreigners working in Poland on a seasonal basis was characterized by a rise in the overall employment rate, including seasonal and permanent

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employees. According to Valenta et al. (2020), implementing measures that enable migrants to convert their seasonal job to permanent employment should thus be strongly encouraged, as this would assist in stabilizing their labor market condition without increasing the danger of deterioration.

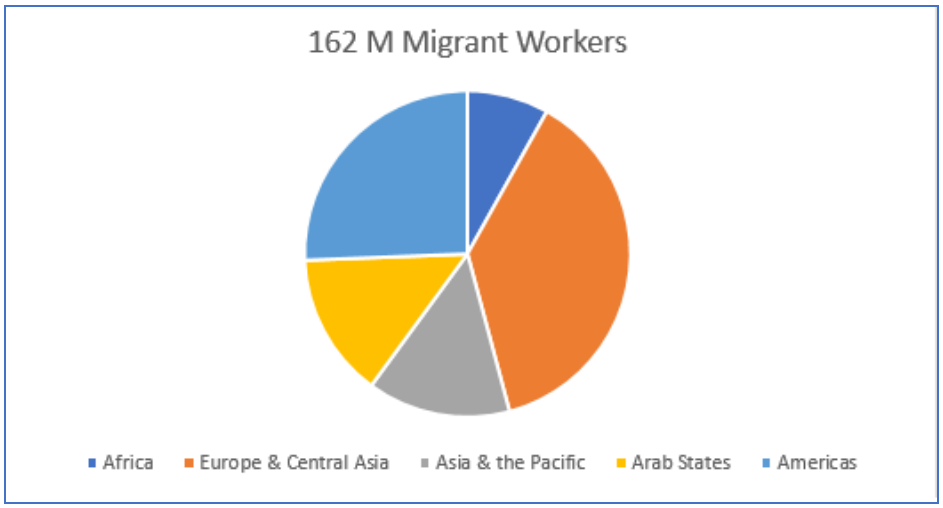

Figure 2. Distribution of Workers in 2019 by region
Source: The authors

Nevertheless, in this scenario, we must be aware of other endogenous elements, like the labor market, the job conditions provided, or employees' accessibility to social services. This surge — of about 100,000 jobs – combined with an additional 40,000 in the first quarter of this year marks a "historic rate" of expansion (Kumar & Jamil, 2020). This significant increasing trend in the percentage of foreign nationals in the Polish labor market has not increased to the multitude of economically unresponsive Poles, insinuating that the proportion of people who have stopped looking for work and have become meek has not risen despite continued competition for jobs among them and migrant workers (Bak-Klimek et al., 2020). With some prudence, we can even argue that the flood of migrants may have caused positive impulses in the labor market – all other financial trends remaining constant – thus making contributions to an increment in the number of jobs (for native-born workers as well) and causing a drop in the quantity of economically inactive people as shown in fig 2.

2.2.3 United Arab Emirates (UAE)

The United Arab Emirates' overall working population in 2018 was 7.384 million. In all, according to research (United Arab Emirates Population Statistics 2022 | GMI, 2022), 7.219 million people were employed, with individuals in the wholesale and retail trade sector earning the highest, AED 62,857 million. The second was the design and building sector, which earned AED 52,959 million. Garces-Bacsal et al. (2021) point out that among Arab nations, the United Arab Emirates has the greatest population density. The number of births, the low mortality rate among countries, and improved life expectancy because of superior healthcare facilities has resulted in a rise in the population of citizens. The continual influx of expatriates contributes considerably to population increase (Al Oraimiet al., 2020). Owing to the country's many job opportunities, the percentage of foreigners staying in the UAE has also grown. Having Expo 2020 creating a wide variety of job prospects, an increase in migrants in 2022 is expected.

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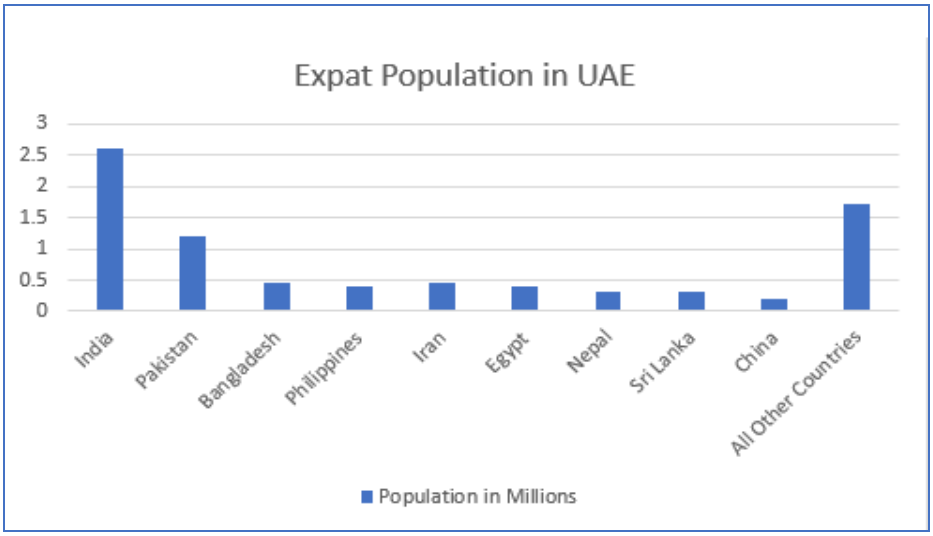

Figure 3. Expat Population in UAE
Source: Global Media Sight

As per recruiting companies, the UAE's economic diversification has increased the number of specialized employments. With the growth of new institutions and enterprises in the UAE, employment prospects for talented professionals in various fields like medicine and healthcare, travel and hospitality, information systems, machine learning, training, digital marketing, SEO, e-commerce, content creation, and web design. According to Quratulain and Al-Hawari (2021), the expansion in employment in all industries resulted in an inflow of employees of all levels and nationalities. Over a decade, the overall population increased by around 5 million people. The expanding expatriate and migrant communities were primarily responsible for the population rise, as shown in Fig 3. The UAE has the greatest net migration rate globally, with roughly 88.52 percent of the expatriates and migrants.

3. Research objective and methodology

The purpose of this research was to carry out a comparative analysis of the foreign employment in the enterprises among the countries of the United Kingdom (UK), Poland, and United Arab Emirates (UAE). To conduct the analysis, a descriptive design was adopted for the study. The quantitative methodology was also adopted where quantitative data were collected and analyzed to address the hypothesis of the study. The data was collected using a structured questionnaire. The questionnaire was structured in two major sections. The first section was collected demographic characteristics of the respondents, using variables such as the legal form of the business, number of employees in the company, business profile, and the position of the respondents in the company. The second section evaluated the foreign employment of migrants in UK, UAE, and Poland. The data was collected from managers and senior officers in the companies operating in the countries of interest. The respondents included 168 managers from Poland, 47 managers from UAE, and 70 managers from the United Kingdom.

The questionnaire was evaluated using a pilot study. The pilot study involved sending the questionnaire to a few respondent managers. The responses of the data were used to improve the questionnaire. The questions that were considered not fit were deleted and others improved. The questionnaire was addressed to the managers of the companies that were working with or had employed foreign workers from other countries. The data was collected from June 1, 2021 to December 31, 2021. The data analysis was conducted using various techniques. The first technique was descriptive statistics which evaluated the characteristics of the respondents. Another analysis conducted was a comparative analysis to compare the characteristics and aspects of migrants employees working in the UK, Poland, and UAE. The Chi-square test was applied as a major test in this study. The purpose of conducting these tests was to evaluate whether there was a significant relationship between the categorical

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variables under consideration. This test was considered suitable because all the study variables in this study were categorical. The test was run as 95% confidence level, and null and alternative hypotheses applied are listed below:

H0: Variable 1 is independent of Variable 2
H1: Variable 1 is not independent of Variable 2

4. Results and discussion

4.1 Descriptive Statistics

The first analysis was examining the characteristics of the respondents. The first descriptive statistics was for the number of respondents from each country. The study used a total of 314 respondents, where 168 managers were from Poland (representing 53.5%), 76 managers were from UAE (comprising 24.2%) and 70 managers were from the United Kingdom (representing 22.3%). The other comparison was the company's legal form among the three countries. The statistics, as shown in Table 1 below indicated that for Poland, the majority business form was limited Liability company, for UAE was other companies, and for the UK, it was Limited Liability Company. Overall, the statistics indicated that limited liability company was the most common legal business form for all the three (43.90%) followed by sole-proprietorship (19.10%).

Table 1. Cross Tabulation for Legal form of the Company and the Countries

	General partnership	Joint-stock company	Limited liability company	Sole-proprietorship	Other	Total
Poland	2	32	72	44	18	168
UAE	15	10	19	8	24	76
UK	3	5	47	8	7	70
Total	20	47	138	60	49	314
% of Total	6.40%	15.00%	43.90%	19.10%	15.60%	100.00%

Source: The authors' research

The analysis also analyzed the number of employees in the company in the three countries under study. The statistics indicated that for Poland, the majority number of employees was under 10 and 50-249 with the same value (46). For UAE, the majority number of employees was over 250, while for the UK, the majority number employees were 10-49 employees. For all the countries, the majority of companies had employees ranging from 10-49 followed by those with under 10 employees.

Table 2. Number of employees across the three countries

		Number of employees				Total
		10-49	50-249	Over 250	Under 10	
Poland	n	44	46	32	46	168
UAE	n	15	14	34	13	76
UK	n	34	9	8	19	70
Total	n	93	69	74	78	314
	%	29.6%	22.0%	23.6%	24.8%	100.0%

Source: The authors' research

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4.2 Comparative Analysis

This section conducted a comparative analysis of the three countries in terms of the migrant employees working in their countries. The purpose of the analysis was to evaluate the similarities and differences in terms of the foreign employment in the companies and enterprises in the migrants.

The comparison of the age brackets of the foreigners employed in the companies among the three countries (UAE, Poland and UK) indicated a significant relationship between them ($\chi 2 = 22.03$, df = 8, $\rho < 0.05$). This implies that age and country variables are not independent of each other and that there is a statistical relationship between them. The age bracket 18-24 years was highest in Poland, but age group 46 -55 and over 56 years was highest in UAE. This is an indication that different countries preferred different age-groups of foreign employees.

Table 3. Age distribution of employees

		Countries				Chi-square	df	p-value
		Poland	UAE	UK	Total			
Age	18-24 years old	16	5	4	25			
	25-35 years old	84	29	45	158			
	36-45 years old	58	27	18	103	22.03	8	0.005
	46-55 years old	10	14	3	27			
	Over 56 years old	0	1	0	1			
Total		168	76	70	314			
		53.50%	24.20%	22.30%	100.00%			

Source: The authors' research

The study also analyzed the type of contracts in which foreigners are often employed in the company. This section intended to investigate the terms the companies offered to foreign employees in their country. As presented in the figure below, the results indicated that it was evident that for all the types of employment consideration, all of them had a significant relationship among the three countries (Poland, UAE, and the UK). This is because all the p-values were less than 0.05 ($\rho < 0.05$). This implies that the type of employment and country variables are not independent of each other and that there is a statistical relationship between them. Considering the Fixed-term full-time employment contract, it was highest in Poland (69.1%) while Fixed-term part-time employment contract was highest in UK (43.20%), and specific task contract was highest in UAE (73.10%). Therefore, different companies in different countries prefer different employment terms as far as employing foreigners is concerned.

Table 4. Employment contract variation

	Countries				Chi-square	df	p-value
	Poland	UAE	UK	Total			
Fixed-term full-time employment contract	114	33	18	165			
	69.1%	20.0%	10.9%	100.0%	38.54	2.00	0.00
Fixed-term part-time employment contract	12	9	16	37			
	32.40%	24.30%	43.20%	100.00%	11.74	2.00	0.00
Full-time permanent employment contract	24	29	29	82			
	29.30%	35.40%	35.40%	100.00%	26.80	2.00	0.00
Part-time permanent employment contract	4	8	6	18			
	22.20%	44.40%	33.30%	100.00%	7.97	2.00	0.02
Contract of mandate	56	5	4	65			
	86.20%	7.70%	6.20%	100.00%	38.85	2.00	0.00
Specific task contract	4	19	3	26			
	15.40%	73.10%	11.50%	100.00%	31.28	2.00	0.00
Self-employment	4	3	4	11			
	36.40%	27.30%	36.40%	100.00%	31.28	2.00	0.00

Source: The authors' research

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Another analysis conducted investigated the most common jobs that foreign employees are employed to do in the three countries. The comparison was intended to investigate if there are any similarities or differences between common jobs foreigners are employed to do in Poland, the UK, and UAE.

The chi-square tests of independence indicated that there is a significant relationship between the most common jobs that foreigners are employed to do in the companies and enterprises and the three countries of Poland, UAE, and the UK. The p-values for all the chi-square tests in the cross-tabulation were less than 0.05 ($\rho < 0.05$). This implied that common jobs foreigners are employed to do and country variables are not independent of each other and that there is a statistical relationship between them.

Considering the specific jobs and countries, the most common job offered in Poland was unskilled manual workers (68.42), while the most common job offered in UAE was a skilled manual worker. Results also indicate that the clerical staff was common in Poland while personal service workers were more in UAE.

Table 5. Category of workers

	Countries				Chi-square	df	p-value
	Poland	UAE	UK	Total			
Unskilled manual workers	104	7	41	152			
	68.42%	4.61%	26.97%	100.00%	61.90	2.00	0.00
Skilled manual workers	78	43	20	141			
	55.32%	30.50%	14.18%	100.00%	11.89	2.00	0.00
Clerical staff	20	9	6	35			
	57.14%	25.71%	17.14%	100.00%	0.60	2.00	0.74
Personal services workers	0	12	1	13			
	0.00%	92.31%	7.69%	100.00%	46.10	4.00	0.00
Specialists and managers	14	38	6	58			
	24.14%	65.52%	10.34%	100.00%	206.18	4.00	0.00

Source: The authors' research

In addition, the analysis to evaluate the reason why the company decided to employ foreigners in the three countries under consideration was evaluated. Some of the options given to the respondents included lower employment costs, high availability of employees, and better employee efficiency among others. From the results, the first thing noted is that based on the chi-square test for independence, to test whether there was a relationship between the categorical variables, it was confirmed that there was a relationship between the variables (all p-values < 0.05). There was a significant association between the countries and the reason why companies decided to employ foreigners. Better employment efficiency was considered as the major reason in Poland (68.9%); foreign language skills were the major reason in UAE (62.8%), and knowing the market of the country where the employee comes from and having multicultural awareness was a major reason in the UK (40.4%).

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Table 6. Employee characteristics

	Countries				Chi-square	df	p-value
	Poland	UAE	UK	Total			
Better employee efficiency	42	14	5	61	53.504	4	0.00
	68.9%	23.0%	8.2%	100.0%			
Diversity facilitating development of the company	6	22	3	31	117.526	4	0.00
	19.4%	71.0%	9.7%	100.0%			
Foreign languages skills	12	27	4	43	146.916	4	0.00
	27.9%	62.8%	9.3%	100.0%			
High availability of employees	70	12	11	93	63.808	4	0.00
	75.3%	12.9%	11.8%	100.0%			
Knowing the market of the country where the employee comes from	8	20	19	47	35.997	4	0.00
	17.0%	42.6%	40.4%	100.0%			
Lower employment costs	78	21	38	137	71.988	4	0.00
	56.9%	15.3%	27.7%	100.0%			
Reducing staff turnover	14	13	3	30	41.374	4	0.00
	46.7%	43.3%	10.0%	100.0%			
Shortage of domestic employees with the required qualifications	0	20	6	26	75.975	2	0.00
	0.0%	76.9%	23.1%	100.0%			
Other	56	5	1	62	76.243	12	0.00
	90.3%	8.1%	1.6%	100.0%			

Source: The authors' research

The purpose of this research was to find out if there are similarities and differences in the employment of foreigners in companies operating in Poland, the UK, and the UAE. Two aspects drove the reason behind conducting this study - the rise in the rate of migration for a major reason of finding employment in the foreign countries; and the choice of three countries (Poland, UK, and UAE) which has been reported to offer employment opportunities for foreigners. The UK is known to employ a large proportion of foreign labor constituting approximately 17.8% by 2019 (The migratory observatory, 2022). In a similar breath, Poland is considered an attractive destination for migrant workers whereby in 2020, there were more than 725,173 foreigners enrolled in the nation's social insurance system (ZUS) (Kumar & Jamil, 2020). For UAE is considered to have many job opportunities, especially for unskilled labor. From these observations, it is conclusive that Poland, UAE, and the UK share two common characteristics: 1) they are a great destination and attraction for foreign employment, both skilled and unskilled; and 2) all the countries have been experiencing an increasing trend in the number of foreign employees working in the companies operating in them.

Different characteristics and aspects of the companies operating in the UK, Poland, and UAE were evaluated, as far as employment of foreign workers is concerned. The first finding worth noting is that the most common legal business form for companies employing foreigners in Poland and UK was limited liability Companies, but in UAE, the most common were other legal business forms. Age and country had a significant relationship; it was found the major age group of foreign workers was those aged between 25-35 years of age. This is considered accurate because this age group makes the most active workforce, and most people at this age have completed college and are looking for employment. There was a relationship between the countries considered and the types of contracts foreigners were employed. While fixed-term full-time employment was common in Poland, the fixed-term part-time employment contract was common in the UK and part-time permanent employment was common in UAE. It is therefore observed that different countries preferred a different mode of employment for foreign workers. For the type of jobs that foreigner was employed in the three countries, unskilled manual work was common in Poland while personal service workers were common in UAE. These findings could be confirmed by the fact that UAE, over the last decade, has attracted many foreign domestic workers (Sabban, 2002).

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Overall, the most common jobs foreigners were employed is unskilled manual workers (confirmed by 152 companies in the three countries). The major reasons mentioned for employing foreign workers included better employment efficiency (42 and 14 for Poland UAE respectively), high availability of employees (70 companies confirmed in Poland), and lower employment rates (78 and 38 companies confirmed in Poland and UK respectively). Knowing the market of the country where the employee comes from and having multicultural awareness for UK (20 companies confirmed in UAE and 19 in the UK); and shortage of domestic employees with the required qualifications in UAE (confirmed by 20 companies in UAE, out of 26 companies in all countries). Overall, it is observed that lower employment cost is the major reason for employing foreign workers (137 total companies confirmed). From the above discussion, the hypothesis of the study is confirmed that there are significant differences and similarities in the migrants' foreign employments among UK, Poland, and UAE.

5. Conclusions

From the comparative analysis of the foreign employment in companies operating in the UK, Poland, and UAE, several conclusions could be pointed out. First, this research noted a similar trend in the increase in the number of foreign employees working in the three countries – the UK, Poland, and UAE. These countries are considered suitable places to find different kinds of employment by foreigners. Concerning the descriptive statistics, this study found that the most common type of legal form of the company for the three countries is limited liability. Limited liability was the most common type in Poland and UK while others were common in UAE. The statistics also indicated that most companies interviewed have employees 10 – 49 in number, followed by those with under 10 employees.

The comparative analysis indicated that there was a significant relationship between age and the countries in which the companies operated. For all the companies, the largest age group was 25-35 years. This age group was the highest in all the countries, implying the age at which people graduate from college and universities and move to secure employment abroad. The type of contracts in which the foreigners are employed and the country of operation had a significant relationship. The highest type of contract was fixed-term full-time employment consented by 165 companies. The job type the foreign employees were employed in has a significant relationship with the country of operation. The most common job was unskilled manual labor (high in Poland and UK, and consented by 152 companies). The major reason why companies employed foreign workers was lower employment costs and the high availability of employees.

Though this research is considered to have been conducted successfully, several limitations could be highlighted. The first limitation is that the study was carried out during the Covid-19 pandemic. During the pandemic, many employees working abroad had returned to their home country due to fear of the economic hardship in the foreign countries. As a result, the statistics could not have captured the actual statistics regarding foreign workers, the aspect which should be recognized in the application of the findings of this study. Another limitation is that the data for this study was collected from the company's managers. Though the managers are considered to have full information regarding the company's operations, this research recognizes that the inclusion of other respondents such as supervisors and general employees could have resulted in varied information. The study was limited by the fact that only companies operating in Poland, the UK, and UAE were considered. It is recommended that future research should expand the scope of the study by considering a larger number of countries operating in different global regions.

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ON THE RELATION BETWEEN SUSTAINABILITY REPORT AND ASSURANCE STANDARDS IN BRAZILIAN FINANCIAL INSTITUTIONS

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Abstract. This study investigates the adherence to standards for assuring Sustainability Reports of financial Institutions listed on B3 stock market between 2016 and 2018. Drawing on 34 Brazilian institutions, we performed the content analysis of the criteria for sustainability assurance in relation to corporate governance by answering the question of how are the sustainability reports prepared by the financial institutions based on the corporate governance classification standards? We posit and find that among institutions investigated, 60.6% disclosed some type of Sustainability Report and only 50% (10 Institutions) performed sustainability assessment of the released reports. The assurance standards of the audited institutions follow 77.7% of the criteria identified as essential to integrity of such reports. This lens of reporting presents the constructs of probable choices aimed by the approaches among the financial institutions to show credibility and transparency. As a result, present a pattern of behaviours of these organisations towards a sustainability reporting. Overall, findings yield important insights on the criteria of sustainability assurance thus signaling a need for better monitoring scheme for voluntary disclosures.

Keywords: Sustainability Report; The Global Reporting Initiative (GRI); Assurance Standards; Corporate Governance; Financial Market; Financial Institutions; Brazil

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JEL Classifications: M40, M42, M43

1. Introduction

The global sustainability reporting has suffered major setbacks in recent times due to cases of corporate fraud. Users of the financial statements, voluntary or mandatory, presented by the reporting institutions are becoming more skeptical. Inevitably the scandals caused by such frauds led to a soaring number of those negatively affected (Moura, 2007). De facto, harboring a reluctance on the part of the organisations who expose themselves without diligently assessing their operations through sustainability assurance standards. Cases like WorldCom and Enron which motivated the creation of the Sarbanes-Oxley Act 2002 are emblematic in the USA. In Brazil, cases like *Banco Santos* and *Boi Gordo* stand out as true showpieces of financial frauds (Costa & Wood, 2012). Such cases highlighted the importance of the veracity of the information disclosed to the public (Chi, 2009). In

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light of the aforementioned, cases such as that of *Samarco* and *Petrobrá*s in Brazil; incidents with major environmental impacts and consequent damage to shareholders, demonstrate the need for the disclosure of information of a socio-environmental concern, not only financial in nature, avoiding information asymmetry. In the bigger companies the stakeholders, government, pension funds, service providers and employers play a pivotal role in reducing information asymmetry (Imoniana et al, 2011). *De facto*, by adhering to the voluntary disclosure of Sustainability Reports, measuring, and disclosing the socio-environmental impacts caused by companys' daily activities, institutions gain credibility in relation to their operations been reported. Such practice has been embraced by several institutions around the world, becoming increasingly relevant in emerging markets (Campos, et al., 2013).

In Latin America, the concentration of Multinational Companies (MNC) and the way they conduct businesses influence the dynamics of countries like Argentina, Chile and Peru. However, Brazil and Mexico have some independence, with a peculiar socio-environmental responsibility model (Calixto, 2012). The same author observes that when analyzing Sustainability Reports in Latin American countries, several levels of approach are found even with recent efforts toward standardization. Thus, the level of adhesion in the business environment to the Sustainability Report varies widely among Latin American countries (Calixto, 2012).

In Brazil, there has been progress on the disclosure of Sustainability Reports in the last decades. *Brasil Bolsa Balcão* (B3) 2017 data shows a significant increase in the number of institutions that have adhered to the disclosure of Sustainability Reports. However, those reports have not been audited in order to show that such reports comply with a reasonable quality standard. B3 Bovespa Stock Market 2019 filings (vide "*Formulário de Referência*") does not make it clear whether Sustainability Reports (or similar) from a company was audited by independent institutions. Regrettably, there is insufficient and reliable information that cultivates the public interest upon assessment of such topic.

B3 recently developed corporate governance classifications for publicly held institutions based on eighteen (18) criteria. From the analysis of the filings mentioned above, they are classified into four main categories: *Novo Mercado (New Market), Nível 2 (Level 2), Nível 1 (Level 1)* and *Bovespa Mais (Bovespa +)*; being considered the *Novo Mercado* with the highest level of corporate governance and *Bovespa Mais* the lowest level of corporate governance respectively. Therefore, it is expected that institutions listed in *Novo Mercado* have a higher level of corporate governance and thus hold higher standards for ensuring their Sustainability Reports.

Prior studies on sustainability have given some importance in recent years to the adoption of social and environmental requirements by shareholders. According to Bellen (2005), the concept of sustainability and other terms related to it comes from a long historical process of maturing human consciousness in the face of rapid development (in particular, technological development) in face of recurrent environmental disasters. This awareness brings about the stimuli to report how far organisations have gone in terms of sustainability. Support is observed as necessary to encourage and sustain creative and meaningful engagement (Kaur and Lodhia, 2016). Thus, in the same line of thought, as the engagement of the stakeholders and reporting is yet to be mandatory every voluntary reporting can follow the style that suites individuals end. Imoniana, Soares and Domingos (2019) upon analyses of sustainability accounting for emission reduction credit and compliance with emission rules call the attention of the regulating bodies to enforcement. Yet Imoniana, Domingos and Soares (2012) examined the parameters of sustainability development (SD), sustainability reporting (SR) and the degree of stakeholders" engagement (SE) in the process of social control (SC) of the municipalities of ABCD of the greater São Paulo, Brazil and confirm the individualization of disclosure. This self-centeredness' poses a risk of interpretation to the reports hereinafter presented. Kaur and Lodhia (2018) contributing to sustainability reporting, stakeholder engagement through the use of managerial stakeholder theory extends the role of stakeholders from merely being an audience for sustainability.

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Noteworthy that the criterion chosen for reporting in one way or the other implicitly assures the intention and the quality of information disclosed to the public else the individualization will reign. Guidelines are relevant points to improve the quality of social and environmental reports (Perego & Kock, 2012). Thus, using a limited amount of assurance statements have shown that the approaches in sustainability assurance differ significantly between accountants and consultants, the two dominant professional groupings in the market for third-party verification (Ball et al. 2000; O'Dwyer and Owen 2005).

In the recent *ex ante* research, Sellami et al (2019) examined the factors that affect the adoption of assurance statements in sustainability reports and, conclude that institutional ownership and the presence of corporate social responsibility (CSR) within the management board have an effect on the demand for sustainability assurance. In the same vein, Boiral and Saizarbitoria (2020) worked on critical analysis of the reliability of assurance statements for sustainability reports and their contribution to stakeholders. Bakarich et al (2020) highlights how augmenting traditional reporting systems with blockchains can overcome problems with sustainability reporting. Tsalis et al (2020) used the GRI to expand on the sustainable development concept thereby drawing on the new challenges for corporate sustainability reporting based on UN 2030 agenda. They reached a conclusion that GRI serves as a channel for clearer communication. Silva and Imoniana (2021) explored auditing in other words assurance as an effective means of communication on environmental, social and governance issues in Brazil and cited that understanding the relationship turns *sine qua non*. In all, none of the mentioned studies explored the relation between sustainability report and assurance standards, therefore paving a way for the current study.

In the light of the aforementioned, we sought to give an answer to the research question of how are the sustainability reports filed by the financial institutions based on the corporate governance classifications following the standards chosen by policy to satisfy institutional ends?

Thus, the rest of this paper is organized as follows. Section 2, the theoretical background. Section 3, the methodology. Section 4, the analysis of the results; and Section 5 the discussion given reflexivity on the findings. Section 6 gives the concluding remarks.

2. Theoretical Background

Sustainability Assurances

The IAASB (2003) provides guidance in the form of basic principles and essential procedures for professional accountants on how to conduct non-financial assurance engagements. As an assurance procedure, sustainability assessment shares the auditing skills, acumen and knowledge statements needed to perform the related tasks and the competences are closely related. Meaning that, the risk-based approach that minimizes the possibilities of material misstatement by the client could be considered in the work of the accountant or the consultant. Also, analytical procedures may be amassed. The materiality concept adopted goes in line with the view of triple bottom line (TBL) which now a days is encapsulated in the concept of the circular economy. Circular economy (CE) is based on environmental, economic, and social dimensions which aims to ensure sustainable development on each step of product creation, transformation and conversion by creating a closed loop economy (Nikanorova et al, 2020).

Since it is an independent limited review, the auditor bares a limited responsibility and there is no clear-cut opinion expected by users of the non-financial statement. This widens the expectation gap for the users. Probably, this is what results the variability of the use of assurance standards.

Sustainability Reporting Standards

The shareholder's initiative developed by the popular GRI provides the framework, principles and guidelines, along with a list of disclosures and key performance indicators, for voluntary use by organization internal users

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and outside stakeholders. A first version of the GRI Guidelines was published back in 1999 and the latest version was launched in 2013 - providing principles, content, and an implementation manual for different institutions, regardless of its size, market, or location (GRI, 2013).

Besides the GRI Guidelines, AA1000AS and ISAE3000 standards are the most common ones used by the assurance providers. They seem to have reference content in them that distinguishes or in combinations in view of minimum content of assurance. As observed by O'Dwyer and Owen (2005, p. 212) the three pieces of guidance, AA1000 most closely aligns itself with the stakeholder accountability perspective.

Regardless of the exact purpose and types of stakeholders' target, the need for enhanced credibility of sustainability reporting to both internal (management and employees) and external (stakeholders) audiences has accelerated the development of relevant assurance standards (Zadek and Raynard 2004; FEE 2006; Manetti and Becatti 2009).

In the same vein, Environmental, Social and Governance issues (ESG) have occupied corporate discussions in recent decades, with the support of financiers, investors, assurors, regulators, and public policymakers, as well as the strong presence of civil society. Such players brought the issue of sustainability to the list of concerns of corporate managers and directors (IBGC, 2019). However, for corporate practices to be enforced in sustainability reports it is necessary to formalize guidelines and goals that neutralizes individualization.

In 2015, the United Nations (UN) launched the Sustainable Development Goals (SDGs) as "an action plan for people, for the planet and for prosperity" (UN, 2016). Also observing the involvement and collaboration with individual`s interest in the public and private sectors foreseen in the development of actions and the achievement of goals by 2030. Therefore, the analysis of environmental and social issues and the corporate governance of institutions influences the granting of credit, the reduction of the cost of funding and the investment decision (IBGC, 2019) - thus changing the dynamics of the financial market.

According to Campos, et al. (2013), the financial and energy markets are the most representative when it comes to adhering to the GRI Guidelines. This shows that such two markets accrued experience and knowledge in adopting the GRI Guidelines in Sustainability Reports - thus bringing greater background when it comes to standards for ensuring such Sustainability Reports. Thus, as the financial institutions are highly regulated, they may not find any difficulty adhering to the sustainability reporting standards of much credibility.

The format and content of the Sustainability Reports have evolved in line with market trends and have been adapted (Campos et al., 2013) with various standards for ensuring Sustainability Reports (and relevant documents) established over time. The Global Reporting Initiative (GRI) guidelines are relevant points to improve the quality of social and environmental reports (Perego and Kock, 2012). Overall, assurance provider may adopt additional artifices to enrich the purpose of assessment apart from standards. For instance, as observed by Evain and Imoniana (2019) the mode by which auditors assure the environmental contingencies borrows on auditing standards and mainly third-party confirmation in the substantive procedures.

Sustainability reporting and structuration theory

As an enhancing theory, the structuration theory is the genealogical structure that displays the mechanisms of the standards for working on sustainability assurance statements. This is because; it has the two sides of the coin without which the other would not exist, thus helping to sustain the act of corporate governance. Giddens (1984) "Structure-agent divide is a false dichotomy; you cannot have one without the other". Structuration is the recursive process whereby agents reproduce social practice across time and space (sometimes intact/ sometimes with changes). *De facto*, it is purely ethics approach in structuration theory that reattaches the concept of virtue

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(morally proper behavior) to its social and political roles. For instance: Rethinking our accountability to society (Brown & Dillard, 2013). Thus, we emphasis that structures changes with time and space and each person have the knowledgeability of how he is situated within reflexivity produced. So, we expand on what Coad, Jack and Kholeif (2016) noted "as a springboard for new social theory emerging from close observation of how accounting shapes societal relationships". De facto, all of the above could be termed as business enablers.

Some characteristics of the Brazilian Financial Institutions

As a peculiarity of the Brazilian Financial institution, it is the cornerstone of the national development. So, the monetary policies are the engines of the economy. All other sectors of the economy have their growth anchored on it. Thus, as a similarity to other institutions worldwide, the central bank with its autonomy assists primarily the development of the political strategy of the ruling government.

Financial Institutions in Brazil can be classified as follows: Banks, Insurance Institutions and Miscellaneous Financial Providers. All the lending institutions, the cooperatives and the like are liable to the regulations of the central bank. It is observable that historically, the smaller SMEs financial institutions have queried the non distinction of thr regulations between the smaller and the bigger banks for control and monitoring procedures. The Brazilian financial institutions follow the pronouncements of the central bank such that the regulations of the Brazilian Stock Exchange *(CVM – Comissão de Valores Mobiliarios)* for reporting are handled in second place. Basically, the American Style following the New York Stock Exchange mimetically impacts the negotiations at Bovespa (B3) stock market. So, when we visit issues of sustainability reporting, the regulations of the central bank of Brazil corroborated by the Brazilian Stock Exchange, regulates the financial reporting for mandatory disclosures. Noteworthy, that in terms of voluntary reporting for sustainability reporting, as it upholds in other economies, all the organisations in the range of financial institutions follow, the guidelines and standards according to different policies that suites their aims. In the same vein, the Central Bank with the role of a watchdog, eventually suggests the guidelines for sustainability reporting. Central Bank of Brazil launched a sustainability agenda in September 2020, with the objective of standardizing and monitoring the national financial system in sustainability aspects (BC#Sustentabilidade, 2020).

3. Methodology

The present work seeks to qualitatively analyze Sustainability Reports and its equivalents with focus on assurance standards used by institutions in the same market (financial) with different levels of corporate governance. In so doing, we adopt the content analysis based on the structures used by Perego and Kock (2012). Observe, content of regulations usually reflects the interests of a small group of people who produce the content of the norm (Bebbington et al., 2012, Criado-Jimenez et al., 2009). So, in undertaking the research, a database was constructed from which all known financial institutions' sustainability assurance statements that accompanied the release with standards were selected for review. Given the aim of ascertaining whether the assurance standards met in the Sustainability Report disclosed by publicly held Institutions listed on B3 in *Novo Mercado* - that disclose this report or similar in the period from 2016 to 2018, a content analysis is necessary to identify the standards of ensuring Sustainability Reports or its equivalent. This implies in analysis of the diffusion patterns of the independent assurance of sustainability reports concentrating on the standards used. Thus, the reference base for the selection of publicly held Institutions to be considered in the study is available in the B3 website, under the "Report or Explain" segment of 2019. This database uses the information provided by the Brazilian Securities and Exchange Commission (CVM, in the Portuguese acronym), item 7.8 of the *Reference Form* complemented by an in-depth search by the B3 team in the case of institutions that do not provide a positive or negative response regarding the disclosure of this information. The base used refers to the year 2018 (to be disclosed in 2019) and includes 426 Institutions. Such Institutions are classified according to the segment of the listing (i.e., level of corporate governance). The segments are: Organized Branch (MBO), *Bovespa Mais, Bovespa Nível 2, Novo Mercado, Nível 2, Nível 1 and Bolsa* (Básico). See Figure 1.

<table>
<tr><th></th><th>Novo Mercado</th><th>Nível N2</th><th>Nível 1</th><th>Básico</th></tr>
<tr><td>Share Capital</td><td>Only common shares</td><td>Common and preferred share (with additional rights)</td><td colspan="2">Common and preferred share (as per legislation)</td></tr>
<tr><td>Minimum percentage of outstanding (free float)</td><td>25% or 15%, if the ADTV (average daily trading volume) is above R$ 25 million</td><td colspan="2">25%</td><td rowspan="2">There is no specific regulation</td></tr>
<tr><td>Public offering of shares</td><td>Share dispersion efforts, except for offers pursuant to CVM’s Instruction 476</td><td colspan="2">Share dispersion efforts</td></tr>
<tr><td>Prohibition to statutory provisions</td><td colspan="2">Voting limitation of less than 5% of the voting capital, qualified quorum and "immutable clauses"</td><td colspan="2">There is no specific regulation</td></tr>
<tr><td>Composition of the Board of Directors</td><td>Minimum of 3 members (pursuant to Brazilian Corporations Law), of which at least 2 or 20% (whichever is greater) must be independent with unified term of up to 2 years</td><td>Minimum of 5 members, of which at least 20% must be independent with unified term of up to 2 years</td><td>Minimum of 3 members (pursuant to Brazilian Corporations Law), with unified term of up to 2 years</td><td>Minimum of 3 members (pursuant to Brazilian Corporations Law)</td></tr>
<tr><td>Prohibition of cumulation of positions</td><td>Chairman of the Board of Directors and Chief Executive Officer or Main Officer by the same person. In case of vacancy that results in cumulation of positions, it is obligatory the disclosure of certain information and the compliance with a deadline to the regularization</td><td colspan="2">Chairman of the Board of Directors and Chief Executive Officer or Main Officer by the same person (a grace period of 3 years from accession)</td><td>There is no specific regulation</td></tr>
<tr><td>Board of Directors’ duties</td><td>Statement on any public tender offer for the acquisition of shares issued by the company (with minimum requirements, including alternatives to the tender offer available on the market)</td><td>Statement on any public tender offer for the acquisition of shares issued by the company (with minimum requirements)</td><td colspan="2">There is no specific regulation</td></tr>
<tr><td>Financial Statements</td><td>As per legislation in force</td><td>Translated into English</td><td colspan="2">As per legislation in force</td></tr>
<tr><td>Disclosure in English simultaneously with the disclosure in Portuguese</td><td>Material Information or Benefit distribution information (Notice to Shareholders or Notice to the market) and results press releases</td><td>There is no specific regulation besides the financial statements (see item above)</td><td colspan="2">There is no specific regulation</td></tr>
<tr><td>Annual public meeting</td><td>Public meeting (in-person or by any other means that allow remote participation) must be hold until 5 business days after the disclosure of the quarterly and annual financial statements about the information disclosed</td><td colspan="2">Mandatory (in-person)</td><td rowspan="2">Optional</td></tr>
<tr><td>Calendar of corporate events</td><td colspan="3">Mandatory</td></tr>
<tr><td>Disclosure of additional information</td><td>Internal regulations of the Board of Directors, its Advisory Committees and the Fiscal Council (if there is one)
Code of Conduct (with minimum requirements)
The following policies with minimum requirements (except the Compensation Policy): (i) Compensation Policy; (ii) Nomination Policy of the Board of Directors, Advisory Committees and Executive Management Board; (iii) Risk Management Policy; (iv) Related Party Transaction Policy; (v) Securities Trading Policy
Disclosure of: (i) annual report of the statutory audit committee covering the points contained on the Regulation; (ii) quarterly minutes of the Board of Director’s meetings, informing the report by the non-statutory audit committee</td><td colspan="2">Securities negotiation policy and code of conduct</td><td>There is no specific regulation</td></tr>
<tr><td>Tag-along rights</td><td>100% for common shares</td><td>100% for common and preferred shares</td><td colspan="2">80% for common shares (as per legislation)</td></tr>
<tr><td>Delisting from the Segment/Public Tender Offer</td><td>Compulsory Public Tender Offer, at least for the fair price, with minimum acceptance quorum of 1/3 (or higher, as established in the bylaws) of the free float shareholders.</td><td>Compulsory Public Tender Offer in case of registration canceling or segment exit</td><td colspan="2">Not applicable</td></tr>
<tr><td>Becoming a Member of the Market Arbitration Chamber</td><td colspan="2">Mandatory</td><td colspan="2">Optional</td></tr>
</table>

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Audit Committee	Mandatory setting up of an audit committee or statutory audit committee in compliance with the requirements set forth in the Regulation	Optional
Internal Auditing	Mandatory setting up of an auditing department in compliance with the requirements set forth in the Regulation	
Compliance	Mandatory setting up of a compliance, internal controls and corporate risks department. It is not allowed the accumulation of compliance and operational functions	

Figure 1. Comparative of B3's Corporate Governance Listing by segments

The comparativeness in Table 1 shows the relation between the various classifications by level of corporate governance. As previously described, this study focuses on Institutions listed under *Novo Mercado*, as per 2018:

Table 1. Classifications by level of corporate governance

Corporate Governance Listing	**Bolsa**	**Novo Mercado**	**Balcão Organiz.**	**Nível 1**	**Nível 2**	**Bovespa Mais**	**Bovespa Mais 2**
	189	140	33	27	19	16	2

Furthermore, of the 426 (four hundred and twenty-six) publicly held Institutions listed in B3, 162 (one hundred and sixty-two) were eligible for analysis of this study for preparing and publishing Sustainability Reports or its equivalent. However, only 80 (eighty) of these Institutions had their Sustainability Reports audited by external Institutions. Noteworthy that of the 80 (eighty) audited Institutions, 10 (ten) are financial Institutions and therefore are shown in Table 2.

