

## Preface

### Special Issue on Management Studies

A diversity of consumer trends characterise our everyday lives, shaping our lifestyles, preferences, purchasing and communication habits.

This volume gives an insight into the colourful and diverse world of these consumer trends, highlighting one or more areas, markets or segments, and analysing them to show the mechanisms of global change.

The volume offers a wide range of case studies, empirical research and professional analysis based on the analysis of relevant sources, to assist the academic teacher, researcher or professional dealing with management, marketing, finance or business economics.

The volume includes a comprehensive analysis of the impact of digitalisation, the need to address the complex challenges of a generation, the importance of financial culture and awareness, and a macroeconomic comparison of the V4 countries.

The volume is unique in that it does not focus on a single theme, trend or discipline, but provides insights into the world and practices of co-disciplines that are integrally linked to the many disciplines of management science. It also approaches, evaluates and analyses the relevant issues from a practical rather than a theoretical perspective, thus providing the reader with a practical approach and a wide range of related primary data to help him gain a comprehensive picture of the world of trends that are integral to contemporary economic processes and their complex impact on everyday life.

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# Assessing the Financial Performance of the Companies that Shape the S&P 500 Index

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*Abstract: Our research focuses on the financial performance of the companies that shape the S&P 500, the US stock market index. We have chosen this index because it reflects the performance of the largest US companies. It is seen, by many, as an indicator of the performance of the US economy. We examine corporate data for the period 2015-2019, which are publicly available. The performance of the companies included in the study was assessed using statistical methods, which also include a sector-specific assessment for this period. The sectors we have selected represent a relevant volume in terms of the number of enterprises in the sample. Our hypothesis is that the performance of each sector has contributed to the average performance of the enterprises that constitute the index, in terms of the five-year enterprise performance in a different proportion. An important area of our research was to examine and demonstrate how the values of the key indicators, that we identified for the study, varied individually and whether they showed significant differences between sectors. Everyone is aware of the most recent events and, unfortunately, their consequences. At both the macro- and micro-levels, the corona virus has had a significant impact, which has also affected the performance of many companies. In our analysis, we will also look at how the financial performance for the period 2016-2019, influenced the value of the operating results for the companies under review in 2020.*

*Keywords: Analysis; Financial performance; S&P 500; EBIT*

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## 1 Introduction

The performance of enterprises, is relevant information, for all the countries, and their role in economic operations is undisputed. During their operation, they hire workers, produce goods and provide services to households. They generate fiscal revenue for the government through their tax liability. Domestic and other European

Union companies, especially those in the SME sector, often rely on both domestic and EU resources. In the event of the covid pandemic, countries can formulate specific problem-solving/financial-resolving package plans to keep businesses running. [1] [2]

In addition to small and medium enterprises, there are a number of large corporations that play a major role in terms of GDP, employment or even foreign trade. It is not new that SMEs represent more than 99% of the total number of companies, not only in Hungary but also in the countries of the European Union. According to data from the Central Statistical Office, only 7.1% of all SMEs are active in the industry, compared to 23.7% of non-SMEs. 'Within the SME sector, the combined weight of agriculture, industry and construction is increasing proportionally as the size category of enterprises increases'. [3] Human resources are one of the most important factors in the economic development of a state. This finding applies without exception to all states worldwide. It is very important, that the current legislation allows their citizens to work without difficulty, to work efficiently and to take other forms of income in each state. [4]

Recently, packages of different economic stimulus and business support measures have stimulated our interest in the overseas financial performance of companies, especially those listed on the stock exchange. The stock market provides a certain degree of transparency for the performance of listed companies, which is why we have chosen the Standard & Poor's 500 Index to test the performance of the largest corporations in the United States. Company analysis stresses financial data from 2015 to 2019, focusing on analysis of profitability and liquidity, as well as the evolution of net working capital and price-to-earnings (P/E) ratio. [5] [6]

## **2 Literature Review**

The literature review section first briefly introduces the importance and role of the S & P 500 Index, then describes the indicators involved in assessing a company's financial performance, and after that it presents and evaluates the results of the analysis.

Based on our studies, the stock market can be defined as a centralized market for alternative commodities. It is worth reflecting on the implications of alternative commodities, which are primarily concerned with commodities traded on commodity exchanges. In recent decades, financial innovation has brought about major changes in this area, with the emergence of certificates and other leveraged futures in addition to traditional financial products. [7-12]

In the stock markets, some investors win while others lose, and this is the beauty of operations in the stock market: participants cannot decide or calculate in advance who will be transferred from a particular group to another and when, but one thing is for sure: of course, not all participants can win at the same time. [13]

The aggregate performance of listed stocks can be expressed in a variety of indices, one of which is the S&P 500, described in the introduction, which is an indicator of the performance of the US stock market, including the 505 largest companies with capital concentration in the US. The S&P 500 is also often used as a market portfolio and as a benchmark for beta US stocks. [14] The depth of the financial system depends among other things on lending and the stock market capitalization to GDP. Through stock market funding the economy can grow, especially in countries where this form of funding is not common. [15] According to publicly available data, our selected index accounts for 80% of the value of the US stock market. However, the market as a whole is determined by the indicators of the ten largest US companies, which account for 28.5% of the market value of the index, i.e., the world economy. They are the best-known giant corporations of the world: Amazon, Apple, Microsoft, Facebook, Alphabet, Tesla, Nvidia, Berkshire Hathaway Inc., JPMorgan. [16]

The performance of US companies included in the analysis can be expressed in the S&P 500 Stock Index but let us take a look at how the values of a particular financial indicator perform. Since the performance of the company is an important issue for investors before investing into them and not only past performance but also future performance is important, the question of who wants to know the financial performance of the company may be raised with the issue of how likely it is to develop in the future. Expectations for the future are basically expressed in terms of hopes for the growth of the company. [17] This means that the more a company grows, the higher the value of its stock and the more it invests. It is important how this growth can be quantified, which indicators can affect the value of earnings before interest and taxes (EBIT), and whether these effects work in the same way in all sectors. [18]

First of all, in our study, we looked at the profitability of the firms and sectors under study, focusing on ROA and ROE. Return on assets (ROA) expresses how much profit a unit of capital can generate. ROE can also be used to analyze the effects of ownership on the company's performance [19]. By the studies the governmental ownership significantly has negative effect on the ROE and for example in Jordan the ownership structure decides the company's performance [20]. The higher the value of this indicator, the better the performance of the company. In the analysts' view profitability indicators do not affect exchange rate movements in the short term, but they actually do in the longer term. [21]

The graph below shows the weights of profitability and capitalization. In the US, companies with higher profitability had almost twice the market capitalization in terms of amount invested than companies with lower profitability from 1990 to 2018, in billions of dollars of data.

The ROE ratio examines the return per unit of capital, i.e., it is the ratio of profit after tax to equity. The relationship between the ROE ratio and the excess return on the stock market has been studied in several research. [22] [23]

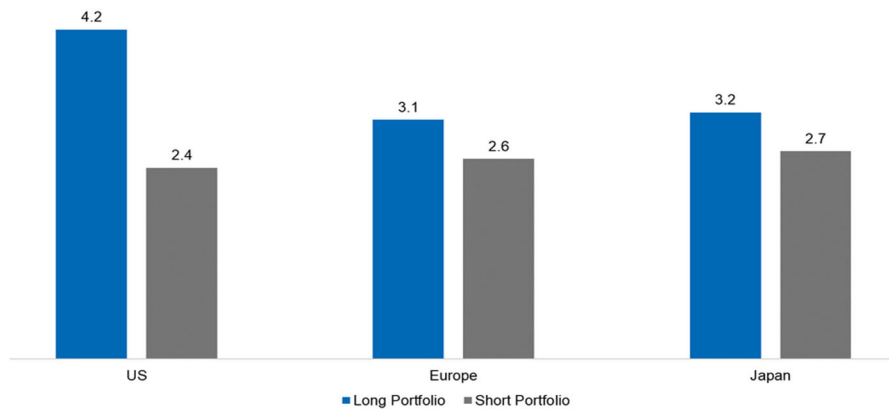


Figure1  
Profitability Factor

Source: FactorResearch, <https://insights.factorresearch.com/research-the-odd-factors-profitability-investment/> [24]

The analysis found that there are significant differences between industries in terms of short-term and long-term investments, as shown in the following graph.

In addition to profitability, the indicators used and applied are liquidity indicators. We use a general form, that is, the value of current assets and current liabilities are compared. The indicator expresses the coverage that assets available for less than one year can provide for our liabilities within the year.

The higher the value of the indicator, the more favourable it is, although its value can be significantly influenced by stocks and receivables, even in a negative direction, especially since there may also be stocks that can no longer be sold with sufficient profit. Receivables may also include items that are not easy to recover. The liquidity ratio, which only compares the actual liquid funds, i.e., cash and cash equivalents and the value of the securities with a maturity within the year, with the value of the liabilities within the year offers a way to avoid these problems.

In addition to profitability and liquidity, we also looked at the ratio of price-earnings ratio (P/E), which is the ratio of the share price to the estimated future earnings per share (EPS). The share price value is the result of market supply and demand, it reflects the current market trend. In other words, how the market perceives the value of a stock, EPS is the profit per share after tax.

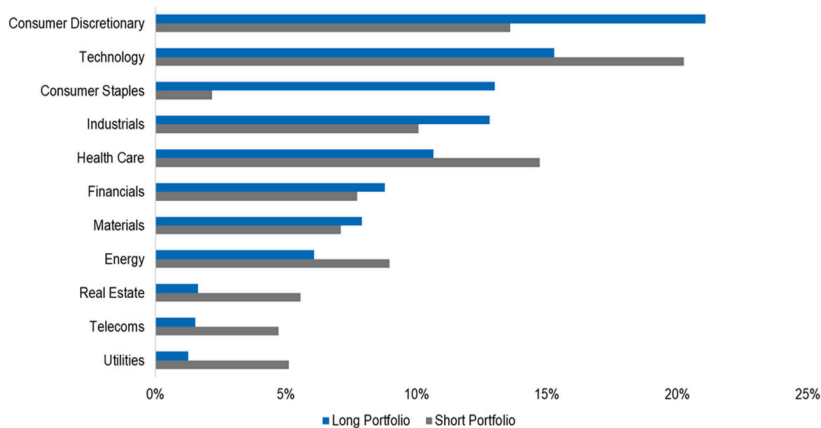


Figure 2

Profitability Factor in the US: Breakdown by Sectors (1990-2018)

Source: FactorResearch, <https://insights.factorresearch.com/research-the-odd-factors-profitability-investment/> [25]

In the case of shareholders, it represents the maximum dividend per share that ordinary shareholders will receive if the company pays all profits as dividends. Comparing the two values of stock price and EPS gives the answer to the question of how many times the profitability of the stock, in this case expressed by the EPS, should be paid for the security you need to pay the profitability of a stock (in this case, expressed in EPS). [26]

Last but not least, we also studied  $P/BV = \text{market price per share} / \text{book value per share}$ , where book value per share =  $(\text{total assets} - \text{total liabilities}) / \text{number of outstanding shares}$ . [27]

A common indicator for evaluating a company's financing strategy is net working capital, which is the difference between current assets and current liabilities. Current assets are assets that serve the operation of an enterprise for up to one year, that is, assets used or sold within one year, which can be permanent or temporary, depending on the frequency of purchase demand.

## 2 Material and Methods

Financial and price data for the S&P 500 index components are compiled based on data published on the most popular websites, including [www.suredividend.com](http://www.suredividend.com), [www.morningstar.com](http://www.morningstar.com), [www.finance.yahoo.com](http://www.finance.yahoo.com) and [www.finviz.com](http://www.finviz.com). Based on the data available on July 11, 2020, the S&P 500 index component list was downloaded from [suredividend.com](http://suredividend.com) and includes the names and stock codes of all

505 components. Based on this data, the financial data of each company during the period 2015-2019 was downloaded from Morningstar.com, which also includes the main financial indicators.

These data include financial details from the balance sheet, income statement and cash flow statement published in the company's annual financial report, which can be found on the Morningstar website. We used the data from the finviz.com website to collect the industries and sectors to which the constituent stocks of the S&P 500 index belonged and used the F search function to add relevant data to the 505 companies in the original database. Accordingly, the industry and sectoral information of each company was added to the database because we also performed statistical analysis on these industries. Among the 505 companies, the minimum number of companies analysed in 2015-2019 was 493, and the maximum in 2019 was 499. The reason for the change in the number of items is that data was not available for the indicators relevant to us for the company in question, so we were unable to calculate the indicator.

Compared to our previous experience with corporate sector research, the current decline in the number of companies is negligible, and we believe this is due to the fact that listing requires companies to provide continuous and up-to-date information to investors and other stock market participants. The sample includes data from companies operating in 11 sectors, the sectors relevant to us were Finance, Healthcare, Industry and R & D & I. More than 60 companies per year were analysed in each industry over the years.

The total sample includes data of 2483 companies for 5 years. In our analysis, we not only checked the complete sample based on the indicators we selected, but also conducted a separate analysis of the above-mentioned industries. For data analysis, we used the function of the SPSS statistical software package, in which we checked the correlation value between the various indicators. One of the characteristics of Pearson correlation is that it is independent of variance, the correlation coefficient can take a value between -1 and 1, and it is symmetric. [28] [29]

## 4 Findings

Table 1 is summarizing the financial performance of companies in the S&P 500 was also compiled.

Table 1  
The financial performance of companies that shape S&P 500 index

Name of indicator	2015	2016	2017	2018	2019
ROA	6.91	6.67	6.84	7.15	6.96
ROE	17.41	17.07	17.96	18.64	18.54
Liquidity ratio	1.58	1.52	1.48	1.43	1.41

<b>Quick liquidity ratio</b>	1.03	1.02	1.00	0.95	0.93
<b>P/E</b>	17.63	18.17	19.40	15.49	18.42
<b>P/BV</b>	3.63	3.74	4.05	3.48	3.72
<b>EBIT</b>	1312	1355	1487	1622	1608
<b>NWC</b>	1027	991	933	927	904

*Source: authors' own calculation using SPSS*

Return on assets shows balanced performance over the review period. The same applies to the return on equity. Equity is smaller than total liabilities / assets, so the trend is the same, and return on equity is always above the return on assets. In terms of overall liquidity, the picture could be one of more efficient management, but it does not seem to be the case as the quick ratio is also decreasing.

The liquidity ratio reaches the 1.3-1.4 expected value in the literature. Despite the numerous factor number, the quick liquidity ratio is also balanced. Compared with previous years, the price-earnings ratio in 2019 showed a trend reversal. As for the earnings before interest and taxes (EBIT), all except one year showed a steady growth, which is a positive and good indicator of the company's performance.

Net working capital shows that companies are not only financing their current assets but also part of their fixed assets from temporary sources. In the following part, we look at the values of the indicators by industry, examining whether we find any meaningful differences between activities. First, we use candlestick charts to show the changes of the asset-ratio performance of four sectors. The figure provides an excellent illustration of the variation in performance of each sector, as well as the variation in dispersion relative to themselves.

The financial sector has the lowest ROA ratio. The banking/financial sector operated in a low interest rate environment. The after-effects of the financial crisis that started and spread in 2008 have not yet fully disappeared, especially in the first part of the period under review. This phenomenon was not only prevalent on the US market but was also evident on the European markets. [30-32] Once the after-effects of the crisis had been overcome, profitability indicators improved, both in terms of equity and return on assets.

'The majority of banks expect ROE to exceed 10% in the long run, and financial institutions that do not adapt or are slow to adapt will be unable to maintain profitability levels,' said Chief Economist Bálint Dancsik at the MNB (National Bank of Hungary). Declining profitability and digitization are major challenges for the European and Hungarian banking systems. [33]



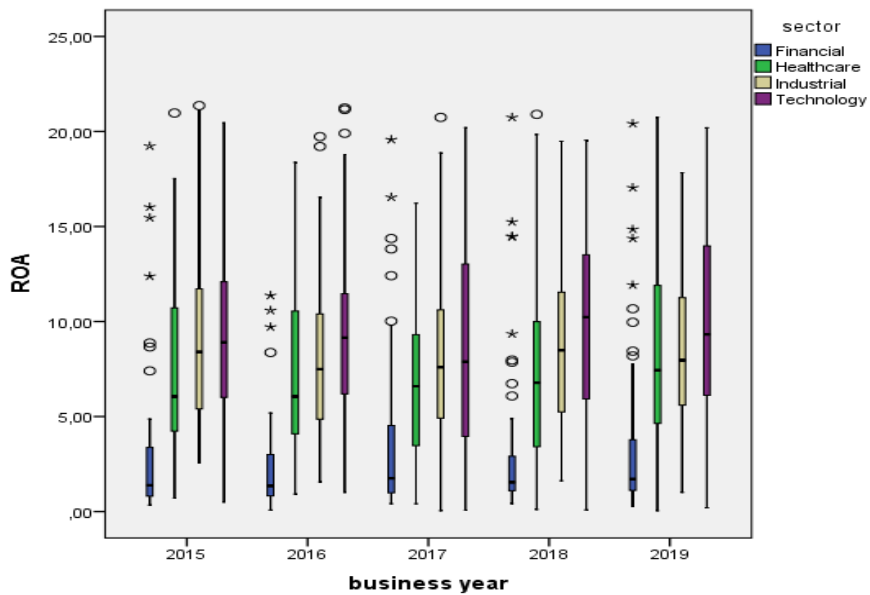


Figure 3

The value of the ROA in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

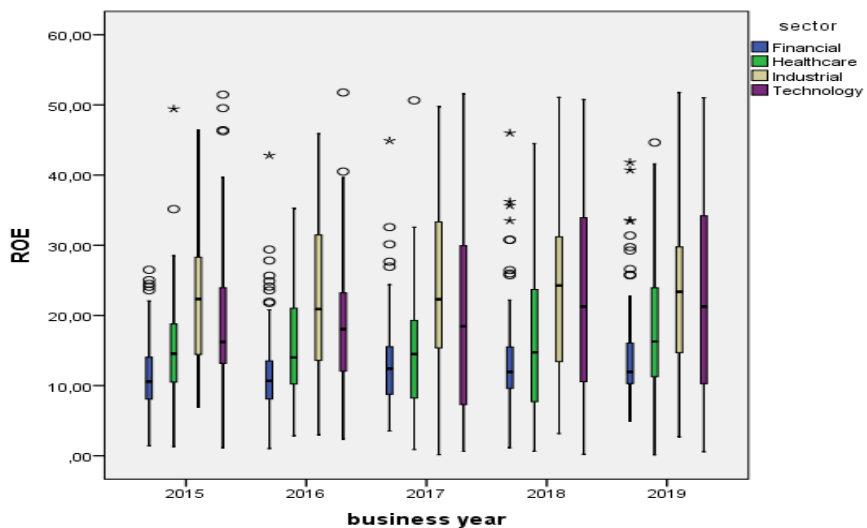


Figure 4

The value of the ROE in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

As we can see from the figure 4, US banks have also achieved an average ROE of 10% by the end of the review period. Profitability improvements have begun to increase significantly not only in Europe, but also in the US financial markets under consideration. The Covid pandemic since 2019 have had a negative impact on the performance of the global economy, but analysts expect record performance to overcome this. 'US banks were able to finish the year with unprecedented profits, thanks to the overall recovery of the global economy and the surge in financial markets', told Tim Adams, the leader of the Institute of International Finance industry association to CNBC. Backtracks from the initial optimistic pronouncements made in early 2020 April, where the IIF President and CEO Timothy Adams supported the calls by the World Bank and IMF on private creditors to suspend debt payments. [34]

Of the ROE / ROE indicators of each sector we can highlight the banking sector, which has outperformed over the last few decades, However, R&D&I shows far better performance. 2017 represents a fairly hectic situation for the sector, as evidenced by the large variability in indicators. In terms of industrial performance, ROA indicator peaked in 2015, but was consistently above the financial and healthcare sectors, except in 2016. [35] [36]

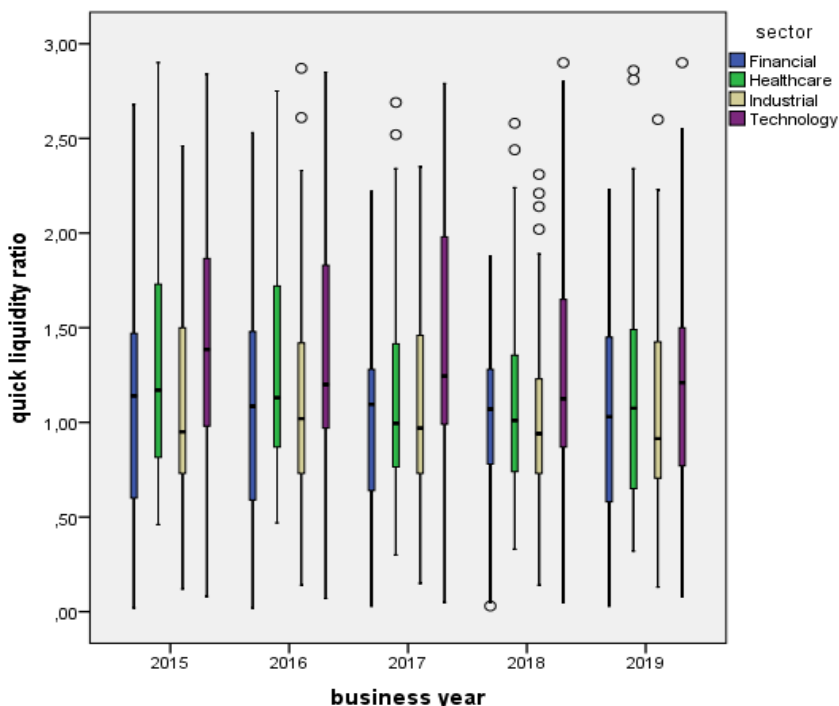


Figure 5

The value of the quick liquidity ratio in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

For ROE and ROA, there are significant differences between sectors, but both indicators show similar trends across sectors, with significant differences in variance both between sectors and by year. The financial sector shows the most consistent (balanced) performance in both ROE and ROA. The technology sector was showing the biggest fluctuations.