Of the 33 (thirty-three) financial Institutions analysed herein, 20 (twenty) carry out and disclose some type of Sustainability Report or similar. For the 13 (thirteen) Institutions that do not report in the Reference Form any Sustainability Report, an in-depth search was made in the investor relationship channel in order to find out if there is any divergence. In no case was a Sustainability Report, Integrated Report or equivalent found.

Table 2. Listings of organisations who disclosed Sustainability Reports

Disclosed Sustainability Report?	**YES**	**NO**	**Non-informed**
Banks	15	3	6
Insurance Institutions	3	2	1
Other Financial Institutions	2	1	0
Total	**20**	**6**	**7**

The distribution of these Institutions was analyzed according to the level of Corporate Governance classified by B3 reference Table 1, which shows that, for the financial market Institutions over the *Novo Mercado* listing (highest level of Corporate Governance in B3) there is a company in the Insurance industry that does not disclose a Sustainability Report. The company claims that even without disclosing, there are internal sustainability practices. The Institutions that do not disclose any information related to the Sustainability Report are as shown in Table 3.

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Table 3. Levels of Corporate Governance and non disclosure

Level Gov. Corp. x Non- Disclosure. SR	Novo Mercado	Nível 2	Nível 1	Bolsa
Banks	0	2	2	5
Insurance Institutions	1	0	-	2
Other Financial Institutions	0	-	-	1
Total	**1**	**2**	**2**	**8**

Of the 20 (twenty) Institutions that publish a Sustainability Report or similar reference to Table 4, only half are audited by an independent company. Therefore, for the present work, these 10 (ten) Institutions will be analyzed in the period between 2016 and 2018. The base year (2016) was chosen because it already includes reports with the most recent changes to the GRI Guidelines (i.e., 2014). Thus, this study comprehends 2 (two) Institutions listed under *Novo Mercado*, 1 (one) company listed under *Nivel 2*, 3 (three) Institutions listed under Nivel 1 and 4 (four) Institutions listed under common basic rules (*Bolsa*).

Table 4. Organisations that disclose a sort of Sustainability Report

Level Gov. Corp. x Non- Discl. SR	Novo Mercado	Nível 2	Nível 1	Bolsa	Total
Published SR	2	1	3	4	**10**
Do not published SR	3	1	1	5	**10**
Total	**5**	**2**	**4**	**9**	**20**

As could be observed in Figure 2, the institutions analyzed by segment in the corporate governance level list are predominately banking.

Figure 2. Organisations and respective governance level

<table>
<tr><th>Bolsa</th><th>Novo Mercado</th><th>Nível 1</th><th>Nível 2</th></tr>
<tr><td>BCO AMAZONIA S.A.</td><td rowspan="2">BCO BRASIL S.A.</td><td>BCO BRADESCO S.A.</td><td rowspan="4">SUL AMERICA S.A.</td></tr>
<tr><td>BCO NORDESTE DO BRASIL S.A.</td><td>ITAÚ UNIBANCO HOLDING S.A.</td></tr>
<tr><td>BCO PATAGONIA S.A.</td><td rowspan="2">CIELO S.A.</td><td rowspan="2">ITAUSA INVESTIMENTOS ITAU S.A.</td></tr>
<tr><td>BCO SANTANDER (BRASIL) S.A.</td></tr>
</table>

The quality of assurance statements is determined through a content analysis of the evaluation framework provided by O'Dwyer and Owen (2005). Perego & Kock (2012) introduced the requirements for a high quality statement, as indicated by the main initiatives in accountings for improvement in comparability, credibility and responsiveness of sustainability reports. The use of GRI standards can be highlighted, specifically holding to the fourth and last version released which according to PWC, focuses on materiality for the implementation criteria in the report and brings greater synergy with the integrated reporting framework (PwC, 2016). Nineteen aspects or classification criteria are considered in the analysis to be performed.

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According to Bardin (1977) content analysis is a research technique that works with the word, allowing in a practical and objective way to produce inferences of the content of the communication of a text replicable to its social context. The text is a means of expression of the subject, where the analyst seeks to categorize the units of text (words or phrases) that are repeated, inferring an expression that it represents (Caregnato & Mutti; 2015). In other words, content analysis is "a set of communication analysis techniques aimed at obtaining, by procedures, systematic and objective description of the content of messages.

In order to ensure reliability in the content analysis, we followed the guidelines of standard content analysis methodology (Neuendorf 2002). The coding procedure involved a team of coders formed by one author of the paper as lead researcher and a graduate student as independent coder. Thus, maintaining reliability, the extent to which a measuring procedure yields the same results on repeated trials, translates into inter-coder reliability when human coders are involved in content analysis. The assurance statements were drawn from the selected statements available in our panel and separately content analyzed by a coder and later by the lead researcher.

Noteworthy, that the possible variation in the scores obtained in the content analysis is from zero to twenty-seven, with zero representing the lowest and twenty-seven the highest level of quality. For most of the nineteen items to be analyzed, the coding procedure is the result of evaluating the various items based on the existence / mention / reference of a specific item in the sustainability assurance statement (for example, whether a recipient is internal or external) does not change the score given in the content analysis, but both occurrences receive a score of one point). Some criteria referring, to materiality and general conclusion / opinion. The level of agreement between the two coders was 100% for nine items, and above 85% the other measures (Perego & Kock, 2012).

The threshold for a satisfactory level of reliability between evaluators would be 80% for the percentage of simple agreement suggested by Neuendorf (2002) and Perego & Kock (2012). The nineteen classification criteria or aspects that were covered in this analysis were: title, recipient, auditor's name, location, report date, report responsibilities, auditor responsibilities, auditor independence from the company, impartiality of interested parties, scope of the assurance, assurance objective, competence of the auditor, criteria used to evaluate the evidence and conclusions. Others are assurance standard used, summary of the work performed, materiality, completeness, responsiveness to stakeholders and general conclusions. Figure 3 shows the concepts of each aspect emphasized.

Figure 3. Qualitative statements for ensuring Sustainability Reports

Ranking Criteria	Definition	Scale	
1. Title	Title of the assurance statement	0	No reference
		1	Reference
2. Addressee	Party to whom the assurance statement is formally addressed (either in title separate addressee line or within text)	0	No reference
		1	Addressee is internal or "the readers"
		2	Stakeholder mentioned in the addressee
3. Name of assuror	Name of the firm that conducts the assurance engagement	0	No reference
		1	Reference
4. Location of assuror	Location of the office of the assurance provider	0	No reference
		1	Reference
5. Report date	Reference to the date for which the assurance	0	No reference

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	exercise was finished	1	Reference
6. Responsibilities of reporter	Explicit statement that reporter is responsible for preparation of report	0	No reference
		1	Reference
7. Responsibilities of assuror	Explicit statement that the reporter is responsible to express an (independent) opinion on the subject matter (the sustainability/environmental/social report)	0	No reference
		1	Reference
8. Independence of assuror from reporting organization	Statement expressing the independence of the two parties involved (a 1is assigned as soon as the word(s) independent or independence appear anywhere in the assurance statement or its title)	0	No reference
		1	Reference or mere statement expressing that independence can be looked up on the internet
9. Impartiality of assuror towards shareholders	Assuror's declaration of impartiality with respect to stakeholder interests	0	No reference
		1	Reference (a remark that such a declaration can be made available on request or reference to an internet site already qualifies for a 1)
10. Scope of the assurance engagement	Assurance statement coverage	0	No reference
		1	Reference (should be assigned if anywhere in the assurance statement the coverage of the assurance exercise is stated)
11. Objective of the assurance engagement.	Objective to be achieved through the engagement (indicating the level of assurance intended)	0	No reference
		1	Review, limited assurance, independent opinion, independent assurance, external verification, external assurance or validation
		2	Reasonable Assurance or reasonable and limited assurance (e.g. two different levels of assurance for different parts of the report)
12. Competencies of assuror.	Description of the professional skills that enable the engagement team to conduct the assurance exercise	0	No reference
		1	Statement claiming competency (but no explanatory note) or mere reference to an internet site
		2	Explanatory statement of competencies based on prior experience/engagements
13. Criteria used to assess evidence and reach conclusion	A statement that makes reference to particular criteria against which the Sustainability Report has been prepared (e.g. GRI and often internally developed standards)	0	No reference
		1	Reference to publicly unavailable criteria
		2	Reference to publicly available criteria (e.g. internally developed criteria that are published anywhere in the report or GRI)
14. Assurance standard used	Standards used which govern the work of the assurance provider (e.g.AA1000AS, SA8000, ISAE3000)	0	No reference
		1	Reference to publicly unavailable criteria
		2	Reference to publicly available criteria
15.Summary of work performed	Statement explaining the actions taken to arrive at a conclusion	0	No reference
		1	Reference
16. Materiality (from a stakeholder perspective)	Degree of information provision on materiality level. If the conclusion states that the report is in accordance with the AA1000 principles (Materiality, Completeness and Responsiveness)	0	No reference
		1	Limited reference to a broad statement (e.g., "covers all material aspects" or "…all material respects…") but also negative statements alleging that Assuror has not performed any work to confirm that all

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	this qualifies for a reference and thus a 1 is assigned		material relevant issues are included
		2	Reference and explanation of reference or materiality setting limited to a broad statement and stakeholder perspective introduced (e.g. "issues material to stakeholders were considered")
		3	Reference, explanation of materiality definition, stakeholders and perspective introduced
17. Completeness	Statement expressing that all material aspects are covered by the report.	0	No reference
		1	Reference (If the conclusion states that the report is in conformance with the GRC principals, this qualifies for a reference)
18. Responsiveness to shareholders	Statement referring to the organization's procedures (or lack of them) for identifying stakeholder interests and concerns.	0	No reference
		1	Reference (If the conclusion states that the report is in conformance with the GRC principals, this qualifies for a reference)
19. General Conclusion / Opinion	Statement expressing the result of the assurance exercise. If there is no general conclusion but the conclusion solely refers to the 3 principles of AA1000 (Materiality, Completeness and Responsiveness) a 1 is assigned	0	No reference
		1	Mere statement expressing the opinion of the assuror
		2	Explanatory statement (more than one sentence, but recommendations for improvement are not considered part of the conclusion)

Source: Adapted from Perego & Kock (2012)

4. Results

The result of the analysis of each report on the sustainability standards of the Sustainability Report is described in Appendix 1.

It is worth recalling that the maximum score is equivalent to twenty-seven points. The objective was to analyze reports from a three-year time window of Institutions that, in 2019, reported disclosing audited Sustainability Reports. Before analyzing the results, here are some considerations:

- Sul America's limited assurance report is not included in the Annual Report for any year analyzed. The 2017 and 2018 reports were found on the company's investor relations website. However, the 2016 report's limited assurance report was not found publicly.
- There is no limited assurance report from the company Banco Amazônia in the year 2017. This report was not found in other public media.
- The 2018 sustainability report of the company Banco Nordeste do Brasil is not publicly released until the date of this work. Thus, it does not appear in the analyzes performed.
- For the analysis of the Santander company in 2018, the "Notebook of Indicators" was considered, as it was audited according to the guidelines of the GRI. This year's Annual report was not submitted to an external audit.

The results obtained with the adherence to Sustainability Reporting Criteria are described in Appendix 1. From such information, it is possible to affirm that no company reached the highest standard of assurance defined by information in the suggested questionnaire, which denotes the possibility of improving the limited assurance reports of sustainability reports or equivalent in the financial institutions in Brazil.
It is also important to note that it would be preferable for the limited assurance terms of reference to be drafted for the reporting. Thus, the terms for assurance would be accessible for shareholders and interested parties.

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The results of the terms of assurance of the reports see Table 5, on average, are relatively close to the maximum value that can be reached with this methodology. It is believed that few modifications and greater attention to details when preparing limited assurance reports can help improve this score.

Table 5. Results of Adherence to Sustainability Reporting Criteria

Financial Institutions & CG Level		2016	2017	2018
Novo Mercado	**Banco do Brasil**	22	22	22
	Cielo	22	21	22
Nível 2	**Sul América**	0	22	22
Nível 1	**Bradesco**	20	16	16
	Itaú Unibanco	23	21	24
	Itaú Investimentos	22	22	22
Bolsa	**Banco Amazônia**	22	0	22
	Banco do Nordeste	24	24	-
	Banco Patagonia	22	21	22
	Santander	21	21	21

Therefore, the following points are those that stand out in relation to most of the reports analyzed:

- None of the limited assurance reports analyzed that belong to *PricewaterhouseCooper* have the location of the company's office (question 4).
- None of the limited assurance reports explicitly state the competences based on the experience / commitment of the professionals who conducted the work (question 12).
- With exception of two reports from the same company, none of the other analyzed reports identified a reasonable level of assurance, in this case, two different levels of assurance (question 11).

Thus, when analyzing the temporal evolution of the sustainability standards for Sustainability Reports or equivalent, by listing segment of corporate governance level, it is possible to state that, no matter how much variation there are, changes in the score in the historical average of the calculated period (2016-2018) occur due to the lack of reports, which, due to the small sample, has a great impact on the final value. It is worth mentioning that for the composition of the figures, data from missing or unaudited reports were not computed.

The average variation is around two points. Comparatively analyzing the levels of corporate governance, the *Novo Mercado* was expected to have the highest score, which proved to be true in 2018, but not for previous years. It is worth mentioning that the *Novo Mercado*, in this sample, has only two Institutions.

Nível 2 should be in the same range as the *Novo Mercado* or below. *Nível 2* membership is just one company. *Nível 1*, on the other hand, was expected to have a higher score than the stock exchange, which did not prove to be true. There is a temporary drop in the score of insurance standards of the Institutions that make up the stock exchange listing as shown in Figure 4.

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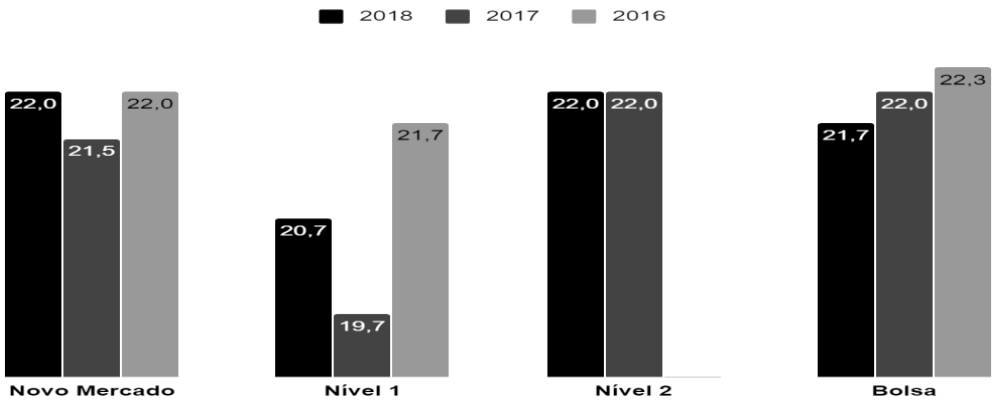
Figure 4. Relations of Sustainability Report for the periods



An interesting point in the analyzed period of time is there was no change in the independent audits that assessed the limited assurance reports shared. Another point is that all Institutions followed guidelines: 80% of the Institutions were evaluated based on the GRI - G4 guidelines; 10% of the Institutions were evaluated by the GRI - G4 guidelines and the AA1000 AccountAbility Principles Standards, and 10% were evaluated under internal guidelines and not publicly available. Normally in Brazil, the internal guidelines do follow the CFC (Brazilian Chartered Accounting) Standards.

5. Discussion

Anchored on structuration theory is the structural pedigree that considers every aspect of the standards for building on sustainability assurance. Structurally, there is the relation of sustainability assurance with the build-up of corporate governance albeit considering modifications that could uphold on a periodic analysis.

Utmost, the necessity to analyze the structure of the reports guarantees the credibility of the information available to the public. Noteworthy that the concern with ensuring the Sustainability Report to follow quality standards is the next step in the evolution of the disclosure of this report to shareholders, mainly in the financial market.

Nonetheless, something is becoming clear, if the assurors concentrate among the Big 4 firms, there is the likelihood of the continued domination of certain standards predominantly those preferred by the independent audit firms in the sustainability assessment process. This could be different in specific cases when organizational policies guided by auditing committees or fiscal boards recommend on the contrary.

De facto, the growing importance of socio-environmental information attached to the Sustainability Reports and their equivalents have begun to gain a space in the dissemination of this information in order to reduce the asymmetry between shareholders. In view of the history of publicly disclosed information aiming at reducing fraud, greater caution should be exercised regarding the reliability of information without proof of veracity, in the case of unaudited statements. For this reason, the standards for ensuring such reports must be analyzed gearing towards accuracy of the information disseminated to shareholders.

Finally, the number of financial institutions that published sustainability reporting in the period studies signals anew a perspective of the assurance and the standards. In particular, the financial institutions have been tagged as exemplary institutions for disclosure's sake where some are even known are touch bearers, therefore, makes one to infer for a growth in the reporting trend in the near future.

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6. Conclusion

The purpose of this study is to investigate the standards for ensuring Sustainability Reports of financial Institutions listed on the B3 stock exchange between 2016 and 2018. Such study is relevant to determine if the statements assured are indeed reliable and whether the information available is sufficient to confirm the quality of the Sustainability Reports.

When focusing on the financial institutions, it is right to say that a greater number of them (60.6%) considering: Bank, Insurance Institutions and other Financial Institutions disclose some type of Sustainability Report. Of such, only 50% (10 Institutions) perform an independent audit of the published reports. The assurance standards of the audited Institutions follow about 77.7% of the points analyzed according to the qualitative multicriteria.

The results of the analysis indicate that there is little variability inherent within the contents of the sustainability reports presented by Brazilian financial institutions. However, it is still possible to see improvements in the limited assurance reports from independent audit firms, for instance, explicitly declaring the skills by experience or competence of the professionals involved in the assessment.

Thus, recapitulating that this study analyses the sustainability reporting standards and assurance practices in the Brazilian financial institutions, the lens of reporting standards presents the constructs of probable choices aimed by the approaches among the financial institutions to maintain compliance. As a result, present a pattern of behaviours of these organisations towards a sustainability reporting.

In general terms, one can affirm that the standards for ensuring Sustainability Reports are in accordance with the points analyzed. Given this, it is concluded that Institutions in the financial market are adhering to a high standard of assurance for such reports. Our findings reinforce those independent evaluations are essential to forestall credibility, thus bringing greater security to the information and data made available to shareholders and shareholders, and also reducing the information asymmetry and conflicts arising therefrom.

It is expected that, in the future, a larger number of Institutions listed on the stock exchange will prepare Sustainability Reports, integrated or similar reports and the like for disclosure. And given the growing importance of such reports, independent audits of such documents should be in common practice, in order to guarantee the veracity of the data disclosed to shareholders.

For future studies, it is suggested to analyze other markets of Brazilian Institutions, such as energy and industrial and building couple with future updating and continuation of the used database. Notwithstanding, the regulating bodies, practitioners and the general stakeholders would derive reasonably well from this study when analyzing the criteria for sustainability assurance for a more suitable one.

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Appendix 1
Analysis of assurance standards for Sustainability Reports or similar, between 2016 and 2018

2016	*Novo Mercado*		*Nível 1*			*Nível 2*	Stock Market			
Question	**Banco do Brasil**	**Cielo**	**Bradesco**	**Itaú Unibanco**	**ItauSA**	**Sul América**	**Banco Amazonia**	**Banco do Nordeste**	**Banco da Patagônia**	**Santander**
	1	1	1	1	1	-	1	1	1	1
	2	2	2	2	2	-	2	2	2	2
	1	1	1	1	1	-	1	1	1	1
	1	1	0	0	0	-	1	1	1	0
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	2	1	1
	1	1	1	1	1	-	1	1	1	1
	2	2	2	2	2	-	2	2	2	2
	2	2	2	2	2	-	2	2	2	2
	1	1	1	1	1	-	1	1	1	1
	1	1	0	3	2	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	1	1	1
	1	1	1	1	1	-	1	2	1	1
	22	22	20	23	22	-	22	24	22	21

2017	*Novo Mercado*		*Nível 1*			*Nível 2*	Stock Market			
Question	**Banco do Brasil**	**Cielo**	**Bradesco**	**Itaú Unibanco**	**ItauSA**	**Sul América**	**Banco Amazonia**	**Banco do Nordeste**	**Banco da Patagônia**	**Santander**
	1	1	1	1	1	1	-	1	1	1
	2	2	2	2	2	2	-	2	2	2
	1	1	1	1	1	1	-	1	1	1
	1	0	0	0	0	1	-	1	1	0
	1	1	1	1	1	1	-	1	0	1
	1	*1*	*1*	*1*	*1*	*1*	-	*1*	*1*	*1*
	1	1	1	1	1	1	-	1	1	1
	1	1	1	1	1	1	-	1	1	1
	1	1	1	1	1	1	-	1	1	1
	1	1	1	1	1	1	-	1	1	1
	1	1	1	1	1	1	-	2	1	1

	1	1	1	1	1	1	-	1	1	1
	2	2	1	2	2	2	-	2	2	2
	2	2	2	2	2	2	-	2	2	2
	1	1	0	1	1	1	-	1	1	1
	1	1	0	1	2	1	-	1	1	1
	1	1	0	1	1	1	-	1	1	1
	1	1	0	1	1	1	-	1	1	1
	1	1	1	1	1	1	-	2	1	1
	22	21	16	21	22	22	-	24	21	21

2018	*Novo Mercado*		*Nível 1*			*Nível 2*	Stock Market			
Question	**Banco do Brasil**	**Cielo**	**Bradesco**	**Itaú Unibanco**	**ItauSA**	**Sul América**	**Banco Amazonia**	**Banco do Nordeste**	**Banco da Patagônia**	**Santander**
	1	1	1	1	1	1	1	-	1	1
	2	2	2	2	2	2	2	-	2	2
	1	1	1	1	1	1	1	-	1	1
	1	1	0	0	0	1	1	-	1	0
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	1	1	1	1	1	1	1	-	1	1
	2	2	1	2	2	2	2	-	2	2
	2	2	2	2	2	2	2	-	2	2
	1	1	0	1	1	1	1	-	1	1
	1	1	0	3	2	1	1	-	1	1
	1	1	0	1	1	1	1	-	1	1
	1	1	0	1	1	1	1	-	1	1
	1	1	1	2	1	1	1	-	1	1
	22	22	16	24	22	22	22	-	22	21

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MANAGING NEW PRODUCT LAUNCH & DEVELOPMENT IN THE DYNAMIC EMERGING MARKET: A CASE STUDY OF SAUDI ARABIA*

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Abstract. This study aims at analyzing the mechanism of New Product launch and Development (NPLD) in two large Saudi Arabian organizations Almarai and Aujan, which are dedicated to the production and marketing of fast-moving consumer goods. The research has opted to utilize the Saudi Arabian established mechanism as a research tool for exploring NPDL methods with a special emphasis on the role of sales and marketing management acumen. In this case study, the information is collected from the employees in two gigantic companies, wherein they are involved in the NPLD process. There is a significant difference between the two companies in their functional adequacy and the efficiency and effectiveness of the NPLD mechanism. It has also an objective to do an analysis of the two companies in respect of scope and treatment in launching NPLD coping with the challenges surfaced in the wake of changing situation due to globalization. Despite the fact, that both companies adopted a formal Stage-Gate process, Aujan Beverage implemented this process more effectively than Almarai, perhaps owing to Aujan's greater expertise in using Stage-Gate methodology. This study emphasizes the importance of the role of sales and operations planning regarding collaborative demand forecasting. There is no doubt that leadership plays a pivotal role in ensuring the analysis, review, and improvement of NPLD process.

Keywords: new product development; operations planning; mechanism; Stage-Gate; enterprise resource planning; fast moving consumer goods

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JEL Classifications: M13, M21, M31

Additional disciplines: retail management, consumer psychology, sociology

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1. Introduction

Launching a new product in the marketplace needs to be efficient and effective to an organization can have a competitive edge in the marketplace. In this present research, there are two Fast Moving Consumer Goods (FMCG) companies of Saudi Arabia taken into our consideration as a case study.

The first company used for research is Aujan. It was founded in 1905, 116 years ago in Bahrain. Aujan entered the FMCG industry in 1928. With its headquarters in Dammam, Saudi Arabia, the company has operations across the world, particularly in the Middle East and African regions. Following a successful forging a partnership between the Coca Cola Company and Aujan Industries, Aujan Coca-Cola Beverage Company (ACCBC) came into existence in 2012 and its trademark is Rani Refreshment (RR) as a premier beverage brand including Rani and Barbican. ACCBC is an authorized manufacturer and distributor of its product in 15 countries across the Middle East and North Africa. Vimto is also a product of ACCBC. It's every product has a leading position in the industry: Rani in Juice Drinks, Barbican in malt beverages, and Vimto in cordial format. The company enjoys the prestige of direct presence in countries such as Saudi Arabia, United Arab Emirates, Qatar, Kuwait, Bahrain, Oman, Yemen, Jordan, Iraq, Iran Lebanon, Egypt, Libya, and Algeria.

The second company for research is Almarai Company. It was founded in 1977, 44 years ago by Sultan bin Mohammad bin Saud Al Kabeer. Its headquarters is in Riyadh, Saudi Arabia. It has operations in GCC countries, Egypt and Jordan. Its main products are dairy, yogurt, Label, juices, bakeries, poultry, and infant formula. It has adopted a business strategy to develop an integrated food supply mechanism, which satisfies its consumers with high quality, value for the money for food and beverage products. Its key brand is Almarai, which has a conspicuous presence in the GCC States. Almarai, as a brand, gives tough competition to major global brands.

In both companies, innovation in the features of products is a mechanism that is used to have an edge over their competitors, which are introducing new products in the market to improve their market share and negate the need to compete on a price parameter (Søndergaard, 2005; Wojnarski et al., 2010; Tanudiharjo et al., 2021; Hasani & Beqaj, 2021).

This is applied in the true sense in the case of distribution and supply of Fast-Moving Consumer Goods (FMCG) in the present competitive environment. Although the methodologies of various new product development (NPD) have evolved, the Stage-Gate, which is developed by Cooper (Cooper, 1990) is reasonably the best and most empirically applied and giving a competitive edge in the era of competition (Sommer et al., 2015; Sarangee et al., 2022).

The model presents a roadmap for the development of new product development subject to a common process adopted by companies that are leading to execute the NPDL to achieve the goal efficiently and effectively. The basic mechanism of Stage-Gate is based on five sequential activities called stages, as explained below (see Figure 1).

Stage-1: Concept generation

The first and foremost important step is to formulate ideas to launch a new value-added product; to design activities, to identify new business opportunities and the needed services and technology. It consists of a preliminary investigation of the practicality of the idea to get insight into commercial aspects.

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Stage-2: Building business case
Under this stage, a comprehensive investigation is carried out involving primary and further research experiments both in the arena of the market as well, as technical realities, including determining the specifications and of product/service, and giving a definition to the project, reaching to project justification, and formulating the proposed plan for development.

Stage-3: Product development
Further, a detailed design and development of the new product or service is finalized, and operations or production processes for a full-scale production are planned.

Stage-4: Testing and validation
Then the stage-4 is devoted to testing or trials in the market; labs and plants decide for the whole operation of the proposed new product, naming the brand, formulating the marketing plans, and launching production/operations.

Stage-5: Product launch followed by a post-launch review
In the last stage, full-scale operation or production gets started commercially in the market for the targeted consumers.

Figure 1. Stage-Gate model
Source: Adopted from Cooper et al. (1986). Referred in formalizing the front-end of the entrepreneurial process using the stage-gate model as a guide an opportunity to improve entrepreneurship education and practice by Bruce B. Barringer and Amy R. Gresock (2008)

Evaluation is needed at each stage; either be allowed through the gate to the next stage, or the gate should be closed and the process either further terminated or shelved. This research aims at examining the scope and treatment of sales and operations mechanisms (S&OM) in the NPDL mechanism. The objective of S&OM is to make major decisions to maintain a balance between supply and demand. The segmentation of the objectives of S&OP is to set a production date, determine production quantities, formulate the inventory policy, and forge counter steps to deviations from the plan of new product development. Sound S&OM decisions play a critical role in making NPDL launch successful; nevertheless, it appears to be not easy owing to uncertainty and unavoidable circumstances in the NPDL mechanism. Projected demand for new products bears challenging and even sometimes volatile to face the ripple effect of non-conformity with the actual future demand (Van Orschot et al., 2013; Simon, 2009; Marzi et al., 2021).

The decisions of S&OM also may lead among the executives of the NPDL project owing to meeting the tight deadlines and other different aspects to be accomplished. It is found that little research has been carried out emphasizing the role of S&OM in the NPDL process and that is why the very topic is given due place for research. It is pertinent to mention here that three major issues may be considered to launching a new product in the present market order. First, an introduced product must have an attribute that appeals to the marketplace. Second, a product is being at the expectation of customers after consuming them. The third one is to reduce the cycle time, idea generation to the delivery of products.

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2. Literature Review

Launching a new product in the dynamic market bears a great responsibility for Fast Moving Consumer Goods (FMCG) based companies. NPDL strategy is a roadmap laying down the activities to grow market share in the competitive market. These activities include:

- Value addition in the existing product
- Extension of existing product lines
- Evolving new uses for existing products
- Identifying new markets
- Analyzing projected sales
- Launching new products in the market (Solomon et al., 1999)

For the foundation days, the Stage-Gate Model works as a roadmap for launching the product with its flexibility, e.g., a series of systematic parallel processing stages to minimize the project completion duration (Cooper & Edgett, 2015; Edwards et al., 2019).

With the time, the model has passed through different phases got refined and flexible to different situations and suitable different corners of the world. Cooper as an originator of the Stage-Gate process and his other colleagues has brought about these changes. Improvements took place in the domain of weakness like innovative management, administration, and decision landscape at the gate process using applied logic.

Flexibility is the hallmark that has led in the strive for improved outcomes and to give a speedy NPDL. The value addition of this project is to avoid complex processes to facilitate to undertake low complexity and risk with few gates' ways for speedy and better output. Value stream mapping plays a key role in the active improvement of the NPDL giving an edge on other competitors in presence through their market share. Innovative techniques are defined and framed and treated as good practices advocated by management scientists. Senior executives should give moral support to their Project Team and guide them on how to achieve the desired result in launching and developing "New Products" in the highly competitive scenario. Top management needs to bring about a system that is multi-disciplinary to evolve the desired skills and enhance functional adequacy and representative character in the organization. Avan R. Jassawalla and Hemant C. Sashittal (1999) shed light on the scope and treatment of the cross-functional team as a roadmap for NPDL; project team having coordination with representatives of Research & Development, testing, manufacturing, and marketing as well. It is pertinent to emphasize that there is a need to decide to launch finally the product, keeping in view its project results. Notwithstanding protecting rights of intellectual property, reasonable customers and suppliers deserve to have the insight of NPDL system adopted in the very strive. There is a need to maintain a middle path to bring clarity to the mind of other key players and manufacturers (Salmen, 2021). The aspect of digitalization reveals another important aspect, as digitalization could cause a cultural change of customers' behavior, customer tastes, distribution channels, and communication (Priede-Bergamini et al., 2020; Paluch et al., 2020). It is as a consequence necessary to inspect the influence of digitalization on the launch process and success factor.

It is also suggested of taking an effective and efficient supply chain to facilitate the availability keeping in view space and time. The high-quality decision-making process and systemization at a different phase of Stage-Gate process are having an indelible impact on the performance of the execution of business activities (de Guimaraes et al., 2019; Salvato & Laplume, 2020).

Involvement of high delegation of authority with desired expertise and knowledge is needed in designing and making a dynamic decision. The evaluation of performance NPDL under Stage-Gate mechanism should be clear

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and crystal in order to take appropriate corrective measures to boost the sales. Wassim J. Aloulou (2019) suggested that managers of Saudi industrial firms should utilize a mix of aspects from several strategic orientations such as market and technology through entrepreneurial capabilities and resources that enhance higher levels of performance in terms of new product development.

In the changing scenario, a lot of business establishments are getting benefits by using Enterprise Resource Planning (ERP) system, which supports in controlling the cost and it appears to be very supportive in development and launchings new products. There is a need for consideration at various stages of NPDL process with concerted efforts. The early phased on launching products need an emphasis on product conception, development of the product, ensuring financial viability, and ascertaining the quality of products through rigorous testing. Goals need to be customer-oriented and have a representative character of features of the product and should be specific, measurable, achievable, and time-bound (SMART). It is needless to mention that Saudi Arabian FMCG market is highly under influence of the European market mechanism where the market is highly customer-centric as well as customer-oriented; the market thereof gives of customers' needs and expectations in determining its features. The consultation of key suppliers especially in agriculture-based ingredients that ensure the availability of raw ingredients, such as milk and fruit, is crucial. The present case study advocates that the early phase of development and launching new products plays a major role and at a very early stage, there is a need to engage all direct and indirect players to ensure the desired goal efficiently and effectively. At the very early stages, any design or logistic imperatives need to be gone under evolution and decision making rather than wrong decision backfires. It is also observed that one of the main factors of the success of NPDL is the better use of resources at the very early stage of the evolution of new products for the market. It is also suggested that any organizations need to bring about robust cross-functional coordination at every stage of product development and launching in the competitive market.

For a successful launching of a new product, planning plays a critical play. Lacuna in planning has a ripple effect on the production and sales of the goods. In NPLD, a study of project sales determines manufacturing the products, aimed to meet the market demand.

3. Research Objective

The objective of this research is to analyze the previous experiences of different organizations during the implementation of launching and developing a new product. Further, it is to synchronize the very first-hand experiences to pave the path for new ventures in the changing market scenario.

4. Methodology

To adopt the methodology with a strategy to study the subject research, the chosen path is the Stage-Gate process model from the past empirical studies. The Stage-Gate process model has been proved to be beneficial from a concept point of view as well as an implementation of the model that leads aspirants, students, engineers, executives, specialists from the very inception of pre-launch stages of evaluation of merits of new tangible or intangible products till the end of the desired result of launching the new product in the market.

An ethnographic approach is chosen to gather a sufficient amount of information and a descriptive, qualitative market research methodology for taking into consideration to understand the subject matter in context to the customer relationship to his or her environment (Baxter & Jack, 2008; Cooper & Edgett, 2015). The present case study is based on imperial interviews covering two chosen organizations in Saudi Arabia. The core foundation of the organizations is the FMCG in nature. The first organization is Aujan Coca Cola Beverages and the second one is Almarai milk company. Both FMCG organizations are well established in Saudi Arabian retail market scenario.

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The participants in the study are comprised of supply planning specialists, marketing managers, and quality control executives. The participants have expressed willingness to interact and willingly come forward to contribute to this study. Both organizations have given the authors to carry out the study and permitted other departments to cooperate in this study. At Aujan Group industry, key managers were invited to participate in the interaction session to understand their experience in the development and launching of new products.
The objective of the interview was to access data related to the subject study:

- Obtaining the information if the NPLD process is effective and efficient in managing time keeping in view its making operation flawless
- Gathering the information if the NPLD process is dynamic in the execution of the plan and has scope to adjust to the imperatives
- Gaining an understanding mechanism in deciding the launch forecast
- Ascertaining the operational requirements for a successful NPLD mechanism

This research opted ABEF category selected keeping in view its relevancy in this competitive scenario:

- Leadership
- Strategy and Planning
- People
- Process
- System & Data, and
- Result.

Table 1 below reflects the resemblance between the ABEF categories and sales & operations planning imperativeness at different phases of NPLL process. For making NPLD process effective and efficient, each of the ABEF categories proves to be a guiding roadmap. The very analysis is the hallmark for leading interview questions for making this research useful for business organizations.

Table 1. Key S&OP concerns at each phase in the NPLD Process

	Concept	Launch	Post-launch
Leadership	Top-level approval on forecast process investment in system and training		Leadership of process-improvement methodology Management of accountability for accuracy of forecasts
Strategy/planning	Methodical translation of financial / and market driven strategic plans into operational requirements	Early involvement of suppliers and customers in the planning process	Consistent methodology for Evaluation for launch forecast accuracy and customer service expectation
People	Use of cross-functional NPDL project and S&OP teams		
Processes	Use of S&OP process including demand, supply, pre-S&OP and Exec. S&OP meetings		Methodology for capturing lessons-learned
Systems / Data	Data to support launch forecasts based on similar products Timely and accurate entry of Master Data to enable backwards-scheduling		Systems to measure performance metrics (Forecast Accuracy and customer service levels)
Results		Consistent methodology for tracking launch forecast accuracy and customer service levels	

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The adopting of the Stage-Gate model has been beneficial for both, academia and practice. It has been mentioned in Stage-Gate Inc. aligning with Robert Cooper, the first conceiver of the model, 73 of North American companies have preferred to adopt the Stage-Gate model for new product innovation. Although, this model has also remained under continuous scrutiny and the majority of the studies have evaluated its values to be helping academia as well as entrepreneurs. Table 2 illustrates a list of strengths and the representative studies that advocate each strength.

Table 2. Strengths of the Stage-Gate methodology

Strengths	Representative studies
Well-organized framework for thinking through the new product development process	Cooper, 1990; Cooper et al., 2002; Paluch et al., 2020; Sulistiyani & Hutomo, 2021; Sarangee et al., 2022
Prevents poor product ideas from chewing up too much of a firm's attention and resources	Cooper et al., 2002; de Guimaraes et al., 2019; Klingebiel & Esser, 2020; Sarangee et al., 2022
Increases the chances of new product success	Cooper, 1990; Sommer et al., 2015; Sarangee et al., 2022
Involves input and participation of employees from various functional areas in a firm	Cooper & Edgett, 2006; Cooper, 2016; Edwards et al., 2019
Holds specific individuals (often organized into a cross-functional team) accountable for the success of a new product or service idea	Cooper & Edgett, 2006; Edwards et al., 2019; Salvato & Laplume, 2020

Source: Formalizing the front-end of the entrepreneurial process using the stage-gate model as a guide by Bruce B. Barringer and Amy R (2008).

5. Findings

The findings cover the first-hand experience as well as the second-hand experience of Aujan Group and Almarai Company. Aujan leads in the implementation of NPLD mechanism in the first phase of globalization. The very mechanism-oriented methodology segmented the NPLD in five phases.

The idea generation is the ripple effect on customer need and market demand, the study of practicality encourages the development and launching team to further study the projected consequence of the very innovative business step to go inside the fact of financial viability of the project and to bring forth a possible negative aspect of the project keeping because of the commercial and market imperatives. A plethora of issues concerning logistics, availability of raw materials, accessibility of technology, and desired innovation were the subject of an address at Gate-2 of the practicality of the project. More comprehensive data and information of related activities to support the launch under the business study from the perspective of a very commercial functional adequacy. Launch occurred provided that the prerequisites have been met at a satisfactory level. The ERP system like SAP must have all the necessary inputs so that automation meets its end without any hindrance.

Aujan got the benefits of an NPDL mechanism based on Stage-Gate process since the inception of globalization when it faces the heat of competition. Two alternatives are available in the NPDL Navigator online tool that supports the NPDL process.

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A 5-gate process was used for "Development and Launching of New Products" (NPDL). The 5-Gate process consists of five milestones:

i) Exploration
ii) Design
iii) Commercialization
iv) Production
iv) Launch

The 5-Milestones are proven very helpful in improving the organization's representative character, functional adequacy, and financial viability. They gave the organization the strength of being dynamic, robust, and resilient.

The Role of Leadership in the NPDL Gateway

Almarai Company has used the best acumen from the industry and its project leader was not from a traditional role mechanism, but the very assignment is given to someone who has empirical marketing experience as well as other related multi-faceted exposures. The leader of the project needs to give the vision to achieve the goal of successfully launching the product in the market. Rigidity in the implementation of the project minimized the scope and treatment of the very mechanisms in achieving the desired result. However, the specific mythology was adopted for processing every phase of the project; the process has become less rigid as it went through implementation and got the art of dynamism.

It has been experienced that this flexibility sometimes harmed the whole mechanism of the project that had been advocated by a top echelon management team who may not have enough experience to handle the ripple effects of the decision that may backfire on the result (Wei et al., 2021). In evolution and giving a final shape to the Stage-Gate process, it has consumed a substantial investment of time and energy.

The very process is a comprehensive mechanism that incorporates placing orders on suppliers, fixing priorities, and managing data, which may face unexpected hindrances for carrying out the initiative. For most organizations, it is a daunting task to measure the amount of success. Measuring the amount of success is imperative for identifying the mistakes and thereof rigorous improvement in the launching mechanism. Less focusing on traction in evaluating the process at different levels and taking corrective measures is owing to overwork and poor management in selecting alternatives. It is sometimes simply a lack of resources, poor project mechanism, which does not compatible with rigid adherence to the evaluation system; it may be as well as a lack of concerted effort in enforcement in line with the compliance of the fixed process, which comes from the high level of authority.

At Aujan Group, the Stage-Gate process was clear, crystal, well-formulated, and well understood; different works were assigned to different skilled executives with desired communication and coordination leading the concerted effort to reach the defined goal. In contrast, Almarai Company passed through continuous and rigorous improvements, taking benefit of its dynamics and laying out an adaptive Stage-Gate process. David Allan Earing, Director of Aujan Beverages claims: "Passing through the gates, these improvements are the ripple effect of rectifying and learning from mistakes during taking initiatives in launching and developing a new product. I guess it is quite systemized from the documentation point of view as well as empirical at each gate and having a scope of the evaluation, identifying mistakes and rectifying them leading to a desired goal".

Strategy and Planning in NPDL Projects

At Aujan Group, the Gateway is best suited for its purpose. However, there were a plethora of peripheral activities surrounding the core issues of NPDL initiatives, which were perceived to be a complex business affair. As it is very systematic and naturally it is experienced as slow decision making. This meant that there were many bottlenecks in executing the very process.

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Almarai has a variety of products in comparison to Aujan and operates in a more dynamic market and systemized environment. Aujan has a comparatively less complex system in launching new products than Almarai. A less complex system allows faster decision-making to achieve the desired goal in its scope and treatment claims Moosa Al Omran, Director at Almarai Operation in Riyadh.

Aujan has an edge over Almarai in the forecasting of the whole operation including projected sales than Almarai. At Almarai, there is a rigid methodology in the whole process from developing to launching the new product. The very methodology by and large has three phases, i.e., input, process, and outputs at each stage. The demand team plays a significant role from the very first stage. The operation team is involved in the planning process with its concerted and coordinated efforts.

People Involvement in NPDL Projects

At Aujan, the implementation of NPLD involves a large number of competent staff, especially with marketing expertise. This fact resulted in facing a bottleneck in the evaluation of NPL project after it gets launched in the market. The staff involved in the project believes that they face a daunting task to utilize our experience while redirecting the plan. In the wake of the shifting of staff involved in this project, the operation face problem as expertise does not get transited as needed. Sometimes staff holding a key assignment of the project leaves the company, and the company bears severe jolts of deputing staff with the same launching acumen.

Almarai strongly believes in the participation of all project managers in the decision-making of the launch and development of the product. One of the main assignments of the project manager is to meet all operational requirements and is to ensure that the supply network would work smoothly. The involvement of NPDL team needs dissemination of information and expertise to every concerned point of action.

Coordination of cross-functional teams is needed from different backgrounds like marketing, sales, finance and operations, and other related areas of involvement. This very kind of interaction during the development and operation of Almarai to get in action in time is allowed rather encouraged, simultaneously there are dynamic urgent changes owing to competitor strategy in the industry. In this process, the demand team needs to evaluate the projected sales at preliminary and based on their assessment; it plans to procure the raw materials, equipment, expertise, and finance as well to achieve the desired result.

The Stage-Gate Process

The operation executives both at Almarai and Aujan conclude that Stage-Gate is the mechanism that facilitates the operation team to implement the whole operation of development and launch of a new product making it financially viable. The mechanism proves itself so effective and it is encouraged and adopted for all segments of operation. An effective brainstorming about the landscape of launching the product is essentially needed, since barriers in communication may create serious ripple effects on the results expected. This fact cannot be simply ignored that there are variations in both fundamental and applied approaches in both the subject of study and organizations. However, there is also a fact that Aujan has a competitive edge in implementing the theory during the operation. The key points of operation in both organizations are mentioned below:

- Whole activities at every Stage-Gate process are well defined, crystal, and easy to be followed. Activities do not get carried out through each gate if the desired data are not available, at the same phase, the mechanisms give all the logistic supports needed for any member of the project team to compile these data into information useful for operation.
- The application of information at every phase is clearly described in the operation. It also works as a tool in forecasting in terms of requirements of raw materials, expertise, and projected sales.

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- The whole process is a bend of dynamism and robustness that provides a good space for continuous improvement at every Stage-Gate process.

Data, information, and communication

Aujan uses SAP communication system to carry out its business activities. SAP has the features of performing different functions such as human resources, sales and distribution, procurement, fiancé, and production planning with a unique integration for coordination with different departments. There is no idea of doubt that SAP system works by feeding the data in an automated way, giving a command for the different tasks to be achieved, and gaining information with a fraction of time to take the appropriate decisions to achieve the target.

Almarai also uses SAP module designed to the needs of the organization which covers production planning, sales and marketing, and forecasting as well. Practically, SAP has a unique blend of integration of different areas of work and its flexibility dimension in executing the different tasks. The flexibility feature facilitates deciding on systemized pre facto as well as post-facto approvals in carrying out assignments. This value-added feature of flexibility proves to be effective in developing and launching new products in the market. Inflexibility paves the path of hindrance, which has a ripple effect on the whole project environment. Failure due to inflexibility has a profound negative impact on the entire mechanism of performance of a new product, which determines the achievement of the organization.

Evaluation of the Gateway

It is very unambiguous that the success of the operation needs evaluation at different phases of operation. This problem appears in maintaining consistency and measuring the performance of the benchmark to ensure a smooth evaluation of the NPDL project. Measuring the accuracy of a forecast to actual sales is also accountable over the team of S&OP although SAP modules.

Evaluation of operation at Almarai is measured in a more systematic, authentic, and comprehensive way than at Aujan. Success is measured based on the financial viability of the project after implementing NPDL and gaining the outcome. Accuracy in forecasting plays a more significant role at Almarai than at Aujan, following a well-articulated methodology for reaching an evaluation. Customer service has its place in the process of measuring the success of the project.

Conclusions

The purpose of this study is to analyze the NPDL process of both organizations keeping given the practices applied and the performance of the operation using the Saudi Arabian approach in the changing dynamic scenario of the present competitive market. Both organizations have adopted the innovative Stage-Gate process which gives them relevancy to the changing market scenarios. Both organizations have tasted the bitter test of failure in their striving to implement NPDL. In the wake of very bitter failures, they have adopted changes in their strategy. The logistics mechanism used at Almarai is more simplified than at Aujan. Nevertheless, it appears that Aujan is more particular about the methodology used by Almarai. There are two recommendations to be adopted as a strategy for better results in NPDL process:

- Smoothen the mechanism for “Forecasting” for demand managers, logistics executives, and Sales & Operation Planning managers for reaching a decision for launch forecast.
- Coordinate at a different level at different phases for adapting to the needed project framework to make this process more dynamic and resilient to make the whole project with functional adequacy and financial viability.

It is to reiterate that Aujan has faced many challenges in reaching the decision through processing available data, resulting in messing up to articulate production plan and material management through SAP and executing activities like raw material procurement and workflow planning owing to the lack of authentic data at the right time. It is to a flashback that Almarai has got success to manage the problem due to a lack of dependency among different segments of operation. The recommended solution consists of:

- Creation of master data records which may facilitate finalizing planning restricted to visibility after having processing costing.
- Feeding the authentic date in time into SAP would strengthen to specify the role of the data system in launching stage-wise through Stage-Gate process.

There is an iota of doubt that the literature suggests that NPDL process should come from top-down. If a process encounters a problem like underselling against projected sales resulting in a baffling situation for the planning and execution team, it is suggested that corrective action needs to be taken after analyzing the facts and figures and should be brought to the knowledge of senior-level management, ensuring:

- The due evaluation should occur at the scheduled time after launch;
- The discussion is needed of key metrics in the execution process;
- The coordination consists of a review of the strategy with recommendations;
- The recommendations need to be approved after the due test of practicality.

Last but not least, the synergy between the two organizations would be proved beneficial in the strive of their NPDL process, paving the path of enjoying a competitive edge over their competitors in the present dynamic emerging market of Saudi Arabia.

Limitations

The study has its limitations covering only two organizations, thus before reaching any conclusion treated as a generalization, caution needs to be taken.

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THE COVID-19 PANDEMIC CONSEQUENCES TO THE ACTIVITY OF NGOs*

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Abstract. The aim of the research is to determine the consequences of the COVID-19 pandemic for activities carried out by non-governmental organizations (NGOs). Moreover, there will be conducted an assessment of the differences in the perceived effects of the pandemic by NGOs due to their activity areas. The analyzes are based on the results of a survey that was carried out among representatives of NGOs in the period April-May 2020. The descriptive analysis was conducted on the basis of survey data. Additionally, a chi-square test of independence will be carried out to verify the differences in the perceived effects of the COVID-19 pandemic in the groups of NGOs established based on the criteria area of activity. The results obtained enable us to point out the consequences of the COVID-19 pandemic in a very short time horizon - the next 4 and 8 weeks – for NGOs in the area of the possibility of fully financing the salary costs, as well as the ability to provide services to clients/beneficiaries. The paper establishes the frequency of concerns regarding the negative consequences of the COVID-19 pandemic (such as loss of income, the need to dismiss employees). In addition, it will outline the most pressing challenges faced by NGOs to the effect of the COVID-19 pandemic and assess the outlook after the pandemic. The paper fills the gap in the knowledge of the effects of the COVID-19 pandemic for NGOs.

Key words: non-governmental organizations; COVID-19; technology (IT)

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1. Introduction

NGOs play a key role in the turbulent times of the crisis caused by the COVID-19 pandemic. They are an important element in mitigating the effects of the deteriorating situation of societies affected by the pandemic. The activities of NGOs are primarily based on the involvement of human resources. They engage in direct assistance in various areas. It is especially difficult in view of the threat of contracting the COVID-19 disease. The crisis of COVID-19 is significantly worsening the situation of all national economies. The financial problems also affect NGOs, whose poor financial condition does not allow them to effectively defend themselves against sudden events (Mikołajczak 2017). NGOs require not only operational changes, but also new strategic vision to effectively fulfill the social mission (Rottkamp, 2021).

Hence, many studies focus on monitoring the situation of NGOs. Authors try to propose recommendations that will improve the effectiveness of NGOs. State aid is of great importance. As the level of public support differs from country to country, the possibilities of coping with the pandemic also differ (Mikołajczak 2021a, Mikołajczak 2021b). The level of support in highly developed countries in Western Europe and the USA is much higher than in developing countries. Also, most of the research to date concerns the impact of the COVID-19 pandemic on the activities of NGOs from richer countries (Fachum et al. 2020; Gronbjerg et al. 2020; Díaz 2020; Deitrick at al. 2020). There is still a visible lack of arrangements in this regard about developing economies. This article fills this gap. What is more, however there is growing number of studies and reports (Bhandari and Mahat 2020; Deitrick et al, 2020; Beaton, 2020; Stefan et al., 2020, Word and Gahre, 2020; Okunola & Fakunle, 2021) that show how differently organizations cope with the pandemic, still surprisingly little is known about how important factors like area of activity affect their functioning, while this issue is well studied in for-profit (Marcu, 2021; Łącka and Suproń, 2021) and public sectors (Qureshi at al. 2021).

The accelerating COVID-19 epidemic and the limited possibilities of supporting NGOs in developing countries prompted a question regarding the consequences of the crisis on the activities of NGOs. Searching for answers in which areas of NGOs activity the support is the most necessarily has a key importance. This knowledge is crucial for managers who face the challenge of meeting the social mission. It is also important for public authorities who are focused on mitigating the pandemic distortions and destruction in many societies by supporting NGOs. In addition, the article introduces a dynamic shot that is a certain novelty. The expected consequences of a pandemic are captured in the long and short term.

The aim of the research is to determine the consequences of the COVID-19 pandemic for activities carried out by NGOs. The research problems that follow this aim first focus on understanding the influence of COVID-19 pandemic on the financial situation od NGOs; and then then investigating the relationships between NGOs' situation and the area of activity. The study attempts to answer two research questions:

1. How do COVID-19 pandemic affect financial situation of NGOs?
2. How do activity area associate with functioning and activities of NGOs?

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This article firstly presents the importance of COVID-19 in other countries as dealt with in scientific considerations to date. The literature section also provides research findings to date with regard to efforts by organizations to deal with pandemic issues.

The study of the literature in this area made it possible for variables to be selected for the methodological section, which also presents the sample studied and the research procedure. This part of the article also includes the results of chi-squared analysis. The final section of the article presents conclusions, recommendations for further research and the limitations of the study.

2. Literature review

NGOs are entities that operate independently of government involvement, are run by citizens and act for a chosen social goal. The most common legal forms they adopt are associations and foundations. Currently, in Poland there are about 143,000 registered NGOs, about 100,000 of which are active (Charycka and Gumkowska, 2019).

The extraordinary scale and speed of changes caused by the COVID-19 pandemic have challenged NGOs, affecting numerous areas of their work (Kim and Mason, 2020, McMullin and Raggo, 2020; Charycka and Gumkowska, 2021). Latest studies (Kim and Mason, 2020; McMullin and Raggo, 2020; Young et al. 2020, EFA, 2020, Stewart et al. 2021) confirm the great impact of the COVID-19 outbreak on the activity, management, work environment and overall condition of NGOs.

While the pandemic has increased the demand for the services of NGOs in many areas, at the same time it injured their finances and staffs and very often forced them to reorient and develop new way of performance. Most organizations had to withdraw from planned actions and cancel fundraising events. Half of them have struggled to reach beneficiaries or deliver services in lockdown (EFA, 2020). At the same time income from both individual donations and services of many NGOs dropped, and their human resource capacity was reduced (EFA, 2020). Their biggest concerns include lost revenue and cash flow disturbances; reaching and engaging supporters; human resources in relation to pay roll, remote-work management, stress and health; and services delivery and fulfilling the needs of the beneficiaries and clients (Stewart et al. 2021; EFA, 2020). Also, organisations very often indicate the need to increase digital skills (EFA, 2020).

When looking at numbers, NGOs finances have been negatively stuck in many ways. Restrictions related to COVID-19 appearance caused decreasing individual donations, fees for services and event participation, and membership dues (Stewart et al. 2021, EFA, 2020, Johnson, et al. 2021). In US over 8 in 10 organisations lost revenue and over 7 in 10 had reduced programming (Johnson, 2021). In European countries 62% of organizations expected that their total revenue for the rest of 2020 (after the pandemic begun) would be lower than anticipated at the beginning of 2020. Responses differed across the nations and by organisation size. Respondents in the UK (71%), Spain (71%) and Italy (70%) were more likely to say their revenue will be lower than anticipated, while in Germany 37% of organisations expected their revenue would be higher than estimated (EFA, 2020). In Poland 65% of NGOs believed that the pandemic has worsened their situation and 57% had lower revenues in 2020 than in the previous year (Charycka and Gumkowska, 2021). Most leaders of organizations already was afraid that long-term

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financial stability was in jeopardy, which had consequences in the form and scope of their reaction for the pandemic crisis (Johnson, 2021).

In many countries a variety of protection programs were offered, however usually they are seen as insufficient. Only 13% of NGOs received funding from government and 21% received other grant funding to continue or increase services, while 36% experienced increased demand for their services, according to European Fundraising Association (EFA, 2020). On the other hand, many organisations experienced reduced government revenue, as public institutions face their own challenges and cover new expenses (Johnson, 2021; Charycka and Gumkowska, 2021).

Since COVID-19 pandemic enforced sudden shift in organization functioning to a great extent, this require not only operational changes, but also new strategic vision (Rottkamp, 2021). In this context realigning programmatic strategies are mentioned as a tool to follow the changing needs of different groups of organization's stakeholders; identifying new revenue streams, joining forces with other organizations and new ways to stay connected with stakeholders, communities, and the public and also accepting and adopting technology solutions (Rottkamp, 2021). This strategic transformation has many aspects and is complex, but organisations already make an effort to embrace and implement all needed changes. For some of them, pandemic is not only a challenge, but also an opportunity to step further and look for new business model or vision. Investments that organisations make today will benefit in the future in collaboration, communication and relation building, financial possibilities and team stability and engagement. The pandemic, in some way – despite all the difficulties and challenges – stimulated NGOs to be more agile and to introduce innovations. It also challenged NGOs to analyze their processes, procedures and overall functioning in a new way in the future. So this process of changes, forced by pandemic situation, can also bring some positive modifications in adapting their cultures to be more flexible and paperless (Chikwanda, 2020).

To be able to continue their activity, NGOs started to transform in many ways and in many areas. Most of them found some new ways to deliver services, e.g. increasing significantly their online offer (EFA, 2020). Also, as their most common problem is the ability to raise enough funds, NGOs were transforming their fundraising strategies, implementing digital tools and diversifying their approach to use a larger variety of channels. Many organisations also launched an emergency appeal, asked corporate partners for support or increased their focus on grants (EFA, 2020). NGOs were also encouraged (or forced) to explore new, innovative revenue sources and to divers revenue streams more (Johnson, et al. 2021).

It is also worth noting that although most of organisations experienced an instant impact on their programs and financing, those with more reserves were less likely to reduce operating hours, lose staff, or experience difficulty getting supplies or vendor services. What is more, they were less likely to experience higher demand for services during the pandemic (Kim and Mason, 2020).

There are, however, some sources of revenues that in many organizations have increased during the pandemic. That include most of all contributions from large foundations and corporations (Finchum-Mason et al. 2020; Johnson, et al. 2021) and individual donations to some extent (Li and Feng, 2021; Johnson, et al. 2021). The number and amount of donations were not related to the size of reserves, which imply that donors aren't much interested in financial situation of the organisation (Kim and

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Mason, 2020). This is also a source that is much less available to smaller or community based organizations (Johnson, et al. 2021). In the COVID-19 perspective, donor behavior differs depending on the financial fairness perception in NGO (Li and Feng, 2021). As authors explain, it may be linked to the fuzziness of the use effect of donated funds and the evaluation difficulty, which is visible especially under the pandemic condition.

As mentioned, philanthropic foundations visibly increased their donations (Finchum-Mason et al. 2020). The majority of them are stating that they also introduce important modifications in how they support their grantees, that they are loosening restrictions, changing how funds can be used or prioritising certain communities most affected by the pandemic. This include reducing reporting requirements, providing additional grant funding and making such funding unrestricted.

COVID-19 pandemic and its turbulences had great impact on NGOs' capacity. It affected human resources on individual, team and organisational level (Akingbola, 2020). Most important consequences for NGO's human resources include layoffs; remote work issues related to team dynamics, mental health concerns, work schedule or work-life balance (Akingbola, 2020); employee' participation in decision making process and their ability to collaborate, which is traditionally an important value and an element of organisational culture in many organizations (Levine and McCambridge 2020).

In Europe, on average, over a third of organisations indicated that staff and volunteers had been reduced with highest numbers (half of organizations) in UK (EFA, 2020). In Poland paid staff was reduced in 17% organisations and volunteers number decreased in 36% of them (Charycka and Gumkowska, 2021). Workers had also their hours or pay cut (Stewart et al. 2021). Team instability, very significant changes in work environment like remote work (Young et al., 2020), financial challenges were also related to low employee morale, and conflicts with organizational mission (McMullin and Raggo, 2020). Existing knowledge do not explain the situation of pandemic and previous findings seem not accurate in many areas, therefore as McMullin and Raggo stated (2020, p. 1185) *boards need to be remarkably agile, flexible, and responsive to the ever-changing environment to ensure survival*. They also suggest that organisations with governance structures matched more to predictable environments will experience more changes and transformations between management and leadership activities while moving through the phases of the pandemic. Another NGO organizational characteristics in COVID-19 perspective stress strong solidarity culture that seems to "protect" the organization from potential pandemic-related threats (Feiler and Breuer, 2021). In this perspective, capacity building is seen as a solution that can help in creating more resilient organisation.

Although it is obvious that the pandemic affected most NGOs, their situation often varied depending on their area of activity. As pandemic and also previous crisis experiences showed, human service NGOs experience increased demand for their services during a recession (Hasenfeld, 2010) and may benefit from emergency foundation support and donations (Walker, 2020), while others – including arts and humanities, sports, education, non-COVID related healthcare units have seen a decrease in demand and decreasing revenue (Johnson, et al. 2021). For example Kim and Mason (2020) indicate that arts and culture organizations which depend largely on consumer spending and leisure activities, were generally hit harder by the COVID-19 pandemic. As they show in USA (ibid.) 93% of arts organizations had to or expected to suspend programs, compared with 66% of human service organizations. Also, 75% of arts NGOs reported decreasing demand for services, whereas 57% of human service organizations reported

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increasing demand. What is more arts organizations faced more resource related challenges compared with human service NGOs. Among Polish NGOs the situation among those branches of the sector was quite similar as in other countries (Charycka and Gumkowska, 2020, 2021). The share of organizations that suspended all or most of their activities is highest among sports (80%), cultural (73%), local development (60%) and health (58%) organizations. On the other hand, most or even all activities conducted so far are most often carried out by organizations in the area of social welfare (57%). These data show that the cultural and sports industries were hit hardest by the consequences of the pandemic in the sense that the vast majority of them had to suspend most or all of their activities. Organizations from the social welfare sector are in the relatively best situation. After a year of COVID-19 crisis this tendency was still visible. The deterioration of the situation was most often declared by NGOs dealing with local development, sport and tourism, as well as culture and art. On the other hand, the pandemic was the most common impulse for development for social welfare organizations. (Charycka and Gumkowska, 2021).

Within the healthcare and education sector, the impact of COVID-19 on generated income has been mixed, however mostly negative (Johnson, et al. 2021). Participation in education services for both adults and children declined, while most of organizations reported increased costs for cleaning, protective equipment, staffing and renovations (ibid.). The operating circumstances and specialization of the organization had a large impact on the its functioning in these sectors. For example, organizations running schools (due to compulsory education) were much less affected by the pandemic than those running nurseries and kindergartens (Charycka and Gumkowska, 2021). In the face of the pandemic, many organizations also began to take new actions, previously not related to their area of activity. These organizations most often started to support seniors (40%), but also doctors and paramedics (30%), sick or disabled people (28%) and people in quarantine (27%). Their activities most often included information and on-line educational activities (61%), emergency assistance (e.g. shopping, serving meals) (25%), understanding the needs of recipients related to the pandemic (24%), sewing masks (23%), activities for self-organization, volunteering (23%), purchase / distribution of hygiene products, disinfectants (22%), or financial and material support (e.g. organization of collections) (18%) (ibid.).

Under the pandemic situation, for some organisations digital development is only a necessity, for others it is a part of strategic and (in many ways) permanent change of the way they work, communicate, raise money or deliver services. It is too soon to state whether these changes are to stay for good (Rottkamp, 2021). In the past, information and communication technologies (ICT) weren't a priority at many NGOs, mostly due to the expense and resources required. These organisations were in a difficult situation ever before the pandemic and in today's reality they are at a big disadvantage (Rottkamp, 2021).

In NGOs, digitization built greater efficiency because it makes specific elements of work easier, and communication in some aspects becomes simpler and faster. Digitization enables NGOs to reduce labor costs by automating certain tasks, personalizing the donation process, increasing transparency and trust in digital technologies, focusing on attracting people supporting the ideas of the organization, building relationships to a greater extent than when focusing on traditional fundraising techniques, virtualizing electronic marketing and decentralizing their services (Herbert, 2017). In addition to its opportunities, digital transformation brings challenges for these organizations. Digitization is a long-term process, that requires strategic planning, finances and careful thought. It is often difficult for NGOs due to the conditions and constraints under which they operate, such as stricter budgets, slower growth potential

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and a slower adaptive culture (Mansfield, 2014), but also their perception in the public space (e.g. the expectation of maximize the proportion of donated funds spent on the provision of services and minimize administrative costs, including technology expenditure) and issues related to organization management (avoiding risk, the need to care for the image of the organization) (Krueger and Haytko, 2015).

Previous studies on digitization in NGOs also indicate, above all, that these organizations are slowly adapting to changes in the digital space (Neff, and Moss 2014), and that they do not fully use the tools they implement, do not operate in an interactive manner and that they do not perceive and do not use the potential of social media (Campbell et al. 2014). Moreover, Gordon et al. (2009) indicate that the consequences of a low Internet presence for NGOs are associated with the loss of potential customers, volunteers and donors, as well as the image of a modern, outdated organization.

COVID-19 crisis pressures for the need to begin or accelerate on digital innovation (Ibrahim et. al. 2021). During the COVID-19 pandemic, digitization technologies have become more critical (Nandi et al., 2021). Email, social media messaging and websites were most commonly used by vast majority of NGOs to fundraise and build supporter engagement. As a result, almost half of respondents reported an increase in money donated online. Although almost all organisations used some digital channels for fundraising to some extent, there were notable differences across the national data sets (EFA, 2020). Also in Poland organisation tried to transfer their activity online after the pandemic begun. Although 65% of organizations believe that the pandemic has worsened their situation, at the same time 52% of them see some positive consequences of the pandemic for their organization (Charycka and Gumkowska, 2021). They are mainly related to the transfer of some activity to the Internet and greater use of ICT in places where previously it seemed unnecessary or even impossible. This resulted, inter alia, in reducing bureaucratic burdens, bigger training availability, better and faster communication and generally favorably assessed changes in the organization in the area of teamwork, and learning how to cope with crisis situations (Charycka and Gumkowska, 2021, pp. 31-32).

After a year of the pandemic, 34% of organizations in Poland operate entirely or mostly online, and at the same time 39% of organizations do not conduct any activities online (Charycka and Gumkowska, 2021, p. 10), so the discrepancy in the manner of carrying out activities is large. At the same time, 41% of organizations, as a result of the pandemic, increased the scope of activities carried out remotely, and 31% of organizations plan to maintain remote activities also after the end of the pandemic (ibid.). However, the significance of the pandemic for the digitization of the activities of an NGO, stability of the changes, or willingness to continue the transformation, is to be seen in the future. For NGOs, it can be an extremely important moment to search for a new identity and a new way of carrying out their mission.

Accordingly, the authors hypothesize that:
H1: the COVID -19 pandemic has a negative impact on the financial situation of NGOs, limiting the possibilities of their operations in Poland.
H2: the COVID pandemic has influenced the functioning and activities of NGOs to a varying degree, depending on their field of activity.

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3. Research methodology and characteristics of the survey

The analyzes are based on the results of a survey conducted among representatives of non-governmental organizations in the period April-May 2020. The questionnaire, originally obtained from The Nonprofit Institute operating at the University of San Diego (USA), was adapted so that the questions contained in it were adequate to the situation of the Polish non-governmental sector, and it was supplemented with additional questions regarding wider variety of issues. Many of the questions were open-ended, which gave the respondents the opportunity to freely express their problems and needs, without imposing a specific subject or form. During the subsequent analysis of the results, they were coded by creating appropriate categories. The questionnaires were sent to the organizations through the Marshal's Offices, which have the bases of the organizations in their voivodship and are in direct contact with them. 115 questionnaires were collected. The respondents were leaders of organizations (mostly board members).

The largest share in the sample are NGOs whose main area of activity is sport, tourism, recreation and hobbies (23.9%) and organizations operating in the field of culture and art (23.9%). These two groups of organizations account for almost half of the research sample. The next places in terms of participation in the research sample are organizations dealing with social services and social assistance (19.5%), education and upbringing (12.4%) and local development in the social and material dimension (10.6%). The remaining NGOs account for 9.7% of the survey participants.

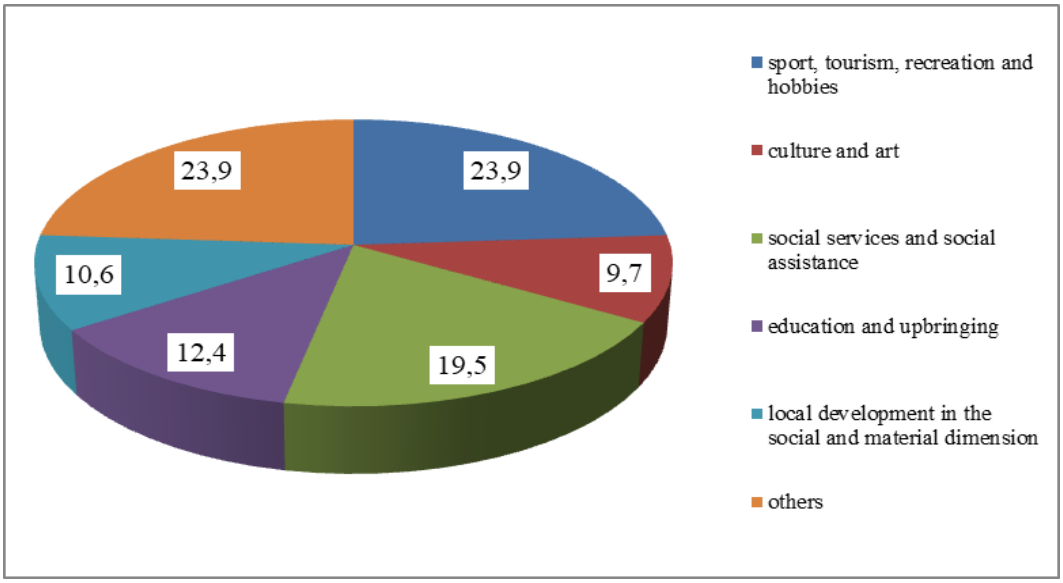

Figure 1. Structure of the research sample by area of activity (in%)
Source: own calculations based on data from the survey

In order to answer the research questions formulated in the introduction to the article, a descriptive analysis was carried out, supplemented by the results of the chi-square test of independence. The analyzes were carried out with the use of the Statistica 13.3 package. For the six questions selected for analysis, pivot tables were created in which the question regarding the area of activity of NGOs was used as a segmentation criterion. On the basis of the pivot tables, the groups of NGOs, separated according to the area of their activity, were compared.

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In order to deepen the conclusions and determine whether the observed differences in the responses in the distinguished segments of NGOs are statistically significant, the Pearson chi-square independence test was performed. The reason for choosing this test was the nominal measurement level of both variables, on the basis of which pivot tables were created - both the variable constituting the segmentation criterion and the analyzed variable. This test is based on comparing the observed values (obtained in the tables) with the expected values (values that would appear in the tables if there were no relationships between the variables). There is a relationship between the variables if the difference between the observed and expected values is large - statistically significant (Adeyemi, 2009).

4. Results

4.1. Expected consequences of COVID-19 in the very short term

An analysis of the opinions of representatives of NGOs indicates that at the time of the survey, as many as 40.4% of organizations did not bear salary costs, and in the case of 1.8% of them, the representatives participating in the survey did not know about the possibility of financing salaries.

On the basis of the answers of the remaining survey participants, it can be concluded what is the probability of problems with financing the costs of remuneration. Within the next 4 weeks, 28.8% of the survey participants indicated the problem with full financing of wages and salaries as a very probable event. According to a further 36.4%, such a situation was rather likely. Thus, about 65% of the participants considered problems to be likely to occur.

In the horizon of the next four weeks, the representatives of NGOs whose main area of activity are culture and art (100%) as well as local development in the social and material dimension (85.7%) are most worried about problems with financing the costs of remuneration. It is also worth adding that representatives of NGOs dealing with education and upbringing (60.0%) as well as sports, tourism, recreation and hobbies (53.3%) most often consider such a situation unlikely.

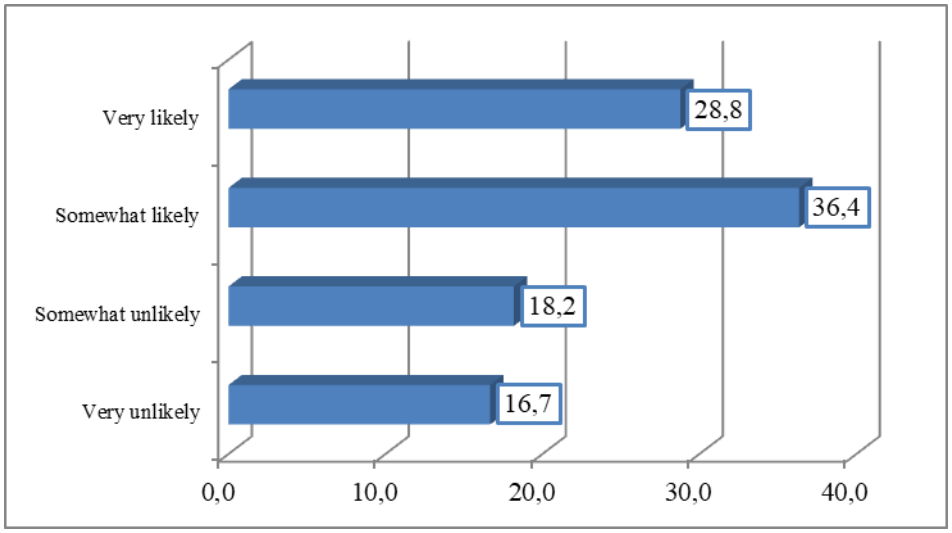

Figure 2. Ability of the organization to fully finance wage costs for the next 4 weeks (in %)
Source: own calculations based on data from the survey

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In the opinion of the survey participants, the extension of the time horizon for the question regarding the financing of wages and salaries gave hope for the necessary support in this respect, thanks to which answers confirming the possibility of problems were indicated less frequently and the frequency of selecting answers indicating that such a situation was unlikely increased (see Figures 3 and 4). Problems with financing wages and salaries over the next 8 weeks are expected by 52.9% of the survey participants, of which 22.9% believe it is very likely, and 30% consider such a situation rather probable.

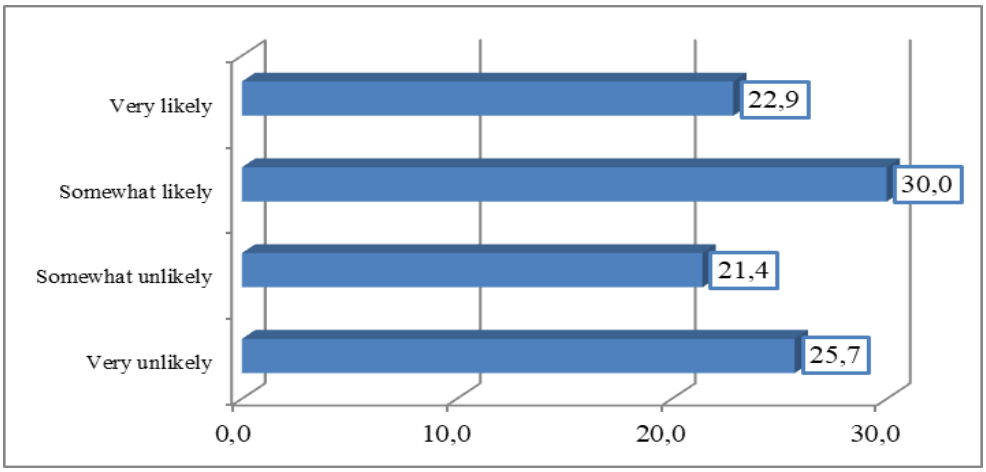

Figure 3. Ability of the organization to fully finance wage costs over the next 8 weeks (in %)
Source: own calculations based on data from the survey

Over the next eight weeks, the greatest concerns related to the possibility of financing wages and salaries are (similarly to the four-week horizon) representatives of NGOs whose main area of activity is culture and art (100%) and local development in the social and material dimension (83.3%). On the other hand, the possibility of problems with financing wages is considered unlikely most often by representatives of NGOs dealing with education and upbringing (90.9%) as well as sports, tourism, recreation and hobbies (62.5%).

Table 1. Results of the chi-square test of independence between the variables concerning the ability of the organization to fully finance wage costs and the field of activity of NGO's

Variables	Field of activity	
	Chi2	p
How likely is it that your organization will be able to fully finance the payroll costs over the next 4 weeks	34.299	0.10168
How likely is it that your organization will be able to fully finance the payroll costs over the next 8 weeks	**48.805**	**0.00298**

Source: own calculations based on data from the survey

The results of the chi-square independence test (Table 1) allow to state the existence of a relationship between the area of activity of NGOs and the perception of the possibility of financing wages and salaries for the next 8 weeks at the significance level of $\alpha = 5\%$. Moreover, no relationship was found between the perception of the possibility of fully financing wages for the next 4 weeks and area of activity.

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4.2. Concerns about the negative consequences of the COVID-19 pandemic

Study participants rated how much they fear the various negative consequences of the COVID-19 pandemic on a five-point scale (1- not a little, 2- slightly, 3- to some extent, 4- rather, 5- very much). On the basis of the sum of the percentage of responses 4- rather and 5- very much, a ranking of the negative consequences that are most feared by people participating in the study was prepared.

Representatives of NGOs, among the possible negative consequences of COVID-19, were most concerned about the delay in awarding subsidies for the activity / project implementation (65.8%) and a decrease in funds obtained from collections / donations (58.5%). A slightly smaller percentage was afraid that, as a result of the COVID-19 pandemic, they would lose revenue from fees due to the cancellation of an event / program (e.g. as part of a paid activity) (47.6%). Almost 40% of the survey participants feared the lack of reimbursement due to the non-eligibility of expenditure under projects implemented from public funds. On the other hand, the consequences of COVID-19 indicated least frequently by respondents included the inability to pay rent, utilities, etc. (29.0% of responses) and the need to dismiss employees (21.6% of responses).

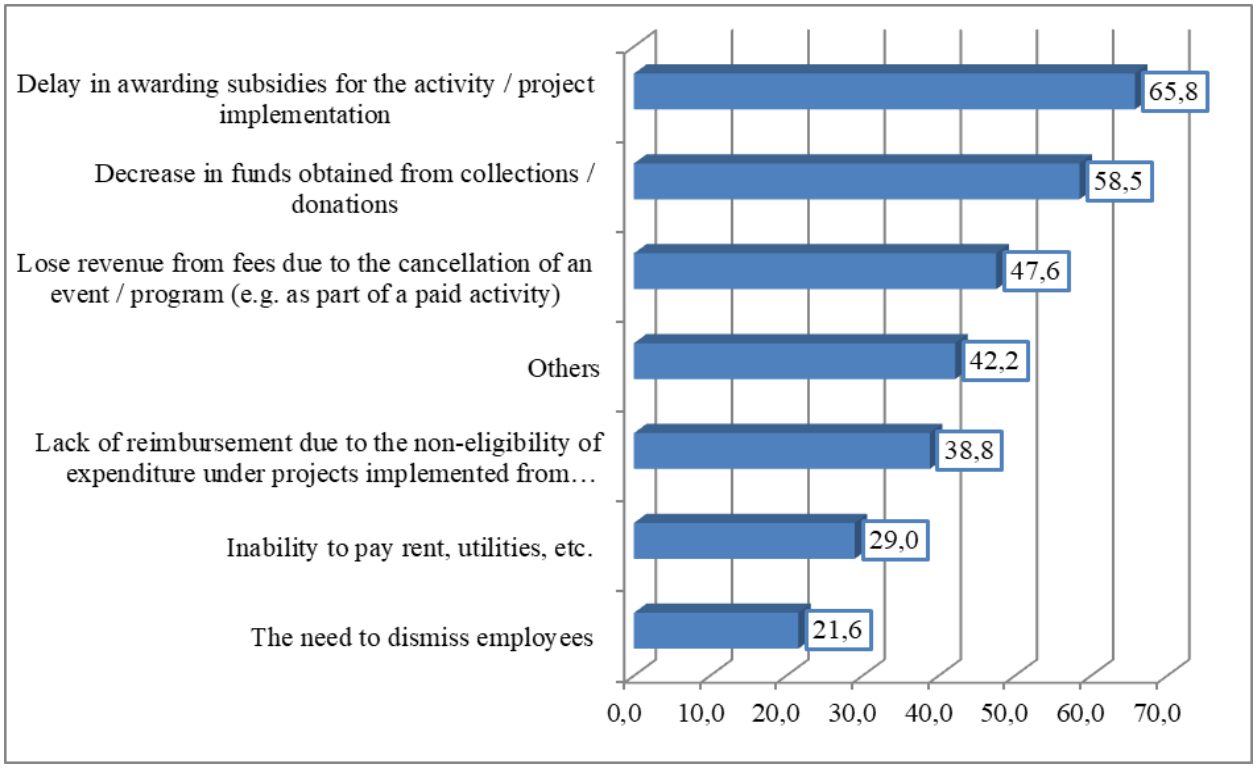

Figure 4. The greatest concerns of representatives of NGOs related to the COVID-19 pandemic
Source: own calculations based on data from the survey

Based on the answers given to the question about the effects of the COVID-19 pandemic, a ranking of consequences was also created, the occurrence of which representatives of NGOs are not afraid of at all. A positive conclusion from this ranking is that almost half of the survey participants (48.0%) are not

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afraid of the need to lay off employees at all. In addition, 36.4% of NGO representatives believe that the COVID-19 pandemic does not threaten the ability to pay rent, utilities, etc. Every fourth study participant was not afraid that the COVID-19 pandemic would lead to loss of fee income due to the cancellation of the event / program (e.g. as part of paid activity) or until no reimbursement of costs due to the ineligibility of expenditure under projects implemented from public funds. The risk of a decrease in funds obtained from collections / donations as a consequence of the COVID-19 pandemic did not occur in the opinion of 15.1% of respondents. It is also worth emphasizing that only 8.1% of representatives of NGOs were not completely afraid of delays in awarding subsidies for the operation / implementation of the project.