For quick ratio = (accounts receivable + securities + cash) / short-term liabilities, the companies under review behave similarly, but there are also good and bad years. The progress of Industry 4.0 for technology-developing companies is also evident here, with the liquidity of companies in this sector surpassing that of the financial sector. However, liquidity improved until 2017, then declined on average in 2018 and surpassed 1 in 2019.

Liquidity in the banking and health sectors was about the same in 2019 and similar in 2015. This clearly reflects the aftermath of the financial crisis in the banking sector, as evidenced by the 2016 data. In terms of liquidity, the lowest average during the review period was recorded by the industrial companies. This can be explained by the fact that they are engaged in production activities with high fixed asset requirements.

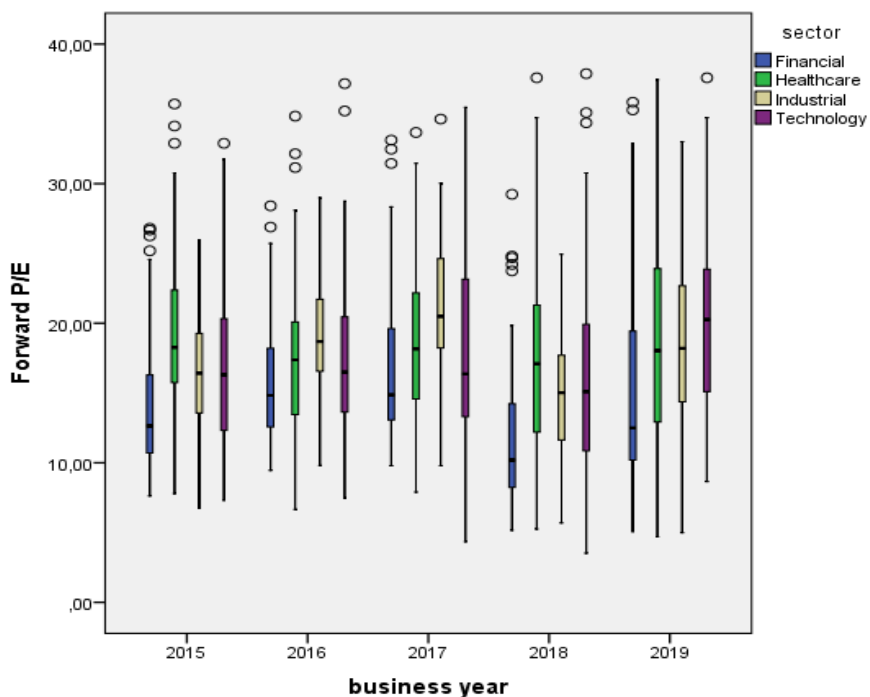


Figure 6

The value of the forward P/E in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

In the following part, we look at the P/E ratio. Again, the indicator shows significant variations across sectors here, and the usual order of performance of the indicators changes. In 2016 and 2017, the industrial sector was the best performer. The technology sector, which represents research and development, did not show an outstanding performance compared to the other sectors and even lost its leading position in 2015, 2016 and 2017. The financial sector is also among the tail enders in this case.

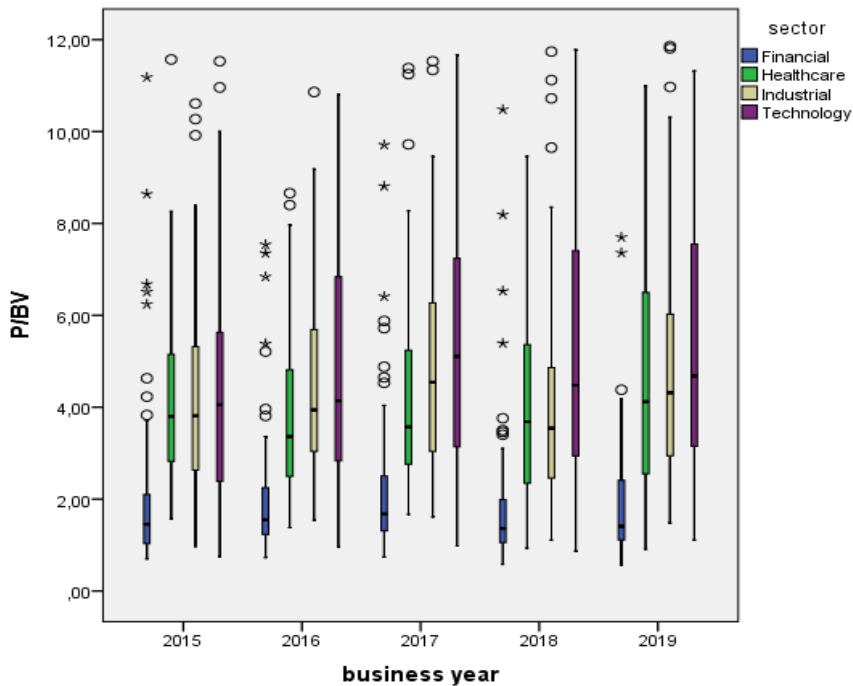


Figure 7

The value of the P/BV in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

We also looked at the P/BV (market price per share/book value per share) ratio by industry. It can be seen that Industry 4.0 leads the average and has a higher dispersion value. The financial sector showed the lowest value. Market prices may deviate significantly from book value, which may result in stocks being undervalued or overvalued. In this case, the market is boding well for the future of the R&D&I industry. The healthcare industry is becoming more and more popular in the investment market.

The changes in net working capital are often linked to the evaluation of the company's financing strategy. In terms of NWC (net working capital) values from 2017 to 2019, the financing strategy of the healthcare industry is the most conservative. With the smallest variance, the financial sector has a similar strategy.

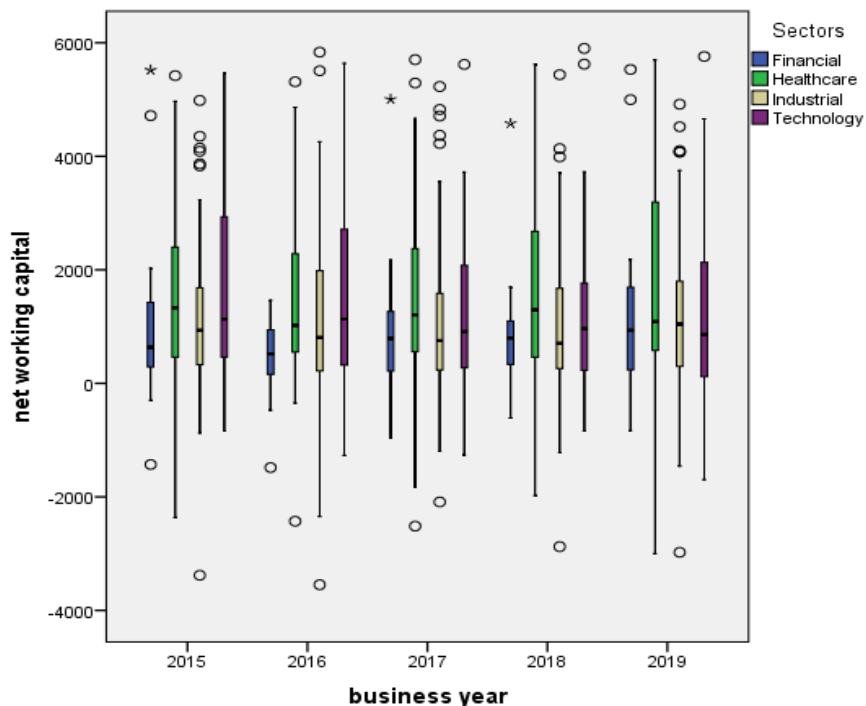


Figure 8

The value of the net working capital in the financial, healthcare, industrial and technology sector

*Source: authors' own editing using SPSS*

The next indicator to be examined is EBIT, which is also examined later in terms of its relationship with other indicators. EBIT is the highest in the financial sector. In other words, the average values of the candles in blue are comparatively higher than the values in the other sectors.

The operating results for banks include income from financial services, that is, interest and expenses, which represent the one-time or continuous income of the industry. In other words, given the low ROE and ROA, we concluded that the banking industry performance in terms of revenue and expenditure is not bad, but in terms of losses, this may be related to past activities and crises, leading to worsening performance. The industry has not totally recovered from the significant credit losses at the beginning of the period. As far as EBIT is concerned, R&D&I has the lowest performance, with a relatively low standard deviation.

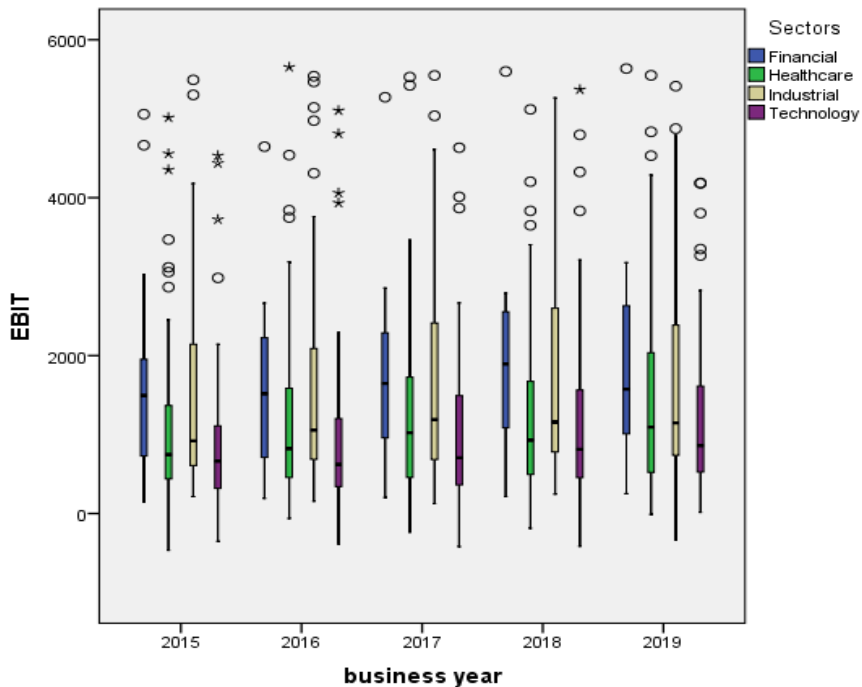


Figure 9

The value of the EBIT in the financial, healthcare, industrial and technology sector

Source: authors' own editing using SPSS

In our research, we examined how each financial indicator affects the value of other indicators, using Pearson's correlation test. EBIT showed a positive relationship with ROE for the companies under study, while the relationship was negative for liquidity, and a similar relationship was found for the P/E ratio. These values imply that when operating profit increases, the return on equity also improves, which can be explained by the fact that a higher EBIT value leaves a higher taxable profit after deduction of corporate tax and dividends paid to preferred shareholders, i.e., the taxable profit per unit of capital increases. However, it is also easy to see that high liquidity is not good for the profitability of the company. A high stock of inventories and receivables may even indicate a high level of liquidity, but it may also mean that part of the inventories cannot be sold or the receivables from customers cannot be managed properly, i.e., these items will not generate real sales and therefore the company will not be able to generate an increasing EBIT. It should also be mentioned, that the company's operating profit can be negatively affected by high cash holdings and a high number of securities within a year, as these do not generate any increase in sales for the company, which also has a negative impact on EBIT. For the P/E ratio, we see that if EBIT increases, the P/E ratio decreases. [37] [38]

Further examination of the relationships between the indicators showed that the ROA indicator was positively correlated with all other indicators except EBIT whose direction was positive. Increasing the value of earnings per asset also has a positive impact on solvency, return on equity, P/E ratio and P/BV ratio.

Table 2  
Correlation matrix of the indicators and EBIT

Name	EBIT	ROA	ROE	Liquidity ratio	Quick liquidity ratio	P/E	P/BV
Pearson Correlation EBIT	1	0.32	<b>0.152**</b>	<b>-0.161**</b>	<b>-0.153**</b>	<b>-0.201**</b>	-0.033
Sig. (2-tailed)		0.181	0.000	0.000	0.000	0.000	0.184
N	1967	1720	1583	1808	1827	1703	1662

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

*Source: authors' own calculation using SPSS*

Below we have further explored our previous hypothesis according to which there might be a relationship between the value of each indicator and continued our analysis in each sector where we obtained interesting values. This analysis also shows that calculating averages on a large sample of items can still hide important information from us.

The first sector was finance, and the indicators of more than 70 large companies included in the smallest item sample were evaluated against other indicators. The Pearson correlation did not show a significant relationship between any indicator and EBIT. As for the other indicators, there was a verifiable relationship, such as a positive relationship between ROA/ROE and a positive relationship between ROA/liquidity ratio. [39-41] The situation is different in the health sector, where liquidity has a negative impact on operating profit, i.e., if EBIT increases, the liquidity of health care companies decreases, if EBIT decreases, the liquidity of companies improves, and a similar relationship can be described for EBIT and P/E ratio. The survey sample included the data of more than 200 companies.

The number of companies engaged in industrial activities in the sample was close to 300. In this case, both liquidity indicators, namely, the P/E ratio and P/BV have a negative (opposite) effect on the value of EBIT. A decrease in operating profit has a positive impact on liquidity, P/E ratio, and P/BV ratio. In the case of the technology sector, EBIT correlates with fewer indicators than in industrial enterprises. EBIT showed a positive relationship with ROA and ROE, and EBIT showed the opposite relationship with the P/E ratio. An interesting lesson is that

there was no verifiable relationship with liquidity. Therefore, it can be concluded that, as a whole, the nature of the activity has a strong influence not only on the change in the value of each indicator, but also on the impact on each other. For example, in the financial sector, the operating profit was not affected by the indicators studied. [42-45]

Table 3  
Correlation matrix of the indicators and EBIT in each sectors

Name	EBIT	ROA	ROE	Liquidity ratio	Quick liquidity ratio	P/E	P/BV
<b>Financial</b>							
Pearson Correlation EBIT	1	-0.040	-0.113	-0.199	-0.172	0.025	-0.167
Sig. (2-tailed)		0.725	0.329	0.083	0.136	0.812	0.165
N	96	81	76	77	76	91	71
<b>Healthcare</b>							
Pearson Correlation EBIT	1	-0.015	0.161*	<b>-0.194**</b>	-0.155*	<b>-0.311**</b>	-0.074
Sig. (2-tailed)		0.820	0.021	0.005	0.027	0.000	0.296
N	242	219	205	207	203	210	200
<b>Industrial</b>							
Pearson Correlation EBIT	1	-0.106	0.136*	<b>-0.283**</b>	<b>-0.195**</b>	<b>-0.310**</b>	-0.135*
Sig. (2-tailed)		0.068	0.026	0.000	0.001	0.000	0.026
N	314	294	270	305	310	300	275
<b>Technology</b>							
Pearson Correlation EBIT	1	<b>0.223**</b>	<b>0.241**</b>	0.137*	0.060	<b>-0.219**</b>	0.020
Sig. (2-tailed)		0.001	0.000	0.034	0.354	0.001	0.767
N	283	238	219	240	239	248	224

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Source: authors' own calculation using SPSS

## Summary and Conclusions

Our research examined the financial performance of 505 large companies, in the S&P 500 stock performance index, over the five years between 2015 and 2019, using SPSS software. We first studied the whole corporate group, and then, we



assessed and compared some of the relevant sectors and industries. The indicators studied included ROA, ROE, liquidity ratios, net working capital, P/E, P/BP and EBIT. We found significant differences in performance across sectors. In the next part of the analysis, the factors affecting EBIT were assessed using Pearson's correlation. Similarly to analysing the full sample, we first looked at the factors that affect EBIT for a sample of 505 companies and then examined the impact of the indicators on EBIT by sector.

Our hypothesis was that, in relation to the average performance of the companies that make up the S&P 500 index, the performance of each sector contributed different proportions to the five-year corporate performance. Furthermore, we examined how the values of the key indicators used in the study varied and whether they showed significant differences across industries. It is confirmed that various sectors affect the value of the S&P 500 index in different ways. The financial sector has the lowest value of the ROA indicator, the reason for this is that the banking/financial sector operated in a low interest rate environment. It is clear from the values of the indicators that the impact of a crisis has a prolonged effect on the performance of a sector, which is particularly true for the financial sector. In the first phase of the crisis, no change in the values of the indicators is discernible, while for other sectors the "symptoms" are immediate, e.g., in the form of a shortfall in turnover, it is difficult to see the stock data, for the financial sector, because of losses. For ROA and ROE indicators, the technology sectors showed the largest dispersion. The liquidity of the banking and healthcare sectors was almost identical in 2019, with similar values in 2015. In terms of liquidity, the lowest average values over the period were recorded by companies in the manufacturing sector. An extended future objective of our research is to quantify/compare the impact of COVID-19 and the Russian-Ukrainian conflict, on the performance of the sectors. The research is hindered by the need to separate the two impacts for the year 2022 and the need to collect data on a company-by-company basis, to analyse the companies that make up the S&P 500 index.

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# Analysis of the Impact of ICT on Economic Growth: Empirical Data from 16 Regions of Kazakhstan

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*Abstract: In the last decade, ICT has significantly impacted economic growth in many developing countries, such as Kazakhstan. In addition, there is practically no analysis of the level of interconnections between the communication infrastructure and economic growth in the regional context. This article will consider the impact on GRP per capita of the following ICT factors: volume of communication services, number of fixed telephone lines, enterprises using computers, enterprises using the Internet, internal costs for R&D by regions, the number of organizations that have created and use new technologies and equipment. The data for the article were collected over ten years, from 2010 to 2020 as part of the dynamic panel data approach, which includes 14 regions and two cities. The initial data were taken from the statistical data of the Bureau of National Statistics of the Republic of Kazakhstan. The methodology used in the article includes the study of the proposed indicators and conducting correlation and regression analysis in the STATA program. The conclusions presented in our work showed that the ICT infrastructure has a significant positive impact on regional development, and the coefficient of elasticity of the ICT infrastructure to regional development is greater than the coefficient of elasticity of the degree of integration. The government can use the results of this study to develop programs to improve regional development.*

*Keywords: economics; economic growth; ICT; network access; digital technology; region; Kazakhstan*

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# 1 Introduction

The COVID-19 pandemic has shown how important the level of development of information and communication technologies (ICT), digital technologies, and access to the network is, all over the world. In recent years, ICTs in everyday life have been present in various fields, such as education, business, culture, finance, etc. The significant role of ICT is due to globalization, structural changes, the continuous growth of technology, and the expansion of opportunities for society to transform information. The development of the level of ICT and its impact on economic growth has increased very rapidly, both in developed and developing countries. However, many scientific studies on this issue have yielded contradictory results related to different research methodologies, geographical diversity, and different specifics of the study. At the same time, new challenges have emerged that require severe measures from the state, businesses, households and change the economic policy of the whole country.

Recently, some scientists have deduced the relationship between telecommunications, the Internet, and economic growth with monetary and human capital [6] [9]. Other scientists argue that the state's economic growth is primarily due to various factors, including the impact of ICT on economic development through access to the network [1] [20] [32]. Most of these studies associate the growth of ICT with the improvement of human capital in the country, improving the quality of educational programs [12] [14]. The next group of scientists believes that economic growth is possible if financial instruments for capital investment appear in the country, leading to industry development [11] [35] [36]. In addition, statistical data on the relationship between GDP growth and various indicators over the past decades suggests that the impact of information technology on economic growth is faster than low.

Despite a lot of work, there is still insufficient evidence of the contribution of ICT to economic growth in developing countries like Kazakhstan. In addition, there is practically no analysis of the level of interconnections between the communication infrastructure and economic growth in the regional context. Based on the statistical data of Kazakhstan, we can talk about the presence of various types of territories according to the degree of accessibility of digital technologies: from the availability of full Internet access in 117 cities and 3324 rural settlements to their complete absence in more than 600 settlements with an average population of 500 people or more.

Therefore, for statistical analysis in this article, panel data were used, including 14 regions and two cities of republican significance from 2010 to 2020. During the construction of the model, which is based on econometric analysis, the difference in the development of ICT technologies between the regional indicators presented in this article is shown.

This article has the following structure: a literary review, the current situation, a methodology that includes a description of the data and the model used, the results

and discussions will be shown in the last chapters of the article, conclusions will be drawn separately.

## 1.1 The Current State of Development of the ICT Sector in Kazakhstan

The ICT sphere's development level in Kazakhstan is ensured by the state policy to form and develop a single digital space. Nevertheless, an essential condition for the further development of the digitalization of the economy of Kazakhstan is the volume of communication services, the level of development of communications (access to communications), and the availability of the level of productivity of new technologies on which the products of organizations in the information and communication technology sector are formed. Over the period 2010-2020, the share of organizations using computers also increased by two times compared to 2010. Moreover, Kazakhstan's volume of communication services has grown markedly, from 479905.30 KZT to 926626.10 KZT (Figure 1).

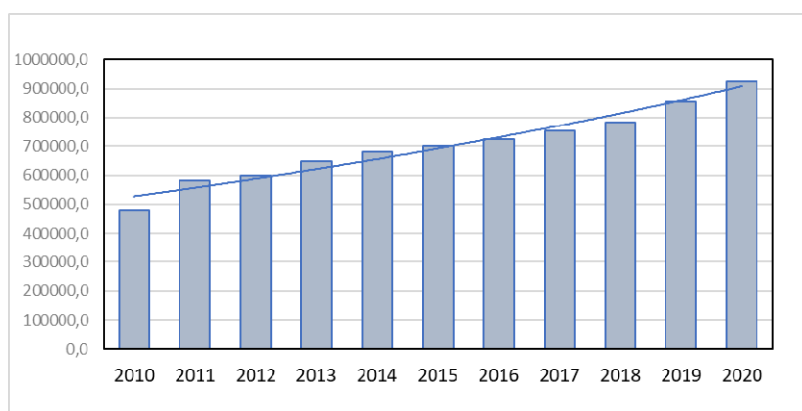


Figure 1

Dynamics of the volume of communication services in Kazakhstan for 2010-2020, in KZT

According to the presented data, it can be seen that the volume of communication services in Kazakhstan has a positive growth trend. At the same time, the growth was achieved due to a significant increase in the population's spending on the Internet and mobile communications. In 2002, about 40% of the total market volume of communication services accounted for Internet services, 25% - for mobile services, and the remainder for other telecommunications services. In addition, the most significant indicators of the volume of communication were shown by the megacities - Almaty and Nur-Sultan. The growth in the volume of digital technologies was facilitated by the stimulation of domestic demand for ICT; the development of e-government and the provision of public services in electronic form; the dissemination of basic skills in the use of information technology, and others.



Thus, information and communication technologies are increasingly penetrating all spheres of society in Kazakhstan. Accordingly, the ICT supply is expanding, and the volume of ICT goods and services is growing. On average, the share of Internet users in 2010-2020 increased annually by 10-15% (Figure 2).

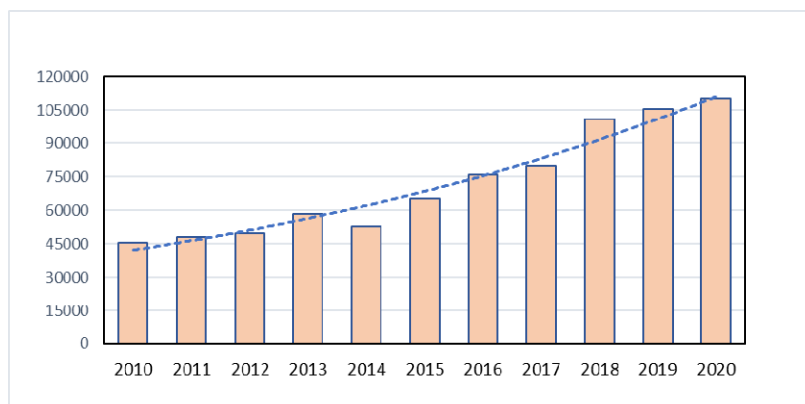


Figure 1

Dynamics of Internet users in organizations in Kazakhstan for 2010-2020

According to the data presented for 2010-2020, it is clear that the share of enterprises using the Internet is overgrowing. This is due to the growing popularity of mobile communications, communication, and telecommunication networks in Kazakhstan. Thus, in 2020 the number of enterprises using the Internet amounted to 110,246, which is two times less than in 2010. Interestingly, the number of users decreased in 2014, but only slightly. The most significant number of enterprises using the Internet is also located in the megacities of Almaty and Nur-Sultan (Table 1).

Table 1

The number of organizations using the Internet in the regions of Kazakhstan for 2010-2020

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Akmola	1677	1840	2203	2659	2818	2782	2906	3008	3183	3347	3636
Aktobe	2912	3410	3300	3581	3165	3721	3484	3714	3981	4101	4049
Almaty	1314	1792	1830	2637	2551	2911	3121	3434	3982	4394	4242
Atyrau	2497	1789	1647	2042	1741	2455	2303	2346	2656	3127	2727
West Kazakhstan	1669	1453	1440	1957	1743	1769	2418	2352	2120	2410	2326
Zhambyl	971	1163	1320	1653	1543	1947	1838	1930	1925	2012	2198
Karaganda	3818	3709	3900	4493	4639	5732	6321	6896	7673	8175	8089
Kostanay	2006	2468	2737	3057	3339	3238	3601	3939	4162	4309	4845
Kyzylorda	1009	1172	1227	1235	1385	1719	1695	1635	1894	1909	1999

Mangystau	2002	2035	2182	3124	1979	2079	1744	2667	2956	2780	2840
South Kazakhstan	2276	2597	3698	3904	2949	3869	4321	4512	8 066	7906	9084
Pavlodar	1874	2129	2284	2761	2805	2979	3691	3770	4104	4370	4653
North Kazakhstan	1632	1745	1762	2226	2266	2294	2500	2852	2999	2939	3494
East Kazakhstan	3287	3772	3988	4249	4135	4148	4452	4940	5375	5351	5769
Nur-Sultan city	3159	3772	3907	4202	4862	5855	9000	10225	21427	22146	20513
Almaty city	13251	13218	12428	14676	10710	17688	22384	21438	24199	26255	29782

*Note: compiled by the authors.*

Based on the data, it can be concluded that there is an increase in the number of organizations using the Internet in most regions. The highest growth rates over ten years were typical for four areas of Kazakhstan – Almaty city, Nur-Sultan city, South Kazakhstan, and Karaganda. Low indicators of the distribution of the number of organizations using the Internet were recorded in the following regions: Zhambyl, Atyrau, and Western Kazakhstan. An interesting fact is that economically developed regions show low Internet usage rates.

## 1.2 Related Studies Review

According to the existing references, many scientists focus their research on the importance of economic growth for developing ICT, including digital technologies and network technologies. Moreover, according to the distributed encryption system, economic growth is positively influenced by the country's technological development and innovations actively supported by the state [8] [9]. This statement is supported by other scientists who have noted the importance of digital technologies in modern society [36]. They also found a long-term stable relationship between technological innovations and their determinants on the level of digitalization.

Recently, there have been significant changes in the economic activity of the regions and have an advantage in the development of ICT. Some scientists in their works considered a vital indicator such as telecommunications and the level of Internet penetration within rural areas. Previously, the same strong effect of business development was given by the spread of telecommunication technologies, fixed telephones, fax machines, and many other things. Scientists have also deduced the relationship between telecommunications, the Internet, and economic growth with monetary and human capital [6] [14] [21].

Furthermore, some works note the usefulness of the Internet. It is also evident that it is more expensive for rural areas to conduct and maintain communication systems

than large cities. At the same time, the main problem is that backward regions have weak rural development agencies due to the migration of human capital [9; 18; 30]. Regarding communication services, there are already many indicators describing the main parameters that show the degree of penetration of the digitalization of the economy. For instance, Kurilova and Antipov proposed the following indicators: the level of availability of high-quality Internet connection and other telecommunications; demand among the population for digital products; investments in the knowledge-intensive sphere (R&D, development of robotics and, in general, "Industrial Revolution 4.0") [10] [16] [18] [19] [30].

The high level of technology, the financing of science, and the development of engineering communications form the basis of innovation. Internal R&D expenditures by regions in Kazakhstan are weak due to a reduction in the level of grant funding [25]. In contrast, Kazakhstan has had a historically established and dominant administrative command system for many decades, negatively affecting the economy [18]. In many cases, the financing of innovations gives a positive result. Thus, Xin *et al.* (2019) and other scientists studied Chinese organizations that create and use new technologies and objects of technology: computers telecommunications equipment [35]. In comparison, R&D financing is positively and statistically associated with corporate bonds, company shares, and increased technology, which positively impacts the social and financial sphere of the state [17] [27] [33].

Other scientists have used the generalized method of the moment growth model to identify the extent of the impact of ICT on financial and economic growth through broadband [4]. Mobile or landline phones are catalysts for economic growth, increase household well-being, reduce inequality, and develop cooperation. At the same time, mobile technologies lead to problems – gambling addiction, reduced confidentiality, more accidents on the roads (in some countries, laws have been passed prohibiting the use of mobile phones while driving), anxiety, and many others [22] [30].

When using a gender approach to mobile phone users, scientists are divided into two camps. Some say that the spread of ICT through mobile phones reduces poverty, especially in rural areas [2] [31]. Others do not find this confirmation in their work. Instead, there is a dependence on the person's digital skills, not gender and location [1].

Scientists have highlighted that ICT positively affects the population's health: easy access to services in a shorter time ensures prompt medical care in time. Digitalization of the education sector also regulates the work of the entire healthcare system, which is a lagging sector of the economy, which is gradually introducing ICT into its activities [3] [5] [13] [16] [26]. At the same time, scientists have found a negative impact of digitalization on people's health: cyber-attacks, privacy violations, false information, and some others [23].

Based on the review of existing video sources, how ICTs affect economic growth.

As can be seen from the related works, there are various factors such as R&D, human capital, access to the network, the production of new technologies that contribute to economic development. In general, there are many works on the chosen research topic. However, there are no thorough studies that consider the influence of factors on regional economic growth, which would provide reliable data for analysis in developing countries. In the next section, we can consider the study's methodology, which will allow us to assess the impact of ICT on regional economic growth.

## 2 Methodology of Research

The use of ICT requires States to train and retrain highly intellectual human capital with modern digital skills. Moreover, using the example of 45 countries, it has been proved that the indicator of innovation increases in the presence of a skilled workforce [7]. Scientists also believe that skills that contribute to professional development and high staff income lead to an overall increase in the economic indicators of rural regions and the macroeconomic level of the whole country [6] [20]. Many Central Asian countries, including Kazakhstan, have already started training IT specialists and retraining specialists from different fields. In addition, the introduction of digital topics into curricula at all levels of education solves the strategic task of teaching digital skills to the population [15].

To study the impact of ICT on the business sector, some scientists use the DESI Index and the State ICT Development Index (IDI). Both indices include indicators of manufacturability. So the State ICT Development Index (IDI) is calculated based on the number of equipment, the number of equipment and technologies, and the second indicator of the DESI Index is based on qualitative indicators: the type of connection, staff skills, Internet connection speed, the possibility of integration between programs, companies, business and the state, the degree of data protection. The scientist's conclusion showed that some European countries are in stagnation, but Eastern countries have a noticeable technological growth [24].

To eliminate heterogeneity, and specifically consider the elastic value of the impact of infrastructure on the regional development, a double logarithmic OLS regression model at the regional level is constructed accordingly [28] [29]:

$$\begin{aligned} \ln GDP_{\gamma,\tau} = & a_0 + a_1 \ln com X \ln tel_{\gamma,\tau} + a_2 \ln com X \ln Int_{\gamma,\tau} + a_3 \ln RD + \\ & a_4 \ln tech + \varepsilon_{\gamma,\tau} = a_0 + a_1 \ln infra com_{\gamma,\tau} + a_2 \ln infra_{ict_{\gamma,\tau}} + \\ & a_j \sum \ln Controls_{\gamma,\tau} + \varepsilon_{\gamma,\tau} \end{aligned} \quad (1)$$

In the formula (1),  $\ln GRP$  - Gross regional product (GRP) per capita in thousand KZT,  $\ln com$  - Volume of communication services in a million KZT,  $\ln tel$  - number of fixed telephone lines,  $\ln comp$  - enterprises using computers in numbers,  $\ln Int$  - enterprises using the Internet in numbers,  $\ln RD$  - internal costs for R&D by regions

in mln. KZT, *Intech* - the number of organizations that have created and used new technologies and equipment,  $\ln controls_{r,t}$  contains the control variables that affect the regional development,  $r$  and  $t$  represent the fixed regional and time effects, respectively, and  $\varepsilon_{r,t}$  is random error terms (see Table 2).

Table 2  
Variables and their measurements used in the study

No.	Code	Interpretation of indicators
1	lnGRP	Gross regional product (GRP) per capita - thousand KZT
2	lncom	The volume of communication services, million KZT
3	lnTel	Number of fixed telephone lines, number
	lncomp	Enterprises using computers, number
4	lnInt	Enterprises using the Internet, number
5	lnRD	Internal costs for R&D by regions - million KZT
6	Intech	The number of organizations that have created and used new technologies and equipment

*Note: compiled by the authors*

Based on the idea of the SFA stochastic cutting-edge production function model, a calculation model for the integration of communication and information technology is proposed, and a collaborative evolution model of the regional development is constructed. The relative distance between the actual value of information technology and the leading edge constitutes the strength of the promotion of communication technology.

In selecting regional ICT infrastructure, there have been more studies on the number of fixed telephone lines and the scope of communication services to form proxy variables for regional communication infrastructure. The strength of the communication infrastructure constructed in this paper is measured by the regional mobile phone exchange capacity ratio to the region's permanent population at the end of the year. In addition, the rapid development of the Internet has accelerated the integration of the original information, communications, and other industries and brought about drastic substitution effects. To better reflect the level of ICT infrastructure in various regions, the influence of the Internet penetration rate, an ICT infrastructure proxy variable, was investigated in the robustness test.

### 3 Empirical Results and Analysis

The COVID-19 pandemic has become the biggest challenge for Kazakhstan in the last two decades. The government has introduced quarantine to combat the pandemic, starting with Almaty and Nursultan, and extended it to all regions.

As a result, many areas, cities, urban-type settlements, and rural settlements of Kazakhstan were isolated. At the same time, we had to switch to a forced remote format of work using digital tools and services. However, due to the forced nature, it turned out that not all regions of Kazakhstan have a sufficient level of digitalization development. Based on the current research results, regional economic growth has become the social foundation for integration, and the provincial per capita GRP is used to measure it. It is the comprehensive application ability of composite skills and complex knowledge. In the final analysis, internal R&D costs and New technologies and equipment objects have become an essential factor in promoting the development of the integration.

To obtain a more robust conclusion, all indicators choose 2010-2020-year panel data from 16 regions in Kazakhstan; the primary data are derived from the Bureau of National statistics of the Agency for Strategic planning and reforms of the Republic of Kazakhstan over the years. The calculation indicators of communication infrastructure and ICT infrastructure are derived from the National Statistics Bureau website. Table 3 shows the statistical description of regression variants.

Table 3  
The statistical description of regression variants

Variable symbol	Indicator	Mean	Standard deviation	Min. value	Max. value
Regional development					
GRP per capita	Gross regional product per capita	7.743587	0.6965029	6.061457	9.587708
Infrastructure					
Communication	Scope of communication services	9.54666	1.133288	8.099494	13.19283
Telephone	Number of fixed telephone lines	5.357449	0.506978	4.281	6.599
Computers	Number of businesses using computers	8.210211	.6494777	7.167038	10.32466
Internet	Number of organizations using the Internet	5.357449	0.506978	4.281	6.599
R&D	Internal R&D costs	7.267846	1.414747	4.375757	10.43501
Tech	New technologies and equipment objects	3.397634	0.9183592	0	5.713733

*Note: compiled by the authors*

The coefficient of influence of the strength of the communication in the model is significantly negative at 1%, and the communication infrastructure greatly hinders the degree of integration. According to the theoretical explanation, this is because the promotion of regional development by communication infrastructure is more than informatization.

However, informatization is still at the initial and middle stages of rapid development. It can be seen from this that the communication infrastructure represented by the number of fixed telephone lines and scope of communication services plays a more significant role in promoting regional development, thereby contributing to the faster growth of regions, which led to a more unstable situation between communication and informatization. Consequently, the communication infrastructure hurts the degree of integration. Using models (3) (4) and (5), it is known that the average throughput of mobile telephone exchanges is significantly higher at the level of 1%, and the ICT infrastructure has contributed substantially to increasing the degree of regional development (Table 4). The principle underlying it is similar to the direction of communication infrastructure. The ICT infrastructure has significantly contributed to the development of informatization. Therefore, the speed of informatization development is higher than that of regional development, which effectively eliminates the gap between informatization and communication and allows them to enter a relatively interconnected state of development.

The interaction conditions between communication infrastructure and ICT infrastructure are significantly favorable at the level of 1%. The interaction between two infrastructures with different attributes has an impact and has led to an increased degree of integration. The control variable, internal R&D costs, have a positive effect, while the area receiving the water level is not disturbed, consumption patterns, water level demand, and industry structure are at a high level of adjustment direction when the income level is low, large-scale industrial production of "good price" industrial products for mainstream consumption, people at the lowest prices to get maximum efficiency with a whole foot; as the level of income increases, industrial products should meet the actual requirements of consumers more, and not meet the different nature of consumer demand to promote industrial production in the direction of Mai information into a significant force, starting from consumer demand for pre-testing, to the product of the intellectual output, highly efficient inexpensive information services are provided in shopping areas, information promotion and communication to a more interconnected state. The positive impact of human capital on the degree of integration was also confirmed. Information-based construction requires intensive investment in human capital. The adequate human capital is, the more it contributes to the development of informatization, which can effectively compensate for the lag in the development of informatization and a low degree of integration. Situation. Government intervention hurts the degree of integration. The government's macro-regulation function is shifted towards communication.

It ignores the development of informatization, which has led to a growing gap between communication and informatization, and the degree of integration between them is constantly decreasing. Table 4 shows the main results of the regression.

Table 4  
The main results of the regression

Variables	(1)	(2)	(3)	(4)	(5)
Infra_com	-0.8887		-1.4790***	24.6513***	20.1333***
Infra_ict		3.5118***	3.5974***	28.4484***	23.8284***
Infra_com X Infra_ict				-6.0408***	-5.0166***
R&D	0.4947* **	0.1951***	0.1815***		0.1500***
Tech	0.0107	-0.0025	0.0277		0.0252
Cons	7.5993* **	-8.389***	-2.9478	-108.7316***	-89.6842***
Adj R <sup>2</sup>	0.3649	0.2810	0.3614	0.1416	0.2576
F	29.61	117.92	97.18	129.83	88.11

Note: «\*\*\*», «\*\*», «\*» means that the variable is significant at the level of 1%, 5%, and 10%, and the value in parentheses is a standard error; the explanatory variable and the dependent variable are represented as a number.

Testing the model shows that the coefficient of elasticity of the communication infrastructure to the integration efficiency is small, and none of them passed the significance test. This indicates that the contribution of communication infrastructure to the efficiency of integration is insignificant. The main reason is that, although communication infrastructure directly contributes to regional development, on the other hand, it also leads to the fact that the degree of integration has decreased. Consequently, the two effects of communication infrastructure compensate for each other, and the degree and direction of the impact cannot be effectively observed. The value of the infrastructure coefficient ICT is stable and positive, and the values of the coefficients in models (3) and (5) are significant at the level of 1% (Table 4). From the point of view of the elasticity value, the elasticity coefficient of the ICT infrastructure for integration efficiency is greater than the elasticity coefficient of the degree of integration. The main reason is that there are two main ways to increase the efficiency of integration provided by the ICT infrastructure. One is to promote better integration, and the other is to encourage the development of information technology.

The direct results of Table 4 showed that the infrastructure constitutes an important influencing factor for regional development. However, there is also the possibility that the regional development will affect the infrastructure, which will cause a two-way causal relationship and influence the return result. To further observe whether there is a reverse causal relationship, this article uses the timing of Variables



to examine whether the reverse causal relationship causes the impact of infrastructure on regional development. The original time point is reversed; the dependent and control variables are delayed by a period, while the core explanatory variable adopts the current value. In this way, it is tested whether the future explanatory variable can predict the existing dependent variable.

The results show a robust, causal relationship, between the infrastructure and the degree of integration, and there is no inverse causal relationship between the integration performance and the infrastructure. The above research results show a specific reason to worry about the endogenous nature of the problem, and the regional development will objectively promote the development of infrastructure.