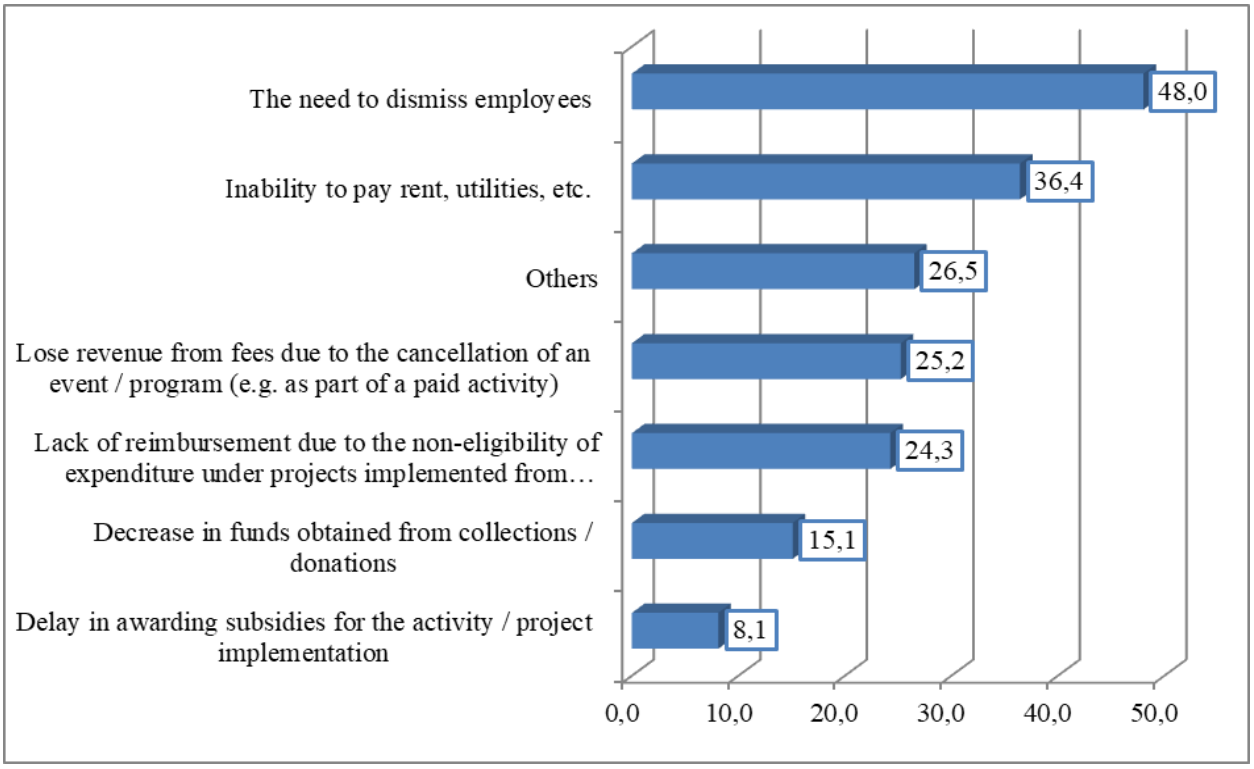

Figure 5. Consequences of the COVID-19 pandemic that representatives of NGOs are not afraid of
Source: own calculations based on data from the survey

Based on the results of the chi-square independence test (Table 2), it can be concluded that there is a relationship between the area of NGO activity and the three consequences of the COVID-19 pandemic, with the significance level of $\alpha = 5\%$. The three consequences of the pandemic include: loss of revenue from fees due to the cancellation of an event / program (e.g. as part of a paid activity), the need to dismiss employees and the inability to pay rent, utilities, etc. There is no relationship between the remaining pairs of the analyzed variables.

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Table 2. Results of the chi-square test of independence between the variables concerning the consequences of the COVID-19 pandemic and the field of activity of NGO's

Variables	Field of activity	
	Chi2	p
Loss of revenue from fees due to the cancellation of an event / program (e.g. as part of a paid activity)	**34.762**	**0.02141**
The need to dismiss employees	**32.614**	**0.03718**
No reimbursement of costs due to the ineligibility of expenditure under projects implemented from public funds	18.577	0.54946
Delays in awarding subsidies for the operation / implementation of the project	23.181	0.28000
Inability to pay rent, utilities, etc.	**33.465**	**0.02998**
Decline in funds obtained from collections / donations	19.976	0.45945
Others	19.430	0.49408

Source: own calculations based on data from the survey

4.3. Changes in the provision of services

In an open-ended question, participants pointed to the changes that have occurred in the provision of services by their NGOs in connection with the COVID-19 pandemic. Some participants indicated more than one change. The answers provided were classified into four categories (Figure 7).

Due to the COVID-19 pandemic, NGOs most often canceled, suspended or closed facilities (64.4%). Half of NGOs transferred work and activities online (32.2%). Moreover, 20.0% of the survey participants indicated other changes in the scope of service provision, and 7.8% reported switching activities to other or additional activities.

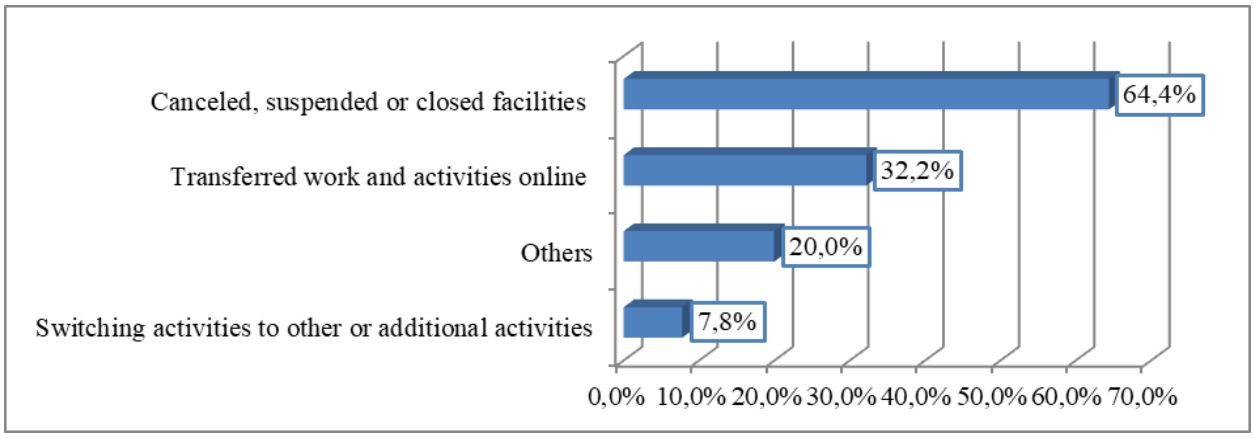

Figure 6. Changes in the provision of services in connection with the COVID-19 pandemic
Source: own calculations based on data from the survey

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4.4. The most urgent challenges faced by NGOs

Study participants identified one of the most pressing challenges faced by NGOs in the COVID-19 pandemic by selecting one out of ten responses to a single-choice semi-open question. The largest percentage of respondents considered the issues related to financing activities, maintaining the organization, financial liquidity, fixed costs, and formalities to be such a challenge (23.5%). On the next place were other challenges indicated by the respondents, not included in the answers to the question, such as, for example, survival, return to normalcy, very specific tasks such as publishing a book, contact with XYZ (14.7%). The percentage of indications exceeding 10% occurred in the case of two further responses - preparation for the implementation of tasks after the lifting of restrictions (in the new formula) - e.g. organization of classes, trips, events (13.7%) and transfer of services to the network, organization of online activities, preparing, for example, new materials, staff training, organization of meetings, classes, etc. (11.8%). In total, almost 64% of the study participants indicated one of the four challenges described above.

The remaining challenges related to the COVID-19 pandemic were less often selected as the most urgent by study participants. In the opinion of 9.8% of the respondents, the most urgent was to ensure the efficient functioning of the team, ensure their safety, the ability to perform tasks, and integrate the team. According to 8.8% of the survey participants, the most important thing was to maintain contact with beneficiaries/ pupils / clients; supporting them, motivating them, keeping them organized, maintaining relationships with them. Other participants of the study indicated solving organizational problems as a key issue - 7.8% considered the most urgent challenge to be the inability to perform tasks at present or large limitations in their implementation, 5.9% chose difficulties in planning decision-making, and 2.0% the highest priority attributed to formal issues related to the implementation of projects - concerns about whether necessary changes will be introduced, etc. It is worth adding that among the representatives of NGOs, 2.0% were people who indicated the lack of the most urgent challenges related to the COVID-19 pandemic.

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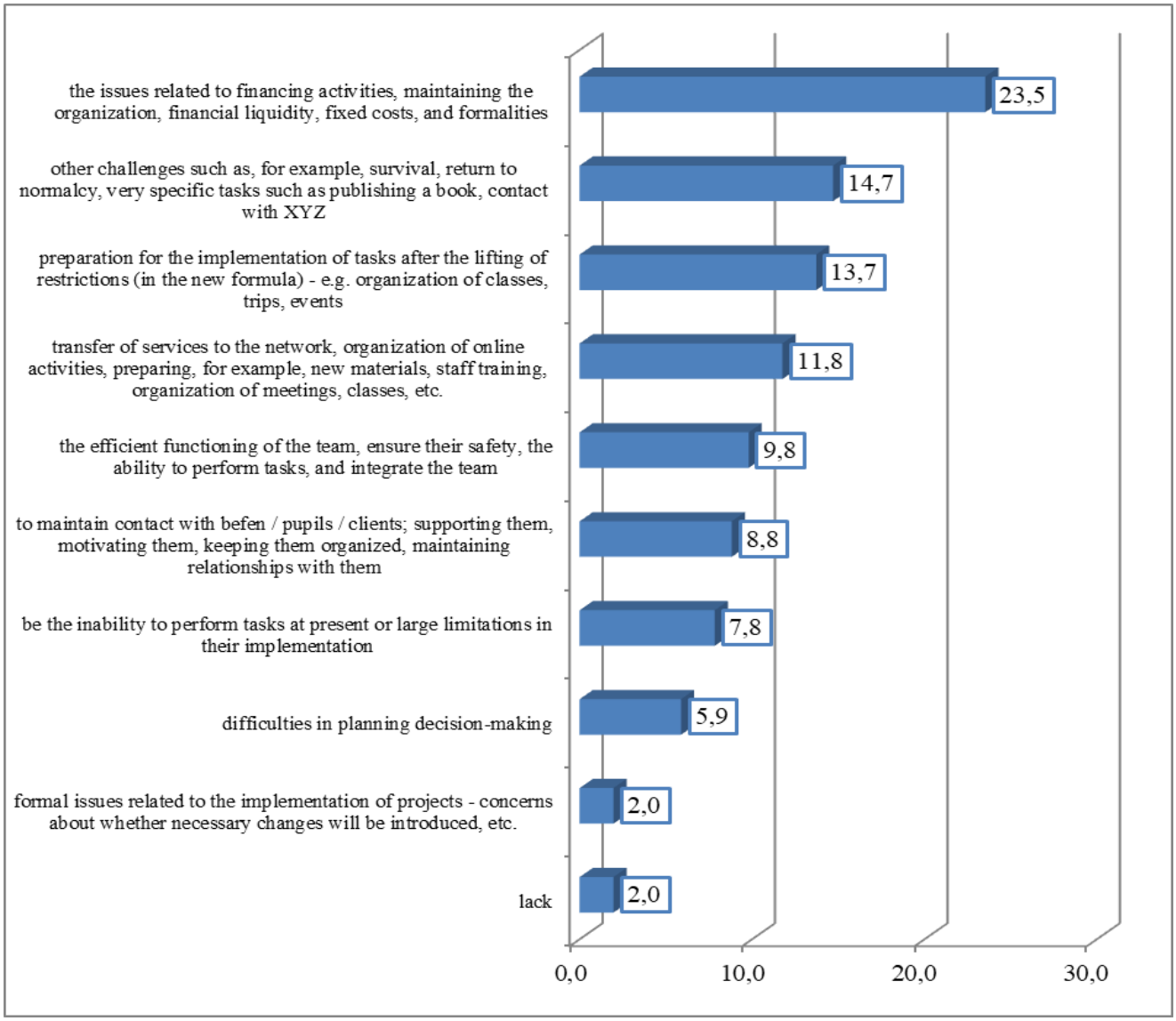

Figure 7. The most urgent challenges faced by NGOs in connection with the COVID-19 pandemic
Source: own calculations based on data from the survey

Based on the obtained results of the chi-square test of independence (Table 3), it can be concluded that there is a relationship between the area of NGO activity and the perception of the most urgent challenges of NGOs related to the COVID-19 pandemic at the significance level of $\alpha = 5\%$. There is no relationship between the variables in the province and the most urgent challenges faced by NGOs in connection with the COVID-19 pandemic.

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Table 3. Results of the chi-square test of independence between the variable concerning the most urgent challenges faced by NGOs in connection with the COVID-19 pandemic and the field of activity of NGO's

Variables	Field of activity	
	Chi2	p
The most urgent challenges faced by NGOs in connection with the COVID-19 pandemic	**78.913**	**0.0133**

Source: own calculations based on data from the survey

5. Discussion and Conclusions

The article presented two research hypotheses. The first assumed that the COVID -19 pandemic has a negative impact on the financial situation of NGOs, limiting the possibilities of their operations in Poland. This hypothesis was confirmed. As shown in the article, a large percentage of Polish NGOs indicated loss of revenue from fees due to the cancellation of an event / program (e.g. as part of a paid activity) and decline in funds obtained from collections / donations. Similarly the research by Deitrick et al. 2020 points out that the most pressing fears related to the epidemic intensify the decline in donations, loss of fee-for service revenue and delayed grant processing. As this study shows. Polish NGOs also express concerns about the need to dismiss employees. A similar finding can be found in the studies of other scientists (see. eg. Deitrick et al.; Fahum Mason et al.) However, many scholars also point to the dramatic problem of burnout of paid staff and volunteers engaged in preventing undesirable effects of COVID-19 (Deitrick et al. al. 2020; Schoebel et al. 2021; Ben-Porat, 2014). In turn, as established in this study, Polish NGOs suffer even from the inability to pay rent and utilities, etc. and the USA of public support (Diaz 2020). As a consequence of the pandemic, the financial condition of most of them deteriorated significantly (Luppi, 2021; Eurofund, 2020).

The second hypothesis assumed that the COVID pandemic has influenced the functioning and activities of NGOs to a varying degree, depending on their field of activity. It is worth to emphasize therefore that the results of analyses proved that the field of activity of NGO's impact the challenges and some of the consequences of the COVID-19 pandemic. With regard to the outlook for NGOs' activities, the organizations anticipated the possibility of financing salary costs within 2 months, but no relationship was found between the perception of the possibility of fully financing salaries for the next 4 weeks from the beginning of the pandemic.

The results of the study indicate a greater interest in the use of IT tools in online communication of the surveyed NGOs with the environment. This in line with results of a research of Grønbjerg (et al. 2020) of who point out that the stay-at-home order was prompted by extensive efforts by NGOs to transfer services to telephone or internet platforms to manage the delivery and receipt of services in this format, both for non-profit organizations and customers. The authors emphasize that for clients it meant IT knowledge and access to cameras, microphones, high-speed Internet and the necessary software. For nonprofits, making sure employees had similar resources, as well as data management systems, IT security, and remote access to files and office equipment was also needed.

The importance of the results and contributions presented in the article has to be considered with their limitations in mind. First, a causal relationship was not confirmed as the analysis shows only correlations. Second, because this study's sample was relatively small and represents one country origin,

the findings cannot be generalized. Therefore, replication of this study in different contexts is suggested to test the generality of the results. Third, the comparison to earlier findings is limited since the lockdown has never happened before on such a large scale and never before had such a multidimensional socio-economic impact taken place. What is more, the limitations of the presented research include the implementation of the survey in the initial stage of the COVID-19 pandemic, characterized by a significant deterioration in the moods of entrepreneurs and consumers, resulting from high uncertainty and concerns about the impact of COVID-19. Moreover, the size of the research sample (n = 115) is a constraint.

However, the value of this study lies mainly in the fact that its results bring essential knowledge about the NGOs early response and needs in the pandemic situation. Despite the fact that a lot of scholars provide research indicating the impact of COVID-19 pandemic on nonprofits, most of them are related to US organizations derived from different states. This article fills a specific research gap in the field of NGOs by explaining the influence of the COVID-19 pandemic on activity of organizations from the perspective of Polish NGOs sector. Also, despite the fact that NGOs' sector is often seen as homogenous, results present important differences between the areas of their activity in terms of both their concerns and effects of pandemic situation. This brings new insight, especially since most authors refer to the situations in the USA, which is significantly different that European perspective, Eastern-European in particular.

The article provides guidelines for public authorities and leaders of nonprofits on what necessary challenges should be overcome to help the third sector to avoid financial and staff problems as well as improving IT infrastructure to fill their mission in turbulent time of pandemic.

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TRANSITION TOWARDS THE ARTIFICIAL INTELLIGENCE VIA RE-ENGINEERING OF DIGITAL PLATFORMS: COMPARING EUROPEAN MEMBER STATES *

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Abstract. The present study is directed at comparing the performances of the 27 European Member States in the period 2012 – 2021 with the choice of assessing their improvement in the transition toward Artificial Intelligence. The study, opening from an analysis of the key factors with strategic rate in the countries' transition, is centered on society, law, physiology, and trust impacts. The valuation of the effects was evaluated by seeing forty - two official European Commission rapports in order to create a composite analysis and assessment of the state of the transition in Europe. The study pointed at understanding the degree of transition related to 27 European Member States in the realization of AI targets. The outcomes of the study highpoint that the transition, evaluated with the support of the composite analysis, is current with a different degree between the Member State and only some elements could be evaluated as suitable in the transition toward an artificial intelligence system in the Europe.

Keywords: Artificial Intelligence; European Member States; Digital Platforms; Trust

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JEL Classifications: L2, L26

1. Introduction

Artificial intelligence (AI) is the last frontier of the digital transformation. Technologies, software, programs and applications have gotten smarter thanks to machine learning. That is, thanks to particular algorithms, they are able to learn and act even without direct human control. The use of AI applications is now increasingly widespread in daily life and in various work environments. These are the public administration challenges in the world of AI. The European Union code of ethics of 2019: towards a "reliable" and "anthropocentric" AI to ensure a more reliable and anthropocentric AI, the European Union has published the European code of ethics for artificial intelligence". The European strategy reads the guidelines of 8 April 2019 - places the human being at the center of

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the development of AI with the aim of creating trust in anthropocentric artificial intelligence. The European Union then indicated six fundamental requirements to be respected: human intervention and surveillance, technical robustness and safety, confidentiality and data governance, transparency, diversity, non-discrimination and fairness, social and environmental well-being Responsibility also understood as accountability. AI should: 1) respect the law, 2) observes ethical principles and 3) demonstrate robustness. The European Union wants to extend its code of ethics even beyond its borders for an ethical approach to artificial intelligence that is increasingly global. Legg and Hunt (2007), starting from collective definition (page 18) in which 18 sources of intelligence definition have been founded, highlight the importance of psychological definition. The thirty - five definitions displays the strong relation between this topic and the definition of Artificial Intelligence (AI) verify in literature. In Particular, the Authors in "AI researcher definition" (page 21) take into account, 18 definitions of AI. Following this research stream the Authors propose, using the synthesis of the psychological and artificial literature, a possible definition of intelligence identifying three common features: (1) "a property that an individual agent has as it interacts with its environment or environments", (2) "related to the agent's ability to succeed or profit with respect to some goal or objective", (3) "depends on how able that agent is to adapt to different objectives and environments" (page 20). The authors point out that intelligence involves adaptation, learning and understanding. At its simplest, then, intelligence is "Intelligence measures an agent's ability to achieve goals in a wide range of environments" (page 23). It is interesting to note that, from a technological point of view the Authors do not take into account an artificial intelligence definition, but use an interesting perspective to contribute to the deepening of the topic and its possible definition. In fact, following this research stream, Medelyan, et al, (2009) highlight the strategic importance of the relation between artificial intelligence and products with particular attention to the role that artificial intelligence has in creating communities and exchanging information using in the digital age, the platforms. Korb, et al, (2010) offer to researchers and operators of the sector an interesting both technological and methodological points of view with particular attention to the application of AI. During the same period, Arel, et al, (2010) highlight the strategic importance to develop an overview of AI with particular attention to strengths and weaknesses, that depending on the application and context in which it is. Only in three years the, use of AI will be extensive and will be linked to the entire products and services world. This extensive use of AI is linked also to semantic network, as Navigli, et al, (2012) have developed in their research's. Furthermore, Mitchell, et al, (2013) developed an interesting approach to AI, pay more attention to the ability to learn. The Authors, argue that this ability is strictly linked to the intelligent behavior. Following this pillar the Authors, highlight that the advancement in the theory and computer modeling of knowledge processes is of great implication to fields concerned with understanding intelligence. Nilsson (2014) has highlighted the strong development of the topic, with its innumerable applications and theoretical elaborations. The Author, underline the importance to bridge the gap related to AI, particularly between theory and practice. Following this research stream, Ghahramani, (2015), highlight the importance to consider the theme of learning as well as intelligence. The Author recalling the studies, also cited in this introduction, raises the need to deepen the topic. The AI, is a structured sector with to economic and social perspectives and offer continually, technological innovation. What is the future of this sector? It is interesting to note that starting from a technological point of view (Adams et al, 2012; Armstrong et al., 2014) highlight the necessity to develop a future of AI in relation with its applications. Müller, et al, (2016) provide to answer this question highlighting that it is not possible to chart the future of AI without considering its fields of application. AI finds wide application in industry 4.0. Its application is linked to the production, design, interaction and management of objects with the environment, big Company, SMEs, Startup but also groups and individuals (Siarry et al., 2020). The application fields range from the healthcare sector see Covid 19 (Allarm et al., 2020), to marketing (Davemport et al., 2020), passing through manufacturing production and sustainable development (Goralski, et al, 2020), private services and public administration (Marino et al, 2021d; Borges et al., 2020). These applications are limited also by the use of the technology itself in some European countries. For example, the phenomenon of the digital divide (Pariso et al, 2020) poses serious problems of economic growth in countries such as Italy, Greece (Marino et al, 2021b). The deep and rapid diffusion of AI highlights the need for multi - model and predictive approaches that can help also, firms in the decision-making process. Furthermore, the

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simulation of human behavior for autonomous problem solving has been an interdisciplinary field of research in which AI plays a leading role. Classical control systems are used for static environments, where technological, organizational, economical and decision making process change slowly. Unfortunately, these environments are on the verge of extinction (Chen et al., 2019) in fact, the speed of the changes, to be interpreted, need models that process, select and interpret the information and suppose the decision-makers (Blažič, et al 2019). Following this research stream, the relationship between AI and decision process has been investigated particularly team composition and its diversity (Andrejczuk, et al. 2019). The ability of technologies to learn, replicate and process information has grown over the years, underlining the need for regulation of the interaction between firms and technologies, people and technologies, shifting the focus of research from the technological point of view to privacy and ethics (Russell et al 2015). The present study is focused on comparing the performances of the 27 European Member States in the period 2012 – 2021 assessing improvement of the transition toward Artificial Intelligence. The study is focused on society, law, physiology and trust impacts. The valuation of the effects was evaluated by seeing forty - two official European Commission rapports in order create a composite analysis and assessment of the state of the transition in Europe. The study pointed at understanding the degree of transition related to 27 European Member States in the realization of AI targets. The focus of our research is on the European Union, specifically the Member States. Each state is a transition and innovation agent, but it must also solve the uncertainties and bottlenecks that change management highlights. The European Union's member States function as agents that cooperate and compete to create a more ethical and open Europe with the help of artificial intelligence. This type of reflection focuses on the following research question: are the Union's Member States a multi-agent network, and are they addressing the issues associated with the transition to Artificial Intelligence? In reality, not only the private sector, but also the Member States as transformation agents, can recognize improvements in order to adapt their operational structures and subsystems to handle the different frameworks of reference, which are defined by the implementation of new management principles, such as ethics in the relationship between people and technology. This study is one of the first regarding the transition to Artificial Intelligence of the European Union. The issue is strongly addressed by the European Commission (2020) with its recent documents that highlight the need to accelerate towards the transition. An overview is now more important than ever. In particular, the issue of ethics is particularly felt by the European Parliament, as recently highlighted in the official documents of the European Institution. Through our scientific hypothesis, we want to contribute to the acquisition of knowledge in order to better explain the observed phenomena. Artificial intelligence is a dynamic transformation that can be broken down on a micro level, such as job practices, professionalism, and human resource abilities, or on a macro level, such as organizational borders, organizational processes, and the position of States as transition agents. It is worth noting that this final macro aspect, the position of states as agents of transformation in relation to Artificial Intelligence, has received little attention in the literature. This knowledge gap can be filled because certain transformations, such as those including the circular economy (Marino, et al, 2021c) and artificial intelligence, see states as the primary agents of the transformation in terms of implementing and managing laws and prospects for economic growth. The rapid and continuing growth of emerging technology, as well as the advancement of Artificial Intelligence, demonstrate that the conventional paradigm of the state as a supplier of resources and a regulator of rights is no longer sustainable. States compete with one another to draw investments in advanced and innovative industries that are characteristic of ICT and its evolving forms. These considerations emphasize the importance of rethinking the old State model in terms of people, business and community.

2. Theoretical background

AI products' create benefits for people, businesses and the community: more advanced diagnostic tools, more rational and ecological arrangements of collective settlements - the so-called smart cities, information packages for the exercise of professions. Furthermore, AI will be able to produce a quantity of intelligent consumer goods - IoT - capable of rationalizing the behavior of consumers and users of products, and the provision of services. Even more evidences, it was thanks to it and to the joint effort of pharmaceutical companies and healthcare

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companies around the world that in the space of a year it was possible to have the vaccine against Covid-19 when the normal average was around 10 years. At the same time, this technology has also recently brought about necessary in-depth research, as in the case of remote work. It is equally true that AI can create applications that violate human rights both individually and collectively and in any case produce socially undesirable effects. Here, it is necessary to act with a balanced regulation. This regulation must involve the implementation of actions and results that are ethical and not adverse to human rights. This complex field of study and action is analyzed, evaluated and developed in the literature starting from the relationship between ethics as more principles. Ethics are moral principles that govern a person's behavior or the conduct of an action. The psychology has debated ethics for many centuries (Capone, et al, 2020), and there are various well-known principles. The psychological principles of ethics are still today, 2021, strong anchors that guide behaviors and decisions in particular in the relationship between companies, people and technologies. The interaction between technologies, institutions and people represents the main theme to which to apply the philosophical principles mentioned above. Among the technologies available, those that have a high degree of interaction and pervasiveness are those classified as AI. AI ethics are linked to the important enquiry of how, manufacturers and operators should behave in order to reduce the ethical harms that can arise from AI, either arising from unethical design, unsuitable application or abuse. The scope of AI ethics is wide and immediate. A brief point-to-point approach may be highlighted as follows: data privacy and bias in AI systems; concerns about, the impact of AI on jobs and the workplace; concerns about the possibility of AI systems reaching or exceeding human-equivalent capabilities. AI applications, in the last 10 years has shifted from an academic and industry concerns to a matter for political as well as public debate. The increasing AI impact in all sectors: industry, finance and leisure, policing & the judiciary, transport, healthcare, as well as the prospect of AI strategic contribute to the arms race, has prompted an unexpected number of national and international actions, from academia, NGOs and industrial groupings, government and professional groups related to the ethics issue. These national and international actions have led to a multiplicity of results, such as, the publication of a large number of researches developed by international journals, a growing number of countries, but is interesting to note that groups of countries, have announced AI strategies and set up national advisory or policy organizations. Furthermore, new ethical standards are emerging from private and public institutions, big Company, SMEs and Startup. The pervasiveness of AI has been also, assessed in areas such as accounting. In this sector, accounting firms are recording a high impact of AI, both horizontal and vertical; therefore, auditing and advisory functions are changing with benefits for both consultants and customers. At the same time, however, reflections emerge, both, by consultants and customers, on the need for secure data and information processing and verification of ethical behavior by accounting firms. Furthermore, the studies, highlighted the specific impact of technology on ethics, with particular attention to professionalism and judgment in this sector. Nevertheless, this same phenomenon is present in the network as well as within financial promoters. Moreover, the role of auditors in the public and private sectors has created an important debate on the relationship between business ethics and the ethical behavior of auditors. The regulatory changes governing the sector offer interesting research ideas on the ethical dimension should be implemented in the public and private services sector. The mismatch and integration between business and ethics has been a long debate (Phillips et al., 1999). Following this research stream, Crane et al., (2019) underline the importance of a clear point of view linked to business and ethics in the age of globalization. Furthermore, the studies, designed to experiment with their suggested protocol a new logic to address issues concerning the relationship between ethics and business. It is interesting to note that recently contribute by Freeman et al, (2020) starting with the new story of business, highlighted the differences between the topics of business and ethics and provide to elaborate an integration model. This model has been taken up and developed in theoretical studies and applications, concerning decision-making and human resource management (HRM). Starting from a reference article, Greenwood, (2002) related to HRM, with particular attention to a review and conceptual analysis of the topic, the Author pointed out the importance to study and develop reflections and evaluations linked to "not of whether HRM is ethical, but of whether HRM can be ethical." Furthermore, the studies, noted that the organizations utilizing progressively more and more on algorithm-based HR decision-making to monitor their employees. Poff et al (2019), underline the importance to develop of the professional ethics in business with particular attention to different both structures

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and institutions. Following this conceptual background, the aim of the paper is mapping the main ethical dilemmas associated with the development of AI in European Member State. Starting from the considerations highlighted above and connecting them to the purpose of the study, it is possible to identify 4 sets of main application fields, formed by topics related to it. The figure 1 collect the main dilemmas associated with the development of AI in European Member State. In Europe, an interesting debate and actions related to AI insist until today 2021 and will insist on the future. The first step is to highlight the main dilemmas associated with the development of AI. This first step is summarized in Figure 1.

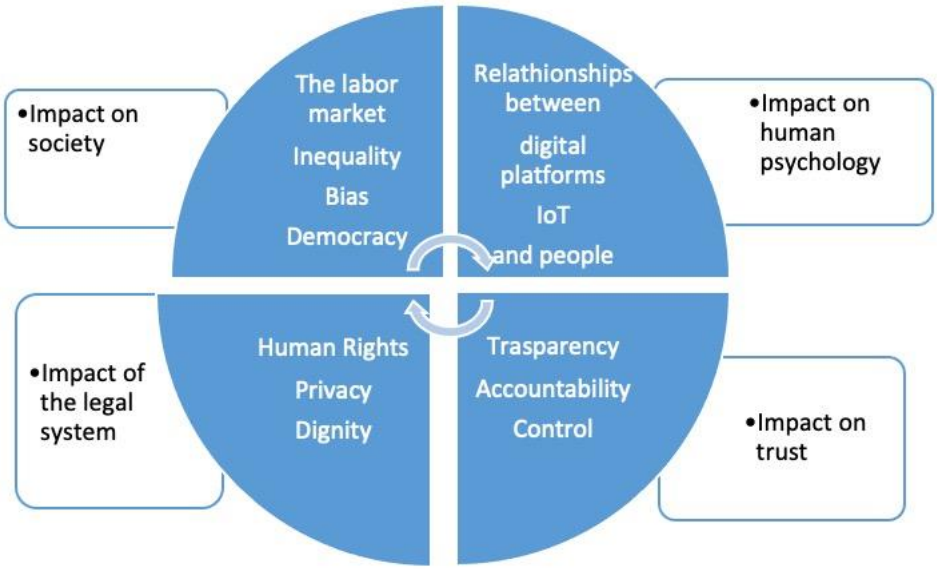

Figure 1. The main dilemmas associated with the development of AI
Source: The authors

The main dilemmas and its pillars are strictly linked each to other as elaborate in figure 1. In the next section will be evaluated, after the development of the individual themes, the actions of the European Member States. The evaluation of the actions is related to the main ethical dilemmas identified and linked to AI.

3. Methodology

Answering the research question (Swanson et al, 2013) means having a qualitative meta-analysis (QMA) collecting and processing the information necessary to create an accumulation knowledge that improves both the transition path of individual Member States and academic research. In order to evaluate AI awareness in the European context, it is necessary to understand how the countries are implementing and should implement actions related to AI. Forty two, official reports (2012 – 2021) were issued: Agency for Digital Italy (2019), AI4All (2019), AI For Humanity (2018), Austrian Council on Robotics and Artificial Intelligence (2018), Austrian Council on Robotics and Artificial Intelligence (2019), British Standard BS 8611 (2016), Council of Europe (2019a), Council of Europe (2019b), Consultative Committee of the Convention for the Protection of Individuals with regard to the Processing of Personal Data (2019), De.digital (2018), Digital Poland Foundation (2019), European Commission (2012), European Commission (2017), European Commission (2018a), European

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Commission (2018b), European Commission (2018c), European Commission (2018d), European Commission High-Level Expert Group on Artificial Intelligence (2019), European Commission High-Level Expert Group on AI (2019b), European Parliament, Council and Commission, (2012), European Parliament, 2017, G20 (2019) G20 Ministerial Statement on Trade and Digital Economy, UK Government Office for Science (2015) Artificial intelligence, GOV.UK (2018a), GOV.UK (2018b), GOV.UK (2019). The UK's Industrial Strategy, Government Offices of Sweden (2018), International Telecommunication Union (2018), International Telecommunication Union (2018), Malta AI (2019), Ministry of Economic Affairs and Employment of Finland (2017), Ministry of Economic Affairs and Employment of Finland (2018a), Ministry of Economic Affairs and Employment of Finland (2018b), OECD (2019), Swedish AI Council. (2019), The Danish Government (2018), The Danish Government (2019), UK Government Department for Digital, Culture, Media & Sport (2019), United Kingdom Commission for Employment and Skills, (2014), World Economic Forum (2018), World Economic Forum. (2019a), World Economic Forum (2019b). National strategies on Artificial Intelligence (2020). Their common denominator was to evaluate AI awareness of the European Countries.

Synoptic framework

We elaborated this information and devised a synoptic framework to outline the progress made so far and to identify possibilities and opportunities for improvement.

3.1. Austria

Austria shows a high AI profile, mainly focused on innovation. The country is oriented to improve ethical outcome linked to the promotion of initiatives, Council on Robotics and Artificial Intelligence with “Einsatz von Robotern und autonomen Systemen” (RAS) that could support the main ethical dilemma associated to the development of AI. The White Paper identifies some critical issues in the development of AI, in particular in the manufacturing sector related to human resources management. Despite this, an effective Austrian AI strategy should include objectives aimed to increase ethical actions. The country's National AI plan related to Figure 1 is focused on the topic: impact on society, with particular attention to the labor market. The economic opportunities linked to AI must be supported by the solution of ethical dilemma, sustaining HRM and taking advantage by the fact that the AI represents 63% of national GDP in the transition from mechanical to digital production and will be necessary to implement strategic actions to increase the ethical behaviors.

3.2. Belgium

Belgium devised a general framework supporting the AI. The actions related to main ethical dilemma concern all four impacts. The actions linked to impact on society, starting from labor market identified the actions to be taken by the public sector. The continuous support of public employees, to understand the implications of AI in public administration, with training and knowledge sharing actions has yielded valid results that the government intends to extend also to the private sector. Despite these actions, both, public and private sectors, underline the importance of complementing ongoing initiatives. The central Government highlight an investment level of €80 million per year equal to at least €1 billion by 2030.

3.3. Bulgaria

Bulgaria has large numbers of AI players across the industry and startups relative to the size of its economy. This strength is all in the private sector, while the public sector suffers from significant weaknesses in the delivery of services using digital and AI solutions. It is interesting to note that in this Country there is a deeply mismatch between public and private sector related to AI. As consequences, some spheres of the impact on society, on the legal system and on the trust in terms of democracy, human rights, transparency, a result that is difficult to understand and the subject of evident and long-term social tensions. Starting from these assumptions Bulgaria presents a weak position in the AI implementation.

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3.4. Croatia

Croatia is committed to a new social, entrepreneurial and technological innovation. This innovation starts from AI and spreads throughout society in both social and legislative aspects. The national AI plan is mainly focused on sustainability actions linked both public and private sectors. The country should gear its efforts towards raising awareness of AI transition policies and promoting tax incentives. The European Commission has strongly recommended that both the private and the public sectors should implement AI actions in their activities.

3.5. Cyprus

Its national AI plan mainly focuses on renewable energy (wind and solar). The problems related to the low level of AI investments' determine bottlenecks and to boost the ethical dilemma. In fact, in the public sector, i.e. digital platforms, the rise of consolidation remote work are creating problems linked to the operator's competencies. These difficulties are wide because is linked to the digital divide of this European Member State. Despite this, Cyprus is putting in place a national strategy for the development of AI. The Public Administration, are developing the plan related to ethical dilemma with particular attention in public sector, supporting AI in domains such as universities, school and National Health Service.

3.6. Czech Republic

The Czech Republic has been quite active in pursuing the solution of ethical dilemmas towards the AI with a good profile in the private sector and particularly in SMEs. In addition, on one hand, the country received substantial EU funding, mainly concentrated in the sector of innovative technologies to raise the awareness of the population in the AI utilization. On the other, as impact on the legal system, the Country has developed an intensive enacting proper legislation to the ethical dilemmas. Several initiatives have been undertaken such as the national AI Plan in which the AI has a leading role in the long term planning.

3.7. Denmark

Denmark has been active in promoting the AI plan and to solve ethical dilemmas with particular attention to the public sector. The country has leader profile in University, School and National Health Service. HRM and AI displays a low level of conflict. The private sector is structured with a large number of SMEs in which AI and related legislation developed complying with the solution of ethical dilemmas. At the same time, the country is one of the highest producers of AI products and workers in digital platforms modality. Many initiatives have been implemented such as the Danish AI Economy to reduce the ethical dilemmas linked both, public and private sectors. The country should work harder at coordinating actions at the national level with actions at the local level in order to avoid different approaches to AI. The strategy is performed by 24 actions for which €9.2 million has been held in reserve by the Danish government for the period 2019-2027.

3.8. Estonia

Estonia published reports on how to advance AI in public and private sector. The proposals made in the last report have been formed into a national AI strategy for 2019-2021. In the strategy, the government takes a leading role in accelerating and supporting the use of AI-based applications in the public and private sector. The AI strategy of this European Member State takes into account actions to boost AI from the government, public sector and impact on society with particular attention to ethical dilemmas, as democracy, bias and inequality. AI in the economy, with particular attention to ability, skills, competencies in the private sector with the necessity to identify a security plan in data repositories, impact on trust – one of four main pillars highlighted in conceptual background Figure 1 – and the impact of the legal system in terms of privacy and dignity. The strategy outlines specific action items across different fields from data governance and open data related activities to support specific projects and skill development.

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3.9. Finland

Finland is one of the European leaders in the AI transition with high attention to ethical dilemmas. The Country planned a strong national financial system to sustain the innovation in the AI in relationship with ethic outcome. Finland created a national AI program in public and private sector, developing several projects for to improve the relationship between innovation, technology and workers, citizens, firms and public administration. This European Member State, organized the World AI Forum conference. The latter was able to encourage the adoption of several best practices and to establish AI and ethical guidelines. In line with these actions, Finland, pay more attention that other Member States to the harmonization of its legislative framework with the European Parliament's criteria for AI and human rights. To support this strategy, has been busy € 8.3 million funding for 2019–2022.

3.10. France

Development of artificial intelligence (AI) is a priority to France. The Country with the task related to AI and ethical dilemmas, are implementing a French strategy on the subject. No other European Member States have shown this reactiveness in AI. The strong push towards AI is given by the idea that it is one of the keys to tomorrow's world. The impact on society, labor market, highlighted in terms of employment, that AI development is possible only with ethical attention to human resource and right. At the same time, the new professions and skills that are emerging in France are supported with specific actions by improving effectiveness of lifelong learning. It is therefore essential to master the technology concerned. Its development raises important ethical questions in terms of impact trust and legal system: algorithm neutrality, use of private data and e-inclusion among them. In this framework, it is interesting to note that many of the biggest digital companies' heads of AI research are currently French. To support these challenges the French Government will invest €1.5 billion to the development of AI in the next two years.