To eliminate the endogenous disturbances of the experimental results, this paper uses the second-stage tool variable regression model for re-examination. The results of the time-point test of the variable show that the primary source of endogeneity is the trend factor of the variable; the late stage of explaining the variable is used as a tool variable, which can eliminate and alleviate the endogeneity problem to a large extent - the results of the second-stage tool variable regression model. Excluding the endogenous regression results, it shows that the infrastructure still offers the same trend of change as the actual results for the effects of the regional development variables. The direction of the main variables remains the same, and indicators such as coefficient size and significance are consistent with the regression results in Table 3, indicating that the impact of infrastructure on regional development is relatively stable.

## **Conclusions**

Building on the existing research results, this paper was devoted to studying the impact of ICT on economic growth in the regional context. The results show that the communication infrastructure represented by the volume of communication services and several fixed telephone lines hinders the improvement of the regional development. In contrast, the ICT infrastructure significantly promotes the progress of regional development. The contribution of ICT infrastructure to regional development is not significant. Still, the ICT infrastructure has a significant positive impact on regional development. The elasticity coefficient of the ICT infrastructure to the regional development is greater than the elasticity coefficient of the degree of integration. On the contrary, the promotion effect of ICT infrastructure is greater than that of communication infrastructure. This leads to a result: the more the ICT infrastructure develops, the more it leads to regional development. ICT infrastructure development has effectively eliminated the gap between informatization and industrialization and promoted coordinated action between the two. The “visible hand” how the government can correctly use the baton to promote the development of two-integration has important practical significance and value for Kazakhstan's economic innovation and development, structural adjustment, and industrial transformation and upgrading. Industrial transformation and upgrading are of great importance and value.

In implementing the regional development, the government needs to fully recognize the complexity of integrating the two systems and correctly distinguish the relationship and sub-work of “government and market”. Promoting the integration of the two infrastructures of enterprises is not only an old way to promote the regional development of critical enterprises and typical enterprises and allocate development funds. Conversely, the policy effectiveness it brings has yet to be tested. On the other hand, it is not conducive to the development of the majority of small, medium, and micro-enterprises. The policy implication of this article is: correctly divide the direction of the government's efforts, and establish a perfect market competitive environment. When faced with how to promote the regional development and build their optimal competitive arrangements, the government needs less intervention in the strategic integration of the two infrastructures. Still, it invests the primary energy and resources in infrastructure construction and improvement that benefits all enterprises. The government needs to provide a perfect development environment for the grand vision of integrating the two so that enterprises can have a healthy market environment foundation.

The thinking framework of this article will help to improve the understanding of the integration of the infrastructures and promote regional development. The goal is to encourage informatization and achieve a state of mutual promotion, mutual integration, and joint action. At the same time, it is also necessary to achieve higher integration benefits. It is essential to comprehensively consider the aspects of industrial construction, information development, and the improvement of integration. Therefore, the government's integrated infrastructure resources should comprehensively consider the infrastructure needs of many aspects to bring about maximum policy effectiveness. In a nutshell, promoting the improvement of integration is not all part of the infrastructure. Policies should pay attention to the benefits brought about by the integration of the infrastructure.

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# The Impact of Mandatory Distance Education on Teaching and Learning Macroeconomics and International Economics, at Budapest Business School, during the Covid-19 Epidemic

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*Abstract: In our study, we explore the impacts of remote and online education framework introduced as a result of the Covid-19 epidemic in the case of two subjects (Macroeconomics and International Economics) taught at the Faculty of Commerce, Hospitality and Tourism, Budapest Business School. We analyzed the measures of the education change, the effects of the change on the final results of the students and introduced the experiences of our students and teachers in this period. The primary data required for the analysis were diaries maintained by teachers and information available through the electronic study systems supporting online learning (CooSpace, Neptun), as well as student and teacher questionnaires and teacher interviews. The results for both subjects show that, despite the unmodified difficulty level of the exam questions, student performance improved during the remote learning period. The implications of the study are therefore as follows: the coronavirus changed the educational framework of our university; the performance of students improved on both subjects; preparation time for teachers has increased, exam preparation time for students has also increased; consequently, the online solutions used in the distance learning period, have changed the attitudes of the students and teachers, as well.*

*Keywords: COVID-19 pandemic; online learning; distance education; teaching methods; universities; efficiency*

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## 1 Introduction

The coronavirus pandemic urged countries to compose and adopt new laws, having a grave effect on the higher education sphere. After the SARS-CoV and H1N1, Covid-19 was the third epidemic to be classified by WHO as a pandemic in

the 21<sup>st</sup> Century. The global pandemic is, however, not only a severe public health emergency, but a political, economic and social crisis at the same time [1]. According to the data recorded on October 12, 2020, almost 37.5 million people tested positive for the disease, and it caused the death of more than 1 million patients [2]. Politicians, health care professionals and other experts introduced numerous measures to control the epidemic and to provide the best possible care to the infected [3]. The first measures of the kind were imposed in Wuhan, and then, the entire city went into lockdown on January 23, 2020 [4].

Thus, the interpersonal contacts promoting the spread of the virus were reduced significantly by shutting universities down [5]. The closing of educational institutions affected millions of students all across the globe [6]. Even though online education is far from being a new method in higher education, its emergency extension to all university courses still imposed a vast challenge [7] [8].

Some courses, laboratory sessions, visual arts, office work, dance, art, and music classes cannot be taught online. In such cases, teachers could either evaluate their students based on their performance up to that point or could opt for suspending their courses until things returned to normal [9].

## 2 Literature Review

Although a relatively short time has passed since the outbreak of the global pandemic, there are numerous academic publications examining the transition of institutions or national educational systems to distance learning and the digitization that followed [11]. New adaptation strategies had to be developed on the level of both micro and macro-organizations [57]. The survey monitoring the opinion of the students in the United States serves as a fine example of presenting a complex view from the point of view of students [11]. A similar study was made with a more general scope, approaching the topic in a nation-state context, processing cases in the Philippines [12], Vietnam [13], Australia [14], India [15], Spain [16], Georgia [17], United Kingdom [18], and China [19]. After introducing government measures in the respective countries, these studies usually analyze primary data to understand how the intervention and transition practices of institutions effect student and in some cases teacher communities.

The impacts of the Covid-19 epidemic on education have also been studied encompassing a narrower scope. Ute Kaden's 2020 study [20] examined the performance and reactions of a number of students in the case of specific subjects in the form of a case study conducted in a Canadian small-town environment. The transformation challenges of the educational processes of special fields were examined in the fields of neurosurgery [21], optometry [22], neuroanatomy [23], traditional Chinese medicine [24] and business training [25].

The studies on different levels examining the impacts of the epidemic on different fields arrived at similar conclusions concerning the society as a whole. One of the most dominant phenomena was the inequality of access to digital learning, also referred to as digital inequality [26-28]. Digital inequalities do have a technical dimension, but it must also be noted that the user's autonomy, the extent of the social support network available to them, as well as their previous digital experience can also vary immensely, which may also serve as the sources of such inequalities [29].

The literature sources have drawn some conclusions in regard to expectations towards distance learning systems operating equally well in a digital context. In addition to taking digital inequalities into consideration, the aspect that distance learning should also preserve the mental health of the participating parties and that it should strive to reduce negative inequality impacts through developing the necessary digital innovations must also be highlighted [28]. In terms of handling these inequalities, particular attention must be paid to the vulnerable groups of society [14], who often do not even have proper internet connection. Only after establishing these baselines can, we examine which software, hardware, as well as organizational and work schedule corrections could bring about a sustainable solution in the educational system [17]. Odriozola et al. [16] call the attention of educational systems to students' stronger inclination towards anxiety and depression, as this problem must by all means be considered in the time of digital education. Another important aspect in the educational sphere is that they could only substitute a certain type of unidirectional, direct, classroom form of education properly with online courses [26], but they could not properly replace field work, laboratory work or processes requiring quick personal interaction in the new distance education framework.

Krishnamurthy [25] identifies the most important aspects to consider that a business school needs in the course of its transformation tailored specifically to business trainings. First, the points of organizational transformation of the given university must be identified, the changes taking place in business life need to be taken into consideration, and the changed attitude of students must also be incorporated into the system. The financial limits as well as the elements of the previously applied IT infrastructure must be considered.

Zhu and Liu's paper published in 2020 [19] does not only share the measures imposed by an individual country (China) and their experiences so far, but also formulates recommendations for the university sphere and governments for the future, which should be taken into consideration during the potential future waves of the epidemic or simply in the course of the further digitization of education.

Therefore, based on previous studies we can state that we must consider a complex set of criteria when examining the conceptual structure of good online education solutions and systems [55] [56].



### **3 Research Questions and Methodology**

#### **3.1 Goal of the Research and Research Questions**

In this study we aim to examine how teachers overcame new challenges and what impacts online education had on the learning effectiveness of students compared to face-to-face teaching. In the framework of our research, we examine two subjects: one of the subjects (Macroeconomics) (751 students) encompassing weekly lectures and seminars, while the other subject (International Economics) with only 68 students included one lecture a week.

We aimed to achieve our research goal by answering the following research questions:

- What differences could be observed between the two subjects in the course of transitioning to online education?
- To what extent was the acquisition of the material and student performance influenced by the methodological change taking place during the spring semester of 2020?
- How did the teachers perceive the transition to online education and what experiences did they gain?
- How did the students perceive the transition to online education and what experiences did they gain?

#### **3.2 Methodology**

The aim of our study was to share with the reader how the education process of our institution was affected by the change of distance education system, caused by the pandemic. Our research includes a systematic description and academic reflection in a community process. In this regard, it is the presentation of a case study. The literature on case study methods is quite complex. According to the type of time dimension, as Starman [30] points to these types of classification our study is mostly a retrospective case study.

The ideal research subjects for the case study are new, emerging phenomena, in our case the transition to online education. Through this method, we wanted to examine the online educational process so that we could see from the outside the process we were involved in.

Case study analysis is a frequently used qualitative methodology tool in researches carried out in the field of education [33], yet it does not have a legitimate status due to the lack of well-defined and structured protocols [34]. From the 1970s, the case study was used in the field of education primarily to evaluate training plans

and materials. The aim was to be able to assess the user experience, opinion and socio-political impact of the trainings on the success of the output side [35].

The researchers who opted for case studies as their research methodology exceed the findings that can be concluded from quantitative research, as they get to see the events from the angle of participants, while the simultaneous examination of quantitative and qualitative data could help both the explanation of the process and the reconstruction of the events examined via complete monitoring and analysis [36].

If we only relied on quantitative methods when evaluating the effectiveness of educational programs and initiatives, some very important data would remain unexplored, and thus the survey would not be complete [36].

In a certain sense we could say that writing a case study is not simply a method, but also an approach at the same time. The essence of this is that in spite of all the apparent differences and distinctions, human behavior does have certain features that can be generalized. Thus, monitoring a given unit also offers a great insight to the specificities of a certain type of behavior or organizational operation [37].

In terms of research design, we have built up the methodological part of our work in a similar way as a study from 2020 on the subject of education (Jesionkowska et al [36]). We planned the steps for primary data collection; collected the data by the help of specific tools, described in the next section; analyzed the received data from the tools and from university databases; and finally, we presented the results of our work. We did not have a more sophisticated goal with the study, for example, we did not attempt to formulate a new theory by the help of our work. In this sense, our study does not strictly meet all the theoretical criteria, formulated in Andrade's [37] study.

Researchers primarily use exploratory and explanatory case studies [32, 33, 38, 39]. Our aim was also to describe the characteristics of the area under study (transition to online education) in a situation where there was no way to prepare students or teachers in advance.

### **3.2.1 Participants**

Four teachers and more than 300 students participated in the questionnaire. Table 1 shows the characteristics of the teachers involved in the study. All teachers have a degree in economics.

In our study, we compared the experiences and results of two full-time subjects in the field of theoretical economics: Macroeconomics and International Economics. A common feature of the two subjects is that both are disciplines of theoretical economics.

Table 1  
The characteristics of the teachers involved to the analysis

<b>Name</b>	<b>Sex</b>	<b>Age</b>	<b>Post</b>	<b>Educational experience expressed in years</b>
Éva	Woman	62	professor	30
Farkas	Man	56	associate professor	34
Tibor	Man	33	associate professor	10
Róbert	Man	32	assistant professor	3

Source: Author's source

However, an important difference between the two is that while Macroeconomics is taught to hundreds of students on a mandatory basis, with a lecture of 2 contact hours and a seminar of 2 contact hours each week, International Economics only has one lecture of 2 contact hours per week, and a maximum of 100 students are enrolled in this class, as an optional subject.

A total of 751 students attended the Macroeconomics course in the spring semester of 2020. The number of students involved in the questionnaire was 334 of which, 76% were female and 24% were male. In terms of age groups, the respondents aged 19 and 20 comprise 58.1%, those 20 to 22 years 35.3%, those 23 to 24 years 5.4%, while the rest of the students are 25 years old or older. More than 90% lives in the capital (45.5%) or in other cities (45.5%), the rest lives in smaller settlements.

68 students attended the International Economics course in the spring semester of 2020. 10 students participated in the study: 8 students are females and 2 are males. In this group distribution in terms of age: 22.2% is 19-20 years old, 66.7% is 21-22 years old, 11.1% is 23-24 years old, and no students are older than 25. The majority of respondents live in the capital (44.4%) or in other cities (33.3%), and 22.2% lives in villages.

91.3% of Macroeconomics students and 90% of International Economics students had unrestricted access to internet prior to online education. The internet did not work perfectly in many cases, only 47% reported no problems, the rest of the respondents experienced issues on a monthly, weekly or daily basis (Figure 1).

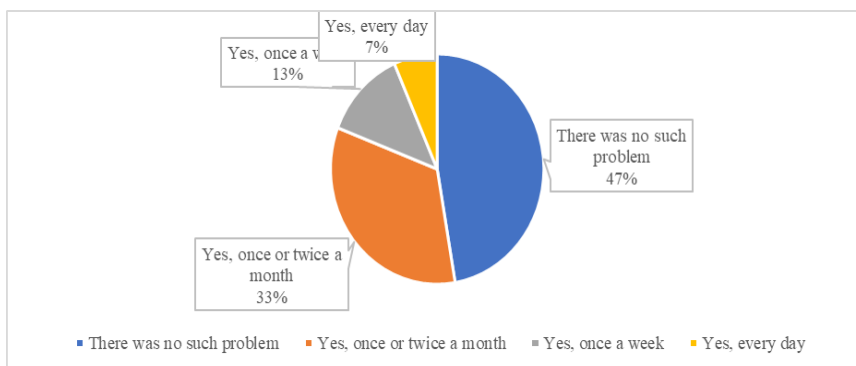


Figure 1

How often did students of Macroeconomics experience internet connection problems?

Source: own editing

### 3.2.2 Data Collection

We obtained important information at the online classes held each week. The meetings were held each week from mid-March until the end of May, over two and a half months, during which we logged the teachers' method of preparation for the classes each week. The log contained the following key information: the exact date of the lesson, the name of the teacher holding the given lesson, the place of the lesson (title of the online interface), the date of the consultation related to the lesson, the outline of the presented topic, listing the supporting materials in connection to the topic, determining the student's contact information, describing the information provided to the students, determining the author and subject of the control test.

We made semi-structured interviews with the concerned teachers, which we examined with the method of content analysis once recorded. To compare the responses of the teachers, first we constructed the main questions. Questions for teachers covered the following areas: comparison of the experiences of the online and offline education, the method of the preparation of online course materials, conclusion of the changes in the education methods, the processes of the control and assessment systems in the online period of the education, the most important best practices. We also sent an anonymous questionnaire with the total of 21 questions to the teachers. The questionnaire could be completed by the teachers over a given period which was between the 27th of August and 5th of September 2020.

We applied questionnaires in the case of students so that we could document and understand their experiences regarding distance learning. The structure of the questionnaire had several distinct parts. After the personal data we focused on the

technical conditions of the students in the online education framework. In the next part we explored the main experiences of our students in the online period. To make it easier to assess the changes, we asked a number of comparative questions between previous normal and online education. Finally, students were able to make suggestions for improving online education. A total of 22 questions had to be answered by the respondents. We sent the same anonymous questionnaire to the students of the two subjects separately, we worked with these two questionnaires in our study, concerning students. The questionnaires could be completed by the students over a specified time period between the 5th of August and 22nd of August 2020. A Google questionnaire link was sent to students through the Neptun and Coospace systems.

### **3.2.3 Data Analysis**

As we have collected data in various manners in our study, we opted for various analysis methods for processing them, as well.

Logging the meetings qualifies as a descriptive research method. This allowed us to collect and cumulate personal experiences and to understand the subject of the research, the underlying causal links, mechanisms and metacommunication aspects.

We processed the answers received in response to the structured questions in the course of the interviews as well as the casual conversations with content analysis.

We analyzed the data of the questionnaire with the help of Microsoft Excel spreadsheets. Except for demographics, the availability of technical devices to students and three open questions, we assessed the students' attitude and experience gained in the course of online education with Likert scale questions. We opted for an odd scale (1-5) in order to allow students to give neutral responses. This is more suitable for measuring attitude than odd scales [42] [43]. When examining data, we primarily assessed frequency and composition.

We exported the students' grades into Excel sheets, then calculated their means and standard deviation, as well as additional descriptive statistical indicators.

## **4 Results**

In this chapter of our study, we present the results and main implications of our research in specific subchapters. These subchapters are arranged according to the topic concerned by the subchapter and not according to the research questions.

#### **4.1 Main Changes in the Assessment Process of the Two Subjects in Question during the Distance Learning Period**

In terms of the formation of students' grades, differences are shown between the two subjects also during the offline, regular education period. Macroeconomics is a subject with a practical course mark, which means that the grade of the student reflects their performance during the given term. The two classroom tests give 70% of the final grade, while the student groupwork (essay and presentation in the case of traditional in-class education, only essay in the case of distance education) gives 30%. In contrast, International Economics is a lecture course, which means that the 100% of total points can be obtained at the written exam held during the exam period. In this sense, we can conclude that the effectiveness of the International Economics subject was completely influenced by the online education framework also in terms of conveying the course material to students (after the mandatory online education was announced), and students also had to obtain the credits necessary for their grade within a completely new framework. A new framework also prevailed in the case of Macroeconomics in terms of conveying the course material, and also in terms of the tests, however, there was no change whatsoever in the case of groupwork giving 30% of their final grade compared to previous periods. In our opinion, students had better chances at online tests, as before the announcement of mandatory online education and the severe spreading of the virus, they had to complete the test in a computer room, in the case of online education they had to pass the subject by completing the test at home, offering more ideal circumstances, and the use of aids also became possible in this case.

#### **4.2 Changes of Student Grades in the Case of Macroeconomics**

We examined the change of student performance by comparing the grades of the spring semester of the school year 2018/2019 with those of the spring semester of the school year 2019/2020 in the case of both subjects. It is true for both subjects that they are only held in the spring semesters, thus we had to go back an entire calendar year for correct comparison. We considered it sufficient to compare grades with those of the previous year, because we did not experience any significant differences in the course of the regular annual comparisons.

When comparing the final results, we examined the mean, standard deviation and mode of the grades achieved, as well as the ratio of students in the case of Macroeconomics that did not obtain a signature in the two periods. In Hungarian higher education, 1 is the worst grade: it means that the student does not pass the subject, while 5 is the highest possible grade. Thus, the range of the possible grades is 4, this did not change during the two periods. In the case of Macroeconomics, getting a signature also has a separate precondition, and those students who did not meet this precondition for any reason receive an entry stating

“signature denied” as an evaluation, and thus do not qualify for a grade at the end of the semester and do not pass the subject.

Table 2  
Descriptive statistics of Macroeconomics in the two periods analyzed

<b>Descriptive statistics of Macro economics in the two periods analysed</b>			
School year 2018/2019		School year 2019/2020	
Students with signature	618	Students with signature	698
Students without signature	10.17%	Students without signature	7.06%
Mean of the grades (618 students)	3.41	Mean of the grades (698 students)	3.56
Mode	3	Mode	4
Standard deviation	1.16	Standard deviation	1.1
Variance	1.33	Variance	1.21
Kurtosis	-0.92	Kurtosis	-0.94
Skewness	-0.16	Skewness	-0.25

Source: own editing

Table 2 contains the relevant descriptive statistical data pertaining to the Macroeconomics subject. The number of students in the two periods was not identical, more students attended the class in 2020. In terms of effectiveness, the performance of students was better in the latter school year, when they studied in an online education framework. This improved performance also manifests in the fact that the ratio of students failing to obtain a signature decreased from 10.17% to 7.06%. In addition, the arithmetical mean of students obtaining a grade increased from 3.41 to 3.56, resulting in a 0.15 rise. The mode of the grades was 3 in spring 2019 and rose to 4 by spring 2020. Standard deviation decreased from 1.16 to 1.1, the decrease also manifested in variance naturally, calculated as the square of the former value. The kurtosis of the basic sample of the two years takes almost the same value, and it is true for both years that the distribution of grades is flatter compared to normal distribution based on the negative indicator. There is a more significant difference in terms of skewness: in both years there are more outliers in the negative side of distribution, this changed from -0.16 to -0.25 by 2020. In our opinion, the students' grades improved in the period of distance education owing to the effectiveness of the well-thought-out educational framework and as a result of completing tests at home.

### 4.3 Changes of the Grades of Students in International Economics

Table 3 contains the relevant descriptive statistical data pertaining to the International Economics subject. The number of students in the two separate periods was not identical in this case either because more students attended this

class in 2020. In terms of effectiveness, the performance of students improved in the latter school year, when they studied in a distance education framework. Signature does not have special preconditions in the case of this subject, as a result of which there is no difference in terms of students failing to obtain a signature, but there are differences in all other aspects. The arithmetical mean of grades increased from 3.85 to 4.15, resulting in a significant increase of 0.4. The mode took the highest possible value in both years. Standard deviation and variance decreased in the case of this subject, too, basically this value is lower in both years than in the case of Macroeconomics. Kurtosis allows us to conclude that the distribution of grades are flatter, compared to normal distribution based on the negative indicator, however, it deviates from normal distribution a lot less in the case of this subject, presumably due to the smaller number of students. The absolute value of skewness also increased in this case, from -0.62 to -1.07, which once again shows outliers on the negative side of distribution, most certainly stemming from the fact that the cumulative results are quite good, and thus the weaker performances qualify as outliers.

Table 3  
Descriptive statistics of International Economics in the two periods analyzed

<b>Descriptive statistics of International Economics in the two periods analysed</b>			
School year 2018/2019		School year 2019/2020	
Students with signature	48	Students with signature	66
Students without signature	0.00%	Students without signature	0.00%
Mean of the grades (48 students)	3.85	Mean of the grades (66 students)	4.15
Mode	5	Mode	5
Standard deviation	1.09	Standard deviation	1.04
Variance	1.19	Variance	1.08
Kurtosis	-0.46	Kurtosis	-0.31
Skewness	-0.62	Skewness	-1.07

Source: own editing

#### 4.4 The Most Important Implications regarding the Student' Questionnaire

The students' perception of online education could be an important criterion, due to its potential application in the future. 334 Macroeconomics students and 10 International Economics students shared their experiences in the course of our study.

The fear of Macroeconomics students from online education was distributed between all values almost evenly (between 'Strongly disagree' and 'Strongly agree'): 16% – 22% – 20% – 25% and 17%, while the majority of Macroeconomics students felt frustrated (70%). Thus, it is not surprising that the



latter were more pleasantly surprised: 60% of them felt this way completely, while 10% reported that they rather felt this way. In the case of the other subject, these values are 35% and 37% (Figure 2).

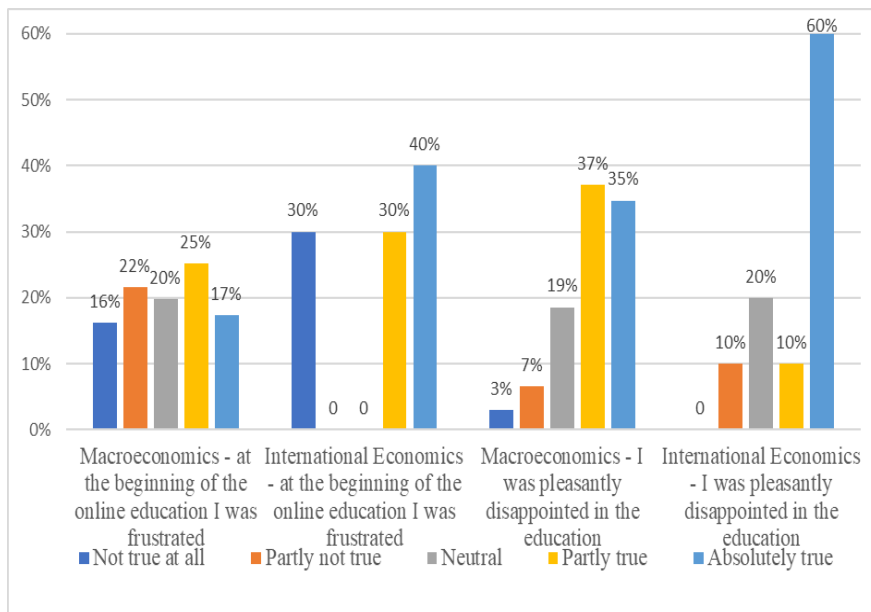


Figure 2  
The student's opinion on the online education – at the beginning and at the final

Source: own editing

Online education did not only put a lot of pressure on teachers, but on students too. The majority (approx. 60%) felt in the case of both subjects that they had to dedicate more time to studying in the course of online education compared to regular education. In the case of International Economics, none of the students thought that this was “Not true at all”, and only 26 Macroeconomics students gave this answer.

How the work of students was facilitated by the materials uploaded during online education compared to regular education is demonstrated by Figure 3. The students thought that the course materials provided by their teachers facilitated their learning and preparation significantly in the case of both subjects. 154 Macroeconomics students (46.1%) and 6 International Economics students (60%) thought that they received maximum support from their teachers. If we add the ‘Partly true’ responses, the ratio of satisfied students is quite high in terms of both subjects: 82.6% and 80%, respectively.

In the case of Macroeconomics, 2 students were completely dissatisfied and 12 students were partly dissatisfied with the materials the teachers uploaded for them.

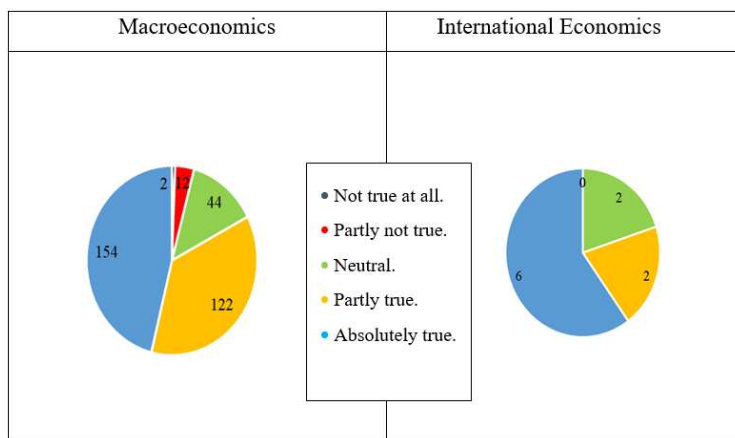


Figure 3

The course materials provided by the teachers greatly facilitated its acquisition (main)

Source: Author's research

The students evaluated the information provided by teachers about the accessibility of course materials and the consultation dates quite positively. Approx. 60% of students considered the information provided to be completely adequate in both courses. By adding the 'Partly true' answers, the rate rises to 80% (Figure 4).

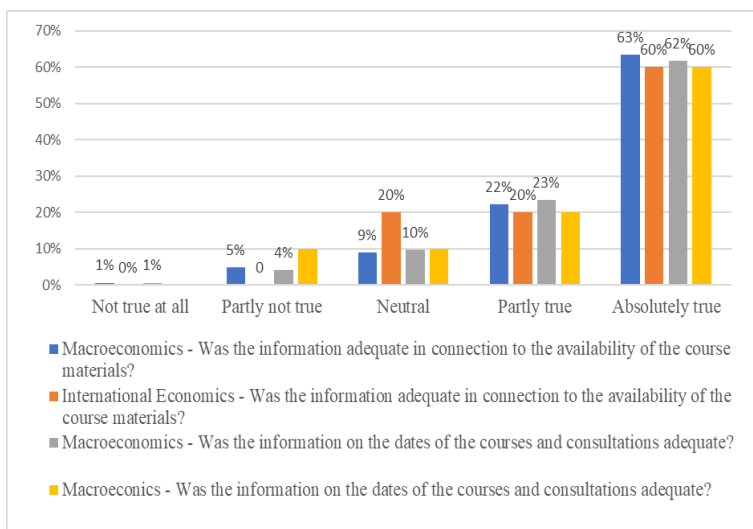


Figure 4

The information was adequate in connection to the accessibility of the course materials and the date of the consultations

Source: Author's research

## 4.5 The Most Important Implications regarding the Experiences of the Teachers

Macroeconomics was taught by 4 teachers, one of whom also holds the International Economics lectures; thus, the teachers' experiences of online education were not separated based on the two subjects.

The 4-member teacher group had worked together effectively already before the measures were imposed due to the epidemic. They provided maximum support to each other, asked for the opinion of the other in professional matters and they made and implemented all decisions together. This way, their cooperation also remained unbroken in the course of online education. All members were present at all weekly Teams meetings held at a fixed date. They planned the key points of the events of the upcoming week at these meetings, including for instance the preparation of teaching aids in addition to the core material, the course of preparing the classroom tests and appointing the persons to execute them. Students were informed about the upcoming week by every Friday. They were informed, among others, about where to find the learning aids (videos, PPT files of presentations, glossaries and practice exercises), the dates of the Teams seminars of teachers, as well as about consultation options and the regular short tests for extra credit.

The fact that the seamless teamwork of teachers not all 4 of them shared the same opinion about the changes taking place due to online education (Figure 5).

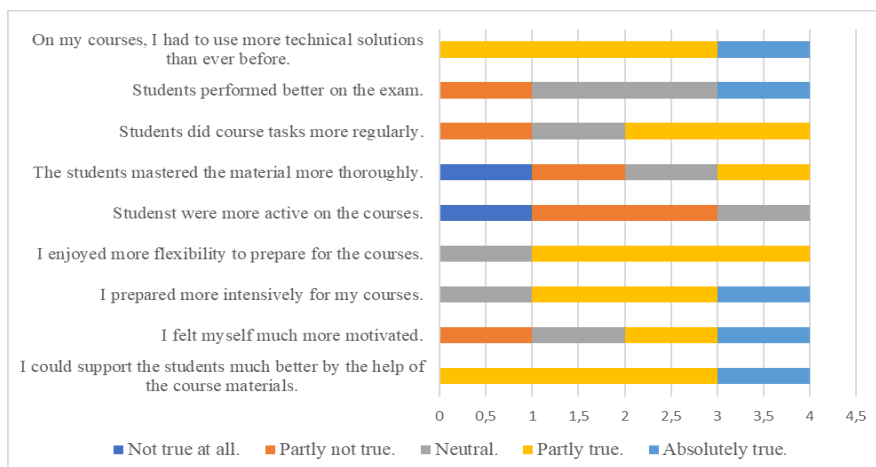


Figure 5

Comparison of the first, traditional in-class teaching to half of the school year in online education

Source: own editing

Their openness towards introducing several new technological solutions shows the flexibility of all 4 teachers, and they did all this to better facilitate students' learning with the course materials. However, their opinions regarding the performance of students varied to a great extent. Only one teacher thought that students achieved better results at tests in the framework of online education. Our findings regarding Research Question 2 support this opinion, as the students achieved a higher average in Macroeconomics and in particular in International Economics. Even though the teachers' levels of motivation were completely different, a more intense preparation can be observed in comparison with normal school semesters (Figure 5).

### **Conclusions, Summary**

In our study, we examined how the Covid-19 epidemic and the resulting social changes, influenced the education of theoretical economics, at the Faculty of Commerce, Hospitality and Tourism of Budapest Business School. Restrictive measures affecting the teachers and students of our institution, as well as the methods of teaching and examination were in place in the early phase of the epidemic. We collected and processed the grades, teaching and examination methods of two theoretical economics subjects (Macroeconomics and International Economics) as well as the experiences of the teachers teaching them, while also assessing student perceptions.

The most important conclusions of the study include the following. In the distance learning period, the revisions of the course materials and the routine use of online interfaces were the main challenges faced by the teachers. In the distance learning framework system, students also had to adopt a different approach towards learning and towards participation within the educational process. In the case of the subjects examined, the effectiveness of examinations significantly improved, which was influenced by the fact that students completed the tests at home, and they were able to learn by the help of newly developed online course materials. We should also stress in relation to students those certain aspects of digital inequality also influenced their approach to distance education and their performance, too. In spite of the relatively rapid and thorough transition process, in general, both students and teachers evaluated the experiences of the online education framework more positively than negatively. According to the teachers' experience, the most important task was the acquisition of coordinated online teamwork and smooth technical solutions. Students had to spend more time with learning in online education, rather than in a normal educational setting, but this was not experienced as a sacrifice. Approximately 60% of students considered the information provided to be completely adequate in both courses in the online education period, and only the lack of personal contacts and permanent internet problems served as negative experiences.

The main implications of our article are manifold. The Coronavirus changed the entire educational framework of our University, the performance of students

improved in both examined subjects; lesson preparation time for teachers increased, student learning time for exams also increased, consequently, online solutions used in distance learning period have changed the attitudes of the students and teachers, as well. In the absence of personal feedback, regular testing opportunities were positively received by students, however, digital inequalities and previously fewer common tasks, were more challenging for them. Although the work of the four teachers involved was more complex during the online education framework, they stated that they were happy to use some online solutions in subsequent classroom courses. This statement is also confirmed by the educational tools in the current school year.

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# **A Comparison of the Entrepreneurial Performance of Asian-Oceanian Countries via the Multi-Criteria Decision-Making Techniques of Critic, Aras, Waspas, Mairca and Borda Count Methods**

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*Abstract: The significance of entrepreneurial activities, in the development of a country, has been increasing at an exponential rate, since the former variable has been repeatedly proven to have a vital effect on economic growth. Within this context, countries periodically publish data related to entrepreneurial activities and undertake regulations that incentivize such pursuits, within their jurisdictions. In light of this, the Global Entrepreneurship Monitor, was constructed to measure and evaluate the countries' level of global entrepreneurship and the ability and hence, the success of entrepreneurial firms' in developing and producing outputs of high quality. In this sense, one can state that the capacity of the aspects that constitute the Global Entrepreneurship Monitor to complement each other plays a vital role in countries' improvement of their entrepreneurial performances. Taking all these into consideration, this study takes into account the Global Entrepreneurship Indicators; tries to identify via the Multi Criteria Decision Making Method their relative importance levels for 34 countries sampled from Asia-Oceania; ranks*

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*those countries' entrepreneurial performances vis-à-vis the aforementioned importance levels through Aras, Waspas and Mairca methods and integrate the scores calculated by these three methods into one embedded ranking via the Borda Count method. The results suggest that while Qatar, United Arab Emirates and Thailand rank as the top three countries, with high levels of global entrepreneurship performance; India, Pakistan, Japan and Malaysia are the last performers.*

*Keywords: entrepreneurial performance; global entrepreneurship monitor; critic; aras; waspas; mairca and borda count methods*

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## 1 Introduction

The main concern of any national and regional economy is to identify the driving forces of economic growth and development. While neoclassical growth theory emphasizes physical capital and labor investments as the backbones of growth, the endogenous growth theory embeds information into this equation. Compared with traditional factors of production like capital and labor, the spill-over effects of information on and to be used by third parties highlight the vitality of the aforementioned variable on economic growth and development. The literature, then, has seen myriad of studies that incorporate other factors, including entrepreneurship, into the neoclassical model [1]. Entrepreneurship has generally been assumed to be a main determinant of economic growth, since it accelerates innovation and facilitates competition among existing companies [2]. It is considered as a crucial tool for economic growth and sustainability [3] and it continues to be one of the most popular concepts in development economics. Schumpeter (1912) expresses entrepreneurship as the start of innovative activities and the release of new products. Kirzner (1973) proposes that the said concept comprises of competitive attitudes that prompts market processes and is a contest of ideas [4]. Zvavahera et al. (2018) acknowledge entrepreneurship as the manufacturer of innovative and improved processes and business ideas [5]. Entrepreneurship is generally regarded as the practice of the designation, initiation and execution of a new business and/or process, mostly undertaken by small enterprises. People who establish those are known as “entrepreneurs” [3]. Fundamentally, entrepreneurship expresses an individual’s ability to transform ideas into action. Within this context, the notion also includes creativity, innovation, risk-taking as well as planning and managing of projects in the pursuit of objectives. The concept of entrepreneurship is regarded as a means to “enlarging the economic pie” and generating more income for more people via creating more jobs through facilitating economic activity; instead of simply transferring wealth from one group to another. Within this perspective, entrepreneurs can effectively contribute to the wealth of a society through the institutions prevalent in the country [6]. Entrepreneurship and entrepreneurs,

because of their contribution to creation of new jobs and employment opportunities, emergence of innovations and facilitation of competition and competitiveness, are considered to be the crucial driving forces behind economic growth [1, 7, 8]. The effect of entrepreneurship on the growth of an economy depends on the level of development the economy in question has. Previous research show that the impact differs among developed and developing countries [9]. The three most distinct channels that transform entrepreneurship into economic growth can be put forward as the creation of innovation, the propagation of innovation and competition. Entrepreneurs render significant innovations via entering into markets with new products and production processes [10] [611]. Entrepreneurial activities can influence a country's economic performance in a multitude of ways: (i) entrepreneurs enter into markets with new products, technologies or processes. (ii) they facilitate productivity and competition; and (iii) they accelerate structural transformation [9, 12-15]. Entrepreneurship supports economic performance by introducing innovation, enabling change and facilitating competition [4]. Stel et al. (2005) proposes several predicaments in which entrepreneurship impacts economic growth. Entrepreneurs can render significant innovations by entering into markets with new products or production processes. They can facilitate competition and increase efficiency [11] and also play a significant role in developing information on the applicability of new innovations [9]. In addition, entrepreneurship is defined as an important driving force of employment in both developed and developing countries [16].

Entrepreneurship is essential for a countries' economic development and the formulation of economic policies. Global Entrepreneurship Monitor (GEM) is academic research, initiated by Babson College (US) and London Business School (UK) in 1999 to assess the importance of entrepreneurship on economic growth. The objective of this project is to identify the reasons behind differing levels of entrepreneurial activities among countries. Encapsulating an ever-encompassing information on the subject for more than 20 years, GEM publishes a myriad of global, national and special-themed reports on an annual basis. Within this schedule, the Monitor publishes the country-based entrepreneurship-related data annually and prepares plans and policies for incentivizing entrepreneurship. The Monitor's first research was conducted with a sample of 10 countries and the results were published in 1999 where more than 100 countries have participated in the project ever since. Global Entrepreneurship Monitor evaluates countries vis-à-vis certain criteria related to entrepreneurship and provides both country-themed and global-scaled reports. The centrally-managed project has been regarded as one of the leading entrepreneurship initiatives in the world, as it tries to collect and provide information from a global scale and prepare comprehensive reports that help raise awareness regarding the concept [17].

The objective of this study is to measure the performance levels of 34 countries in Asia and Oceania with regard to the entrepreneurship indicators and exhibit the related importance of those indicators for the time span between 2016 and 2020.

The aim to capture the fastest growing economic area and the biggest continental economy with regard to the GDP based on PPP has played a significant role in the selection of the sample size. China, Japan and India are among the top 10 economies of the world and all focus on high-technology-augmented industries for manufacturing, trade, and eventually growth. This work utilizes 5 different multi-criteria decision-making methods, namely Critic, Aras, Waspas, Mairca and Borda Count.

## 2 Entrepreneurial Behavior and Attitudes

Entrepreneurship is the ability and the willingness of individuals to perceive new opportunities by rendering new products, production processes, organization methods, product and market combinations to the market, either by themselves or through collective effort [18]. In light of this, one can redefine the concept as the exploration, assessment and utilization process of opportunities to develop new products and services [19]. In other words, entrepreneurship is the transformation of innovative attitudes such as risk-taking, control-focus and autonomy into innovative and target-focused organizations [20].

Entrepreneurship, defined as the initiative to create a new business organization or the enhance an existing business, is seen as a crucial driving force of economic growth since it provides new business opportunities, introduces and promotes innovations, supports structural reforms, facilitates competition by rendering new products and services [21] [22]. Entrepreneurship can improve regional economies, facilitate technological development, increase value creation, create new jobs and accelerate innovation [23]. Therefore, the aforementioned notion is regarded as one of the best economic development strategies of recent times [24].

Entrepreneurial attitudes and behaviors play an important role in the development of entrepreneurship. Attitude, in the most general sense, expresses the beliefs, values and emotions that change over time and can be used to guess people's decisions and actions [25]. Entrepreneurial attitude and behavior are accepted as an increasing function of the values, beliefs and preferences of entrepreneurship [26-28]. An entrepreneurial attitude can turn into an entrepreneurial behavior, where an individual's entrepreneurial attitude is known to bear significance in estimating her entrepreneurial attitude. Entrepreneurial attitude is not simply a matter of personal perception but rather an individual stance vis-à-vis entrepreneurship [29]. Entrepreneurial behavior implies the emergence of environmental signals of business opportunities' resources through differing perceptions [30] [31].

Global Entrepreneurship Monitor (GEM) focuses on three main objectives: to measure the differences between economies with regard to their entrepreneurial

attitudes, activities and aspirations, to identify the factors that determine the characteristics and level of entrepreneurial activities and to facilitate entrepreneurship [32]. Entrepreneurial attitude and behavior indicators are: perceived opportunities, perceived capabilities, fear of failure, entrepreneurial intentions, total early-stage entrepreneurial activity, established business ownership, entrepreneurial employee activity, motivational index, female/male early-stage total entrepreneurial activity, female/male opportunity-driven early-stage total entrepreneurial activity, high job creation expectation, innovation, business services sector, high status to successful entrepreneurs and entrepreneurship as a good career choice [17].