3.11. Germany

Germany shows a very advanced profile in the transition towards the AI with a good management and the ethical outcome. This good management extends to both the impact of AI on society and the legal system. Digital platforms, influence human psychology, displays before pandemic time a balanced relationship with remote work in terms of employees, training and income received. The country carried out several well-coordinated AI initiatives with a good coordination at the national level aimed at achieving the transition from mechanical to digital society. The strengths of the German AI plan can be found in the strong national policy, the awareness and receptivity of the population towards the technological issues. The budget to implement AI strategy, amounts to €3 billion for the period 2019-2025.

3.12. Greece

The country's performance is particularly poor, both in the private and in the public sector. The main weaknesses that can be identified in the AI actions are mostly due to the difficulties in overcoming the barriers created by the mechanical model. Moreover, there is a slow response in adopting the EU Commission's proposals. Efforts have been made to promote new legislation in terms of the impact of the legal system, and to allocate funds for educational and organizational purposes in terms of transition towards AI and ethical outcome. On one hand, impact on society and the legal system and on the other, impact on trust and psychology must be improved in terms of governance, structures and operative task. These decision process making should be supported by a new management culture. The European Commission has strongly recommended that both the private and the public sectors should promote AI and ethical outcome. National Action Plan on AI; should promote, transparency laws and regulations; simplify administrative procedures; implement an AI trust.

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3.13. Hungary

The Hungarian national AI Strategy has been published in the first half of 2020. The complete strategic plan aims to sustain all pertinent sections of the AI value chain from public and private sector with particular attention to data generation and management. The plan underlines the importance of basic and applied research, technology development and AI applications. More particularly, the plan aims to: change the basic pillars of Hungarian ecosystem from mechanical to digital: this challenge take into account data industry, R&D, education, infrastructure and regulatory framework. Focusing on the specific development of public sector, the plan declares the strategic importance to create the conditions of a friendly interaction between the public sector and citizens. The education system and health organization are the pillars of this challenge in public context. Nevertheless, private sector in the National plan plays a strategic role in terms of transition from traditional to innovative sectors. The transition from mechanical intelligence to AI in this Member State has been slow and intermittent. Barriers include a lack of extensive resource-efficient and strategic thinking that could facilitate the transition. The barriers are present both public and private sectors. In the private sector, the SMEs and big companies are intensely attached to the mechanical intelligence. In the agricultural and the public sector, no effective plans or actions were implemented to support the transition. The European Commission underlined the importance of undertaking to implement a Hungarian AI Roadmap, to reduce the gap with outcomes declared by the European Commission.

3.14. Ireland

The Department of Business, Enterprise and Innovation (DBEI) is the focal point in the development of the national AI Strategy. The National plan presents a complete framework addressing the future steps to confirm that use of AI will benefit society. In line with these assumptions, the strategic pillars are: to improve the relationship between enterprise development and AI sector; to develop a human capital long life education; to invest in digital and connective infrastructure; to assure ethics standard and friendly regulatory framework. The Member State created strong actions linked to AI program. Particular attention is dedicated in several government support programs, planning a public e-course to raise awareness about AI, along with creating test for testing public sector AI applications. The private sector will have the occasion to use chosen innovation and development grants for increasing machine learning based solutions. Furthermore, education and research are also in application of a new Master's curriculum at the University as well as interdisciplinary partnership between ICT sector and educational platforms.

3.15. Italy

Italy's AI strategy, formulate in 2019 provide a National guide, elaborating actions and policy recommendations as a first step for Italy's AI strategy. The public consultation linked to National strategy, designed current issues to develop the AI strategy for Italy. The long-term strategy identifies as bottleneck to improve, public services and its digitalization. Furthermore, it presents key actions to increase in terms of: developing AI skills and competences at all education levels with particular attention to the building sector (Agliata et al, 2020) and public administration a lifelong learning program will be implemented; boosting AI competitiveness of the entrepreneurial ecosystem; coordinating a regulatory and ethical framework. Italy's performance has been more positive in the private in terms of SMEs transition towards AI. It is interesting to note that Italian SMEs represent the backbone of Italian production by a number of production units, employees and contribution to GDP. In the public sector, the implementation of AI shows serious delays, both at the central and local level. The biggest bottlenecks for both levels concern the advanced age of public employees and weak digital training. The national level presents as weakness in the use of AI, while the local level does not invest in the purchase and use of this technology. The European Commission underlines the importance to implement an AI plant, to boost the transition. The Italian government allocates €1 billion of public investments by 2025 for the strategy implementation.

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3.16. Latvia

Latvia's AI performance is quite poor, in fact only in 2020; the government released its national AI strategy. The primary problem is to create in private sector an economic value. This sector is structured in large part with startup and SMEs, with a strong vocation for the implementation of digital technologies and AI, but at the same time, a difficulty in investing huge capital to compete on global markets. There is a high stakeholders' awareness in the public sector. In this sector, the transition towards AI is considered as a first strategic step to improve services and to create a large base of opportunities to invest in Latvia. European Commission recommendations are linked to the AI strategy and its implementation. Particular the suggestions concern the use of EU financing also to improve the infrastructure with common rules at the national and local level. In addition, the application of AI national plan, for both public and private sector, include a training program as support to boost the transition.

3.17. Lithuania

Lithuanian Artificial Intelligence Strategy: a vision for the future is the national plan linked to develop AI in this European Member State. The purpose of the strategy is to modernize and increase the current AI ecosystem in Lithuania and guarantee that the Nation is organized for AI implementation. A focusing group related to private sector, academia and governmental institutions has drafted the National plan. The plan, make available an outline of the current AI scenery in Lithuania and a series of policy recommendations in key areas with the purpose to: improving the skills and education in AI for all citizens; joining the national research and innovation ecosystem in the field of AI; facilitating the development and use of AI in all economic activities; strengthening national and international collaborations in AI networks; developing an ethical framework for AI applications. The Lithuanian strategy does not embrace tangible policy actions, but interesting guideline for all stakeholders in the country with policy recommendations aligned with the European Commission. It is possible to identify a weakness in the plan, relating to the non-detailed share of investments for the identified actions.

3.18. Luxembourg

Luxembourg distributed its national AI strategy, in 2019. The strategy is part of a larger policy program related to digital transformation towards the development of a digital society. The strategic National plans outline the application field of AI and the strategic policy trajectories in key areas to realize them. The policy vision of Luxembourg's strategy is to support the attention to HRM. The ambition of this Country has become a leading digital society in the world. The following trajectories are considered strategic: a lifelong learning as a support to the digital transformation both public and private sector; a strong dissemination of lab for applying AI; to collaborate with international projects with strategic partners in AI. These trajectories are supported by growing investments in AI and associated technologies. It is interesting to note that a consistent range of public investments is linked to an ethical and regulatory framework. Particularly, the regulatory program is linked to privacy and security to safeguard transparent AI development. The national AI strategy does not divulge financial assessments for its implementation.

3.19. Malta

Malta's national AI strategy started in 2019. The ambition is to increase AI opportunities in the global economy. To realize this objective, the strategy presents three pillars to boost the transition towards Malta's AI strategy: first of all the national strategy underline the importance of to create an AI ecosystem based on investments, start-up support and innovation; this ecosystem, must be supported by the adoption of AI both in the public and private sector. Particularly in the private sector, the economic, technological and financial attention will support Startup and SMEs, or a large number of Malta industrial structures. The success of these purposes depends on five horizontal enabling factors that are shared across the two sectors: education, workforce, legal and ethical framework and infrastructure. Unfortunately, the AI strategy does not reveal financial estimations for its complete implementation.

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3.20. Netherlands

In 2019, the Dutch government has made public its national AI plan. The plan presents a set of policy actions and decision-making process to strengthen Netherlands' competitiveness in AI within the global economy. The actions and decision-making process of the Dutch AI strategy depend on three strategic pillars, pointing at: exploiting AI opportunities, boosting the adoption, use and development of AI in the private and public sector and encouraging the use of AI to achieve a new societal configuration; generating the right conditions supporting education and skills in AI are developing research and innovation in AI, enabling the admission both to qualitative and quantitative data improving the digital platforms; consolidation attention to the actions related to ethical issues, such as trust, human rights, consumer protection, and safety of citizens. The budget to promote and support AI innovation is estimated at € 63 million.

3.21. Poland

In 2019, the Government has published the National plan of its national AI strategy, entitled "Artificial Intelligence Development Policy in Poland for 2019-2027". The roadmap released by the Ministry of Digitization forecasts to approve the national AI strategy by the end of 2020. The outcome of Poland's strategy is to support the development and innovation of the knowledge-based economy associate to the AI science and research. Furthermore, the National plan, to prepare citizens for the digital transformation by improving their abilities. Along this route, the National plan, declare that is strategic take into account the protection of human dignity and ensure ethical conditions related to AI. The plan pointed out the following specific objectives: improving the educational system supporting it by lifelong learning opportunities in AI sector; supporting development and innovation of AI companies in terms of research and financial resources; stimulating national and international partnerships in AI; generating a data ecosystem with particular attention to high-quality data and data exchange mechanisms; strengthening the digital infrastructure, boosting the development of AI innovations. The budget dedicated these objectives is estimated about at PLN 1.8 billion.

3.22 Portugal

The Portuguese government presented in 2019 its national AI plan 2019 – 2030. It is pointing out the risks and opportunities of a fast growing AI ecosystem in the Nation. Fastes growing is related to public sector boosting of knowledge investments in AI competences and in the private sector, supporting the technological, organizational and financial challenges. Furthermore, the National plan declares that people constitute the main pillar for the effective development of AI, in this framework, the plan pointed out the strategic importance to achieve actions and decision – making process related to inclusion, education, qualification, specialization and research. The national AI strategy does not divulge financial estimations for its implementation.

3.23 Romania

The Romanian Government is preparing its national AI plan. Romania's AI plan should be developed by public consultation. The national security system will be applied to the AI sector. The aim of Government is to promote strategic research related to the development of the national AI sector with particular attention on one hand to public sector i.e., digital platforms oriented to citizens and on the other to private sector linked to the strategic industry. In this context, the Government declares a high attention to preserve human rights and social values.

3.24. Slovakia

This Member States include its AI development as part of a National digitalization strategy. In 2019, the Government elaborated the Action plan for the digital transformation of Slovakia in 2019 –2030. The action plan proposes a regular and innovative action in terms of how to create a sustainable and human centric, AI ecosystem. Moreover, particular attention is dedicated to the impact of trust. The digital transformation is the pillar and the action plan is based on a broad sharing of all stakeholders, including citizens. The National plans pointing out the long-term standpoint of this Member State for an effective digital transformation of the economy and society. The plan highlights an action list of policy initiatives with a short-term that covers the following critical issues to

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overcome in order to achieve the objectives: developing digital transformation of education system preparing it for digital skills needed; supporting the digital and data economy; strengthening the skills and abilities of the public administration to update the data for an institution citizens friendly. Budget information on AI will be developed as a supplementary stage, together with the strategic partners from academia, business, civic society and non-profit organizations.

3.25. Slovenia

The improvement of a national AI strategy of this Member State is ongoing. The involvement of the national government of the main stakeholders present in the country has been carried out, but the actions taken and the expected results are not yet evident. The establishment of working groups containing of various ministries, research institutions and government departments has been organized to develop the AI strategy. The declared outcome is to support Slovenia in increasing its international competitiveness in AI. The first target identified, are the following: mastering the state of art in the country; analyzing technological and industrial capacities in AI field; coordinating the socio-economic changes linked to AI, i.e., the labor market and education system; creating proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework.

3.26. Spain

A complete elaboration in AI strategy has been elaborated in 2019. Despite the recent start point, Spain displays a series of priority actions and policy recommendations to generate the suitable ecosystem for the growth and application of AI technologies. These actions and recommendations are focused on the creation of a background of a solid Research, Development and Innovation (RDI) ecosystem in AI. In fact, it attends as the early structure for the expansion of a national AI strategy. The RDI strategy in AI identifies the following pillars: to develop the RDI system and the analysis of its socio - economic impact; to identify priority strategies in which research and innovation in AI should be implemented; to encourage the development of education and competences in the field of AI; to create proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework. Compa with Italy, the Spanish RDI strategy dedicated focus on the public sector. The strategy, intends to improve data governance and its quality with particular attention to public service delivery. The fixed outcome in terms of quality of service is a better interaction between public services and citizens. Following this action line, the Government is participating in the implementation of the European Open Science Cloud (EOSC) initiative, a cloud 5G infrastructure to promote open science at a European level. Nevertheless, this Member State, creating proposals for systemic regulation of the field, i.e., trust and its impact with appropriate ethical and legal framework.

3.27. Sweden

In 2018, this Member State published its AI strategy. The National plan points out the general guide for AI development. The plan, aims to outline a base for future policy decisions and activities. In fact, the plan supports the government in implementing AI systems and identify forthcoming of several strategic pillars to realize in short – term: improving education and training system; strengthening ethical and legal framework. The national plan outlines a wide range of opportunities and challenges in Sweden's capabilities to reinforce the full prospective of AI. The Swedish AI strategy does not divulge financial estimations for its implementation.

4. Results

The surveys of European perspectives to AI have highlighted that there are strengths and weaknesses but also threats and opportunities. The strengths are: a) supportive of using digitization as strategic technology to improve productivity and job and to boost the transition. Furthermore, b) Member States agree such technology necessitates active and careful management. c) There is a strong attention to data ethics, including security and transparency, related to a strong ethical framework. d) Identify the AI actions and improve the quality of public

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services. The weaknesses are: a) not widespread use of AI into health service with particular attention to vulnerable members of society. b) A generic plan on ethical and legal framework, this plan is declined not in terms i. e., of age, gender, educational level, and location and a planning of related investments. c) Several Member States were not declaring the investments necessary to support the transition. d) Weak investments in connectivity and slow adaptation times to the objectives set by the European Commission. e) There is a low level of interdisciplinary collaboration between sectors and with other countries. The threats are: a) Member States are worried that AI will bring job losses, and is not evident if the turnover will be positive. In this case, the bottlenecks are linked to the new job opportunities across the EU. b) The bottlenecks related to access and protection of their data and information online, highlight high concern, in institutions, businesses and citizens. c) Only some Member States are focusing National plan on investment for business competitiveness and public services. d) In the national programming of the individual Members, the theme of the cultural change necessary to support the transition is not developed. The opportunities are: a) the European citizens holding a positive point of view about AI sector and its developments. This idea underline a positive approach linked to society, the economy, and citizens' lives. b) A large base of European Member States has incorporated in their strategy AI sector and related work groups. d) Several Member States will develop Centers of Excellence for AI research. e) Create a European Industrial Strategy related to AI sector. Strengths and weaknesses such as threats and opportunities are in terms of impact on society, on the legal system, trust, less on the psychological dimension (Figure 1). The impact of the psychological dimension, studied in the literature (Capone, et al, 2020), does not find space in the national programs in the 27 Member States in relation to the 42 official documents evaluated. This lack of attention in national programs is also linked to the human level (Adams et al, 2012) which, like the psychological level, is developed in the literature. The literature highlight the link between the results obtained in relation to the impact on society. Following the results of official national plan the impact on society with its pillars, highlight in the labor market some strengths and opportunities. Particularly, productivity and AI applications may create a mismatch between loss and job creation in the short run. It is interesting to note that this topic has been discussed in terms of meaningful AI: connecting business, labor market and work. Following this discussion stream, has been highlighted that in the long – run the mismatch characterized by a loss job, may develop economic and social inequality with negative consequences for the democracy of the Nation. These negative performance can reinforce traditions against innovation and spread negative bias in relation to the development of AI. The impact of the legal system has been pointed out in all 42 official documents evaluated, but the three pillars develop in literature are often stated and not detailed in the programs of the individual Member States. Some issues specific to this technology, such as identity theft, its protection and the penalties for this crime, are not explored and diverge within the European Union. The strong development of the digital platforms in terms of privacy (Stemler et al. 2019), one of the three pillars, underlines the necessity to integrate actions between law and control communication in relation to digital platforms. This role should be public with particular attention to human rights and dignity. Digital platforms, human rights, and dignity, are strictly linked to human resource management and its development as underline in literature (Csillag, 2019). Following this research stream is interesting to note that this approach affects the trust that is perceived and experienced by workers and citizens. The European Commission with satisfaction questionnaires from the individual Member States measures the impact on trust in AI era. This type of information gathering and processing concerns the citizens and less the workplaces. In fact, the pillars that emerge from the evaluation of the 42 official documents analyzed refer to the role of AI towards citizens: transparency, accountability, control, less in relation to SMEs, big companies, startup that use AI. This partial view, public social standard (Asif et al., 2019), does not help in understanding the phenomenon, of course, workers are citizens and vice versa, but the dynamics and use of these technologies is different in terms of methods and objectives. In literature this scenario has been developed with particular attention to leadership and philosophical approach with interesting results in terms of application and future issues. Unfortunately, these trajectories (Gindis et al, 2020; Chia et al, 2020) are not applied to the EU commission. The study of the 42 official documents shows that the Member States are very attentive to an economic dimension of the phenomenon in general terms of forecasting, but are unable to have detailed implications in the different areas of impact of AI. Particular elements of delay in processing are highlighted due

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to psychological, legal and trust effects on the part of both citizens and workers in relation to the use, applications and future scenarios related to AI. This delay, on the other hand, does not belong to theoretical and case studies, which precisely on these issues highlight interesting results that foreshadow scenarios and trajectories in relation to which the public decision-maker should intervene to manage and regulate the future development of AI. Furthermore, the analysis shows a heterogeneous transition with all countries beware to impact on society with particular attention to economic variables. An interesting feature, by analyzing the European geographical areas, is represented by the fact that there are not leader areas in transition. These performances are highlighted also at operative level of the information related to the budget: only a few Countries have declared the budget dedicated to the transition in an official document assessed. The novelty and practical value of the obtained results are linked to a first comparison of AI in Europe with different configurations and trajectories.

5. Discussions

The comparison of conceptual context and obtained results demonstrates that AI is a European strategic topic. AI in Europe would have to be handled by the Union's member states not only through regulatory legislative interventions, but also, and most importantly, through the management of the transition towards a digital economic model and AI. It should be noted that the literature has not yet dealt exhaustively with the transformation and the position of the Member States that would promote the advancement of AI. The findings, as stated in the study paper, demonstrate bottlenecks in the guarantee of protection and constitutional rights of individuals and companies. Simultaneously, acts that strengthen the implementation of artificial intelligence in Europe are visible. The problem of establishing adoption criteria, which is entirely lacking, reveals a flaw in the ethical application of technology. The Member States are confronted with a quickly developing market, although their activities remain inefficient and not tied to a shared vision. The management of the Union's countries is focused on opposition to transition. The need to monitor the uncertainty of AI systems, which are seen as a direct threat to each Member State's defense, provides a high level of resistance to transition. Another source of opposition to transition is the presence of AI platforms with strict transparency obligations, such as government-provided automated networks, in which customers must be conscious that they are communicating with a software and must be able to select whether to proceed or to back off. AI transitions must be further investigated along this way in order to understand the position of Member States as transfer agents. In the digital age, the usage of networks, which has risen since the pandemic, should be better studied because it has not shown that Member States value work ethic, especially remote work. The desirable future is structured between utopia and the imagination of alternatives. This desirable future would include the commitment of conceptual and technological research, the acquisition of information about the phenomena, and the decisive intervention of the Union's Member States as agents of the transition to the AI society.

6. Conclusions

The paper presented an assessment analysis on the AI transition of the 27 EU Member States. Starting from a conceptual background and operational overview, the study defines the state of the art of the phenomenon. Moreover, have been identified strengths (4 points identified) and weaknesses (5 points identified) but also threats (4 points identified) and opportunities (5 points identified). These 18 points have been elaborated in relation to the literature in order to examine the transition degree of each country towards the AI. In conclusion, it can be observed that in order to moderate the gap within the 27 EU Member States, it is necessary to develop motivated government actions to support the best possible transition in each country. This requires a strong idea of what is AI in Europe, a willingness of the governments in term of policies, an entrepreneurial culture able to understand the different impacts as identified in the literature. AI represents a major shift in terms of opportunities, not only from an economic point of view, able to see in this opportunity a future inclusive of the different economic, social, legal and trust issues for all stakeholders. The AI is an open question, and therefore

the output of discussion linked to research results, reject a stance where from the transition must be seen as under constant development and re-interpretation.

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MOBILE INTERNET IN THE EU: PROBLEMS AND PERSPECTIVES

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Abstract. Mobile communication has become a taken for granted condition of people's everyday lives. Internet and mobile technologies have changed our way of both doing business and dealing with our daily routine activities. Researchers have increasingly focused on the impact of the level Internet, i.e. mobile Internet level on national economies. Mobile Internet rapidly been integrated not only into people's daily lives, but also into the daily lives of companies, organizations, administration. The aim of the present research is to perform a statistical study and assessment of the level of mobile Internet development in Latvia in the context of the EU countries in the period from 2014 to 2019 years. The Mobile Connectivity Index measures performance of 150 countries according the four key enablers of mobile Internet connectivity: infrastructure (i.e., the availability of high-performance mobile internet network coverage), affordability (i.e., availability of mobile services and devices at price points that reflect the level of income across a national population), consumer readiness (i.e., citizens with the awareness and skills needed to value and use the internet) and content (i.e., availability of secure online content and services accessible and relevant to the local population). The study analyzes the impact of the Mobile Connectivity Index on the Latvian economic growth, makes recommendations for improving the Internet and mobile technologies as an endogenous factor of economic development.

Keywords: Mobile Internet; Latvia; GSMA Mobile Connectivity Index

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1. Introduction

Mobile Internet represents an emerging information technology that came out of the application of third generation (3G) mobile communication technologies. Some regard mobile Internet as wireless Internet that requires going online using a mobile phone or an extension of PC-based Internet. It is expected that mobile Internet allows people to perform the same tasks that they do via fixed, conventional Internet. Mobile Internet has benefited individuals and organizations in many ways such as in communication, education, healthcare, commerce, advertising, social network, entertainment and government (Sadiku et. al., 2017; Trubnikov, 2019; Aleksejeva et al., 2021; Torkayesh, 2021; Du et al., 2020; Jiang et al., 2021; Fakunle, Ajani, 2021).

Use of the Internet has exploded in recent years. Rapidly evolving network and computer technologies, coupled with exponential growth of services and data available on the Internet, enable hundreds of millions of people to have fast access to a huge amount of information from anywhere and everywhere (Otsetova, Otsetova-Dudin, 2019; Ronaghi, Forouharfar, 2020). According to experts' forecasts, in 2025 the mobile industry will reach new major milestones across key indicators – unique subscribers, Internet users and 4G/5G connections. The number of mobile subscribers will reach 5.9 billion by 2025, which is equivalent to 71% of the world's population (GSMA Intelligence, 2019). The COVID-19 pandemic has accelerated digital transformation around the world. The rapid transition of education, medical services, e-commerce to the online environment, as well as popularization of remote work have contributed to the development of the mobile Internet (Moreno-Llamas et.al 2020; Delaporte, Bahia, 2021).

The most critical driver from demand side is a sharp evolution and usage of mobile equipment – smartphones, media tablets, dongles (PCs, laptops, notebooks), M2M devices (Čerņakovs-Neimarks et al., 2013).

ICT also stimulate progress in entrepreneurship, innovation and positively affects society as a whole (George, Merrill, Simon, 2021). The period between 2019 and 2020 saw an increased use of Internet platforms, with e-commerce usage increasing from a global average of total retail equaling 9.5% in 2019 to 12.4% in 2020. Thus, there has been an increase in the use of Internet platforms in terms of downloads of mobile applications by smartphone users: the use time of applications in India, Mexico, Turkey and the United States was 4.2 hours per day, which is 30% more than two years ago. At the same time Brazil, Indonesia and the Republic of Korea hit five hours of mobile app usage (Redseer Consulting, 2021; Kristianto, 2021).

2. Methodology

In 2014 GSMA Corporation stared to calculate Mobile Connectivity Index. The measures performance of 150 countries, accounting for 98% of the world's population, against the four key enablers of mobile Internet connectivity: infrastructure, affordability, consumer readiness and content (GSMA Mobile…, 2020). (See Table 1).

Table 1. Mobile Connectivity Index

Infrastructure	Affordability	Consumer readiness	Content
1. Mobile infrastructure; 2. Network performance; 3. Other enabling infrastructure; 4. Spectrum	1. Mobile tariffs; 2. Handset price; 3. Income; 4. Inequality; 5. Taxation.	1.Basic skills; 2.General equality.	1. Local relevance; 2. Availability

Source: GSMA Mobile Connectivity Index, Available at: https://www.mobileconnectivityindex.com/, 2020

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Each final rating is derived from four key indicators. The enablers of mobile internet connectivity that provide the indicators selected for the Index are: 1. Infrastructure (i.e., the availability of high-performance mobile internet network coverage); 2. Affordability (i.e., availability of mobile services and devices at price points that reflect the level of income across a national population); 3. Consumer readiness (i.e., citizens with the awareness and skills needed to value and use the internet); 4. Content and Services (i.e., availability of secure online content and services accessible and relevant to the local population) (Bahia, Agnoletto, 2020).

As the Mobile Connectivity Index is an input index, it has to be underlined that each indicator within its framework is an 'input' for mobile internet connectivity rather than an output or outcome (e.g., measuring the level of take-up). It is also important to develop a set of criteria against which each indicator can be considered for inclusion in the Index. The following criteria have therefore been developed by the authors of the Index, based on guidance from the JRC and OECD. It includes:
- Relevance (the indicator should measure a barrier or an enabler in the take-up of mobile internet services);
- Accuracy (the indicator should correctly estimate or describe the quantities or characteristics they are designed to measure);
- Coverage (the data should cover as many countries as possible, as the Index is intended to be a global one Therefore, an indicator is not included into analysis if there is missing data on more than 25% of countries in the Index);
- Timeliness (the data should be collected consistently over time).
As it can be seen from the abovementioned criteria, the main point is to include, to the greatest extent possible, 'hard' indicators that are objective and can be quantified (Ibid).
For implementation of normalisation for the Mobile Connectivity Index, the minimum-maximum method is used, which transforms all indicators so that they lie within a range between 0 and 100, with the following formula:

$$I_{q,c} = \frac{x_{q,c} - min_c(x_q)}{max_c(x_q) - min_c(x_q)}$$

Where 'I' is the normalised min-max value, 'x' represents the actual value and the subscripts 'q' and 'c' represent the indicator and country respectively (Bahia, Agnoletto, 2020).

In order to aggregate indicators into dimension scores (in its turn, dimension to enabler scores and enabler scores to an overall index score), it is necessary to assign a weight to each component of the index. To construct the weights at the dimension, enabler and overall index level, a number of considerations have been taken into account by the developers of Methodology (Bahia, Agnoletto, 2020), including:
- Statistical relationship between indicators and dimensions concerning mobile internet penetration;
- Analysis of consumer survey responses regarding perceived barriers to mobile internet access;
- Principal component analysis to identify weights that correct for the overlapping information implied by grouping indicators that are correlated (rather than representing a measure of importance);
- Research carried out by the GSMA and other organisations on digital inclusion and barriers to mobile connectivity;
- Qualitative research.

Once weights have been assigned to the indicators, dimensions and enablers, they need to be aggregated to produce the relevant composite scores. Two methods of aggregation were employed: arithmetic – for dimension and enabler aggregation and geometric – for index aggregation (Bahia, Agnoletto, 2020). At the same time the main methods used by the authors of the present research to study the development of mobile Internet in Latvia in the context of the European Union countries included comparison of average indicators of the EU member states and cluster analysis.

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Researchers are studying the relationship between Internet technology and economic growth in several ways. Gruber H., Hätönen J., Koutroumpis P., as well as Katz R., Callorda F. (Gruber et al. 2014, Katz, Callorda, 2018) study this issue with the help of Structural Equations Models; Czernich N., Falck O., Kretschmer T., Woessmann L., Edquist H., Goodridge P., Haskel J, Li X., Lindquist E. – with the use of Instrumental Variables (Czernich et al., 2011, Edquist et al., 2018); Arvin B. M., Pradhan, R. P. и Giday G. employ Dynamic Panel Data models (Arvin, Pradhan, 2014; Giday, 2019). Edquist H., Goodridge P., Haskel J., Li X., Lindquist E. (Edquist et al. 2018) have studied 135 countries from 2002 to 2014, established that there is a statistically significant impact of broadband on GDP (a 10 percent increase in mobile broadband adoption translates into a 0.8 percent increase in GDP), with the impact waning over time. Amiri S., Reif B. (Amiri, Reif, 2013), examined the time series in the Nordic region, also found that the introduction of the Internet was a direct driver of GDP growth in the economy.

Andrianaivo M., Kpodar K. (Andrianaivo, Kpodar, 2012) examined the impact of mobile phone development on economic growth in a sample of African countries during the period 1988-2007 and found that mobile phone development (as measured by mobile phone penetration and the price of phone calls) contributed to economic growth in Africa.

Other researcher (Minges, 2016) concluded that a 10 percentage point increase in fixed broadband penetration increased GDP growth by 1.21% in developed economies and 1.38% in developing ones. However, while the coefficient was significant at the 1 percent level for developed economies, the significance was only 10% for developing economies. The R for the regression was 0.49.

A study of the countries in North and South America found that a 10% increase in fixed-broadband penetration would result in a 1.9 percent increase in GDP per capita. In addition, pricing remains a key driver for broadband adoption, with a 10% drop in prices boosting it by more than 3.0%. (Katz, Callorda, 2019).

Studies based on econometric model using data from 139 countries between 2007 and 2018 provide strong evidence of the importance of information and communication technology (ICT) as a driver of economic development (Katz, 2020). It is established that mobile broadband provides a greater economic contribution than fixed broadband; developing countries benefit more from mobile broadband than industrialized countries; developed countries with high fixed-broadband penetration rates benefit from technology more than developing countries; the economic contribution of digitalization, which includes not only the introduction of ICT, but also their use, more in advanced economies than in developing countries, ICT contributes significantly to increasing labor productivity and overall factor productivity; ICT is accelerating beyond an initial time lag when political and institutional support is driving structural change (Katz, 2020b; Katz, Callorda, 2018). The early adopters of broadband benefit more from the introduction of mobile broadband. The impact on the national economy reaches its maximum when investments in broadband infrastructure reach certain levels: after that, the impact on the economy slows down. Gruber and Koutroumpis (2011) found that the impact of mobile Internet on GDP growth correlates with increased wireless penetration until penetration reaches 60 percent, after which the effects tend to subside. In countries with low GDP per capita, mobile broadband is a technology with great economic impact (Katz, 2020b). Other researchers also confirm that the benefits of broadband may vary from region to region (Haller, Lyons, 2019).

Studies on the causal relationship between broadband penetration and economic output indicate a non-linear relationship between the two (in the form of an inverted U). With low broadband penetration rates, the economic impact of broadband is minimal. The impact of telecommunication infrastructure on production volumes becomes maximum only when the infrastructure reaches certain values. Therefore, countries with low economic development need to strive to significantly increase broadband penetration. (Katz, 2020b).

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Thus, studying the impact of the Mobile Connectivity Index on GDP should be based on the endogenous growth theory, which takes into account the impact of technological progress on economic development. (Gordon, 2009; Romer, 2007).

4. Research results

After analyzing the GSMA Mobile Connectivity Index data, it was established that in the period from 2014 to 2019 years. Latvia's rank among the EU countries fell from the 17th to the 24th place, though with a slight increase in the absolute values of the Index (see Figure 1).

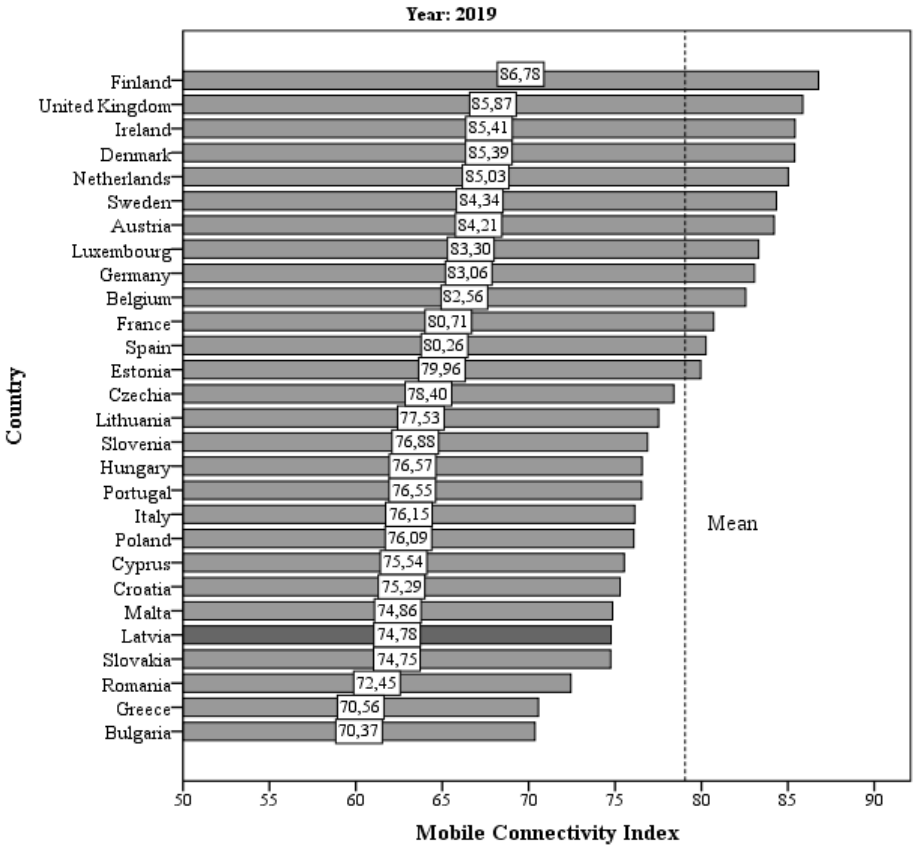

Figure 1. Absolute values of the GSMA Mobile Connectivity Index in the EU countries in 2019 (https://www.mobileconnectivityindex.com/#year=2019)

Even among the three Baltic countries, in 2014 Latvia, possessing the absolute Mobile Connectivity Index of 68.03, surpassed Lithuania (66.88) and was closer to Estonia (71.10). However, in 2016 the Lithuanian index was equal to the one of Latvia (72.06). What is more – in the period from 2017 to 2019 yy., the value of the index in Lithuania increased from 73.54 to 77.53, while in Latvia the values of the index in the same period were 73.28 and 74.78 respectively. These observations are demonstrated in Figure 2.

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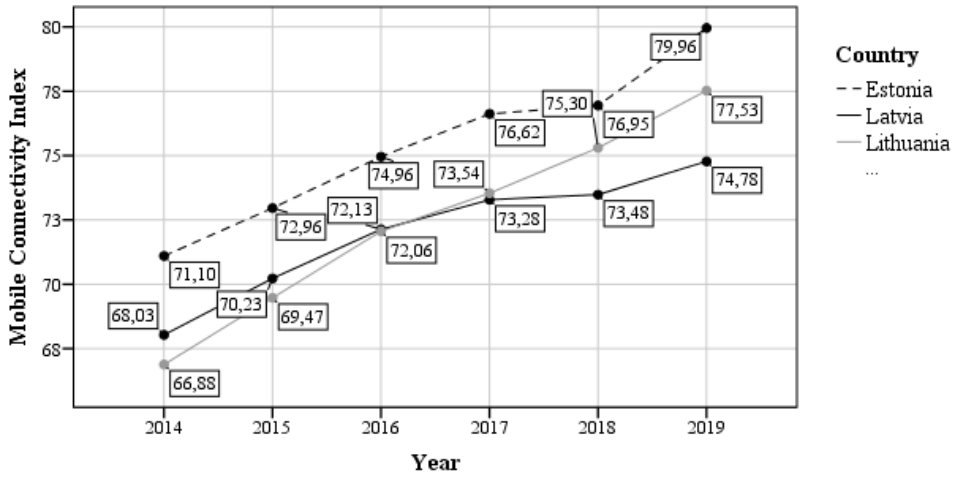

Figure 2. Absolute values of the GSMA Mobile Connectivity Index in Latvia, Lithuania and Estonia in the period from 2014 to 2019 years.

Source: Mobile Connectivity Index (https://www.mobileconnectivityindex.com/#year=2019)

Moving on to the situation in the EU countries on the whole, it has to be mentioned that Latvia, Slovakia, Romania, Greece and Bulgaria were among the five outsiders in terms of the index value in 2019. At the same time leading positions were taken by Finland, England, Ireland, Denmark, the Netherlands.

Upon the analysis of the values of sub-indices the following was established: in terms of "Infrastructure" Latvia's position fell from the 9th to the 15th place; in terms of "Content and Services" – from the 22nd to the 26th place. The situation is somewhat better in terms of "Affordability" sub-index, where the 24th place were retained by Latvia with no changes. Finally, according to the values of the "Consumer Readiness" sub-index, Latvia has improved its rank in the EU from the 12th to the 5th (see Table 2).

Table 2. Absolute and rank values of the Mobile Connectivity Index along with its sub-indices in Latvia in 2014 - 2019 years.

	Year					
	2014	2015	2016	2017	2018	2019
Mobile Connectivity Index	68,03	70,23	72,13	73,28	73,48	74,78
Rank	17	16	18	21	22	24
Infrastructure	65,04	71,03	74,20	76,36	75,88	77,25
Rank	9	9	13	14	13	15
Affordability	63,16	62,97	64,13	64,85	63,50	66,41
Rank	24	25	24	23	25	24
Consumer Readiness	88,09	88,83	89,75	90,71	91,61	91,92
Rank	12	10	6	6	5	5
Content and Services	59,19	61,22	63,40	64,22	66,05	66,30
Rank	22	22	21	22	24	26

Source: Authors' calculations in SPSS software according to the Mobile Connectivity Index sub-indices values in 2019 (https://www.mobileconnectivityindex.com/#year=2019)

To determine the dynamics of the Mobile Connectivity Index development according to selected sub-indices a comparative analysis was carried out according to spatial and temporal characteristics. To that end, the clustering of countries (in 2019) was carried out. Cluster analysis was used to carry out the classification.

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According to the hierarchical classification, two groups of countries were identified. Using the k-means method, the features of each cluster were established (Appendix 1). Thus, the first group with average value for the Infrastructure sub-index equaling 75.06, Affordability – 69.10, Consumer Readiness – 86.75, Content and Services – 71.19, included such countries as: Bulgaria, Croatia, Cyprus, Czechia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia. While the second group with higher averages, particularly, for Infrastructure equaling 81.57, Affordability – 79.04, Consumer Readiness – 90.21, Content and Services – 84.31, included the following countries: Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Spain, Sweden, United Kingdom. The differences between the two clusters are displayed in Figure 3.

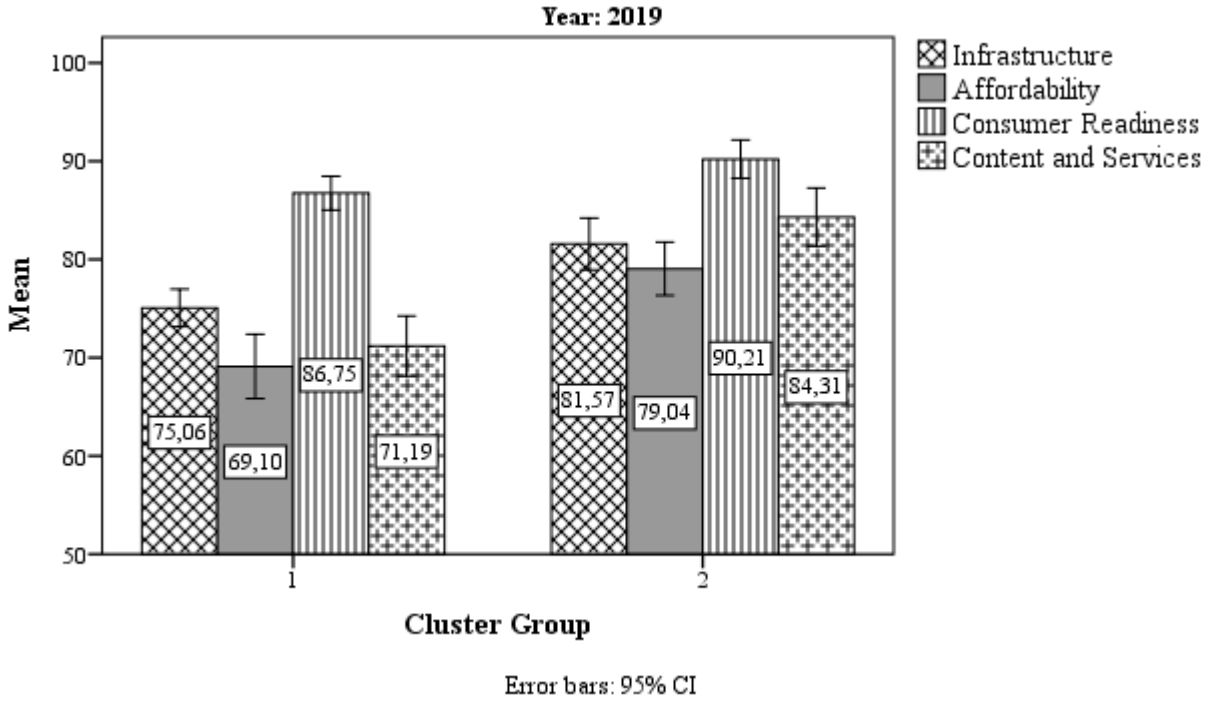

Figure 3. Cluster groups for the classification of the EU countries according to the values of the sub-indices included in the Mobile Connectivity Index, 2019

Source: Authors' calculations in SPSS software according to the Mobile Connectivity Index sub-indices values in 2019 (https://www.mobileconnectivityindex.com/#year=2019)

According to the research conducted, it is possible to identify some differences in the development of the Mobile Connectivity Index among the countries of the first and the second cluster. Particularly, it was established that lower values of the Affordability, as well as Content and Services sub-indices in the first cluster are due to lower values of the indicators included in these sub-indices, namely: Mobile tariffs (72,7), Handset price (67,2), Taxation (64,1), Inequality (71,5), Taxation (64,2), Local relevance (75), Availability (67,4). It is obvious that lower values in the first cluster in terms of the above-mentioned indicators reflect general economic development of the countries included in the cluster, and also characterize the market in the studied area in a certain way. Accordingly, investments in these areas play a crucial role, and special attention should be paid to them.