### 3 Methodology

This study uses multi criteria decision making methods to measure the sampled countries' entrepreneurship levels and compare their entrepreneurial performances. First, the Critic Method was utilized to identify the importance levels of the variables used in this work, since the technique makes use of the correlation matrix that puts forward the interdependencies between the variables. Then Aras, Waspas and Mairca methods are utilized to compare entrepreneurial performances. These techniques are selected because all indicators used to measure the aforementioned dependent variable are positive and favorable. Nevertheless, since there is a possibility that different rankings might arise from these three methods, the outputs are aggregated by the Borda Count Method. In other words, Borda Count Method constructs one ranking by aggregating the outputs of the aforementioned three methods and hence eliminates potential contradictions in interpreting the findings.

### 4 Findings

For this study, first a data set was constructed by taking into account all the 15 indicators used in Global Entrepreneurship Monitor, which were accessed through GEM's website. The sample selected spans the last five years, between 2016 and 2020, and is comprised of countries in Asia and Oceania. The sample is presented in Table 1.

In the sample presented in Table 1, there are 15 variables and 34 countries, in which some variables and countries are omitted due to incomplete data. Moreover, the variables are abbreviated for practicality purposes.

Table 1  
Sample of the Research

Countries	Variables	Years
Armenia, Australia, Bangladesh, China, Georgia, Hong Kong, India, Indonesia,	Perceived Opportunities (PO),  Perceived Capabilities (PC),  Fear of Failure Rate (FFR),  Entrepreneurial Intentions (EI),	2016
Iran, Israel, Japan, Jordan, Kazakhstan, Kuwait, Lebanon, Malaysia,	Total Early-Stage Entrepreneurial Activity (TEA),  Established Business Ownership (EBO),  Entrepreneurial Employee Activity (EEA),  Motivational Index (MI),	2017
New Zealand, Oman, Pakistan, Palestine, Philippines, Qatar, Saudi Arabia, Singapore,	Female / Male TEA (F/M TEA),  Female / Male Opportunity-Driven TEA (F/M OD TEA),  High Job Creation Expectation (HJCE),  Innovation (I),	2018
South Korea, Syria, Taiwan, Thailand, Tonga, Turkey, United Arab Emirates,	Business Services Sector (BSS),  High Status to Successful Entrepreneurs (HSSE)	2019
Vanuatu, Vietnam, Yemen	Entrepreneurship as a Good Career Choice (EGCC)	2020

Following the construction of the sample, the importance of each variable for the countries in question is assessed via computing the relative weights of the indicators via the Critic Method.

Table 2  
Critic Scores (%)

Variables / Years	2020	2019	2018	2017	2016
PO	7,53118761	6,01291145	5,533251996	5,424265998	5,980638631
PC	7,314432	5,656946	5,977068	6,530255	6,967537
FFR	9,300036	7,815284	7,478274	6,08321	7,247113
EI	8,85482	6,391891	5,006642	5,887213	6,622753
TEA	7,559723	6,853502	6,04077	7,553192	6,441641
EBO	11,19918	12,19903	8,360966	7,567202	7,284261
EEA	9,711992	10,74535	6,748851	7,989906	6,62497
MI	-	-	6,146587	6,427382	7,002205
F/M TEA	7,116784	6,027517	7,281673	5,974508	6,008783
F/M OD TEA	-	-	6,223252	5,571323	7,304324
HJCE	7,976597	9,1473	6,942892	8,154061	7,896626
I	-	-	8,32859	6,89476	5,683329
BSS	9,077192	13,32755	8,629325342	8,679571415	6,010831181
HSSE	7,529871	8,486021	5,421379	5,578993	6,34965
EGCC	6,828189	7,336688	5,880479	5,684156	6,575338

Critic scores presented in Table 2 suggest that the most important global entrepreneurship indicator in 2020 is EBO with an 11.19% score whereas the one with the least importance is EGCC with a score 6.82%. Moreover, the indicators MI, F/M OD TEA and I couldn't be analyzed for 2020 due to missing scores. In 2019, the most important global entrepreneurship indicator is BSS with a score of 13.32%, while the least important variable is EGCC (5.65%). Similar to 2020, the indicators MI, F/M OD TEA and I is not evaluated due to missing data. The most important global entrepreneurship indicator in 2018 is BSS with a score of 8.62% and the least important indicator is EI with a score of 5%. The most important global entrepreneurship indicator in 2017 is BSS with a score of 8.67% and the least important indicator is PO with a score of 5.42%. In 2016, the most important global entrepreneurship indicator is HJCE with a score of 7.89%, while the least important variable is I 5.68%. Following the computation of the degrees of importance of variables, the Asian and Oceanian countries are ranked vis-a-vis their entrepreneurial performances between 2016 and 2020 by using these weights. The scores gathered from the first technique used, the ARAS method, is presented in Table 3.

ARAS scores presented in Table 3 are collected from the computations conducted for a different sub-sample of countries for each year, due to changing number of countries and incomplete data. The scores calculated demonstrate that in 2020, the country with the highest global entrepreneurship performance is Qatar with a score of 0.71 while India ranks last with a score of 0.44. In 2019, United Arab Emirates leads the sample with a score of 0.79 whereas Pakistan is the country with the lowest global entrepreneurship performance by scoring at 0.37.



Table 3  
ARAS Scores

Countries/Years	2020	2019	2018	2017	2016
Qatar	0.715482	0.69551	0.646627	0.520343	0.677893
Kuwait	0.64224	-	-	-	-
South Korea	0.600801	0.620353	0.511775	0.457897	0.535776
Saudi Arabia	0.593311	0.52245	0.567675	0.431323	0.468877
Israel	0.580411	0.638355	0.619696	0.570068	0.607749
United Arab Emirates	0.57821	0.798384	0.622011	0.566516	0.499487
Kazakhstan	0.570137	-	-	0.489302	0.437346
Oman	0.551423	0.478172	-	-	-
Indonesia	0.499784	-	0.495406	0.398918	0.500431
Iran	0.487738	0.629828	0.555897	0.49785	0.534119
Taiwan	0.482242	0.532883	0.586622	0.579185	0.519784
India	0.44711	0.536862	0.462399	0.308841	0.379814
Australia	-	0.671234	-	0.613077	0.63352
Armenia	-	0.525943	-	-	-
China	-	0.499117	0.465575	0.407984	0.469039
Jordan	-	0.430283	-	-	0.37184
Japan	-	0.398885	0.481784	0.418736	-
Pakistan	-	0.37616	-	-	-
Thailand	-	-	0.657036	0.645283	0.565083
Turkey	-	-	0.584269	-	0.574154
Lebanon	-	-	0.50755	0.501365	0.519974
Vietnam	-	-	-	0.526269	-
Malaysia	-	-	-	0.508837	0.331521
Georgia	-	-	-	-	0.383309
Hong Kong	-	-	-	-	0.530212

Thailand performs best among sampled countries in 2018 with a score of 0.65 while India ranks last with a score of 0.462. In 2017, the country with the highest global entrepreneurship performance is Thailand with a score of 0.64, while India ranks last with a score of 0.30. Qatar performs best among sampled countries in 2016 with a score of 0.67, whereas Malaysia is the country with the lowest global entrepreneurship performance by scoring at 0.33. Subsequently, the sampled countries are ranked with regard to their entrepreneurial performances in the aforementioned time period with another multi-criteria technique, the WASPAS method, in which the results are shown in Table 4.

WASPAS scores presented in Table 4 indicate that in 2020, the country with the highest global entrepreneurship performance is United Arab Emirates with a score of 6.52; while Kuwait ranks last with a score of 5.16.

Table 4  
WASPAS Scores

Countries / Years	2020	2019	2018	2017	2016
Qatar	6.193575	6.170087	7.610641	7.426673	7.639426
Kuwait	5.165099	-	-	-	-
South Korea	6.013094	5.924123	7.525287	7.336616	7.395753
Saudi Arabia	6.032202	6.082647	7.429816	7.357581	7.438194
Israel	5.95549	6.087498	7.58043	7.486333	7.565084
United Arab Emirates	6.527455	6.261311	7.553908	7.522013	7.416529
Kazakhstan	6.006681	-	-	7.399518	7.316064
Oman	5.961888	5.865526	-	-	-
Indonesia	5.855929	-	7.369333	7.250776	7.381468
Iran	5.827254	6.10004	7.454354	7.421134	7.478874
Taiwan	5.883094	5.962999	7.5369	7.502736	7.449688
India	5.769251	5.874902	7.314769	7.009774	7.235655
Australia	-	6.094698	-	7.554836	7.585186
Armenia	-	5.946929	-	-	-
China	-	5.888363	7.353405	7.289922	7.396864
Jordan	-	5.809233	-	-	7.21651
Japan	-	5.706132	7.2869	7.198725	-
Pakistan	-	5.676097	-	-	-
Thailand	-	-	7.621093	7.617866	7.475726
Turkey	-	-	7.53609		7.53774
Lebanon	-	-	6.438667	6.388348	6.462769
Vietnam	-	-	-	7.410858	-
Malaysia	-	-	-	7.401197	7.082015
Georgia	-	-	-	-	7.231379
Hong Kong	-	-	-	-	7.47329

In 2019, United Arab Emirates leads the sample with a score of 6.26, whereas Lebanon is the country with the lowest global entrepreneurship performance by scoring at 5.67. Thailand performs best among sampled countries in 2018 with a score of 7.62, while Lebanon ranks last with a score of 6.43. In 2017, the country with the highest global entrepreneurship performance is Thailand with a score of 7.61; while Lebanon ranks last with a score of 6.38. Qatar performs best among sampled countries in 2016 with a score of 7.63; whereas Lebanon has the lowest global entrepreneurship performance by scoring at 6.46. Then, the entrepreneurial performances of the countries are re-ranked via the MAIRCA technique. Unlike the previous methods, here, the scores computed are ranked in ascending order and the alternative with the lowest score is considered as the best option.

Table 5  
MAIRCA Scores

Countries/Years	2020	2019	2018	2017	2016
Qatar	0.027612	0.02148	0.027999	0.02811	0.018588
Kuwait	0.035472	-	-	-	-
South Korea	0.041971	0.034442	0.034989	0.035079	0.03198
Saudi Arabia	0.032857	0.027686	0.040973	0.031915	0.024308
Israel	0.045276	0.028247	0.028973	0.026586	0.022108
United Arab Emirates	-1.55832	0.018722	0.031147	0.024813	0.027714
Kazakhstan	0.03823	-	-	0.0302	0.032179
Oman	0.037494	0.037015	-	-	-
Indonesia	0.044626	-	0.040493	0.03699	0.027218
Iran	0.050908	0.026932	0.038981	0.030639	0.025836
Taiwan	0.050944	0.037357	0.034796	0.028387	0.02901
India	0.049066	0.02873	0.041953	0.04273	0.03564
Australia	-	0.028895	-	0.025733	0.02406
Armenia	-	0.033639	-	-	-
China	-	0.032527	0.042682	0.034714	0.030668
Jordan	-	0.039752	-	-	0.036697
Japan	-	0.048656	0.046595	0.03849	-
Pakistan	-	0.043509	-	-	-
Thailand	-	-	0.025516	0.021171	0.025948
Turkey	-	-	0.036387	-	0.025431
Lebanon	-	-	0.040801	0.032702	0.029346
Vietnam	-	-	-	0.028459	-
Malaysia	-	-	-	0.028462	0.037889
Georgia	-	-	-	-	0.03715
Hong Kong	-	-	-	-	0.028034

MAIRCA Scores presented in Table 5 suggest that in 2020, the country with the highest global entrepreneurship performance is United Arab Emirates with a score of -1.55; while Taiwan ranks last with a score of 0.05094. In 2019, United Arab Emirates leads the sample with a score of 0.018 whereas Japan is the country with the lowest global entrepreneurship performance by scoring at 0.048. Thailand performs best among the sampled countries in 2018 with a score of 0.025; while Japan ranks last with a score of 0.046. In 2017, the country with the highest global entrepreneurship performance is Thailand with a score of 0.021, while India ranks last with a score of 0.042. Qatar performs best among the sampled countries in 2016 with a score of 0.018; whereas Malaysia has the lowest global entrepreneurship performance by scoring at 0.0378. After the grading and ranking of the respective entrepreneurial performances via different multi-criteria decision-making techniques, the Borda Count method is utilized to eliminate the

differences in the findings of those methods. This technique aggregates the outputs of multiple methods to formulate a single ranking, and hence provides a more suitable approach for assessment. Moreover, possible contradicting results and varying outputs are eliminated and a single performance ranking is acquired. The scores computed via the Borda Count method between the years 2016 and 2020 are presented in Table 6.

Table 6  
Borda Count Method Results

<b>2020</b>		
<b>Country</b>	<b>Borda Score</b>	<b>Borda Ranking</b>
Qatar	31	1
United Arab Emirates	28	2
Saudi Arabia	27	3
South Korea	25	4
Kazakhstan	18	5
Kuwait	18	6
Oman	17	7
Israel	15	8
Indonesia	10	9
Iran	5	10
Taiwan	5	11
India	3	12
<b>2019</b>		
<b>Country</b>	<b>Borda Score</b>	<b>Borda Ranking</b>
United Arab Emirates	42	1
Qatar	39	2
Iran	34	3
Australia	31	4
Israel	31	4
Saudi Arabia	29	5
India	21	6
Armenia	19	7
Taiwan	18	8
China	16	9
South Korea	16	9
Oman	10	10
Jordan	6	11
Japan	2	12
Pakistan	1	13
<b>2018</b>		
<b>Country</b>	<b>Borda Score</b>	<b>Borda Ranking</b>

Thailand	39	1
Qatar	36	2
Israel	32	3
United Arab Emirates	31	4
Taiwan	27	5
Turkey	23	6
South Korea	22	7
Iran	18	8
Saudi Arabia	13	9
Indonesia	12	10
Lebanon	8	11
China	5	12
India	4	13
Japan	3	14
<b>2017</b>		
<b>Country</b>	<b>Borda Score</b>	<b>Borda Ranking</b>
Thailand	48	1
Australia	44	2
United Arab Emirates	41	3
Israel	38	4
Taiwan	38	4
Qatar	33	5
Vietnam	30	6
Malaysia	26	7
Iran	24	8
Kazakhstan	21	9
Saudi Arabia	17	10
Lebanon	13	11
South Korea	12	12
China	11	13
Indonesia	6	14
Japan	6	14
India	1	15
<b>2016</b>		
<b>Country</b>	<b>Borda Score</b>	<b>Borda Ranking</b>
Qatar	54	1
Australia	50	2
Israel	49	3
Turkey	44	4
Iran	39	5
Thailand	39	5

Saudi Arabia	38	6
Hong Kong	32	7
Taiwan	28	8
United Arab Emirates	26	9
Indonesia	25	10
China	20	11
Lebanon	17	13
South Korea	17	12
Kazakhstan	13	14
India	9	15
Georgia	7	16
Jordan	5	17
Malaysia	1	18

Borda Count method results presented in Table 6 demonstrate that in 2020, the country with the highest global entrepreneurship performance is Qatar with a score of 31, while India ranks last with a score of 3. In 2019, United Arab Emirates leads the sample with a score of 42; whereas Pakistan is the country with the lowest global entrepreneurship performance by scoring at 1. Thailand performs best among the sampled countries in 2018 with a score of 39; while Japan ranks last with a score of 3. In 2017, the country with the highest global entrepreneurship performance is Thailand with a score of 48; while India ranks last with a score of 1. Qatar performs best among the sampled countries in 2016 with a score of 54; whereas Malaysia has the lowest global entrepreneurship performance by scoring at 1. It should be noted that for each year, multiple countries may share the same Borda ranking, due to bearing the same Borda scores. In such cases, the country with the most frequent lowest score in all the studied years is ranked lower. Nevertheless, if no such observation exists for the countries with same scores, they may share the same rank for the year in question.

## Conclusions

Entrepreneurial activities are essential for economies, providing a significant contribution to economic growth, employment and the eradication of poverty. Entrepreneurial activities accelerate economic development by creating employment opportunities, enabling the integration of regional economies and trade activities, boosting efficiency through new technologies and facilitating competition and innovation. The purpose of this study was to measure the entrepreneurial performance of countries with regards to the indicators constituting the Global Entrepreneurship Monitor and identify the related degrees of importance of those indicators. In the pursuit of this objective, five multi-criteria decision-making techniques, namely Critic, ARAS, WASPAS, MAIRCA and Borda Count Methods are used. First, the importance levels of global entrepreneurship indicators are identified via the Critic method. Then, the entrepreneurial performances are compared through the ARAS, WASPAS and

MAIRCA techniques. To eliminate the possibility that the outcomes of these computations may provide contradicting results that might be difficult to interpret, the findings of the aforementioned calculations are, then, aggregated to become a single ranking via the Borda Count Method. The data set used in this study incorporates 15 indicators, 34 countries from Asia and Oceania, and 5 years spanning 2016 to 2020. Data was collected from the website of Global Entrepreneurship Monitor (GEM). The results of the Critic technique show that the degrees of importance of the indicators vary by year. While EBO, BSS and HJCE are the most important global entrepreneurship indicators in different years, EGCC, EI, PO and I are shown to be the indicators with the least significance. Based on the first method utilized to calculate the performance ranking; Qatar, United Arab Emirates and Thailand are discovered to be the best entrepreneurial performers, in different years among the sample; whereas India, Pakistan and Malaysia have the lowest scores. The WASPAS Technique bears similar results, as it also finds the three aforementioned countries to be the best performers. Nevertheless, the technique ranks Kuwait, Pakistan and Lebanon last with regards to entrepreneurial performance. Akin to the results of the previous two techniques, MANICA method finds Qatar, United Arab Emirates and Thailand to sustain the scores that suggest high entrepreneurial performance, but demonstrates that Taiwan, Japan and India and Malaysia are the worst performance in the time period studied. Borda Count Method, aggregating all three-decision making technique finds out that while Qatar, United Arab Emirates and Thailand rank best vis-à-vis their entrepreneurial performance; India, Pakistan, Japan and Malaysia rank last. Analogous to the trend in all geographical regions, there are disparities between the levels of development among Asia and Oceania countries, which resonate in the cross-country differences between the Global Entrepreneurship Monitor indicators. In conclusion, for Asian and Oceanian countries, attention should be paid to building collaborative economic, social and political initiatives that would streamline entrepreneurial activities on a global scale and providing necessary incentives to steer entrepreneurs to global markets. Specific policies aimed at initiatives oriented to better production technologies, usage of technology in the production process and research and development activities should be developed in order to improve the quality of the products developed by local entrepreneurs and consequently, to improve global entrepreneurship. Moreover, strategies that train entrepreneurs about the global entrepreneurship culture should be designed, leading to an increased effectiveness and success of entrepreneurs in the global markets. The results of this analysis are restricted to a specific time period and data set. Therefore, these limitations should be taken into account upon evaluation. It is believed that there is still ample ground for further results, if the study is conducted using different time periods, data sets and analytic methods.

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# Analysis of Financially Aware Consumer Segments from the Perspective of Conscious Consumer Behaviour

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*Abstract: Changes in production and consumption are necessary to address global environmental concerns. The consumer market is dynamic and constantly changing. The analysis of consumer patterns, preferences and attitudes, and the monitoring of changes in consumer decisions is of key importance for all professionals with a market-oriented approach. In this paper, I analyse the characteristics of the conscious consumer, including the financially aware consumer, from the perspective of consumer trends. In addition to being fully educated, consciousness also refers to a complex pattern of behaviour that includes both values and actions. After presenting the theoretical insights based on secondary data, I also provide a thorough analysis of the topic of financial awareness using data from quantitative primary research. As a result of, a self-administered survey with 3,515 evaluable responses, well-differentiated segments of the population in terms of financial awareness were characterised. The findings provide statistical evidence of a link between financial awareness and financial and economic knowledge. I believe that the results will be beneficial for educational institutions, which play a key role in imparting financial and economic knowledge, and for organisations involved in improving financial literacy and in identifying the primary target groups, as well as for opinion leaders. Additionally, the results also serve as a basis for further potential opportunities for raising and expanding financial awareness among consumers.*

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*Keywords: conscious consumer; financial awareness; cluster analysis*

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## 1 Introduction

Trends are processes that can be perceived in the present, but it can be assumed that they will continue and accelerate in the future. A trend is, therefore, an observed and documented direction of development [1], [2].

Trends are the result of social and economic processes that fundamentally determine development trends in most countries of the world. These phenomena

have radically changed everyday life and contributed to the development of trends in consumer behaviour: influencing both the preference system and the stages of the purchasing decision, significantly shaping the overall consumer attitude and value judgment at the same time [3].