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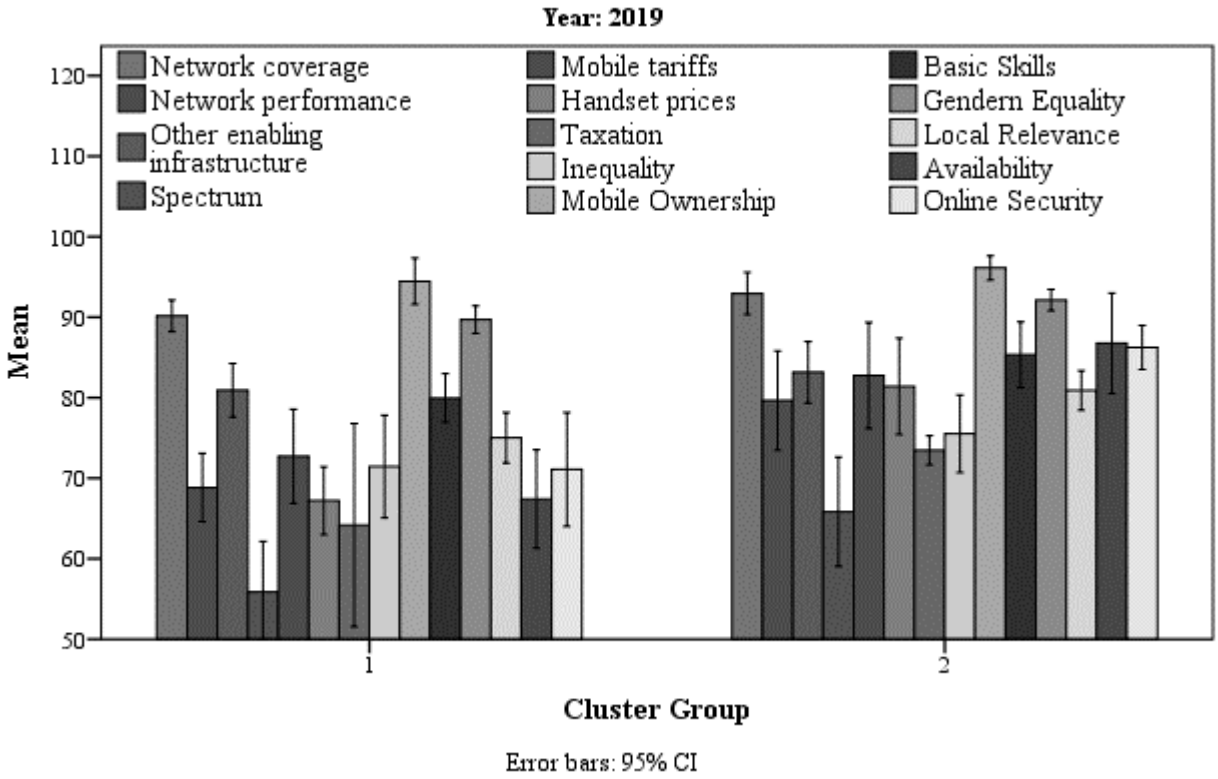

Figure 4. Comparison of indicators among the two cluster groups in 2019

Source: authors' calculations in SPSS software according to the value of the Mobile Connectivity Index in 2019 https://www.mobileconnectivityindex.com/#year=2019

A linear relationship between GDP (PPP) per capita (%) and Mobile Connectivity Index has been established:
- for all EU countries in 2019 (p-value = 0.000) Ln (GDP) = 4.1 * ln (Mobile Connectivity Index) -13.4; thus, with an increase in the Mobile Connectivity Index values by 1%, GDP (PPP) per capita increased by 4.1% on average in the EU countries in 2019;

- for the leading second cluster (p-value = 0.000) Ln (GDP) = 4.6 * ln (Mobile Connectivity Index) -15.4. Consequently, with an increase in the Mobile Connectivity Index values by 1%, GDP (PPP) per capita increased by 4.6% on average in the countries of the leading cluster in 2019;

- for Latvia and the entire first cluster, it was found that Ln (GDP) = 5.8 * ln (Mobile Connectivity Index) -20.7 (p-value = 0.085). Thus, the following trend can be observed: with an increase in the Mobile Connectivity Index values by 1%, GDP (PPP) per capita increased by 5.8% on average in the countries of the first cluster in 2019.

Thus, the effectiveness of the impact of mobile technologies on GDP (PPP) in the countries of the first cluster, including Latvia, is higher than in the countries of the second cluster with higher Mobile Connectivity Index, therefore, the return on mobile technologies slightly decreases with an increase in their values.

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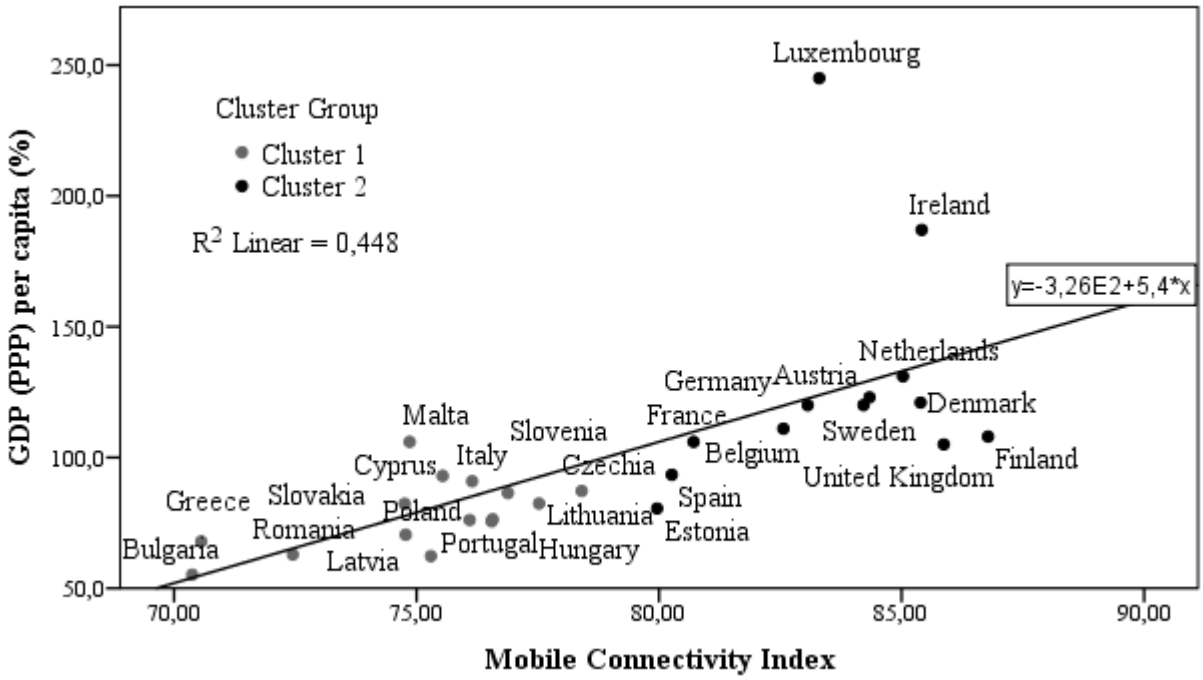
This assumption can be verified by building a regression of the growth rates of the Mobile Connectivity Index to their initial level (y=ln(Mobile Connectivity Index 2019/ Mobile Connectivity Index 2014), x=ln(Mobile Connectivity Index 2014):
Y=1,5-0,324*X (p-value=0,000). Consequently, countries with lower values of the index had higher growth rates in the period 2014-2019 than countries with higher values. It is also true that countries with lower GDP values had a higher growth rate of the index than countries with higher GDP. (y=ln(Mobile Connectivity Index 2019/ Mobile Connectivity Index 2014), x=ln(GDP 2014): Y=0,352-0,051*X (p-value=0,011).



Picture 5. Linear dependence of GDP (PPP) per capita (%) on Mobile Connectivity Index by clusters of EU countries, 2019.

Source: Authors' calculations in SPSS software according to the Mobile Connectivity Index sub-indices values in 2019 https://www.mobileconnectivityindex.com/#year=2019

Such subcomponents of the Mobile Connectivity Index as S1 (Infrastructure), S2 (Affordability), S3 (Consumer readiness), S4 (Content) affected GDP (PPP) per capita (%) in 2019 the following way
- for all EU countries the regression equation is set Ln (GDP) = 1.2 * ln (S2) + 1.7 * ln (S4) (p-value = 0.015; p-value = 0.000). Thus, with an increase in the sub-index of the availability of safe online content and services available and relevant to the local population by 1%, GDP (PPP) per capita increased by 1.7% on average in EU countries in 2019; with an increase in the sub-index of the availability of mobile services and devices at prices reflecting the level of income of the country's population by 1%, GDP (PPP) per capita increased by 1.2% on average in the EU countries in 2019;

- for the leading second cluster Ln (GDP) = 2.2 * ln (S2) + 1.6 * ln (S4) -6 (p-value = 0.002; p-value = 0.003). Consequently, with an increase in the values of the sub-index of the availability of mobile services and devices at prices reflecting the level of income of the country's population by 1%, GDP (PPP) per capita increased by 2.2% on average in the countries of the leading cluster in 2019; with an increase in the sub-index of the availability of

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safe online content and services available and relevant to the local population by 1%, GDP (PPP) per capita increased by 1.6% on average in the countries of the leading cluster in 2019;

- for Latvia and the first cluster on the whole, the dependence of GDP (PPP) per capita (%) on S1 (Infrastructure), S2 (Affordability), S3 (Consumer readiness), S4 (Content) has not been established (p-value> 0.05), trends (at p -value> 0.01) has not been observed either.

5. Discussion and conclusions

According to the results of the present study, it is established that Latvia at present moment is among the outsiders in terms of Mobile Connectivity Index value. With the help of the data obtained, it can be concluded that countries occupying leading positions in terms of the level of Mobile Connectivity Index pay special attention to the place of individual in the information and knowledge system. High values characterizing such indicators as Basic skills, General equality, Local relevance, Availability etc. provide evidence for that. Moreover, the states representing cluster 2 have a well-developed high-tech infrastructure (see Figure 3).

For Latvia, like for other countries in the 1st (lower) cluster, it is important that the entire society has the necessary skills for enjoying mobile connectivity. In order to provide sufficiently large and highly qualified staff, interest in ICTs needs to be encouraged – starting from primary school. International funding needs to be used to streamline education by creating additional ICT opportunities, training courses in the latest ICT disciplines, and, what is also very important, for improving infrastructure.

It was found that with an increase in the Mobile Connectivity Index values by 1%, GDP (PPP) per capita increased by 4.1% on average for all EU countries in 2019. For Latvia, like the entire first cluster, the following trend was observed: with an increase in the Mobile Connectivity Index by 1%, GDP (PPP) per capita increased by 5.8% on average in 2019. For the cluster with the leading positions of the index, the following statement is true: with an increase in the Mobile Connectivity Index by 1%, GDP (PPP) per capita increased by 4.6% on average in 2019. Thus, the results of the research correspond to those obtained by Edquist N., Goodridge R., Haskel J., Li X., Lindquist E. (Edquist et al. 2018), Amiri S., Reif B. (Amiri S., Reif B., 2013), Andrianaivo M., Kpodar K. (Andrianaivo, Kpodar, 2012) and other researchers (Katz, Callorda, 2019). Thus, the data on the impact of mobile Internet on GDP received within the present study have confirmed the conclusions obtained by other scientists. (Gruber и Koutroumpis, 2011; Katz, 2020b; Katz, Callorda, 2018).

It was found that the subcomponents of the Mobile Connectivity Index S2 (Affordability), S4 (Content) affected GDP (PPP) per capita (%) in all EU countries in 2019: with an increase in the sub-index values of the availability of secure online content and services available and relevant to the local population by 1%, GDP (PPP) per capita increased by 1.7% on average; with an increase in the sub-index of the availability of mobile services and devices at prices reflecting the level of income of the country's population by 1%, GDP (PPP) per capita increased by 1.2% on average. For the countries of the leading cluster, this dependence is even stronger: with an increase in the values of the sub-index of the availability of mobile services and devices at prices reflecting the level of income of the country's population by 1%, GDP (PPP) per capita increased by 2.2% on average; with an increase in the sub-index of the availability of safe online content and services available and relevant to the local population by 1%, GDP (PPP) per capita increased by 1.6% on average in the countries of the leading cluster in 2019. For the regression of the first cluster, which includes Latvia, such a dependence has not been observed (p-value> 0.01).

Consequently, countries with lower economic development need to strive to significantly increase broadband penetration. For Latvia, as well as for the entire cluster to which the country belongs, it is necessary to make strategic investment decisions in the field of ICT that maximize their economic efficiency: to promote the use of the latest technologies to meet the need for affordable digital infrastructure and services, to promote the availability of mobile broadband access (minimum 3G) for non-professionals, providing affordable prices for the most vulnerable segments of the population, promoting relevant content for residents of the country, developing

local Internet content in the languages used in the country, promoting the development of digital skills among non-professionals, as well as promoting the development of infrastructure, especially in rural areas.
Current authors' research contributes to the mobile economy theory by providing deeper insights into the impact of mobile Internet on GDP by specifying the mobile Internet factors (infrastructure, affordability, consumer readiness and content). Similarly, other researchers show the direct effects of information technology on economy in a context of the sector development in the European Union (Sinica, 2017), the key reason for the persistent digital divide seen between countries is financial variable (Nielsen et al. 2018). In 2021 authors got the same results that mobile ICT plays an important role in increasing national productivity (Kim et al. 2021), relatively small investments in mobile Internet have effects on economic development (Edquist et al. 2021). In 2020, mobile technologies and services generated 4.6% of GDP in Europe, 5% -of global GDP (GSMA, 2021). Manyika et al. (2015) estimates suggest that mobile technologies and services will contribute approximately 11 % of total world GDP in 2025.

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Appendix 1

The EU countries divided into two clusters according to the sub-indices of the Mobile Connectivity Index in 2019

			Country	Infrastructure	Affordability	Consumer Readiness	Content and Services
Cluster Group	1	1	Bulgaria	71,08	62,78	86,64	63,43
		2	Croatia	74,01	70,60	84,80	72,54
		3	Cyprus	73,02	67,48	82,90	79,69
		4	Czechia	81,90	77,66	87,74	67,71
		5	Greece	74,17	55,08	89,71	67,62
		6	Hungary	77,25	75,43	84,85	69,52
		7	Italy	77,76	64,61	85,27	78,48
		8	Latvia	77,25	66,41	91,92	66,30
		9	Lithuania	80,56	71,24	90,21	69,77
		10	Malta	73,85	64,36	83,92	78,73
		11	Poland	68,49	72,35	89,66	75,45
		12	Portugal	74,90	68,96	85,35	77,88
		13	Romania	74,99	69,61	81,81	64,51
		14	Slovakia	73,11	75,21	85,47	66,44
		15	Slovenia	73,60	74,78	90,96	69,79
		N	15	15	15	15	15
		Minimum	Bulgaria	68,49	55,08	81,81	63,43
		Maximum	Slovenia	81,90	77,66	91,92	79,69
		Mean		75,06	69,10	86,75	71,19
		Median		74,17	69,61	85,47	69,77
		Std. Deviation		3,45	5,91	3,11	5,54
	2	1	Austria	82,87	79,10	89,91	85,34
		2	Belgium	79,11	82,66	92,13	77,11
		3	Denmark	86,48	73,91	93,99	88,50
		4	Estonia	81,32	75,54	89,77	74,12
		5	Finland	92,34	79,46	94,89	81,46
		6	France	77,07	76,03	87,00	83,24
		7	Germany	80,81	79,94	89,83	82,03
		8	Ireland	76,98	86,54	90,74	88,06
		9	Luxembourg	79,54	85,04	82,14	86,66
		10	Netherlands	85,02	78,04	90,79	86,76
		11	Spain	77,15	70,51	90,02	84,74
		12	Sweden	81,93	78,13	92,68	85,28
		13	United Kingdom	79,84	82,66	88,81	92,76
		N	13	13	13	13	13
		Minimum	Austria	76,98	70,51	82,14	74,12
		Maximum	United Kingdom	92,34	86,54	94,89	92,76
		Mean		81,57	79,04	90,21	84,31
		Median		80,81	79,10	90,02	85,28
		Std. Deviation		4,36	4,49	3,22	4,89
		N	28	28	28	28	28

	Minimum	Austria	68,49	55,08	81,81	63,43
	Maximum	United Kingdom	92,34	86,54	94,89	92,76
	Mean		78,09	73,72	88,35	77,28
	Median		77,25	74,99	89,69	78,18
	Std. Deviation		5,06	7,25	3,56	8,42

a. Year = 2019

Source: Authors' calculations in SPSS software

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UNDERSTANDING THE PREDICTORS OF ENTREPRENEURIAL INTENTIONS OF YOUNG PEOPLE FROM ARGENTINA, BELGIUM, BULGARIA, CHINA, AND ROMANIA*

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Abstract. Entrepreneurship helps grow economies. Thus, under comprehensive competence frameworks, such as European Entrepreneurship Competence Framework (EntreComp), entrepreneurial skills development is a global priority. However, under no guarantee, newly developed skills will be utilised in entrepreneurial activity. The question of which entrepreneurial skills predict entrepreneurial intentions remains with no definite answer. Our study examines the extent to which entrepreneurial intentions can be predicted in young people (aged 18 to 25, n=203) by a model grounded in the Self-Efficacy Theory. Our model tested the contribution of demographics, Big Five personality characteristics and entrepreneurial self-efficacy (ESE). Through a hierarchical multiple regression, we reveal that our participants' entrepreneurial intentions are predicted by two variables: developing new product and market opportunities and conscientiousness. As a result, we found that participants are likely to think of becoming entrepreneurs when confident in their ability to innovate and leverage the market. Interestingly, those same people tended to be somewhat less conscientious. The results showed a significant influence of neither nationality nor age or gender on entrepreneurial intentions. The novelty of our findings is three-fold. First, underlying data is derived from a multicultural sample of young people from three continents. Second, contrary to common sense, they reveal no influence of demographics on entrepreneurial intentions. Third, when ESE is explored as sub-dimensions, not all of them predict entrepreneurial intentions. Overall, our model explained 44% of the entrepreneurial intentions variation. Those results show a path to help develop better-targeted entrepreneurship education or more impactful initiatives for young people. They can be found helpful by policymakers, researchers and practitioners alike.

Keywords: Big Five personality items; entrepreneurial intentions; entrepreneurial self-efficacy; Self-Efficacy Theory; young people

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1. Introduction

Entrepreneurial activities play a significant role in growing economies by creating jobs (Valliere & Peterson, 2009). Thus, the development of entrepreneurial skills is a global priority (European Commission, 2017; Kinner, 2015). Education systems around the globe have developed a strategic approach to foster entrepreneurial learning in various settings and contexts, including formal and informal entrepreneurship and enterprising education (Quality Assurance Agency for Higher Education, 2018). Despite the increased focus on entrepreneurship, research seems to predominantly explore two particular groups of countries. Those countries may be considered sitting on the two extremes of the entrepreneurial spectrum.

The largest number of entrepreneurial studies comes from North American (e.g. Ferguson, 2018; Pepin & St-Jean, 2019; Rodriguez & Lieber, 2020) and European (e.g. Grewe & Brahm, 2020; Heinrichs, 2016; Pinho, Fernandes, Serrão, & Mascarenhas, 2019) industrialised countries. African countries also feature a considerable amount of research. Studies can be identified in Botswana (Assan, 2012), Lesotho (Berry et al., 2013), Nigeria (Bano, 2018), Uganda (Alzua et al., 2020) and Tanzania (Bjorvatn, Cappelen, Sekei, Sørensen, & Tungodden, 2020). This representation leaves middle-income countries largely underrepresented. Furthermore, cross-cultural studies are much less common. To provide a more comprehensive understanding of entrepreneurship, our study involved participants from Argentina, Belgium, Bulgaria, China and Romania.

Regardless of country, comprehensive competence frameworks, such as EntreComp (McCallum, Weicht, McMullan, & Price, 2018), provide guidelines for practitioners and policymakers on how to foster the development of entrepreneurial skills. Those frameworks claim to incorporate the latest research evidence.

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Over the last decade, academic research has been devoting growing attention to concepts and empirical evidence targeting the development of entrepreneurial skills in various age groups and contexts, including relevant skill growth in the early formative years (childhood and adolescence) (Brüne & Lutz, 2020; Lerner & Damon, 2012; Obschonka, 2016; Obschonka, Hakkarainen, Lonka, & Salmela-Aro, 2017). This research involves, rigorously designed evaluation studies of skill development programs (Huber, Sloof, & Van Praag, 2014; Oosterbeek, Van Praag, & Ijsselstein, 2010; Schroder & Schmitt-Rodermund, 2006), often with a focus on cognitive vs. non-cognitive skills. As a result, there is a growing understanding about the influence of education on entrepreneurial skills development.

Regardless of that increased knowledge, there is no guarantee that newly developed skills will be utilised in entrepreneurial activity. Thus, which entrepreneurial skills predict entrepreneurial intentions remains a question with no definite answer. In the light of this ambiguity, we aimed to help close this research gap by investigating what determines entrepreneurial intentions in our target group of young people aged 18 to 25.

2. Theoretical background

Understanding what determines entrepreneurial intentions can help promote entrepreneurship when integrated into programmes and policies development. Krueger, Reilly, and Carsrud (2000) argue entrepreneurship to be best predicted by entrepreneurial intentions. Bird (1989) sees them as a starting point of new value and business creation. As such, they can be perceived as the beginning of starting a new venture (Veciana, Aponte, & Urbano, 2005).

Some researchers believe entrepreneurship is cognitive in nature, leading to a deliberate career choice (Bacq, Ofstein, Kickul, & Gundry, 2017). As noted above, it is predicted best by one's intentions to establish a new enterprise instead of work for others (Krueger et al., 2000). The Self-Efficacy Theory (SET) (Bandura, 1977) provides a useful model for understanding entrepreneurial intentions and behaviour. SET is focused on entrepreneurial self-efficacy (ESE), i.e., how much an individual believes they can achieve specific goals. By influencing entrepreneurial intentions, ESE impacts entrepreneurial behaviour (Chen, Greene, & Crick, 1998; Schlaegel & Koenig, 2014). Our study contributes to this discussion by measuring the extent to which ESE predicts entrepreneurial intentions.

In their systematic review, Newman, Obschonka, Schwarz, Cohen, and Nielsen (2019) identified six widely used scales to measure ESE. For the purpose of the current study, we looked at employing domain-specific self-efficacy measures, as per Bandura (1986) recommendation. De Noble, Jung, and Ehrlich (1999)'s 23-item multi-dimensional scale offers insights into six sub-dimensions. Those sub-dimensions are developing new product and market opportunities, building an innovative environment, initiating investor relationships, defining core purpose, coping with unexpected challenges, and developing critical human resources (De Noble et al., 1999). Newman et al. (2019) identified 19 studies, which used De Noble et al. (1999) scale, offering support to applying it in our study.

Regardless that behaviourists (Bird, 1989; Gartner, 1988) focus on measures, such as ESE, and believe that personal characteristics play minor role in becoming an entrepreneur, other researchers see entrepreneurship as a consequence of entrepreneurial individuals' personal characteristics (Atiya & Osman, 2021; Brockhaus Sr, 1980; Carland, Hoy, & Carland, 1988). Some of those researchers even argue there may be genetic predispositions determining whether some people do and some do not become entrepreneurs. Our study contributes to this discussion, too, by exploring the extent to which personality predicts entrepreneurial intentions.

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To explore personality, we used the Big Five ten-item personality inventory (Goldberg, 1992). The inventory defines five personality characteristics: extraversion (assertive, dominant, energetic, active, talkative, and enthusiastic), conscientiousness (persistent and hardworking with a strong motivation), intellect (intellectually curious, seeking new experiences, and exploring novel ideas), neuroticism (adjustment and emotional stability), and agreeableness (e.g. self-centred and ruthless, or trustworthy) (Goldberg, 1992). The Big Five have been previously utilised in research on entrepreneurship (Bazkiaei et al., 2020; Mahmoud, Ahmad, & Poespowidjojo, 2020), supporting the inventory application in the current study.

Some venture creation research suggests that other individual differences beyond personality are contributors to some people creating their businesses (Baron, 1998; Krueger et al., 2000; Shinnar, Giacomin, & Janssen, 2012). Studies highlight gender role expectations to explain gender differences in entrepreneurship (Burgess & Borgida, 1999; Eagly, 2013). For example, Thébaud (2015) sees entrepreneurship as a field generally regarded as men's, which leads to entrepreneurship not being so popular career amongst women. Thus, men can potentially have more positive attitudes toward entrepreneurial intentions (Ryu & Kim, 2020). Despite efforts to motivate women, gender differences seem to persist in entrepreneurial activity (Boudreaux & Nikolaev, 2019; Hechavarría, Terjesen, Stenholm, Brännback, & Lång, 2018). For example, women continue to have lower entrepreneurial intentions than men (Westhead & Solesvik, 2016; Zhao, Seibert, & Hills, 2005). Nevertheless, the literature discusses gender similarities and differences and is not conclusive about this matter (Lim & Envick, 2013). Our study expands this discussion by exploring the contribution of gender in predicting entrepreneurial intention.

De Vita, Mari, and Poggesi (2014) believe countries' cultural values generate gender and, more broadly, social roles. This belief leans into another research view which considers socio-cultural and economic environmental aspects to influence individual entrepreneurial intentions (Baubonienė, Hahn, Puksas, & Malinauskienė, 2018). The argument that entrepreneurial psychological attributes can be culturally acquired finds further support in Ajzen (2001) and Gibb and Ritchie (1982).

Previous research has provided evidence in supporting this view that people vary in their entrepreneurial intentions depending on their country of origin. For example, Tomal & Szromnik (2022) explored cross-cultural differences in East European countries. They found that cultural aspects influence entrepreneurial intentions in young people and that this influence varies between the studied countries. Similar country-determined variabilities were confirmed in European countries more broadly (Teixeira et al., 2018). In another cross-cultural study, Iakovleva, Kolvereid, & Stephan (2011) present findings that show differences in entrepreneurial intention between developing and developed countries, in general. In particular, the authors reveal young residents of developed nations as having lower entrepreneurial intentions than those of developing ones. Thus, it can be assumed that country of origin. By involving a culturally diverse sample, we investigated the extent to which culture, i.e. country, might determine some young people to consider becoming entrepreneurs.

In summary, we applied a SET model consisting of demographic variables (gender, age and country), personality (Big Five) and ESE to assess young people's intentions to become entrepreneurs.

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3. Research objective and hypotheses

Applying the SET model, this study surveyed 18 to 25 years-old people in Argentina, Belgium, Bulgaria, China, and Romania to identify their predictors of entrepreneurial intentions. It was hypothesised that:

H.1. C*ountry*, *gender* and *age* (demographic variables) would account for a significant variation in *entrepreneurial intentions*.

H.2. *Extraversion, conscientiousness, intellect, neuroticism,* and *agreeableness* (Big Five personality variables), applied over and above the demographic variables, would account for a significant variation in *entrepreneurial intentions*.

H.3. *Developing new product and market opportunities, building an innovative environment, initiating investor relationships, defining core purpose, coping with unexpected challenges,* and *developing critical human resources* (ESE) (De Noble et al., 1999), applied over and above the personality variables, would account for a significant variation in *entrepreneurial intentions*.

4. Methodology

4.1. Recruitment of participants

Recruitment of participants took place between the 13th and the 18th of October, 2021. It was done face-to-face and through social media. The initial number of 207 completed surveys was reduced by removing partially completed ones. This action left 203 cases (100 male; Mage = 21.03, SD = 2.65). This final dataset was considered sufficient to perform a regression analysis. Tabachnick and Fidell (2007) specify $n=>104 + m$ as the necessary minimum, with m being the number of predictors. The distribution amongst the participating countries was balanced: Argentina (41), Belgium (35), Bulgaria (42), China (40) and Romania (45).

4.2. Materials

Data was collected through an online survey. It consisted of four sections in a fixed order. Section One of the survey, demographic data, contained 2 items: *age* (in years) and *gender* (0 = female / 1 = male). *Country* was not included as the survey was administered separately in each participating country. Section Two measured ESE using 5-point scales from "Strongly disagree" (1) to "Strongly agree" (5). It contained six sub-dimensions: *developing new product and market opportunities* (7 items), *building an innovative environment* (4 items), *initiating investor relationships* (3 items), *defining core purpose* (3 items), *coping with unexpected challenges* (3 items), and *developing critical human resources* (3 items) (De Noble et al., 1999). Section Three contained five items, adapted from Ismail (2017), to measure *entrepreneurial intention*. Personality was measured through the Big Five ten-item personality inventory (Goldberg, 1992), using a 5-point Likert scale (1. Very Inaccurate, 2. Moderately Inaccurate, 3. Neither Accurate Nor Inaccurate, 4. Moderately Accurate, and 5. Very Accurate).

4.3. Data transformation

The negatively-keyed Big Five personality inventory items were recoded for the current analysis. Following the recoding, a smaller value, left of the scale, denotes a negatively-loaded answer, while a higher value, right of the scale, denotes a positively-loaded answer. Subsequently, all subscales were examined for internal consistency: *developing new product and market opportunities* (α = .87), *building an innovative environmen*t (α = .78), *initiating investor relationships* (α = .86), *defining core purpose* (α = .73), *coping with unexpected challenges* (α = .70), *developing critical human resources* (α = .83), *entrepreneurial intentions* (α = .89), *extraversion* (α = .88),

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conscientiousness (α = .80), *intellect* (α = .82), *neuroticism* (α = .77), and *agreeableness* (α = .83). The generally acceptable Cronbach's α limit is .70 (DeVellis, 2016), revealing the high internal consistency of the data. Finally, the entrepreneurial intentions and ESE items were averaged, while the personality subscales were summed up to calculate single values for each measure.

4.4. Analysis

Initially, we checked whether our data meets parametric tests assumptions. We looked into the homogeneity of variance, linearity, normality, homoscedasticity and multicollinearity.

We investigated multicollinearity within the regression analysis. Variance inflation factors showed lower than three values. Thus, we did not remove any variable from the analysis.

For the dependent variable (DV), *entrepreneurial intentions*, we inspected skewness (.07, std. error = .17) and kurtosis (-.90, std. error = .34) values, histograms, 95% trimmed means, standardised residual scores, and scatterplots. All inspections confirmed assumptions to be sufficiently met. The Shapiro-Wilk test suggested a non-normal distribution (.97, $p < .001$). However, it is considered very sensitive and potentially unreliable in samples > 50 (Elliott & Woodward, 2007). Thus, a parametric test was used in the analysis (3-step hierarchical multiple linear regression).

The hierarchical regression helped us identify the variables that are statistically significant in predicting *entrepreneurial intentions*. The strength of each independent variable (IV) on the DV is shown by the standardised beta coefficients (β). A higher value signifies a stronger effect.

5. Results and discussion

5.1. Zero-order correlations

In Table 1, we present Spearman's rho correlations and means with standard deviations for *entrepreneurial intentions*, ESE and Big Five. Those results show consistency with SET (Bandura, 1977) in that *entrepreneurial intentions* was strongly correlated with *developing new product and market opportunities* (*rho*=0.62, $p < .001$) and moderately correlated with *building an innovative environment* (*rho*=0.46, $p < .001$), *initiating investor relationships* (*rho*=0.35, $p < .001$), *defining core purpose* (*rho*=0.33, $p < .001$), *coping with unexpected challenges* (*rho*=0.23, $p < .001$), and *developing critical human resources* (*rho*=0.37, $p < .001$). The separate ESE measures showed strong or moderate correlations between each other, with the strongest ones being between *developing new product and market opportunities* and *building an innovative environment* (*rho*=0.63, $p < .001$), and between *defining core purpose* and *developing critical human resources* (*rho*=0.60, $p < .001$).

The results of the Big Five varied. None of the subscales correlated significantly with *entrepreneurial intentions.* The correlations between the different personality characteristics were generally less strong than those within ESE, with many being insignificant. The strongest correlations were moderate between *conscientiousness* and *intellect* (*rho*=0.40, $p < .001$), and between *extraversion* and *agreeableness* (*rho*=0.37, $p < .001$). The strongest correlation between an ESE subscale and a personality characteristic was observed between *defining core purpose* and *conscientiousness* (*rho*=0.34, $p < .001$).

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Table 1. Means, standard deviations and bivariate Spearman's rho (n=203)

	Scale range (min/max)	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12
1. Entrepreneurial Intentions	1-5	3.03 (0.98)	-	.62**	.46**	.35**	.33**	.23**	.37**	.10	-.02	<-.01	.08	.08
2. Developing new product and market opportunities	1-5	3.45 (0.74)		-	.63**	.53**	.58**	.29**	.59**	.13	.01	.19**	.23**	.24**
3. Building an innovative environment	1-5	3.84 (0.76)			-	.58**	.57**	.25**	.49**	.23**	.15*	.17*	.27**	.18*
4. Initiating investor relationships	1-5	3.57 (0.91)				-	.56**	.40**	.53**	.17*	.06	.21**	.15*	.19**
5. Defining core purpose	1-5	3.86 (0.72)					-	.42**	.60**	.18**	.15*	.34**	.28**	.31**
6. Coping with unexpected challenges	1-5	3.74 (0.79)						-	.32**	.09	.11	.31**	.16*	.24**
7. Developing critical human resources	1-5	3.48 (0.86)							-	.19**	.03	.20**	.17*	.18*
8. Extraversion	10-50	33.06 (8.63)								-	.37**	-.15*	.04	.25**
9. Agreeableness	10-50	37.07 (6.78)									-	.22**	.07	.39**
10. Conscientiousness	10-50	36.04 (6.40)										-	.18**	.40**
11. Emotional Stability	10-50	32.05 (6.08)											-	.04
12. Intellect	10-50	36.16 (6.58)												-

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

5.2. Predictors of entrepreneurial intentions

We assessed which measures (demographics, personality characteristics and ESE) and to what extent they accounted for the participants' self-reported *entrepreneurial intentions* variance through a 3-step hierarchical multiple regression. Table 2 reveals that the demographic variables explained 2% (adj. $R^2 < .01$, $p = .375$) of the *entrepreneurial intentions* variance. Statistical significance was not reached by any predictor. The results did not provide support for H1, which predicted that the demographic variables would account for a significant variation in *entrepreneurial intentions*.

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Our findings suggested that although demographic characteristics may be important for entrepreneurship, in general, in our particular case, they are not significant to determine *entrepreneurial intentions*. We intuitively support De Vita et al.'s (2014) notion that national cultural values generate gender roles. However, we found no evidence of this notion to apply in the case of *entrepreneurial intentions*. Such a result does not support Baubonienė et al. (2018), either, regarding *entrepreneurial intentions* being influenced by socio-cultural and economic environmental aspects. Overall, we found no evidence of country of origin being a determinant of *entrepreneurial intentions*, contrary to previous research (Tomal & Szromnik, 2022; Teixeira et al., 2018; Iakovleva, Kolvereid, & Stephan 2011).

Similarly to *country* and contrary to previous research (Burgess & Borgida, 1999; Eagly, 2013), our data did not reveal significant *gender* effects, either. Thus, *entrepreneurial intentions* seem not reserved for men only, challenging Thébaud (2015) assumptions. In that sense, we found support for Lim and Envick (2013) in that the literature is not conclusive on the topic of gender differences persisting in entrepreneurship, particularly in *entrepreneurial intentions*.

At Step 2 of the regression analysis, adding the Big Five personality characteristics insignificantly increased the explained variance by Δ3%, $p = .299$. Again, no statistical significance was reached by any of the predictors. The results did not provide support for H2, which predicted that the Big Five personality variables, applied over and above the demographic variables, would account for a significant variation in *entrepreneurial intentions*.

These results did not support previous research (Atiya & Osman, 2021; Brockhaus Sr, 1980; Carland et al., 1988), which suggested personal characteristics as significant determinants. It can be argued that such characteristics play a role in any business endeavour, being entrepreneurial or not. However, we did not find evidence that they can determine *entrepreneurial intentions* by themselves.

The explained variance significantly increased by Δ39%, over and above the Big Five when the ESE subscales were added at Step 3. *Conscientiousness* ($\beta=-.15$, $p = .033$) and *developing new product and market opportunities* ($\beta=.58$, $p < .001$) emerged as statistically significant predictors of *entrepreneurial intentions*. The results supported H3, which predicted that the ESE subscales, applied over and above the personality variables, would account for a significant variation in *entrepreneurial intentions.*

The Table 2 final column shows the bivariate DV/IV relations. It revealed all ESE subscales as strong individual predictors of *entrepreneurial intentions*, but none of the demographic variables or the personality characteristics. *Developing new product and market opportunities* was the strongest individual predictor, explaining 38% of the variance.

In an overall model with all IVs considered, the highest unique variance was explained by *developing new product and market opportunities* (sr^2 – variance explained, unshared by other variables), 15%. This variable was followed by *age*, *conscientiousness*, and *coping with unexpected challenges*, which explained 1% of the variance each.

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Table 2. 3-step hierarchical multiple regression analysis, predicting entrepreneurial intentions with demographic, Big Five and ESE *variables (n=203).*

Step	Variables	Step 1 β	Step 2 β	Step 3 β	Step 3 sr^2^	Bivariate R^2
1. Demographics	Country	-0.10	-0.13	-0.07	<.01	<.01
	Gender	0.09	0.07	<.01	<.01	<.01
	Age	-0.03	-0.03	-0.11	0.01	<.01
2. Big Five	Extraversion		0.11	-0.03	<.01	0.01
	Agreeableness		-0.14	<.01	<.01	<.01
	Conscientiousness		-0.02	-0.15*	0.01	<.01
	Emotional Stability		0.07	-0.07	<.01	<.01
	Intellect		0.12	<.01	<.01	<.01
3. ESE	Developing new product and market opportunities			0.58**	0.15	0.38**
	Building an innovative environment			0.15	<.01	0.21**
	Initiating investor relationships			0.01	<.01	0.12**
	Defining core purpose			-0.05	<.01	0.11**
	Coping with unexpected challenges			0.12	0.01	0.05*
	Developing critical human resources			-0.02	<.01	0.14**
	R^2	0.02	0.05	0.44**		
	R^2_{change}		0.03	0.39**		

Standardised beta weights.
* p < .05
** p < .001
^ sr^2 – variance explained, unshared by other variables.

These final results support the findings in previous behaviourist work (Bird, 1989; Gartner, 1988). Although not all ESE subscales were significant determinants when taken together, each one of them was a strong individual predictor. This finding means that entrepreneurial education may focus on each separately and expect some influence on *entrepreneurial intentions.* However, it seems that most value in entrepreneurial education might be achieved if the focus falls on *developing new product and market opportunities*. This particular variable consistently emerged as a significant contributor in the regression analysis, the strongest individual predictor and the one explaining the most unique variance.

Those findings support the notion that entrepreneurship is cognitive (Bacq et al., 2017). More importantly, they reveal additional influences when this cognition is present. For example, once ESE is considered in an overall model, demographics (*age)* and personality characteristics *(conscientiousness)* start contributing by explaining unique variance, unshared by other variables. Although some of that information is lost when we look at the overall variance explained, i.e. *age* is not a significant contributor in such an analysis, *conscientiousness* continues to be a significant predictor.

A more interesting consideration is that the relationship between *conscientiousness* and *entrepreneurial intentions* is negative. This counterintuitive finding means that the more persistent, hardworking, and motivated people are not necessarily the ones with the highest intent to start a new venture. However, such people seem to be overall well-aligned with ESE, particularly with *defining core purpose* and *developing new product and market opportunities*. The last, in turn, is the variable most likely to induce *entrepreneurial intentions*.

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6. Conclusion

This study research objective was to identify the predictors of entrepreneurial intentions in a sample of young people from Argentina, Belgium, Bulgaria, China, and Romania. We applied a SET-grounded theoretical model. As part of the model, we investigated the contribution of demographics, personality and ESE to our target group's entrepreneurial intentions. Overall, 44% of the variance was explained by the model.

A particular strength of the study was the collected variables diversity. This diversity permitted the establishment of a more complete effects' picture. Another strength was its geographical coverage, i.e. we recruited participants on three continents. A third strength of the study was the depth of the analysis. For example, we explored ESE subscales as separate measures instead of looking at ESE as a single measure.

The study had some notable limitations. For example, the data was collected through online questionnaires. This collection method is known to be susceptible to bias. However, the anonymous nature of the data collection should have minimised bias in the provided data.

Another limitation is the sample size. Despite being sufficient for regression analysis, 203 cases might be considered insufficient to make this study representative. Furthermore, it did not allow regression analyses to be performed for each country separately. The necessary n=>104 + m number of cases (Tabachnick and Fidell, 2007) was collected for neither participating country. As a result, our conclusions and practical implications cannot be referred to a single country but should be regarded as informing a global approach.

A third limitation is that it is highly likely that much more factors than the ones used in our regression analysis influence entrepreneurial intentions. Such factors may include business environment, family traditions or personality traits. We cannot include all potential influencers in a single study for practical reasons, which limits its findings. Nevertheless, such factors can be investigated in future studies to build on the findings presented in this article.

Our data revealed some counterintuitive findings, such as that the country of origin and gender did not matter when predicting entrepreneurial intentions in our population. While we can debate the reasons for such findings, future research should look into why country and gender are significant influencers in one circumstance and not in others. Another unexpected finding was that personality characteristics did not matter by themselves. What ultimately determined our participants' entrepreneurial intentions was their ability to develop new products and market opportunities. Other ESE subscales did not reach statistical significance in the overall model.

Those insights can support the global priority of developing entrepreneurial skills, particularly in young people. They have theoretical implications, such as providing further evidence of the role of ESE towards entrepreneurial intentions, and through it, towards entrepreneurial activities. As a continuation, future research activities may focus on whether initiatives to promote entrepreneurship influence ESE, its subscales or entrepreneurial intentions.

The practical implications of such future knowledge can be immense. While education systems foster entrepreneurial learning in various settings and contexts, our findings provide guidance on where they should focus their efforts. As a result, educational policies can leverage this knowledge to provide opportunities for targeted learning with the potential to enhance the individuals' quality of life. Such learning can be further directed towards solving global challenges. The focus can be on identifying future needs, thus, exploring emerging market opportunities through the development of new products to create new industries (Moyle et al, 2019). For example, people are increasingly working from home, which has its economic and pandemic

justificataion but can potentially trigger mental health issues. Those issues can be visible, but solving them would require some structure and process, which can be developed through new skills and practical knowledge acquisition, such as entrepreneurship fundamentals. In the current article, we have shown that some skills (*developing new product and market opportunities*) weigh more than others when it comes to entrepreneurial intentions.

Technological and scientific advancements, as well as the hardships of life in an ever-changing world, can potentially turn such entrepreneurial intentions into motors for sustainable economic development. With the evidence we provide, policymakers and stakeholders can develop better, more targeted initiatives in future to promote such sustainable economic development. Beyond creating employment and career outcomes that matter for young people, entrepreneurial effects may include improved national wellbeing through established pathways from entrepreneurship to employment (Andersen et al, 2017; Dvouletý et al, 2018; Milovic, Jocovic, & Djurisic 2020). Understanding and promoting youth entrepreneurship, which contributes to healthier sustainable communities, supports sustainable economic recovery and growth (Apostolopoulos et al, 2018; Barrett, 2016).

In conclusion, our results can inform more effective entrepreneurship policies. Those policies can extend to inform others on education, health and economy. Such broad implications should be considered when designing practical, research-informed solutions to support willing learners. As a follow-up, future research may investigate to what extent those research-informed solutions generate positive outcomes for learners.

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BIG DATA ANALYTICS ADOPTION VIA LENSES OF TECHNOLOGY ACCEPTANCE MODEL: EMPIRICAL STUDY OF HIGHER EDUCATION

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Abstract. The goal of this study was to establish a model to quantify the adoption of big data in relation to education and to translate the adoption of big data in literature into the educational context. This study hypothesizes that encouraging situations, perceived risk, perceived usefulness, perceived ease of use influence the attitude of the students towards use and the intention to use behavior, in turn impacting the adoption of big data in education, this research used the Technology Acceptance Methodology (TAM) model. Through analyzing 282 university students, the present thesis followed quantitative data collection along with analysis procedures. Therefore, the responses of students were grouped into seven testing constructs and evaluated to understand their adoption influence. Accordingly, data were subsequently quantitatively analysed utilising Structure Equation Modelling (SEM). The findings revealed that facilitating conditions, perceived risk, perceived usefulness, perceived ease of use were important determinants of the attitude of students towards use and behavioral intention to use big data, and 71.2% of acceptance was also significant for the attitude of students towards use and behavioral intention to use big data.

Keywords: Big Data Adoption; Technology Acceptance Model (TAM); Empirical Study

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JEL Classifications: I21, I25

1. Introduction

Nowadays, humanity develops data about our behaviors at an exponential growth rate. This knowledge covers, for instance, our mobile phones and their location, all online sales, the Internet of Things, social networks, wearables, etc. A major competitive advantage (Matthews et al., 2022) is gained by universities who are able to turn this data into real-time customer information and knowledge. Usage data allows universities and colleges to understand why their students buy their products, the best times for deals, and how to improve learning. Big data companies

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(Ogbuke et al., 2022) can manage large volumes of data and become market leaders, almost in real time. Big data adoption, implementation, and management also requires university students to develop new skills and knowledge. The task of such big data adoption is increasingly becoming important as data infuses and manages digital evolution. Presented that universities are at an early stage of using big data adoption, it is timely and important to review factors that influence big data adoption technologies at universities. A research by Gartner (Ranjan, & Foropon, 2021) shows that more than three-quarters of organisations are anticipating or engaging in big data, recognizing the important and relevant characteristics that affect the organizational adaptation of this technology. Reviews from 200 (approximately) journal papers along with many conference proceedings related to the adoption of big data so far indicate that less analysis is conducted on features that affect adoption (Georgiadis & Poels, 2022). In addition, considering the lack of analysis into the deciding factor of the adoption report on big data adoption (Iftikhar et al., 2022). The current research therefore intends to establish a model proposing an acceptable view of the departure for future studies on the implementation of big data adoption. In this context, investigation is being performed on certain variables that are likely to influence universities' acceptance of big data adoption technologies, such as TAM variables with adoption factors. The cause of these errors is unknown, aside from being badly examined (Batko & Ślęzak, 2022). There is also a need for more intentional and systematic analysis to determine the speed of organisations to change big data. Sustainable growth and sustainable competitive advantage are becoming more dependent on the ability of every institution to use big data, innovations and the sharing of knowledge management (Ead et al., 2021; Karnan, 2022). However, not as much literature has been found about how different variables impact the acceptance of big data or the present problems that emerged during the implementation of the adoption of big data. There was also a shortage of a detailed structure in this respect, including a lack of references about how to develop and use certain institutional frameworks (Batko& Ślęzak, 2022). In addition, as shown in (Gusc et al., 2022), the existing systems are primarily technical-oriented. In comparison, recent research on the adoption of big data have focused primarily on technological features (for example, technical algorithms or machine learning) in addition to model development (Park & Kim, 2021). There have been several studies focused on the theoretical analysis performed on the fields of big data adoption, but there is a study deficiency that explores the relation between the adoptions of TAM variables. As a result, seven variables have been examined in the latest research on the acceptance of big data by students in educational institutions.

2. Theoretical Model and Hypotheses Development

In education, Big Data has transformed technology and learning in general. Different complementary and conflicting models for the adoption of studies have been developed by adoption research, primarily related to the adoption of the information system (IS), including information technology (IT). TAM by (Davis, 1989) is the most dominant theoretical contribution to the adoption study and is generally used by academics to analyze technology adoption. In the current research, seven influences on the acceptance of big data were analyzed as follows: Facilitating Conditions (FC), Perceived Risk (PR), Perceived Usefulness (PU), Perceived Ease of Use (PEU) Students' Attitude toward Use (AT) Behavioural Intention to Use (BIU), And Big Data Adoption in Education (BDA), see Figure 1.

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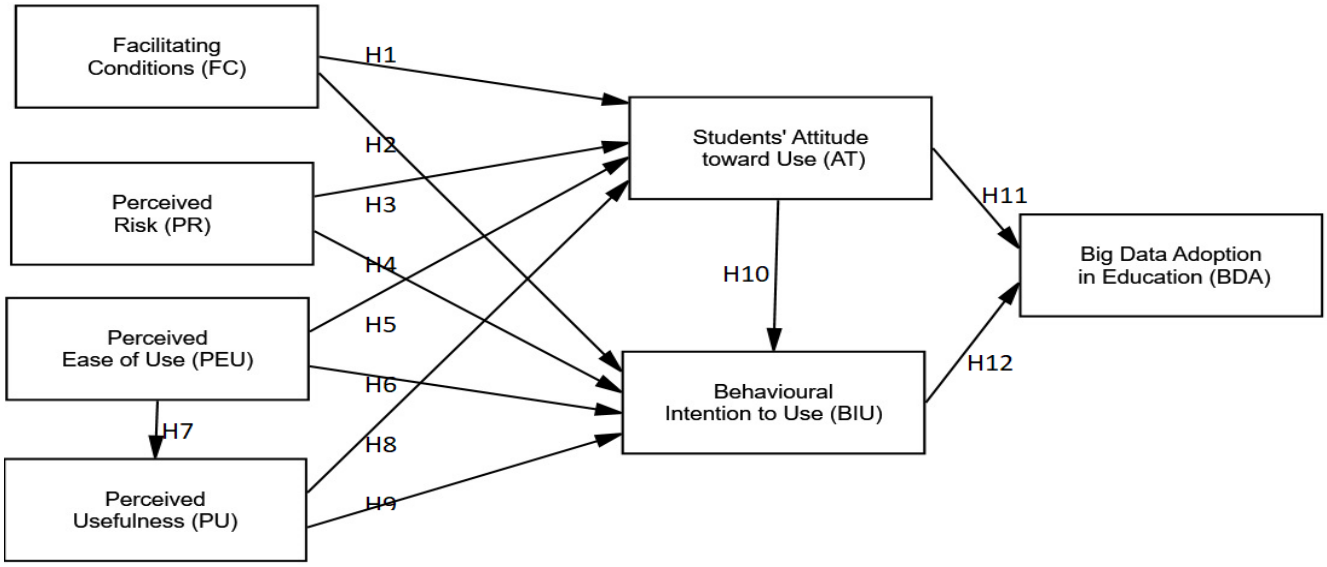

Figure 1. Research Model and Hypotheses
Source: Authors

2.1 Facilitating conditions (FC)

FC are favorable since the tools required to use a new approach and manage it subsequently are easy to access (Venkatesh et al., 2003). (Venkatesh et al., 2012) observed in later studies using TAM that this construct has an important effect on the behavioral motivation to use a new technology. This beneficial effect on behavioral intent has also been supported by more recent findings (Cabrera-Sánchez et al., 2021; Kaur & Arora, 2022). The use of new technology has a positive influence on conditions of relaxation. This beneficial effect on behavioral intent has also been confirmed by more recent findings (Cabrera-Sánchez et al., 2021; Kaur & Arora, 2022). The use of new technology has a positive influence on conditions of relaxation. Numerous subsequent works (Al-Rahmi et al., 2022; Chauhan & Jaiswal, 2016) also affirm this relationship. Therefore, this research use this factor (FC) to measure to students' attitude toward use and behavioural intention to use big data in education. The following hypotheses were suggested based on the discussion above:

H1: FC is positively associated with AT.

H2: FC is positively associated with BIU.

2.2 Perceived Risk (PR)

The current strategy must take risk as a critical consideration into account, mostly due to the complexity of the adoption big data in learning impacts. Cunningham distinguishes expected risk by two variables that determine the future and ambiguity by which uncertainty corresponds to the arbitrary probability of something not happening by students, whereas consequence is risk of effects following final verdict (Jain & Raman, 2022), Bauer defined perceived risk as a concoction of uncertainty and the significance of the consequences (Osakwe et al., 2022). Featherman and Pavlou noted that the perceived risk is sometimes referred to as a sense of suspicion as to the potential detrimental effects of the use of a service or product (Liu & Tao, 2022). Perceived risk is the choice that individuals decide regarding the magnitude and uniqueness of a risk prior to the system's usage. Previous study has found that the recognition of technological adoption has been taken into consideration (Shank et al., 2021; Zhang et al., 2021; Chen et al., 2022). Luo, Zhang and Shim stressed the relevance of multi-faceted risk perception when contemplating a technology implementation framework (Shahid et al., 2022). The implementation of big data is risky and various significant threats found by the McKinsey Global Institute have been taken into account in this study (Di Vaio et al., 2022). Therefore, this research use this factor (PR) to

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measure to students' attitude toward use and behavioural intention to use big data in education. The following hypotheses were suggested based on the discussion above:
H3: PR is positively associated with AT.
H4: PR is positively associated with BIU.

2.3 Perceived Usefulness (PU)
PU is the degree to which any person expects that it will increase her or his job output using a technology (Davis, 1989; Chen et al., 2022). In describing the implementation of technology, Tan and Teo explained the assumed usefulness as an essential determinant (Yeong et al., 2022). The keenness of a person to handle a complex method is considered to be useful (Li, Mao, & Liu, 2022). User efficiency is demonstrated by the usefulness and ease of using technical observations (Bansah & Agyei, 2022). Therefore, this research use this factor (PU) to measure to students' attitude toward use and behavioural intention to use big data in education. The following hypotheses were suggested based on the discussion above:
H5: PU is positively associated with AT.
H6: PU is positively associated with BIU.
H7: PU is positively associated with PEU.

2.4 Perceived Ease of Use (PEU)
PEU is referred to as the degree to which individuals feel that little or no effort should be taken to use any given technology (Davis, 1989). Likewise, PEU was defined as how well a user is doing what is required for a handling system and how simple it is to receive the system, mental work needed to connect with the systems, and ease of using the systems (Al-Rahmi et al., 2021; Alyoussef et al., 2019). Empirically, it has been found that perceived ease of use is an indicator of adoption of technology (Chen et al., 2022; Venkatesh & Bala, 2008; Mitra et al., 2022). In the past, some scholars have not provided significant data as to whether the TAM construct would have an effect on the perceived ease of use of technology (Yeong et al., 2022). Therefore, this research use this factor (PEU) to measure to students' attitude toward use and behavioural intention to use big data in education. The following hypotheses were suggested based on the discussion above:
H8: PEU is positively associated with AT.
H9: PEU is positively associated with BIU.

2.5 Students' Attitude toward Use (AT)
In this analysis, attitude is defined as any actions relevant to big data adaption by the students. It has been hypothesized that the mentality is closely associated with the intent of utilizing actions. Without a pre-defined target, the big data revolution has developed a data management mentality, embracing a bottom-up, inductive approach to big data analysis, exploration and research (D'Hauwers & Walravens, 2022; Chatterjee et al., 2022; Brossard et al., 2022). Attitude towards, which is defined as the attitude of students to big data adaptation, has been included based on the TAM. The Attitude towards mentality is expected in this study to have a statistically significant correlation with the behavioral purpose of reacting to big data. Therefore, this research use this factor (AT) to measure to students' behavioural intention to use and big data adeption in education. The following hypotheses were suggested based on the discussion above:
H10: AT is positively associated with BIU.
H11: AT is positively associated with BDA.

2.6 Behavioural Intention to Use (BIU)
BIU is the the eagerness to use and continue using technology, which defines the use of technology. In addition, in this exploration, the adoption of big data is an important factor in the models of building technology utilization (Davis, 1989; Venkatesh et al., 2003). The theories listed are from TAM theories that have seen the adoption of big data as a result of attitude towards particular behavior and basic rules that were later extended to add perceived influence BIU (Venkatesh & Bala, 2008). In the same way, the perceived ease of use and perceived

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utility reflect the trust of the critical students after adoption, resulting in higher levels of student satisfaction and a strategy for persistence (Cheng et al., 2022). Therefore, this research use this factor (BIU) to measure to big data adeption in education. The following hypothesis were suggested based on the discussion above:
H12: BIU is positively associated with BDA.

2.7 Big Data Adoption (BDA)
According to Singh et al. (2022) Big Data Adoption is an intelligence source characterized by such high speed, scale, and diversity that needs specific analytical methods and technologies to turn them into meaning. An analysis by (Ranjan, & Foropon, 2021) reveals that three-quarters (approximately) organisations have either invested or are preparing to invest in big data, and it is timely and critical to find reasons that influence organizational acceptance of big data adoption. There are limited types of literature on big data adoption in higher education systems (Kumar & Kumar, 2022), spite of the exponential development of study on big data adoption in other fields. The effect on the Higher Education system of big data implementation technologies would promote teacher inquiry, provide opportunities to methodically analyze training exercises, devise methods to find better learning frameworks (Rolf et al., 2022) and provide insights for teachers to represent their teaching strategies as well as how they influence learning outputs (McDowall et al., 2021). These are extensively utilized by scholars for adopting variation of technology, together with organizational big data adoption (Wu et al., 2022; Park et al., 2022; Kornelia & Andrzej, 2022; Gvishiani et al., 2022).

3. Research Methodology

The research was conducted on both postgraduate and undergraduate students in relation to the sampling and population to assess the adoption of big data for learning. Items in the TAM theory questionnaire were tested by students on the basis of the 5-point Likert scale. Students who received the surveys manually have been asked to complete their information and include their views on the adoption of big data for learning. For data analysis, which was extracted from the questionnaires, the Statistical Package for Social Sciences (SPSS) was used. Specifically,' SEM- Amos' was used as the key data analysis method. This technique of using SEM-Amos has taken effect through two major phases: evaluation of construct validity, convergent validity, discriminant validity of measurements; and structural model analysis. Both of these steps have been adopted by the recommendations (Hair et al., 2012).

3.1 Sample Characteristics and Data Collection
311 questionnaires were manually deployed, but only 299 were sent back to the students, representing 96.1 percent of them. Since 3 incomplete surveys were excluded, 296 were analysed using SPSS. 2 further surveys were excluded: 5 were incomplete details and 7 were outliners. Once this omission was completed, the total number of eligible surveys was 282. According to (Hair et al., 2012), this exclusion stage has highlighted that this method is important since the presence of outliers may be a justification for imprecise results. From the demographic data of the respondents: 123 (43.6 %) are male, 159 (56.4 %) are female, 21 (7.4 %) are in the 25-29 age group, 241 (85.5 %) are in the 30-35 age range, 20 (7.1 %) are above 36 years of age. 36 (12.8 %) of respondents were from social science, 94 (33.3 %) of respondents were from engineering, and 152 (53.9 %) of respondents were from science and technology, in contrast to the demographic variables of specialization, see Table 1.

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Table 1. Demographic Data of the Respondents

Factor		Number	%
Gender	Male	123	43.6
	Female	159	56.4
Age	25-29	21	7.4
	30-35	241	85.5
	above 36	20	7.1
Specialization	social science	36	12.8
	engineering	94	33.3
	science and technology	152	53.9

Source: Authors

3.2 Measurement Instruments

To satisfy the goal of maintaining content validity, objects in the constructs have been adapted. There are mainly two aspects of the survey. The first section is about the demographic data of the age, gender, level of education. The second section includes the questionnaire used in this analysis. Four elements from (Habibi et al., 2020) have been modified from previous studies promoting condition, perceived risk was adapted four from (Jain & Raman, 2022; Shahid et al.,2022), perceived usefulness was adapted five items from (Davis, 1989), perceived ease of use was adapted five items from (Davis, 1989), students' attitude towards use was adapted four items from (Venkatesh & Bala, 2008), behavioural intention to use was adapted four items from (Venkatesh & Bala, 2008), and big data adoption in education was adapted five items from (Al-Rahmi et al., 2022; Saravanan et al., 2022).

4. Result and Analysis

The Alpha reliability coefficient outcome of Alpha value was 0.910 TAM hypothesis that influenced the acceptance of big data. The Discriminant Validity Assessment (DV) was evaluated using three criteria, namely: Index between variables that must be below 0.80 (Hair et al., 2012), the average variance extracted (AVE) value of each construct that requires to be equal to or greater than 0.50 and the square value (AVE) of each construct that needs to be greater than the factor-correlated inter-construction correlations (IC) (Fornell & Larcker, 1981). In comparison, the results of the factor loading (FL) crematory factor analysis (CFA) have to be 0.70 or more, although the results of the Cronbach Alpha (CA) have been agreed to be 0.70 (Hair et al., 2012). Researchers have also added that composite (CR) reliability must be 0.70.

4.1 Measurement Model Analysis

For data processing, this analysis employed AMOS 23. Specifically, as primary research methods, It has incorporated both structural equation modelling (SEM) and confirmatory factor analysis (CFA). Therefore, in order to validate the measurement model, (Hair et al., 2012) extended the criteria for goodness-of-fit, Uni-dimensionality, convergent validity, reliability along with discriminant validity such as standardized chi-square, degree of freedom/chi-square ($\chi 2$- 3908.523/1219), relative fit index (RFI- .947). The normed fit index (NFI-.959), the comparative fit index (CFI-.978) of the Tucker-Lewis coefficient (TLI-.979), the incremental fit index (IFI-.969), the root mean square approximation error (RMSEA-.047) and the root mean square residual (RMR-.035) are all methods that can be used to test the model estimation method that facilitating conditions, perceived risk, perceived usefulness, perceived ease of use effect the students' attitude toward use and behavioural intention to use, in turn in effect big data adoption in education.

4.2 Reliability and Validity of Measures Model

In this research the method of validity is used to verify the scale of the difference, along with other theories, between a hypothesis and its measures (Bagozzi et al., 1998). Discriminant validity, through review in this context, was positive for both hypotheses, assuming that the values were above 0.50 (cut-off value) at p=0.001

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(Fornell & Larcker, 1981). In conformity with (Hair et al., 2012), the correlation of the factors in any two given constructs shall not surpass the square root of the average variance shared by them in one construct. The resulting composite reliability (CR) values, in addition to those of Cronbach's Alpha (CA), remained about 0.70 and above, although the results of the average variance extracted (AVE) remained about 0.50 and higher, the total loading factor (FL) remained relevant as it complied with certain measurement (Hair et al., 2012; Fornell & Larcker, 1981). The following sections comment further on the estimation model's results. In order to assess the validity of the discriminant, the validity and reliability results with which the average variance extracted (AVE), CR and Cronbach's Alpha (CA) were all accepted are also indicated. Both (CR) values have been noted to range from 0.879 to 0.932, which means they are over the cut-off value of 0.70. In comparison, the resulting (CA) values range from 0.842 to 0.919 and reach the cut-off value of 0.70. AVE value of 0.599 to 0.682 is also over 0.50. Both of these outcomes are positive and significant (FLs) and agree with the criteria for traditional evaluation (Hair et al., 2012; Fornell & Larcker, 1981). Refer to table 2 and table 3.

Table 2. Confirmatory Factor Analysis Results

Factors	Items	Factor Laoding	AVE	CR	CA
Perceived Usefulness	PU1	.788	.599	.904	.917
	PU2	.841			
	PU3	.823			
	PU4	.794			
	PU5	.892			
Perceived Ease of Use	PEU1	.881	.611	.882	.907
	PEU2	.846			
	PEU3	.738			
	PEU4	.880			
	PEU5	.798			
Perceived Risk	PR1	.836	.602	.894	.907
	PR2	.812			
	PR3	.875			
	PR4	.846			
Facilitating Conditions	FC1	.807	.682	.932	.842
	FC2	.846			
	FC3	.753			
	FC4	.864			
Students' Attitude toward Use	AT1	.891	.611	.907	.900
	AT2	.846			
	AT3	.794			
	AT4	.866			
Behavior Intention to Use Big Data	BIU1	.810	.611	.911	.919
	BIU2	.863			
	BIU3	.884			
	BIU4	902			
Big Data Adoption	BDA1	.854	.644	.879	.890
	BDA2	.877			
	BDA3	.895			
	BDA4	.865			
	BDA5	.794			

Source: Authors

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Table 3. Validity and reliability for the Model

Factors	Code	PU	PEU	PR	FC	AT	BIU	BDA
Perceived Usefulness	PU	.921						
Perceived Ease of Use	PEU	.341	.901					
Perceived Risk	PR	.370	.435	.836				
Facilitating Conditions	FC	.433	.348	.330	.890			
Attitude toward Use	AT	.324	.456	.412	.400	.870		
Behavior Intention to Use	BIU	.442	.501	.409	.382	.411	.879	
Big Data Adoption	BDA	.394	.345	.323	.467	.349	.402	.902

Source: Authors

4.3 Structural Model Analysis

The path modeling research in the current study was used to construct a model to measure facilitating conditions and perceived risk with TAM model variables on learning adoption of big data. The effects are showed and compared in the hypothesis testing discussion, according to the model. Subsequently, factor analysis (CFA) was conducted on SEM to evaluate the suggested hypotheses as seen path model results in Figure 2 and hypotheses testing in Figure 3 for the second step.

Figure 2 and Figure 3 above indicates that the findings of this study have accepted all hypotheses via path model results and hypotheses testing. In addition, Table 4 below indicates that the key model statistics were fit, demonstrating model validity and hypotheses by showing the values of standard errors and then unstandardized coefficients of structural model testing coefficients.

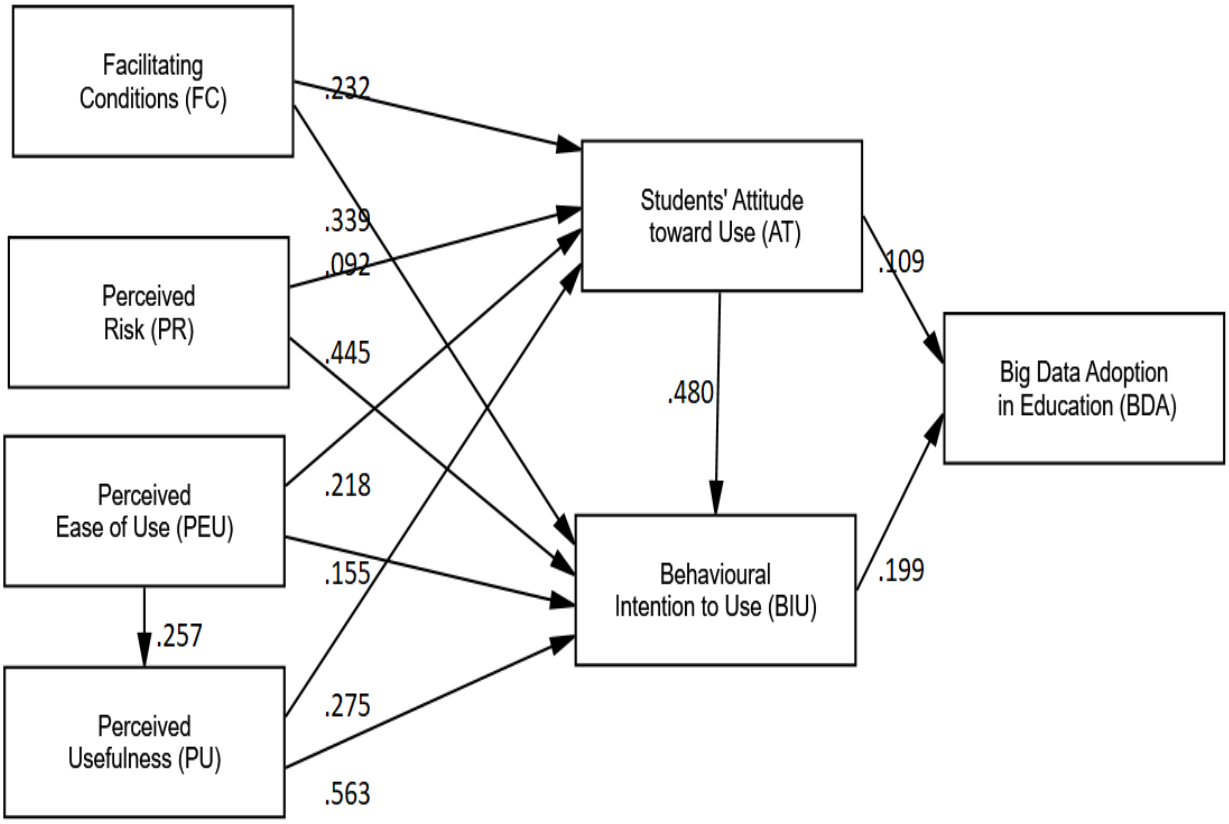

Figure 2. Path Model Results
Source: Authors

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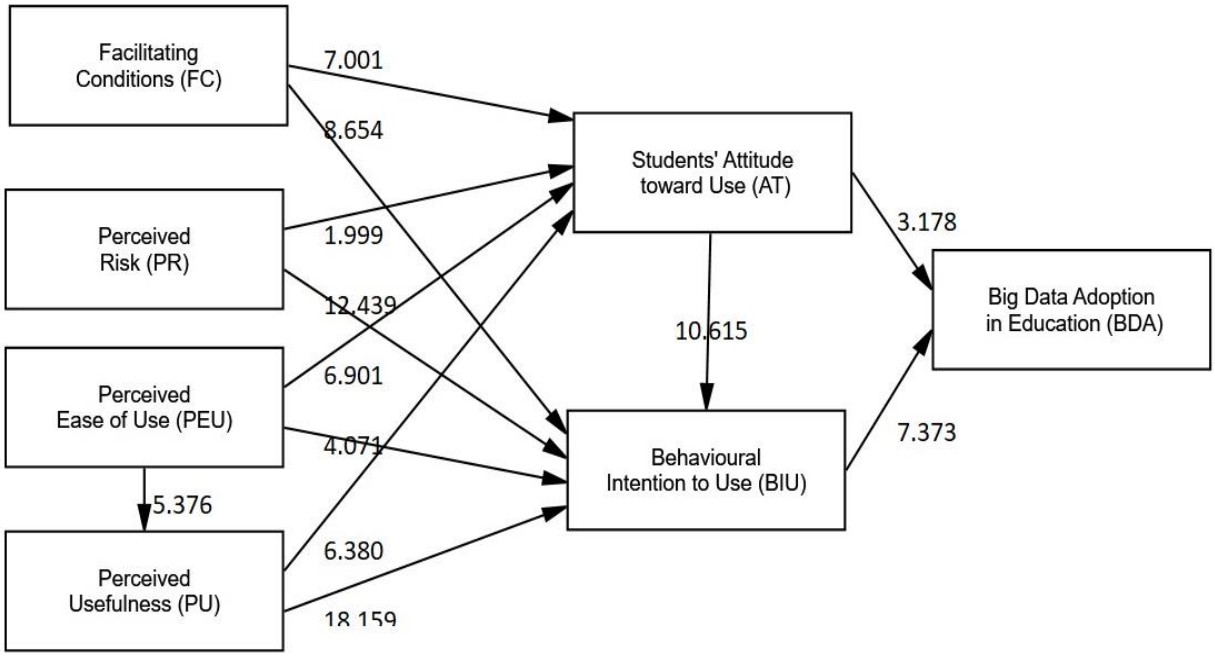

Figure 3. Hypothesis Testing
Source: Authors

Table 4. Structural Model Hypothesis testing results

Hypotheses	items	Relationsh	items	Estimate	S.E	C.R	P	significant
H1	FC	→	AT	.232	.033	7.001	.000	Yes
H2	FC	→	BIU	.339	.039	8.654	.000	Yes
H3	PR	→	AT	.092	.046	1.999	.046	Yes
H4	PR	→	BIU	.455	.037	12.439	.000	Yes
H5	PU	→	AT	.218	.032	6.901	.000	Yes
H6	PU	→	BIU	.155	.038	4.071	.000	Yes
H7	PU	→	PEU	.257	.048	5.376	.000	Yes
H8	PEU	→	AT	.275	.043	6.380	.000	Yes
H9	PEU	→	BIU	.563	.031	18.159	.000	Yes
H10	AT	→	BIU	.480	.045	10.615	.000	Yes
H11	AT	→	BDA	.109	.034	3.178	.001	Yes
H12	BIU	→	BDA	.199	.027	7.373	.000	Yes

Source: Authors

As shown in Table 4, all hypotheses were accepted as all the seven factors were found to be statistically significant. Facilitating Condition-> Students' Attitude toward Use (β=0.232, t=7.001), Facilitating Condition-> Students' Behavior Intention to Use (β=0.339, t=8.654), Perceived Risk-> Students' Attitude toward Use (β=0.092, t=1.999), Perceived Risk-> Students' Behavior Intention to Use (β=0. 455, t=12.439), Perceived Usefulness -> Students' Attitude toward Use (β=0.218, t=6.901), Perceived Usefulness -> Students' Behavior Intention to Use (β=0.155, t=4.071), Perceived Usefulness-> Perceived Ease of Use (β=0.257, t=5.376), Perceived Ease of Use -> Students' Attitude toward Use (β=0.275, t=6.380), Perceived Ease of Use -> Students' Behavior Intention to Use (β=0.563, t=18.159), Students' Attitude toward Use -> Students' Behavior Intention to Use (β=0.480, t=10.615), Students' Attitude toward Use -> Big Data Adoption (β=0.109, t=3.178), and finally, Students' Behavior Intention to Use-> Big Data Adoption (β=0.199, t=7.373). Thus, confirming hypothesis number 12 is positive and supported. The in line with previous findings ((Georgiadis & Poels, 2022; Gvishiani et al., 2022; Fayda-Kinik, 2022; Naderi et al., 2022).

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4.4 Discussion and Implications

The purpose of this research was to cultivate a novel about how to explore the variables affecting the adoption of big data by facilitating conditions and perceived risk with TAM model. According to the proposed model, the relationships between the seven creative characteristics with the facilitating conditions, perceived risk, perceived usefulness, perceived ease of use, attitude of students towards use, behavioral intention to use, and adoption of big data in education were examined. Big data adoption is at an early stage, but is steadily improving as significant investments are made in the implementation of novel technology and techniques (Moturi et al., 2022). Big data adoption is observed by organisations around the world in popular media and academic journals. For sharing information, the use of big data characterizes both potential and challenge. It is foreseeable that the implementation of big data would sweep away the sharing of information and knowledge, consigning it to a drawer of institutional history (Al-Rahmi et al., 2021b; Sayaf et al., 2022). Alternatively, the adoption of big data could lead information management back to the dark eras, with a strong focus on correlation and technology and the recorded heightened risk of failures (Sayaf et al., 2021). Big data adoption, on the other hand, is struggling with many similar dilemmas and challenges posed for years by the sharing of information and knwoledge, the foregrounding of technology over human sociology and the phenomenological perspective of knowledge. One problem with sharing knowledge and information is that it has been and continues to be a highly dis-integrated area. This study could also provide possibilities for the implementation of big data adaptation by university students. In General, the results validated and explores the factors of (TAM) to investigate facilitating conditions, perceived Risk, perceived usefulness, perceived ease of use, students' attitude toward use, behavioural intention to use, in turn, affect big data adoption in education, this is our research findings support students' attitude toward use and behavioural intention to use big data. Results concurred with the previous investigation indicate that facilitating conditions, perceived risk, perceived usefulness, perceived ease of use, attitude of students towards use, behavioral intention to use had significant positive effects on learning adoption of big data ((Georgiadis & Poels, 2022; Venkatesh et al., 2012; Zhang et al., 2021; Chen et al., 2022; Di Vaio et al., 2022; Kornelia & Andrzej, 2022; Gvishiani et al., 2022; Al-Rahmi et al., 2021c; Alhussain et al., 2020). In addition to transactional data used by many organisations, there are also significant treasure troves of mature, less structured adoption of big data knowledge that can be used for valuable information (Al-Rahmi et al., 2021c; Behera et al., 2022). Twitter, Facebook, Google+, Linked, are used these days for online activities by top college students. In addition, users are familiar with Flickr where their photographs can be uploaded, semantria.com to manage perception mining or sentiment analysis, ebay.com to buy or sell goods, and crowd sourcing functions by Amazon.com, these are forms of big data application (Al-Maatouk et al., 2020; Al-Rahmi et al., 2020a). Data is also available from instruments, cameras, websites, telephony, social networks, medical records and e-commerce. In addition, the internet and web-based social networking adoption of big data has increased rapidly in simplicity and speed, and social networking platforms today allow public exchange of information, engagement, and collaborative learning (Alamri et al., 2020a; Alamri et al., 2020b). The use of Big Data adoption to provide teaching materials to facilitate students' adoption of technology must be demonstrated by the faculty. Furthermore, the findings would indicate that faculty should explain how technologies can assist students and help them study Big Data adoption or achieve other learning goals. A positive behavioural intention to adopt big data is gained by students who believe they can benefit from the adoption of big data. Similarly, this analysis provides two methodological bits of knowledge. The first empirical effects of students' attitude to use, behavioral intention to use conditions that facilitate, perceived risk, perceived usefulness, perceived ease of use. The second observational evidence of students' attitude toward use, behavioural intention to use that can influence big data adoption in learning. This research has provided outstanding results, it has certain limitations, the limitations being that one university was limited by the sample size of the research. As a result, the findings do not disclose the success of colleges, military, or school lecturers from non-governmental institutions. Other limitations are that only questionnaires were included in this study. In the study, no qualitative data are examined, and the research is focused on only the expectations of students, which may differ with the perception of teachers. Also, the analysis does not consider

variations within fields of analysis. Future studies, however, are recommended to adopt surveys in different countries, with various views and reflect these constraints further.

5. Conclusion and Future Research

The findings of our study endorse students' attitude to use and behavioral intent to use through facilitating conditions, perceived risk, perceived usefulness, and perceived ease of use for big data education adoption. The results also confirmed the use of the TAM model in researching students' attitude towards use and their behavioural intention to use big data. As a result, overall outcomes may have been enhanced by a plan that integrates conditions of facilitation and perceived risk with the TAM model. Given the importance of the behavioural intention of students to use big data, future research would have to consider developing guidelines for teachers on the Big Data adoption initiative for educational programs in different fields. Future research in this field on the use of big data adoption in educational institutions must also be considered by teachers and other higher education leaders. Although this study indicates that students may find it quite positive, limitations and facilitators should be examined. Exploring and evaluating perspectives from and with other countries would also enrich the findings achieved in the current study and build a larger perspective on how higher education adoption of Big Data is perceived.

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CRISIS DEVELOPMENT AND ITS MANAGEMENT*

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Abstract. The paper deals with the theoretical concept of crisis. The crisis is an integral and, in essence, regularly recurring part of any human activity. We are facing a crisis in areas such as the economy, politics, the military, civilization, as well as in our private, human lives. The paper analyzes in detail the dimensions and characteristics of the crisis, deals with the various stages of the crisis, their recognition and solution. The paper was created as one of the outputs of the foundation of the theory of security sciences, where the basic general concepts of security character were defined, which are valid in various fields of human activities, including various scientific fields. The concept of crisis is part of threat analysis and subsequent risk management in various fields, including economics, management of state and non-state institutions, business and overall sustainability. The concept of crisis is currently closely linked to global globalization, which brings significant benefits as well as global risks. These risks, which are not well addressed or subsequently managed, can erupt very quickly in a variety of crises of considerable global scope. The paper lists typical symptoms that are important for early detection and crisis management. The paper presents the definitions and relationships between the crisis and the stability of any systems (economic, social, political, etc.). It also provides a classification of crises, its contexts and related panic.