Consumer trends are mediators of multiple values, which, in many cases, lead to the emergence of different behaviours. Consider, for example, the trend towards globalisation and its counterpart, localisation or ethnocentric behaviour. Similarly, a trend-counter-trend parallel can be observed in the phenomenon of urbanisation and 'back to nature'. There are many other examples of trend-counter-trend relationships, all of which have in common the coexistence of phenomena, habits and attitudes that generate an increasingly colourful range of consumer market mechanisms. Research into trends provides an excellent starting point for outlining future processes, understanding new phenomena in consumer behaviour and identifying new consumer groups [4].

One of these trends is LOHAS (Lifestyle Of Health and Sustainability), with environmental and health consciousness as its core value [5]. A segment of consumers and shoppers prioritise health and the environment, which is expanding in both importance and size. For them, the goal is to maintain health, and an almost entirely new sector has been built to serve this goal [6], [7].

The term 'health-conscious consumer', which is so popular today, is also associated with this consumer segment. It is this conscious form of behaviour, including financial awareness, that is the focus of this study.

## **1.1 Characteristics of Conscious Consumers**

Conscious consumption can be seen, at first glance, in the deliberate purchasing decisions of consumers, who are more likely to take some aspects into account. Consciousness implies both being informed, such as being aware of consumer rights, or – as is also increasingly the case today – being aware of the mechanisms of action of marketing tools that are essentially targeted at consumers [8]. It also entails not only being aware of one's own values and interests, but also acting on them: for example, recognising health and the environment as values and making them a factor in purchasing decisions: choosing healthy and environmentally friendly products and services [9], [10].

At the same time, a very important characteristic of an informed consumer is the willingness to consider and prioritise ethical, environmental, social and economic sustainability considerations in addition to self-interest [11], [12].

The conscious consumer is, therefore, not only self-conscious but also socially conscious, and is concerned not only with their own interests but also those of their immediate and wider environment, and takes them into account in their purchasing decisions. It is not driven by a narcissistic, individualistic, self-

interested value system, but by a concern for community, social and environmental values [13], [14].

A conscious consumer is further characterised by the fact that they build on trust and credibility in their decisions, and prefer and seek out credible manufacturers and brands. For them, credibility is a key factor in communication [15].

A conscious consumer is proactive, open to novelty and, if necessary, takes risks when shopping. In contrast, to consumers who focus on habits and buy tried and tested products and brands, the conscious consumer is not afraid to try something new because they are well informed and self-identified, so the risk of novelty does not hold them back or make them feel insecure.

## 1.2 The Consumer Dimension of Financial Awareness

The market for financial products and services is constantly expanding, innovating and developing. Consumers are confronted with a wide range of financial offers, whether they are investments, savings or credit schemes. It is becoming increasingly difficult to find information, compare the various alternatives and thus make an informed and conscious consumer choice [16]. It is no coincidence that the concept of financial literacy, because of its multifactorial nature, is increasingly being studied in a complex way in economic and social research [17], [18], [19].

Financial literacy is both the knowledge of and attitudes towards financial products and services, including the individual ability to plan and respond appropriately to life events that may affect their everyday financial decisions.

Financial literacy has been defined in a number of ways in the literature [20], [21], [22]. Some authors focus on knowledge and understanding [23]. Others see the relevance of the concept in the combination of awareness, knowledge, skills, attitudes and patterns of behaviour [24].

In the absence of a single definition, each author draws attention to a different aspect of the concept: proficiency in financial services, the ability to manage personal finances, the ability to make financial decisions, the confidence to plan, invest and save for the future, or the ability to communicate financial ideas in a conscious way [25], [26], [27].

Financial literacy is closely related to financial culture, as it implies a general awareness of the world, self-care, and attentive financial management. In addition to the above-mentioned self-interest, financial literacy is complemented by other elements of conscious consumer behaviour, such as environmentally and socially aware behaviour and values. In the case of financial products and services, this means giving preference to the services, organisations/institutions offering financial products and services which the consumer knows, support and represent community and co-ownership values. The well-known terms 'ethical bank',

'sustainable bank', 'community bank' refer to banking activities which ensure that their customers only support environmentally and/or socially responsible companies and projects with their money. In this way, by selecting a particular financial service or product, consumers can indirectly support organisations, institutions or programmes that are of value to them, even by foregoing the higher interest rate on their own investment.

A sound cognitive basis, i.e. sufficient information and knowledge about financial products, services and choices, is essential for financial awareness. This is why the primary research of this study is to validate the relationship between financial and economic literacy and financial awareness on the sample, thus underlining the importance and the crucial role of financial and economic literacy education. Using the models used in the literature for the study of financial literacy [20], we analysed them along the dimensions complemented by conscious consumer value orientation with my fellow researchers during the primary data collection.

## 2 Method

In this paper, I will present the results of our primary research with the help of my colleagues in the research team, in addition to a systematic review of relevant national and international literature. In the framework of primary data collection, we conducted quantitative research in the form of a pre-tested, standardised online questionnaire.

Subjects were recruited through an arbitrary sampling procedure, resulting in 3,515 evaluable questionnaires.

The research tool included open and closed questions. In the case of the open questions (3), the aim was to measure the subjects' spontaneous reactions without providing alternative answers by using free association or spontaneous brand recognition.

For the closed questions, nominal levels of measurement – single-choice and multiple-choice selective questions – were used, in addition to Likert scales and semantic differential scales to analyse attitudes and values. Scaling questions were asked using a scale from 1 to 4. One reason for this is the individual scale preference of Hungarian respondents: due to the school grading system, our Hungarian respondents are most stable in interpreting the scale up to 5 as opposed to scales 1-7, 1-9 or 1-10.

The even scale was chosen because we wanted to avoid the option of a middle value (3) for the odd (1-5) scale, which would have provided a kind of escape route, a neutral alternative. In attitude analyses, those who choose the middle value do not tip the scales in either direction, often resulting in an excessive

proportion of "indifferent" consumers, making it difficult to segment them in a statistically and professionally meaningful way. We therefore opted for an odd-numbered scale, which, by excluding the middle value, leads the respondent to take a more rigorous stance, thus contributing more to a successful segmentation [28].

The design of the research tool items was the result of the relevant secondary data analysis. The finalisation of each response alternative – the pre-testing of the research tool – was done in the light of pre-qualitative results. The topics of the quantitative research tool included the impact of digitalisation on financial decisions, analysis of the value of money and the way money is treated, analysis of financial awareness, financial culture, analysis of attitudes towards different investment alternatives (cognitive, affective and conative phases), socio-demographic data, analysis of individual value orientation.

In the present study, I will focus on the possible segmentation possibilities based on financial awareness and the characterisation of the segments along these descriptive variables.

The main socio-demographic characteristics of the sample show that 60% of the respondents were female and 40% male. In terms of age, the largest proportion of respondents were aged between 16 and 20 (31.1%), followed by young people aged between 21 and 25 (24.5%), i.e. more than half of the sample (55.5%) were under 25 years old, i.e. Generation Z. Unsurprisingly, given the age, 42% of respondents were single and 54% were married or in a partnership. 42% of the respondents live in the capital, 38% live in a city and only 20% live in a village. In terms of educational attainment, those with secondary education were absolutely overrepresented (70%).

My main objective in the quantitative research was to analyse financial awareness. I tested the following hypotheses:

(H1) Financial awareness is related to financial literacy.

On the basis of financial awareness, distinct consumer groups can be defined (H1/a).

There is a statistically verifiable correlation between these segments and financial and economic literacy (H1/b).

Descriptive statistics, bivariate and multivariate analyses were applied using SPSS 22.0 software to process the quantitative results and test the hypotheses put forward.

The first step in segmentation by financial awareness was to perform a factor analysis of the preference system, deciding on the final factor structure based on the KMO value, the total variance value and the professional explanatory power. For the segmentation, we implemented a K-means clustering procedure, which is a statistically appropriate method due to the sample size of more than 1,000 sample elements.

In the present study, in addition to the results of the factor and cluster analysis, Pearson's Chi-square significance values were used to establish statistical correlations when characterising the segments. In each case, the internal correlation test for each relationship was performed on the basis of the adjusted standardised residuals (AdjR), interpreted as follows: AdjR  $\geq 2$ : 95% confidence in the positive direction relative to the expected value; AdjR  $\geq 3$ : 99% confidence in the positive direction relative to the expected value. In the case of a negative sign, the deviation from the expected value is negative for the same value intervals [29].

### **3 Findings**

#### **3.1 A Comprehensive Analysis of the Elements of Financial Awareness**

Looking at the dimensions of financial literacy across the sample as a whole, we found for the first time that respondents tend to look for information before making financial decisions (Table 1). This is not surprising given the consumer trend that describes how customers today typically make their purchasing decisions not at the point of purchase, but before, mostly based on information available on the internet. And it is precisely because of the prosumer phenomenon that consumer opinions are increasingly prominent among this information available on the Internet, in place of or alongside brand communication and advertising. This enhances and amplifies the influential power of consumer opinions. This is one of the reasons why we believe it is important to find opinion leaders who can influence the opinions of others and shape behaviour and awareness of financial literacy. This was one of the main objectives of our segmentation procedure for the list of statements under study, which will be described later.

The other main feature of the sample in terms of financial awareness was price monitoring. This result is not surprising, as a number of studies analysing different product and service preferences regularly confirm that domestic consumers are quite price sensitive, so it is not surprising that they reportedly look at prices when making purchases.

The finding that our respondents did not spend the money they had but also sought to spend it is certainly welcome in the light of the recent severe economic crisis. The macroeconomic challenges and difficulties seem to have had an impact on consumers, leading to an appreciation of the importance of savings and financial stability in the individual preference system.



Table 1  
Analysis of financial awareness

<b>Dimensions of financial awareness</b>		
	Mean (where 1= not typical at all, 4= most typical)	Std. Deviation
<b>Whenever I make a financial decision, I always do research beforehand.</b>	<b>3.24</b>	0.842
When making financial decisions, my parents'/close friends' opinions are my primary reference.	2.70	0.929
For financial matters, I try to rely on external sources of information (consultants, economic news portals, etc.).	2.81	0.887
I always manage my finances with the same bank.	2.93	0.965
I trust advertising that promotes financial products.	1.86	0.914
I always monitor the development of my finances.	3.06	0.887
I would rather spend my money than save it.	2.06	0.925
The money I have now is always worth more than the money I will save in the future.	2.38	0.976
I am willing to risk a part of my money if it is an investment with a high return.	2.40	0.957
I would not tie up my money for the long-term because I do not trust banks.	2.40	0.942
<b>If I buy, I will check the prices.</b>	<b>3.31</b>	0.826
If I can, I save money by buying lower quality but cheaper things.	2.41	0.934
I prefer buying more expensive but more durable things.	2.89	0.867
<b>I try not to spend all my money, but also save some.</b>	<b>3.19</b>	0.876
My parents always save money.	3.00	0.926
As a family, we discuss our shopping decisions together.	2.82	0.957
I think it is right that in a family, the one who earns the money makes the spending decisions.	2.40	0.958
We always watch/look for special offers when we shop.	3.03	0.883
I save money by buying something when it is on sale.	2.61	0.918
I tend to buy several items on sale.	2.58	0.943
If I do not have the money for something but want to buy it, I borrow for it.	1.79	0.946
If I really want something, my parents will buy it for me.	1.94	0.985

I know exactly how much money I have and what I will spend it on.	2.95	0.865
I often spend my money inconsiderately.	2.09	0.944
I often buy things that I regret later.	2.03	0.916
I always think carefully about how I spend my money.	2.96	0.851
If I do not have enough money for something, I am willing to take a job to get money.	3.08	0.915
I like working for my money.	3.15	0.863
I do not care about my finances because I can get anything I want.	1.63	0.933
If I work for my money, I spend it more consciously.	3.15	0.880

*Source: author's own research 2022 N=3515*

To test our first hypothesis, we conducted a factor analysis on the list of statements for the first time. After several factor tests, we opted for the five-factor structure that was statistically and professionally the most stable. As a result, we were able to characterise the following factor groups (Table 2):

'Inconsiderately spending of money', which included factors such as spending money carelessly, buying rather than saving. This group also includes factors that suggest that money should not be managed, that it is not worth saving, that the current value of money is worth more than the expected return on investment. This is the group of factors that is dominated by the 'it does not matter how much or what we spend' attitude, because when we run out of money we will borrow it because we will 'get it all anyway'. These statements are an aggregate of hedonistic behaviour that prioritises short-term goals in relation to money.

In contrast, the 'conscious management' factor emphasises the planned, deliberate, expertly informed elements of money management. Here, long-term goals are preferred, with a preference for savings and the more secure future that money can bring.

The 'work and awareness' factor is an aggregate of dimensions that emphasise the utility of money created by working. What we work for is better valued, and if we want to achieve something with money, we have to work for it. The attitude of valuing money and spending it wisely is dominant in this set of factors.

The 'savings and special offers' factor brings together elements that emphasise saving money, even at the cost of sacrificing quality.

The factor 'loyalty and social background' brings together factors of family, shared decision making, and in the case of money-related issues, parental role modeling. The element of loyalty behaviour in bank selection dominates this factor.

Table 2  
Factors of financial awareness based on the respondents' opinion

Examined dimensions of financial awareness	Factors of financial awareness				
	Component				
	factor of inconsiderately spending money	factor of conscious management	factor of work and awareness	factor of saving and special offers	factor of loyalty and social background
I often spend my money inconsiderately.	<b>0.717</b>	-0.322	0.080	0.039	0.089
I do not care about my money because I get everything I want.	<b>0.716</b>	-0.002	-0.366	0.080	0.022
If I do not have money for something but I want to buy it, I borrow it.	<b>0.711</b>	-0.034	-0.276	0.122	0.050
I would rather spend my money than save it.	<b>0.693</b>	-0.192	0.007	0.014	-0.044
I often buy things that I regret later.	<b>0.680</b>	-0.206	0.014	0.121	0.102
I trust advertising that promotes financial products.	<b>0.652</b>	0.089	-0.289	0.148	0.103
If I really want something, my parents will buy it for me.	<b>0.594</b>	-0.056	-0.259	0.074	0.289
The money I have now is always worth more than the money I will save in the future.	<b>0.500</b>	0.105	0.119	0.017	-0.055
I am willing to risk some of my money if it is an	<b>0.492</b>	0.255	0.121	-0.102	-0.172

investment with a high income.					
I would not tie up my money for the long-term because I do not trust banks.	<b>0.449</b>	0.040	0.101	0.064	0.010
I think the right thing to do in a family is for the person who earns the money to decide on spending.	<b>0.441</b>	0.121	0.059	0.111	0.153
I always think carefully about how I spend my money.	-0.110	<b>0.669</b>	0.126	0.181	0.102
When I make a financial decision, I always do my research beforehand.	-0.171	<b>0.645</b>	0.189	0.116	0.174
I know exactly how much money I have and what I am going to spend it on.	0.007	<b>0.593</b>	0.231	0.116	0.056
I always keep track of my finances.	-0.031	<b>0.565</b>	0.300	0.073	0.054
I prefer to buy the more expensive but more durable things.	0.181	<b>0.525</b>	0.170	-0.336	0.079
For financial matters, I try to rely on external sources of information (consultants, economic news portals, etc.).	0.146	<b>0.516</b>	-0.035	0.077	0.127
I try not to spend all my money, but also save some of it.	-0.187	<b>0.504</b>	0.343	0.077	0.226

If I do not have enough money for something, I am willing to take a job to get money.	0.084	0.210	<b>0.682</b>	0.054	0.025
I like working for my money.	-0.021	0.259	<b>0.654</b>	0.012	0.147
When I shop, I check prices.	-0.207	0.278	<b>0.493</b>	0.321	0.287
If I work for my money, I spend it more consciously.	-0.043	0.355	<b>0.475</b>	0.103	0.209
I save money by buying something when it is on sale.	0.198	0.196	0.015	<b>0.740</b>	0.034
I tend to buy more than one item on sale.	0.200	0.175	-0.026	<b>0.669</b>	0.016
I always watch for special offers when I shop.	-0.067	0.221	0.294	<b>0.648</b>	0.224
If I can, I save by buying lower quality but cheaper things.	0.305	-0.152	0.086	<b>0.584</b>	0.186
When making financial decisions, my parents/close friends' opinions are my primary reference.	0.142	0.112	-0.002	0.139	<b>0.684</b>
I always manage my finances with the same bank.	0.093	0.034	0.215	0.031	<b>0.568</b>
My parents always save money, too.	-0.009	0.266	0.194	0.070	<b>0.554</b>
As a family, we discuss purchasing decisions.	0.059	0.387	-0.026	0.070	<b>0.521</b>

Source: author's own research, N=3515, Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. KMO=0.865; total variance=51.02%

### 3.2 Characteristics of Financial Awareness Clusters

For hypothesis analysis, I performed cluster analysis on the factor structure using K-means clustering, which resulted in five segments (Table 3):

The 'Working Hard for Money' group, who overestimated the work and awareness factor. These are the respondents who are willing to work for money, and even claim to value and appreciate it more if they can produce it by their own efforts. They typically value the money they earn, spend it wisely and do not waste it.

Respondents who did not rate any of the factors above-average or above other segments were in the 'Without preferences' group. One reason for the appearance of this segment is due to the specificity of the K-means clustering procedure and implies a neutral stance or even an immature value orientation of the respondents in this segment.

The segment 'No Money Valuers' includes respondents who overestimate the factor of inconsiderate spending. They are the respondents who value money the least. They generally have everything, so they value money little, they do not have to work for it, they take it for granted that what they need and want they will get. So it is not surprising that they often spend inconsiderately on things they do not really need. It is interesting that this kind of 'no good master' attitude towards themselves is realistic, yet it does not deter them from spending money excessively and wastefully. It certainly implies an attitude and values of its own.

For 'Followers of family role models', loyalty is an important issue, whether it is following the family example, passing on the financial behaviour and attitudes of their parents, or choosing their financial service providers. They are the respondents who learn the basics of conscious money management through family examples, for whom the value of managing money and not just spending it is something that comes from home.

The cluster of 'Special Offer Watchers' includes respondents who pay close attention to prices and promotions. These are the people for whom affordability is more important than quality when making a purchasing decision. They are also willing to save money by choosing lower quality. They are the most price sensitive consumers.

Table 3  
Consumer segments based on financial awareness

Factors of financial awareness	Group of financial awareness				
	Working hard for money	Without preferences	No money valuers	Followers of family role models	Special offer watchers
factor of inconsiderately	0.007690679	0.0938969	<b>1.594275764</b>	-0.4566877	- <b>0.694922638</b>

spending of money					
factor of conscious management	-1.154124443	-0.6955889	0.393709956	0.395455068	0.647977799
factor of work and awareness	<b>1.0141427</b>	-1.1060807	-0.303523821	0.26617005	0.15084351
factor of saving and special offers	0.304712315	-0.3516399	0.335424784	-1.019243809	<b>0.684269792</b>
factor of loyalty and social background	0.16178709	-0.647649	0.293823157	<b>0.624852847</b>	-0.3194445

Source: author's own research,  $N=3515$ ,  $K$ -means cluster analysis

Regarding the socio-demographic characteristics of each cluster, a significant relationship was found for gender in terms of cluster membership (Table 4).

Table 4  
Characteristics of financial consciousness segments by gender

		Gender		Total
		Male	Female	
Working hard for money	Count	197	376	573
	% within row	34.4%	65.6%	100.0%
	Adjusted Residual	-4.9	4.9	
Without preferences	Count	386	289	675
	% within row	57.2%	42.8%	100.0%
	Adjusted Residual	7.9	-7.9	
No money valuers	Count	286	294	580
	% within row	49.3%	50.7%	100.0%
	Adjusted Residual	3.0	-3.0	
Followers of family role models	Count	305	450	755
	% within row	40.4%	59.6%	100.0%
	Adjusted Residual	-2.1	2.1	
Special offer watchers	Count	362	570	932
	% within row	38.8%	61.2%	100.0%
	Adjusted Residual	-3.5	3.5	
	Count	1536	1979	3515
	% within row	43.7%	56.3%	100.0%

Source: author's own research,  $N=3515$ , Pearson's Chi-square sig=0,000

The results show that the proportion of women is higher than expected in the 'Working hard for money', 'Followers of family role models' and 'Special offer watchers' categories, while the proportion of men is higher than expected in the 'Without preferences' and 'No money valuers' categories.

Also for financial and economic literacy, I was able to find a significant relationship between cluster membership and the variable under study (Table 5).

Table 5

Characteristics of financial awareness segments according to financial and business studies

Segments of financial awareness		Have you studied finance and business previously?		Total
		Yes	No	
Valuers of money	Count	269	304	573
	% within row	46.9%	53.1%	100.0%
	Adjusted Residual	-1.9	1.9	
Without preferences	Count	309	366	675
	% within row	45.8%	54.2%	100.0%
	Adjusted Residual	-2.7	<b>2.7</b>	
No valuers of money	Count	276	304	580
	% within row	47.6%	52.4%	100.0%
	Adjusted Residual	-1.5	1.5	
Followers of family role models	Count	409	346	755
	% within row	54.2%	45.8%	100.0%
	Adjusted Residual	<b>2.3</b>	-2.3	
Special offer watchers	Count	512	420	932
	% within row	54.9%	45.1%	100.0%
	Adjusted Residual	<b>3.2</b>	-3.2	
Total	Count	1775	1740	3515
	% within row	50.5%	49.5%	100.0%

Source: author's own research,  $N=3515$ , Pearson's Chi-square  $\text{sig}=0,000$

In this regard, we can see that conscious spending is typical among those with financial and business knowledge, and the proportion of those without preferences, i.e. those who are still uncertain and have not yet developed their values, was higher than expected.