Keywords: economy; crisis; balance; crisis characteristics; panic

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Introduction

From its very onset, humanity has faced periods when people, states and civilisations prospered and flourished. Over time, these historical spells naturally turned into periods of stagnation, decline and limited development. The periods of "success and failure" and development and stagnation cyclically alternate. We live in a time of globalisation, which changes, accelerates and deepens everything that is fundamental (Marini, Chokani & Abhari, 2019). The present essentially differs from the past in the speed at which we can transmit and share information and individually perceive it (Pártlová et al., 2020). In essence, people in developed countries have online access to information from all over the country. Several million people own the property and land resources of the rest of the global population, so the basic distribution has already taken place and it is now only distinct elite groups battling each other, each group wanting to increase their share to the detriment of the other groups (Alkopher, Blanc, 2017). From the civilisational viewpoint, we are entering a stage where humanity is creating an unnecessary quantity of products that it is unable to use effectively, while at the same time excessively depleting its last resources without realising it (Savona & Ciarli, 2019).

Material and methods

Many concepts in threat analysis and risk management occur in different domains of human activities, disciplines and industries, including different scientific disciplines. For example, there are many definitions of the term "security". Otherwise, it is defined by economists, sociologists, politicians, police or criminologists, soldiers, security experts in industries, critical infrastructure, information technology (Matuszak, Jaskiewicz, Ludwinek et al. 2015; Ajdari, & Asgharpour, 2011). Security at the most general level is a special, diverse process, ensuring the continuity or state of a key, important process (business, life, health, sustainable development or at least a satisfactory state, etc.) (Alkopher, 2018).). At the Police Academy in Bratislava, Slovakia, a scientific research task arose, establishing a new field of Security Science, which would be a general, theoretical basis for solving security in any field of human activity. The basic task was (and is to establish) uniform basic security terminology, including generally applicable terms and definitions. One of the key concepts is the concept of crisis, which is addressed in this paper, based on the activities of the above research team during the years 2020-2021. When defining the basic concepts of security sciences, a comparison of basic definitions in domestic (Šimák, 2015), (Zeman et al., 2002), (Kopencova, Felcan & Rak, 2020) and foreign literature was made (Matuszak, Jaskiewicz, Wieckowski, 2017), (Moravcik & Jaskiewicz, 2018), (Breznau, 2021), (Blinc, Zidansek & Šlaus, 2007), (Buzan & Wæver, 2003), and many more).

Part of the theoretical task was the method of consistent and very extensive literary research. It was found that different entities (scientific institutions, companies, government organizations, etc.) perceive and interpret their content differently under the same content of basic security terms. In many cases, on the other hand, different institutions use different security terminology for the same content of a given term, which in many cases is even logically contradictory. The method of literary research was performed several times, gradually, repeatedly in several iterations. Domestic and foreign literary sources were used for various security areas, so that the basic terminological dictionary was as broad as possible and at the same time sufficiently general. Based on the obtained list of security terms, basic security terms were singled out using analytical and comparative methods. The specific content of these terms was then defined so that the definitions were in harmonious harmony with the various security areas. Security experts from various fields were involved in the process, and the Delphic oracle method was also used. Subsequently, a method of synthesis was applied, which helped to correctly understand the content of individual security terms. The result was definitions of basic terms and their contextual clarification. For the purposes of this paper, the date of the crisis was chosen and further theoretically processed.

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Crisis

To identify the origin of the word crisis, we have to go all the way back to Ancient Greek and Latin. The Greek word *krino*, meaning select, assess, choose between two opposite variants, denotes the final, irrevocable either-or type of decision (success or failure). The word *krisis* expresses the decisive moment or time, the decision itself or the difficulty associated with making a decision, a sense of uncertainty, looking for help or averting a calamity (Šimák 2015). The Latin word *crisis* means a critical, culmination point in the progress of an event or process. In Czech, the word *krize* may often be interchangeable with such terms as **emergency** or **crisis situation**. In medicine, *crisis* is a term that refers to a period of hardship, a culminating medical condition; in theology it means the "last judgement".

Crisis denotes a situation characterised by a serious, but not necessarily transparent disruption of a certain system (consisting of objects and ongoing processes) or any of its parts, with an utmost urgent need to come up with a decision that is adequate in terms of time and system, followed by a solution that leads to elimination of the disruption that compromises the treasured and protected values, interests or goods (Zeman et al. 2002, adapted), (Jakulikova, Vrankova et al, 2020). Crisis is synonymous with such terms as disaster, deterioration, complication, turnaround, turning point, trouble, distress, calamity, hardship, emergency, adversity, conflict, tension or panic. In life we may distinguish between health, personal (individual), middle-age, financial, economic, system, international, political, refugee/migrant, security and other crises.

Dimension of crisis

There are usually the following dimensions to every crisis (Zeman et al. 2002, adapted):

- Crises are turning points that disrupt a sequence of events.
- Crises are situations that call for a response on the part of those affected by it.
- Crises compromise the goals of those affected by them.
- The consequences of a crisis shape the future of those involved.
- Crisis means a convergence of events that results in their rearrangement.
- A crisis produces uncertainty in evaluating the situation and formulating alternative solutions.
- A crisis reduces the ability to have control over events and their consequences.
- A crisis is a situation where those trying to contain the crisis have extremely inadequate information.
- A crisis puts extra time pressure on those involved.
- A crisis is characterised by changes in relations between those involved.
- A crisis escalates tensions.
- A crisis provides an opportunity for those who are prepared.
- A crisis clarifies human relationships.

Crises are usually conceived of as certain stages of conflicts characterised by precisely defined traits (Klikova, Kotlan & Machova, 2017). There is probably no general definition of crisis as much of the term's content depends on the needs, interests and professional focus of the creator of the definition who may come from a variety of backgrounds (König & Winkler, 2021). Before defining the very term itself, some assumptions and generalisations need to be made that are common to all crises (Šimák 2015, adapted, expanded):

- a crisis arises at a certain stage in the development of objective phenomena, events and processes as a result of changes in their external and internal conditions and parameters;
- a crisis involves a disturbance of the functional balance (stability) of an object, system or process and a threat to its development as a result of changes in the external or internal environment that substantially change or may change such objects, system or process;
- the negative consequences conditioned by the course of a crisis can seriously compromise the functioning or even the existence of an object, system or process;

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- there are causal determinacy and temporal sequence elements to each crisis;
- in objective processes, a crisis arises and progresses independently of the will of man; knowledge of the causes, tendencies and regularities behind these phenomena makes it possible for social subjects to influence, to a large extent, the origin of the crisis, its course and consequences; on the other hand, without people, there would be no crises;
- a crisis may also arise as a result of subjectively determined and partly deliberately induced processes, the consequences of which do not necessarily correspond to what has been expected;
- the evaluation and perception of the crisis is subjectively determined by its consequences for the evaluating subject. These consequences can not only be intrinsically contradictory in terms of the diversity of their effects on the subject, but also in terms of the different effects on other evaluating subjects; i.e., crises have a subjective-objective dimension in the value sphere (the crisis of one subject can at once be a benefit, and a precondition for the development of another entity);
- a crisis can be artificially induced as a vehicle for addressing the subject's internal problems, or as part of a tactic or a strategy in a competitive environment;
- crisis is an objective part of the development of society, of nature and of technical or technological processes, but also the subjective experiencing of a threat (risk) (Kotlan 2020a, 2020b). See Figure 1 below.

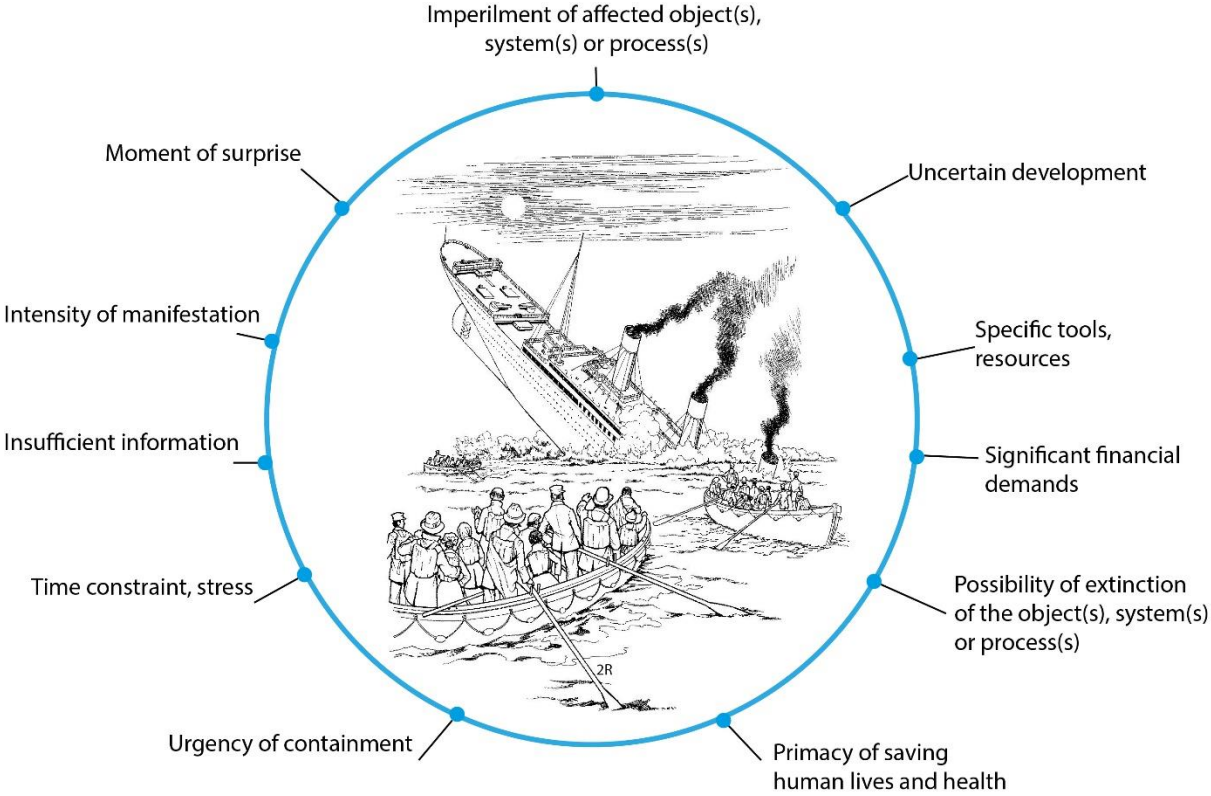

Figure 1. Typical characteristics of a crisis.

Source: Roman Rak

<u>Crisis</u> denotes such disturbance of the functional balance (stability) of an object, system or process due to changes in their internal or external environments that significantly changes or may change the object, system or process, with the resulting negative consequences being capable of seriously compromising their functioning or existence (Šimák 2015, p. 50, adapted).

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It is typical for a crisis and its elimination (Buzan & Waever, 2009), (Chehabeddine & Tvaronavičienė, 2020):

- **Affected object(s), system, processes imperilled** – if the crisis is not contained, there is a risk of the objects, systems or processes ceasing to exist. The objects, systems and processes are imperilled, and the attention in addressing the crisis is devoted to them in the first place.
- **Moment of surprise –** as a general rule, a crisis arrives unexpectedly, surprisingly, at a time when it is least convenient, and when we are not sufficiently prepared to face it.
- **Intensity of manifestation** – a crisis generally culminates at a very high intensity unless we have responded to the early warning symptoms characterising and advertising the potential onset of the crisis and its further development.
- **Lack of information** – at the time of a crisis, the information required to contain the crisis safely and quickly and to raise awareness and subsequently coordinate the containment processes is usually not available.
- **Time pressure, stress** – there is usually very little time to address a crisis; the crisis is only addressed by small work teams and in some cases even individuals. They are exposed to tremendous physical and mental stress.
- **Urgency of the solution** – in order for an intense crisis to be successfully contained, it must be resolved as soon as possible, in a qualified manner and with resolve.
- **Uncertain development** – containing a crisis is an extremely difficult task, both mentally and logically, as the outcome of the containment measures cannot be known beforehand and at times the result may be very hard to predict.
- **Specific tools, resources** – specific tools and resources (technology, material and other resources, crisis scenarios, management procedures, etc.) are usually required to prevent any further deterioration of a crisis and to eliminate its consequences.
- **Substantial financial demands** are typical of certain types of crises. At times, the required funds are exponentially higher than those we chose not to invest in elimination and prevention of crises, or insurance, etc.
- **Risk of an object, system, process ceasing to exist** causes stress and concerns in a situation of a severe time constraint, increases the level of experienced pressure and calls for the deployment of all available resources in order to successfully contain the crisis. In many a crisis, however, the outcome is never clear, yet all available resources must be used.
- **Primacy of saving human lives and health** – during rescue and liquidation work, human health and lives and their protection have the highest priority. In certain specific large-scale crises (wars, the Cold War, armed conflicts, specific intelligence operations), however, even this principle can be neglected and it may be acceptable to sacrifice a certain number of people to save much larger groups of population. Yet, the process is hardly ever supported by law.

Example:

The example of bringing down an airliner with a missile fired from a military jet fighter will help us clarify other parts of the context and technical terminology. Security incidents, various events, processes, as well as crises, always take place at a certain point in time. Crises come and go. Therefore, one axis of the chart is time. The second relevant parameter in monitoring the development of security incidents (including crises) is the value of the monitored critical parameter(s) of an object, system or process. There can also be multiple monitored critical parameters at the same time.

In the given case, some examples of the other parameters include the distance of the missile from the airliner, the ability of the airliner to avoid the fired missile (or otherwise avert the collision), the integrity and airworthiness of the airliner, the number of live, injured or dead persons on board, etc. Each of the parameters takes a certain value that must not (or should not) be exceeded in order to avoid damage (acceptable risk).

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The monitored parameters may vary up to the critical limit (value), the threshold of a crisis, where there is a serious disruption of the functioning, existence of the object, system or process itself. This point is referred to as the ***onset of crisis*** *(t_{ZK}). If the* ***critical values of the monitored parameters*** *continue to develop unfavourably, there can be* ***crisis culmination*** *(point K in* Figure 2*). Eventually, the crisis subsides with the passage of time, ending at time t_{KK} (****end of crisis****). The events unfolding during the <t_{ZK}, t_{KK}> window are referred to as a* ***crisis*** *(during which critical, negative events and processes occur, with large-scale, often unforeseen, impacts). See Figure 2.*

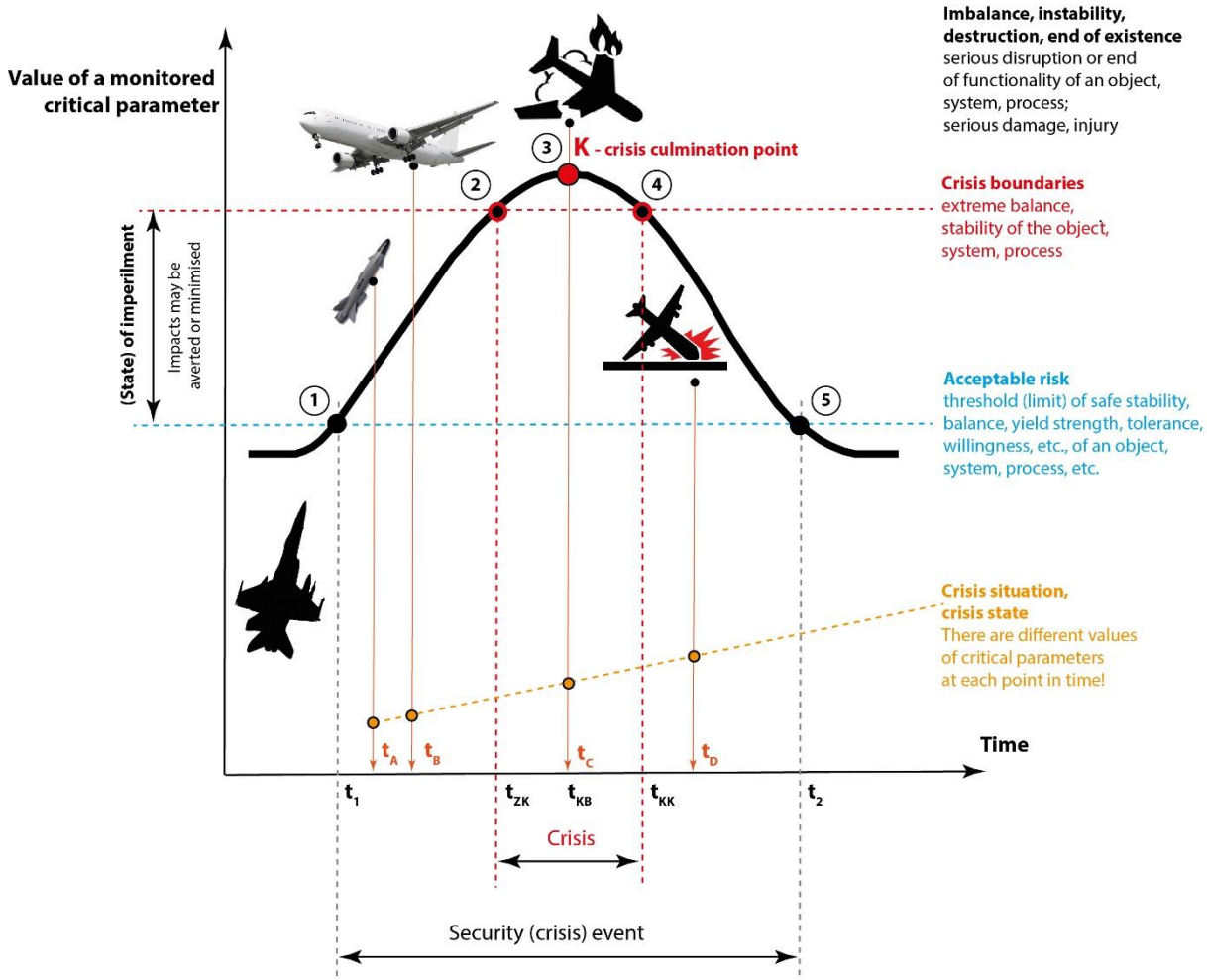

Figure 2. A figure designed to explain the terms security (crisis) incident, crisis, crisis boundaries, acceptable risk, crisis situation, crisis state, crisis culmination, culmination point of a crisis.

Source: Roman Rak

The events unfolding during the <t_1, t_2> window are referred to as a security incident or ***crisis incident****. Although the acceptable risk, i.e., the threshold, yield strength, tolerance, etc., of an object, system or process is exceeded, in reality, the objects, systems and processes are capable of withstanding the effects of the disturbing factors to a certain (considerable) extent. This condition is referred to as vulnerability. An actual crisis only occurs after the critical parameter values exceed the crisis threshold (yield strength, tolerance, etc.), when objects, systems or processes are no longer capable of maintaining their balance, integrity, equilibrium, functionality or even their existence (Böhm, Kubjatko et al, 2020).*

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Crisis situations or crisis states are time frames capturing the course of security, crisis incidents, events, processes, always related to a specific point in time and a specific place (if the event can be narrowed down to any geographical area). Each crisis / security incident evolves over time, and it always shows different values of the monitored critical parameters. ***The terms "crisis situation" or "crisis state" always characterise the actual state of events, objects, systems or processes at a specific point in time and at a specific place.***

The Table 1 below shows how the security situation changes over time t, how the crisis evolves:

Table 1. Example of a crisis situation developing over time

Time	Security state, security situation, crisis state, crisis situation
t_1	A missile is fired from a fighter jet. The missile may hit an airliner.
t_A	The rocket approaches the airliner, it is spotted by the pilots and reported to the air traffic controller. The first symptoms of a crisis appear.
t_B	The pilots try to avoid the missile by initiating an evasive manoeuvre against the sun. The manoeuvre has failed – the missile continues to track its target and approaches. The security situation continues to deteriorate.
t_{ZK}	The missile is now so close that it cannot be safely avoided and the collision is inevitable. A crisis has occurred; the airliner is doomed.
$t_{KK} = t_C$	Civil airliner hit by an air-to-air missile. This is followed by the destruction of the airliner and the death of several passengers as a result of an explosion in the enclosed space with subsequent formation of a vacuum. From the viewpoint of the monitored critical parameter of the missile's distance from the airliner, a crisis occurs.
t_D	However, it depends on the choice of the monitored parameters and their values over time. If one of the parameters is the number of people killed, then the crisis only occurs at time t_D when the plane hits the ground in a densely populated area. Dozens, hundreds of other people in a shopping centre are killed. From this point of view, other people are killed or injured. Therefore, the crisis only culminates at that time.

Source: the authors

Course and stages of a crisis

As shown above, security situations as such and crises constantly evolve.
Each crisis shows a specific pattern of progress, which is determined by the type of the crisis, its intensity and space, its external and internal processes and circumstances, etc., in which the crisis takes place. In general, a crisis has 4 developmental stages (Šimák 2015, Kotlan, 2019):

- Symptoms stage[†]
- Acute stage
- Chronic stage
- Crisis containment stage

The **crisis symptoms stage** is not static; symptoms of instability show up at a varying intensity, inconsistent with the usual state of the object(s), systems and processes, which also has implications for the perception, identification, analysis and assessment of such objects, systems and processes. The stage can be divided into 4 phases, which depend on the intensity of the symptoms:

- **Unnoticeable symptoms of a crisis** – they traditionally pass unnoticed by the disinterested public and are only spotted by a narrow community of experts. During this period, it is difficult to come up with an adequate response and prevent aggravation of the crisis as the factors contributing to the crisis cannot be clearly identified;
- **Mild symptoms of a crisis** – partial and ambiguous information on the impending crisis, which can only be identified by experts in the given field. This is a very good time to apply adequate responses and nip the crisis in the bud;

[†] Sometimes referred to as the **latent stage**.

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- **Strong symptoms of a crisis** – clearer and more comprehensive information on the impending crisis, which can be correctly evaluated by most managers. Once they are identified, an adequate and immediate response must be taken resolutely;
- **Very strong symptoms of a crisis** – complete and unequivocal information describing the impending crisis, which even a layman can identify. In this case, it is already difficult to come up with an adequate response, and the chances of successfully averting the acute stage of the crisis are minimal. However, it can be assumed that if an adequate response is produced, the impact of the crisis, i.e., the extent of damage and loss, will be minimised. See Figure 3.

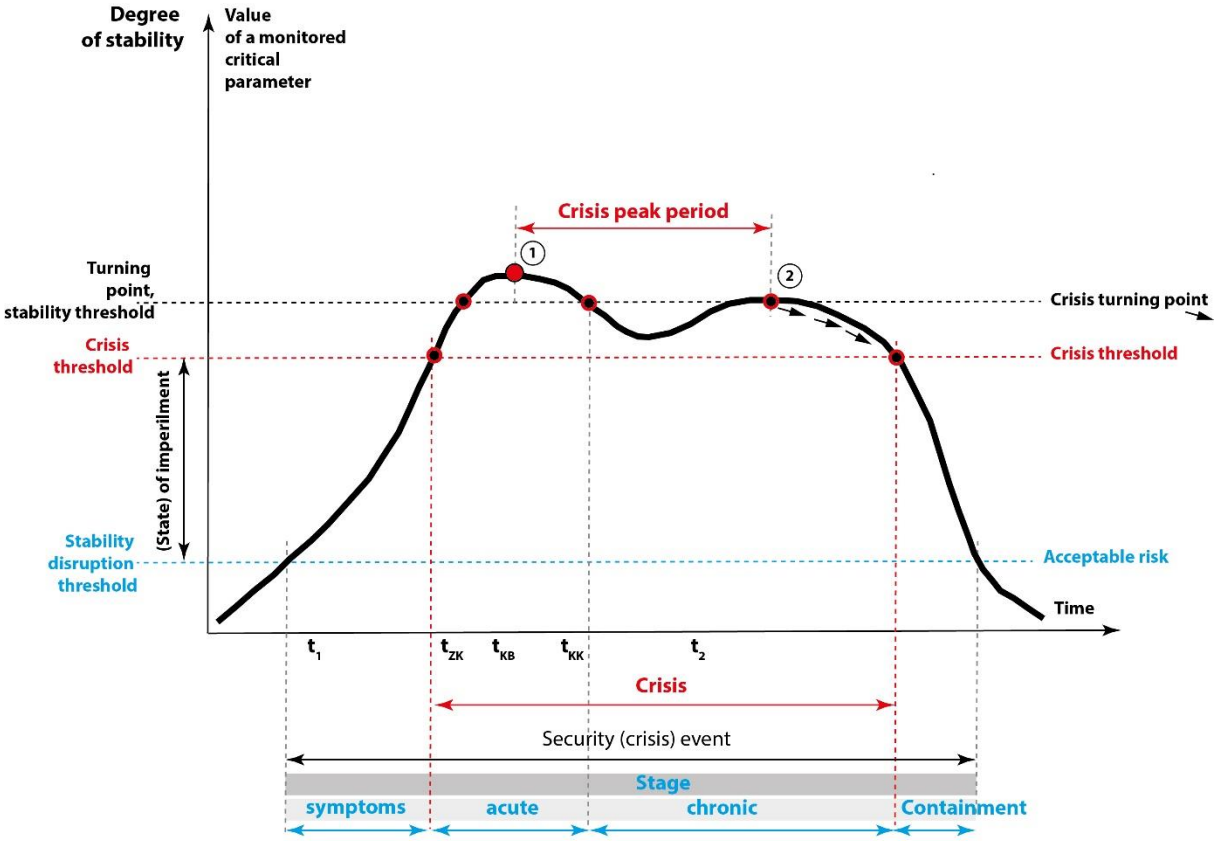

Figure 3. Stages of a crisis.

Source: Roman Rak

Acute crisis stage – denotes a period of crisis where the discrepancy between the actual state and the usual functional state of an object, system or process, or its development, is so significant that a change in quality occurs, with the risk of the object, system or process being disrupted or ceasing to exist. Their basic functions have been disrupted, which is obvious to all those involved, and therefore emergency measures must be immediately taken. At this stage, it is necessary to take adequate measures to eliminate the damage and injuries that are already occurring, and respect the fact that:

- the very essence of the functioning and existence of the object, system and process is compromised;
- decisions are made under pressure and without sufficient information;
- if the response to the acute stage of a crisis is successful, the chronic stage of the crisis may be avoided, i.e., the acute stage passes to the crisis containment stage.

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The chronic stage of a crisis is the period where the susceptibility to a change in quality of the objects, systems and processes created at the acute stage of the crisis persists. Disruption of the basic functions of the objects, systems or processes persists, causing more destruction, with no signs of a turning point in the development of the crisis towards the extinction of the objects, systems or processes or containment of the crisis (Kubjatko, Görtz et al, 2018). During this stage, the crisis may be mitigated or it may even subside as a result of the action taken by those involved, or it can escalate in several waves, and its course and consequences may be diversified. During this period, it is generally impossible to clearly identify the sources and causes of the crisis, which adds extra pressure and at once delays the containment of the crisis. See Figure 4.

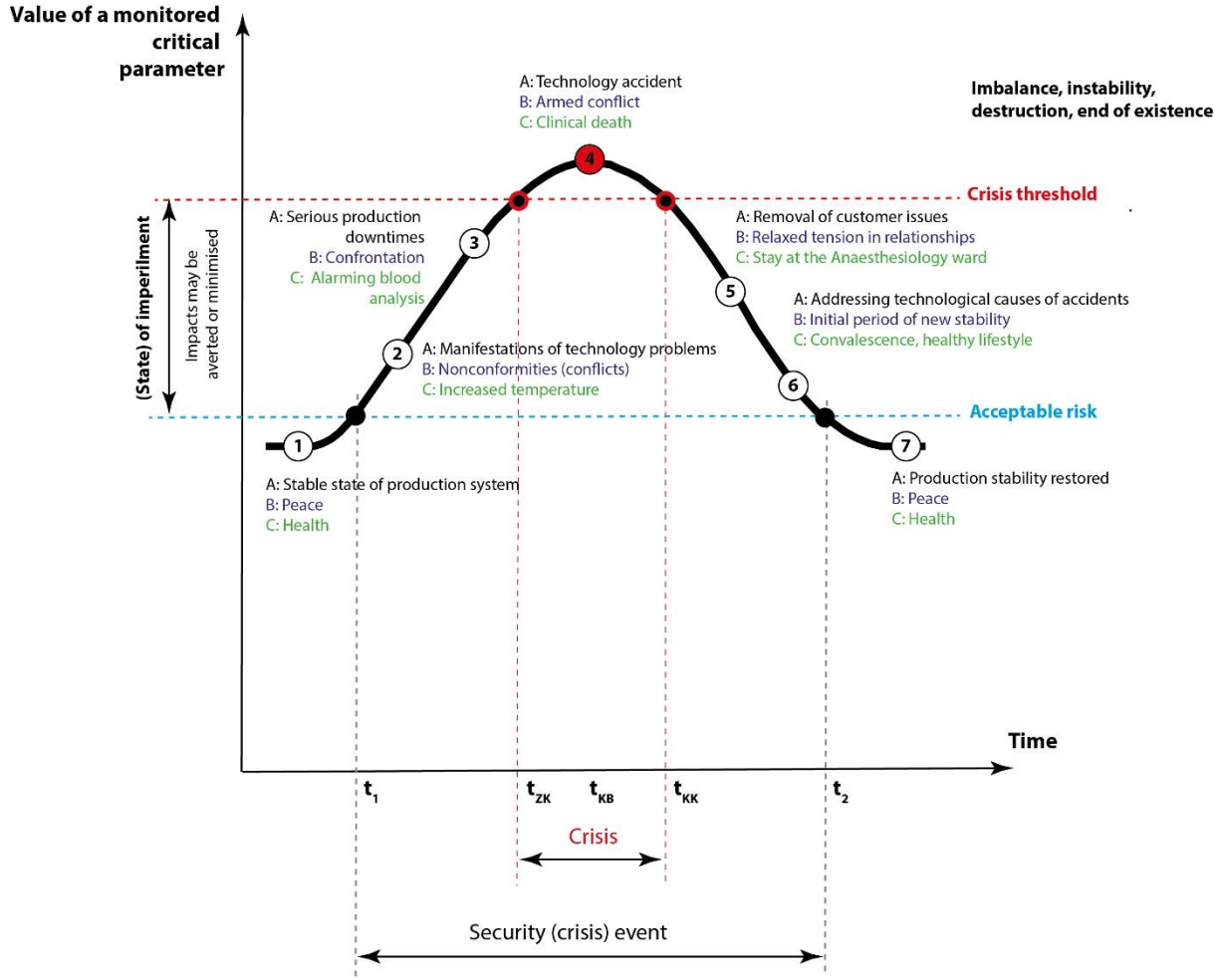

Figure 4. Sample courses of crisis in various environments / for various objects A – production plant (emergency), B – state (armed conflict), C – patient (serious disease).

Source: Roman Rak

The crisis containment stage is characterised by the restoration of equilibrium of the objects, systems or processes to their original or a new quality level. The containment may take the shape of the original objects, systems or processes ceasing to exist and new objects, systems or processes emerging, or the original objects, systems or processes being restored in a new form affected by the crisis and the altered conditions. During this period, the entities involved, respecting the course of the crisis, define a recovery strategy and implement a number of organisational, HR - and technology-related and other specific measures, culminating in the restoration of stability and new quality of the objects, systems or processes.

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The individual crisis stages take alternate turns, and whether they occur, and in what sequence, depends on the timely identification of the crisis symptoms and the effectiveness of the measures put in place (see Figure 1, Figure 5). If the early symptoms of a crisis are identified in good time and adequate effective countermeasures are taken, the crisis may be averted. Similarly, the chronic stage may be avoided. See Figure 5.

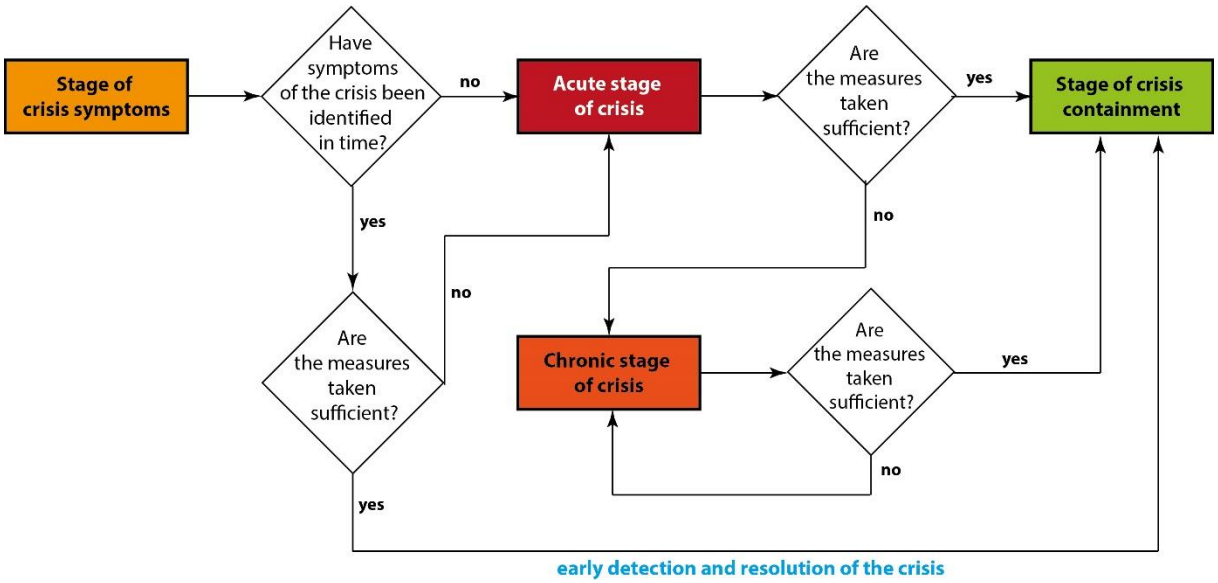

Figure 5. Dependencies of individual crisis stages on the timely identification of the symptoms and adequacy of the measures taken to avert it.

Source: Roman Rak

Classification of crises

In terms of security, there are a number of criteria by which crises may be artificially classified, such as:

- **Area of occurrence** – local, regional, national, international, global crises;
- **Level of imperilment**
  - **Lower level** – minor imperilment, sufficient time to adopt measures;
  - **Higher level** – immediate and extensive manifestations;
  - **Catastrophic level** – extinction of an object, process, system;
- **Rate of formation** – slow, fast;
- **Number of affected persons** – large-scale crises (10^4 and more), medium-scale crises (10^2 to 10^3) and small-scale crises ($1\text{-}10^2$) affecting individuals;
- **Affected object** – the economic sphere, public sector, environment, social policy, foreign policy, domestic policy, social, military, technology, evidentiary, moral value-related, ethical, religious, personal, health, financial and other crises;
- **Effect of the factor** – creeping (continuous), leap crises;
- **Surprising effect** – surprising, expected.

Context of the crisis

There are several terms related to crises that are relevant to public administration:

- **Crisis attribution** – attributing the causes and factors behind a crisis to an individual, which often does not correspond to reality.
- **Crisis intervention** – specialised instantaneous assistance provided to people who land in a crisis. The aim is to restore the individual's mental balance, which has been disturbed by a critical life event. Crisis intervention is a comprehensive, practical tool, which may include psychological help (the point of focus

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is on the problem that triggered the crisis, with the individual concerned being confronted with the crisis and the crisis is addressed), medical help (psychiatric intervention, medication, hospitalisation), social assistance (social intervention) and legal aid (Vel'as, Lenko, Lenkova & Felcan, 2019).

- **Crisis communication** – transfer of information between public authorities, regional self-governing bodies and components of the integrated rescue system using means of voice and data transmission of information via public electronic communications networks and selected parts of non-public electronic communications networks.
- **Crisis measures** – measures designed to contain crisis situations, as well as actions to mitigate or eliminate the consequences of crisis situations. Some rights and freedoms may have to be restricted and specific obligations imposed in order to implement the measures.
- **Crisis preparedness** – designing measures to contain crisis situations and to participate in containing them.
- **Crisis planning** – a comprehensive set of procedures, methods and measures used by competent authorities and designated entities in order to prevent, prepare for and respond to crisis situations.
- **Crisis management** – a set of activities performed by crisis management authorities focused on the analysis and evaluation of security risks and the planning, organising, implementing and monitoring of the activities performed in connection with the preparation for and containment of crises, or protection of critical infrastructure. Crisis management can be considered in the narrower or broader sense of the term. In its broader sense, the term includes restoration and prevention actions; in its narrower sense, it includes preparation measures (especially crisis planning), containment of crises and liquidation work.
- **Crisis negotiation** – a method of resolving incidents and crises where the police communicate with offenders and other persons involved as an important part of managing certain types of crisis situations. It is used in those cases where the use of force would mean an excessive risk of injury for the innocent participants of the event. Crisis negotiation applies social, forensic and clinical psychology, as well as information and communication technologies and special police procedures. The aim is not only to persuade individuals to cease their hazardous behaviour, but often to calm the situation and provide time and social space for resolving the crisis by means other than force.

Panic

The frequent response to crisis situations is panic.

Panic means collective fright, chaos that primarily evolves during mass events (sporting events, traffic accidents, natural disasters, calamities, epidemics, financial or social crises, etc.)**, when people begin to worry about their lives, health or property for any reason whatsoever,** usually in confined spaces or in spaces from which it is even mentally impossible to escape – at such moments, an individual finds no rational way out (Nalepova, 2020). **It is an irrational behaviour that arises as a result of dangerous situations or emergencies. Panic may lead to the formation of a so-called panic crowd, which drags the individual with it. Panic is a socio-psychological phenomenon giving rise to a panic attack. It manifests itself by strong anxiety or horror, which can also arise for no apparent reason.** In such case, a person feels a strong danger and various catastrophic ideas may come to their mind (Šimák 2015, p. 72, adapted).

Psychologists characterise panic as spontaneous, uncontrolled behaviour in people whose mental balance has been disturbed. Some of the typical symptoms of panic given in literature include:

- rapid multiplication of irrational (incomprehensible) components in behavioural strategy;
- amplification of the emotional component of the decision-making process;
- lack of coordination of interactive, communication and information links;
- reduced cognitive control of behaviour;
- tendency to extreme reactions.

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Panic is caused by shortage of information, inside a certain social structure, which, in connection with extreme tension or expectations, can sometimes take the form of a crowd psychosis. Therefore, in crisis situations, timely and correct communication is vital, providing the necessary, adequate information (Odlerova, 2014).

Discussion

Recognizing crises, especially their serious signals, symptoms, before crossing the limit state is a very difficult matter in modern practice (Ajdari & Asgharpour, 2011). Crises in a globalized world are very specific today, especially their rapid development, the interconnectedness of many fields or spheres of influence or dependence, which they simultaneously or gradually affect.

Crisis management should be dealt with primarily by experts, professional crisis managers, profesional teams with high erudition, outlook and especially experience. However, this is not always the case in today's practice. Often, only politicians or managers who are unable or unwilling to assess the extent of the crisis and the necessary countermeasures in a broader context or for a longer period than their election period decide.

Many crises can even be caused quite artificially and can pursue the narrow, private goals of economic, political elites. Current anthropogenic crises are usually characterized by not a single culmination point, but take place in gradual, relatively fast waves.

Due to these circumstances, it is sometimes difficult to recognize the symptoms of crises and to look for adequate anti-crisis measures.

Conclusion

The submitted paper deals with the phenomenon of crisis, which can (and indeed does) occur in various spheres of everyday reality – in economics, social or political development, in the development of civilisation, etc. The concept of crisis is also perceived as an opportunity, because a crisis is always followed by the restoration of equilibrium, with the subsequent upturn. However, the model is based on the assumption that there are sufficient various resources for further development so that the dreamt-of principle of sustainable development survives. But the equilibrium can also be restored at must lower values than we have grown accustomed to. From the viewpoint of the economy in particular, we have become accustomed to alternating periods of stagnation and prosperity in the shape of a standard sinusoid, with the stagnation, or the culmination of the crisis, presenting a single wave reaching its minimum. This is how we have learned to perceive crises, and then act; expect a calming decline and stabilisation once the peak critical values have been reached. Yet, the COVID-19 pandemic shows that there are increasingly more waves coming after the first one, reaching far more critical parameters (Kurilovska & Hajdukova, 2021). Globalisation, which is based on synergies and a strongly interconnected economy, can lead to the development of the most diverse subsequent crises in various areas. Due to the interconnectedness of their many aspects, these crisis will spread gradually, in different waves, where their periodicity (frequency) and amplitudes may not be as regular as we have been used to.

Crises are very creeping; slowly or quickly. In order to be able to respond adequately to crises, we need to identify control and border (critical) points in good time. These points will then help us to detect impending dangers in time and take appropriate action. The contribution of the article is a description of the existence and illustrative graphical representation of these points, which are crucial for early recognition. When searching for and evaluating threats, it is necessary to analyze their time course and impacts depending on time. The contribution, in contrast to static observation or examination of crises (reaching a critical, further irreversible point), provides an insight into the dynamic side of the crisis. In practice, the symptoms of an impending crisis are either overestimated or not observed at all. The paper newly introduces various parameters, characteristics of crises, which can be used to further classify crises. The paper also presents the characteristics by which it is possible to recognize acute or chronic (protracted) crises. These characteristics are shown in a simple flowchart.

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