This also confirms the importance of financial and economic literacy in laying the foundations for conscious money management and conscious spending decisions in everyday life. Those who are not yet very confident in financial matters, for whom money management is more of a question mark than a well-known concept, need education, and in my view – based on the results of our previous research – I think it is worth starting this learning process as soon as possible, especially among young people who do not bring the necessary model from their families,



for whom parents do not set a sufficiently relevant example, i.e. a form of behaviour to be followed.

### **Conclusions and Recommendations**

In this study, I focused on the analysis of awareness, in particular, financial awareness. In an ever-changing consumer market, driven by trends and megatrends, I think it is of particular importance to monitor what new segments and their potential opportunities are emerging.

The emergence of the conscious consumer has been generated by the emergence of information that is becoming more numerous and more easily available. The conscious consumer not only accumulates knowledge to represent and assert his or her own interests, but is also sensitive to community and environmental issues [30] [31] [32] [33] [34] [35].

In the context of this study, I have examined the phenomenon of financial awareness in the light of the results of a primary quantitative data collection. Financial awareness is related to financial literacy. The hypothesis of my research, that different consumer groups can be defined on the basis of financial awareness (H1/a), was confirmed, as I was able to characterise five different segments on the basis of the results.

I was able to confirm that there is a statistically verifiable correlation between the segments created and the existence of financial and economic education (H1/b).

This result clearly demonstrates the importance of the cognitive phase in the development of financial awareness. The result highlights the importance of economic and financial education, emphasising the importance of acquiring this knowledge as soon as possible.

The phenomenon of the conscious consumer, in my view, in itself requires knowledge, in this form the cognitive part of the attitude, to be grounded. Without this, I do not think we can discuss real conscious consumer behaviour and preferences. In the absence of a cognitive part of the attitude, in my opinion, the phenomenon of cognitive dissonance would only be reinforced, and we would at most be talking about fashion following rather than conscious behaviour based on values and beliefs.

One of the limitations of the research is that it does not take into account regional aspects, which, in my view, can be the source of very significant differences at national level. I therefore plan to continue the research by examining this regional dimension. I intend to analyse the differences in the typology of financial awareness between rural and urban areas and between national regions. This, I believe, could provide more accurate results for practitioners, institutions and organisations seeking to promote financial literacy.

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# Impact of the Applied Project Management Methodology on the Perceived Level of Creativity

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*Abstract: The phenomenon of creativity has been studied by many authors and there have been numerous research studies conducted about how to induce it. In software development project contexts, especially when comparing agile and waterfall methodologies, this topic seems to be unexplored. The authors aimed to fill this research gap by conducting a survey based on quantitative research that involved 61 project managers or employees. The perceived creativity in project activities is operationalized through the degree of innovation content and extraction in the project, as well as through factors that relate to the exploitation of creativity as the way how it is learned and recognised. The use of the agile development approach was characterized by agile practices such as the use of stand-ups, sprint plannings and user stories. The results of the research suggest that the chosen software development approach has an impact on the perceived use of creativity, whereas learning is significant in cases where the stand-up tool of agile project management is used.*

*Keywords: project; project management; creativity; learning; agile software development*

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# 1 Introduction

Many researchers highlighted that projects, despite being “*temporary endeavours undertaken to create a unique product, service, or result*” [1] deliver significant added value and help achieve strategic goals [2] [3], as they are “*vehicles for strategy implementation*” [4]. Researchers also highlighted that an appropriate translation of strategy to project level, and project governance are also important for realizing competitive advantage [5] [6] [7] [8]. However, Shenhar & Dvir [9] identified that, projects should be considered from two other angles; being a temporary organization and a unique task. In this way, project managers should focus on three aspects, such as managing the unique task, managing the temporary organization, and delivering the beneficial change [10]. This triple aspect further increased both the complexity and the importance of the role of the project manager, which was highlighted by numerous authors [3]. Researchers also revealed that a properly defined and planned project process could have a huge impact on successful project delivery [11] [12] [13] [14] as well as the business case, risk management, organizational characteristics, and senior management support [15] [16] [17] [18] [19] [20]. Görög [3] and Blaskovics [10] identified nine potential factor groups which could influence achieving project success, and based on these, the following categories can be created:

- Environmental factors, i.e. those, which are originated from the surrounding project environment, and have an impact on the project.
- Hard, methodological, i.e. those, which are related to the project process and the relevant tools and techniques
- Soft, i.e. those, which are related to managing the project team, the project manager, and the other stakeholders which bear of importance.

Certain environmental factors such as the macroeconomic environment or the COVID-19 pandemic, or those that originated from a distinct organizational unit (like the project management office and the company-related project management policy) also play a significant role in achieving project success, or in some cases, influencing circumstances [21]. Numerous researchers highlighted that soft and methodological elements could be at least as important as the aforementioned ones [10] [22] [23]. It has also been highlighted that a motivated and competent project manager and project team could have a high if not the highest impact on project success. An appropriate project task delegation system and a challenging yet supportive environment could increase the performance of the project team members. Goleman [24] points out that emotional intelligence, including empathy, could increase the effectiveness and efficiency of project management. Blaskovics [10] further reinforced this statement, since a stakeholder-centric attitude, which considered the appropriate management of stakeholders as a key project management task, could generate the highest potential for project success. Görög [3] also argued for the importance of the project manager and stated that the lack of

a competent project manager cannot be compensated, while other factors could be somehow substituted by a resource-abundant environment. Creativity, especially on project level, has also been highlighted to be a key factor in achieving project success [25] [26] [27] [28].

Based on the above-mentioned research findings, the focus of our research study is to explore the perceived level of creativity by the project team members. Since numerous authors found differences between the level of motivation and work efficiency in different project management methodologies (especially between agile and waterfall), the authors will analyse the perceived level of creativity in terms of waterfall and agile project management methodology, to understand whether project members experience a higher level of creativity in an agile rather than in a waterfall project.

## 2 Literature Review

### 2.1 Creativity and Innovation

Creativity as a construct has been widely researched in psychology over the past decades, but it has been difficult to define and measure it due to its complex and multidimensional nature. Definitions of creativity usually include at least one of four perspectives: cognitive processes involved in producing creative work, characteristics of creative individuals, end products or outcomes of creative work, and the environmental factors conducive to creativity. Measuring creativity is usually based on these main categories of creativity definitions [29].

According to Hennessey and Amabile [30] social and environmental factors play major roles in producing creativity in work. They also assert that there is a strong and positive link between a person's intrinsic motivational orientation and the creativity of the person's performance: people are the most creative when they feel motivated by interest, enjoyment, satisfaction, and the challenge of the work itself. If people are intrinsically motivated, they seek situations that require the use of their creativity and resourcefulness [31].

Amabile [32] expands on the definition of creativity by adding the dimension of innovation in a business context: creativity is the implementation of novel, useful ideas to deliver new products and services. According to her componential model of creativity, three major components of creativity in the workplace – expertise in complex problem solving, creative thinking of new ideas and intrinsic task motivation – are all necessary for being creative in any domain. It also means that the work environment can have an impact on creativity by influencing task motivation, providing learning opportunities, and facilitating creative problem

solving for team members. The theory also states that creativity produced by individuals serves as a primary source for innovation within the organization. Management practices are also necessary to foster innovation and creativity, especially in projects, including clear planning and constructive feedback, good communication between team members, as well as mutual support and commitment.

The existence of a mutual link between flow and creative work was proposed by Csikszentmihalyi who described the mental state of flow as the “*peak of creative insight*” and “*optimal experience*”, when interviewing hundreds of people, such as rock climbers, artists, chess players, and athletes, who had a deep sense of enjoyment and accomplishment in their work that were challenging enough to stretch their abilities and skills. He used the term “*flow*” to describe the common subjective experience reported by his respondents as several of them used the metaphor of a current that carried them along when they enjoyed performing their activities that they found challenging. He considered the experience of flow as a vital element in all activities which makes work more productive, rewarding, and meaningful [33] [34]. Although the concept of flow has remained vague and ambiguous in psychology ever since it was coined by Csikszentmihályi in 1975, the initial studies helped define the phenomenological and intrinsically motivating nature of the flow experience [35].

Creativity along with innovation has been suggested to play an important role in Information Systems Development projects over the past 30 years, and most recently in the agile method movement which advocates that creativity and innovation are needed to solve complex software development problems and to deal with unpredictability inherent in technology projects. The agile environment is particularly conducive to creativity and innovation as it provides a high degree of autonomy, task diversity and swapping of roles, goal clarity, ownership of work, trust and openness [36]. Görög [3] also highlighted that improvisation – which is the manifestation of creativity on project level – is one of the five crucial project management characteristics. Müller and Turner [37] identified in their research – based on the leadership model of Dulewicz & Higgs [38] – that a high-level of creativity (intuitiveness) is required especially in a highly uncertain environment with a considerable impact on organizational performance, but creativity could be important in every type of project.

As optimal experiences most often occur within sequences of challenging activities that are goal-directed and bounded by rules, requiring appropriate skills or highly disciplined mental activity [39], it can be particularly relevant in the context of complex project management which provides a structured framework for goal-oriented and challenging activities that require highly specialized skills and competencies.



## 2.2 Waterfall and Agile Project Management

As numerous authors have highlighted an appropriate planning process is of utmost importance, arguing that a suitable project life cycle should be assigned to projects [11] [40] [41]. The Project Management Institute [11] identified four types of life cycles based on the definition of project result; (i) predictive, (ii) iterative, (iii) incremental, and (iv) adaptive. Although Wysocki [41] also identified four types of project life cycles, these are based on the ambiguity of project result and the implementation method: (i) traditional, (ii) agile, (iii) extreme, (iv) emergent. The commonality in these categorizations is that they define the best-suited life cycle for the project based on the uncertainty regarding the client and environment, the nature of the project result, and the novelty of the methodology that should be used to deliver the project result. However, authors tend to agree that agile could manage more effectively a higher level of uncertainty than the predictive or traditional approaches.

### 2.1.1 Waterfall Project Management

The planning-based methodology, which is either called waterfall, traditional, or predictive, is considered a methodology where the different phases of the project follow one another. Cleland [2] identified five phases; (i) conceptualization, (ii) planning, (iii) execution, and (iv) termination. Verzuh [42] also identified similar phases; (i) definition, (ii) planning, (iii) execution, and (iv) close out. Gido, Clements & Baker [43] came to the same conclusion. All the authors separate the definition of the business case and the business benefit of the project (as conceptualization or definition) and the detailed planning phase. The first defines the potential project result, the general requirements, the time and cost constraints, and the high-level risks of the project. While the second defines the definition of the deliverables, the detailed key elements of the project, the detailed scheduling, and budgeting, the communication and every other element that is needed to deliver the project with the predefined requirements. Görög [3] merges the first two phases as project preparation but defines a separate phase for the external contributor. All of these approaches consider that project phases follow one another – although there could be overlaps between the phases, and there is a need for detailed planning and control of the completion. Researchers highlighted that this type of project planning methodology could be less adaptive to changes, and as a result of this, there is a potential for achieving a lower level of customer satisfaction than expected. At the same time, this frequent and phase-based completion could reduce the commitment of both the project team and the project manager.

### 2.1.2 The Beginnings of the Agile Mindset

To the authors' understanding, the earliest source on the subject is an article by Nonaka and Takeuchi [44] on the nature of effective innovative product

development projects. Their paper describes an approach to adapting to changing circumstances, a rapid yet flexible development, which these authors call "scrum". Scrum is the resumption of play after an interruption when one has to adapt to the play of the opponent as well as to the other own team. Nonaka and Takeuchi [44] do not use the word "agile", but the problem they studied is precisely the one that led to the development of the agile approach. Product development teams were expected to deliver results in a reasonable time, within changing expectations [44].

### **2.1.3 The agile Approach in Software Development**

Many authors consider the "Agile manifesto", which was issued by methodological experts in the field of software development [45], as the first crucial milestone of the agile movement. However, criticism against the planning-based approach arose earlier [46] [47].

Software development has its specific risks. The socio-technical nature of information technology systems makes learning cycles almost inevitable. The failure rate of software development projects is high, as it is indicated by the Standish Group reports [14]. Around the same time when the Agile Manifesto was published, a number of new software development methods based on iterative and incremental approaches emerged. According to "*The Annual State of Agile*" report, a survey that is conducted in the United States, Scrum is the most popular method [48]. The advantage of this method could be earlier completion, and higher customer satisfaction [49].

Scrum is the most widely known agile development method, and in accordance with the aim of this research and the popularity of the method, the authors describe agile software development primarily in terms of the Scrum method. In the Scrum development process, there are procedures and roles.

In Scrum terminology, an iterative development cycle is called a sprint, and the software functionality to be implemented during a given sprint is called the "*sprint backlog*". These functionalities are often expressed in terms of user stories or cadences. Scrum assumes that the scope of all the products to be built during the sprint is known in broad terms, hence the term product backlog [49].

Scrum assumes smaller development teams (5-8 people). It distinguishes between two roles; the "*product owner*", meaning a user who can essentially define the functionality expected from the software to be developed; and the "*scrum master*", who is responsible for understanding and enforcing the rules of Scrum. The remaining members of the development team are simply called developers.

Having settled down the sprint backlog, the development work can be started. Each day during a sprint a workshop called "*daily scrum*" should be celebrated that is used to plan the work in the next 24 hours. At the end of the sprint, a "*sprint review*" takes place where the completed and unfinished parts are reviewed; the reasons and possible consequences are examined. At this point, the state of implementation of

the overall product can also be reviewed. A “*sprint retrospective*” can also be used to assess the actions taken to improve the development team and methodology. This can then be used to plan the next sprint, often defining functionality that can be used immediately upon successful completion of the sprint.

### 2.1.4 The Appearance of Agile Project Management

Over the years, several works have been published that approach the topic of agile project management from a software development perspective [50] [45] [51] [52]. The common feature of these works is that they fit their specific proposals to a specific life cycle model of software development. The agile label has proved so successful that there are now independent certification schemes for individual project managers created by the market. The content of these certifications, however, is still linked to the world of software development.

From 2000, publications appeared that discuss the concept of agile project management in general. Wysocki [41] discusses project management in general, with agile project management as one possible approach. Wysocki recognised that, although by definition a project is a unique endeavour, there is a significant difference between the uniqueness (or riskiness) of each type of project. The construction of a typical family house is usually substantially different from an innovative product development project. Wysocki sees the way to deal with these differences as an appropriate dose of “*flexibility*” and “*adaptive capacity*”. In this terminology, “*agile project management*” is needed when the goal is clear but the way to achieve it is not. For such cases, Wysocki proposes a phasing of the project life cycle that is iterative and incremental [41].

A similar approach is taken by Chin [53], who justifies the introduction of the concept of agile project management, inter alia, on the basis of the different uncertainty of projects. Like Wysocki [41], Chin [53] also examines the question of the applicability of the agile approach, i.e. he approaches the issue from a contingency perspective.

There are a number of reasons for using an agile project management approach. The main drivers of the adoption of agile are the hazy (unclear) definition of and the frequent changes to project deliverables, and the incremental approach of delivery [54].

In accordance with the purposes of this paper, we will distinguish only two project approaches (life cycles) of software development; agile and waterfall. We characterized the agile life cycle mainly by the use of sprints (as a planning tool) and daily stand-ups (as work organization).

### 3 Methodology

The ultimate aim of the research is to identify whether there is a connection between the applied project life cycle and creativity. Thus, our research question is:

- Is there a higher level of perceived creativity in the case of using agile project management methodology compared to waterfall?

In accordance with Görög [3], Csíkszentmihályi [33], and Müller and Turner [37], we decomposed perceived creativity into two main factors: (i) innovation content of the project, and (ii) challenging level of the project task, considering them as factors, which could catalyze creativity. However, based on Goleman [24], Horváth [55], and Hennessey and Amabile [30], the output side should also be analyzed which could be decomposed into two categories; (i) learning from the project, (ii) appreciation for the project work.

For identifying the project approach as agile, a dual approach was used. On one hand, it was asked directly from the participants, whether the project was more agile or predictive, and on the other hand, we asked them whether they use certain tools and techniques, which are characteristic of the agile approach, such as (i) existence of stand-ups, (ii) existence of sprints or cadences, (iii) participation in sprint (or cadence) planning, and (iv) use of user stories in planning.

Based on these, and in accordance with the research question, the following hypotheses were formulated:

- H1: The perceived innovation content in projects using agile project management methodology is higher than those that use waterfall project management methodology.
- H2: The perceived challenge level of the tasks in projects using agile project management methodology is higher than those that use waterfall project management methodology.
- H3: People learnt more in projects using agile project management methodology than those that use waterfall project management methodology.
- H4: The perceived appreciation in projects using agile project management methodology is higher than in those that use waterfall project management methodology.

In order to answer the research question, and accept or reject the hypotheses, exploratory research was conducted, which consisted of two phases. The first was the library research, and in the course of this phase, the nature of the project, elements of creativity, and the project life cycles were analysed. As a result of this, we accepted the findings of Amabile [32], and Csíkszentmihályi [33], and we measured creativity in terms of innovation content and challenge, and based on Goleman [24], and Hennessey and Amabile [30], the “rewarding” side based on

learning and appreciation. The special tools and techniques of agile project management methodology were also revealed and encapsulated in the model. In the second phase, during the field research, a questionnaire was filled out by project managers and project team members, in a leading IT company. The research model is shown in the following figure:

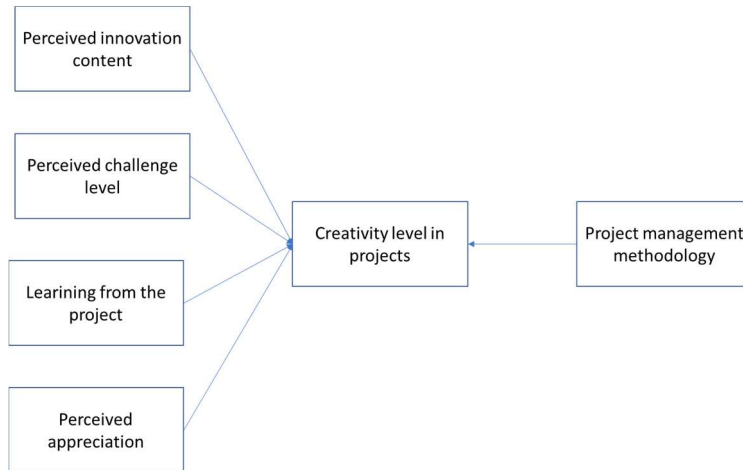


Figure 1  
Research model

*Source: authors' own editing*

In accordance with the aim and nature of the research, a questionnaire-based survey was conducted, which took place between June and July 2022, at a software development company which was selected based on such selection criterion as being one of the leading software developers in Hungary, which guarantees high, medium, and low innovation-content projects, and uses both agile, and waterfall approach for project delivery. Besides basic, demographic questions the questionnaire collected data regarding the general working environment (like current job position, task delegation, etc.), and more project-specific questions (like the aforementioned factors of creativity) from their last project. We argue that team members remember their last project the most, and only closed projects have the potential to have a complete overview.

The most important questions (what were used in the analysis), and their types are summarized in Table 1.

The base for the analysis was twofold. On the one hand, we checked the free text and option set questions whether the responses were suitable for analysis (like working in a project environment, or giving a complete answer for every question), and then we compared the creativity factors to the methodology itself, and the questions checking the agile approach.

Table 1  
Questions and their types

Question	Type
How innovative was your last project?	Ordinal (1-7 Likert-scale)
How challenging was your task in your last project?	Ordinal (1-7 Likert-scale)
How much have you learnt from your last project?	Ordinal (1-7 Likert-scale)
How was your work appreciated during the project by others?	Ordinal (1-7 Likert-scale)
Do you think your project has agile or waterfall/predictive characteristics?	Nominal (more like agile, more like predictive/waterfall, don't know)
Did you have daily stand-ups?	Nominal (no, seldom, frequently, every day or multiple times a day)
Did you have sprints (or cadences) in your project?	Nominal (no, sometimes, yes)
Did you participate in sprint (or cadence) planning?	Nominal (no, sometimes, yes, we didn't have sprints)
Did you use user stories in your project estimations?	Nominal (never, seldom, often, always)

*Source: authors' own editing*

The population in the research was the employees working on projects. The planning and the sampling were done with the help of a key project manager in the company. In the end, we received 59 unique answers we could work with. 176 people started the questionnaire, but only 61 respondents provided answers to the questions defined in Table 1, the other respondents gave only mainly their demographic and/or company-related data. However, two responses should have been taken out because they answered 'don't know' for the project management methodology they used, and as a result of this, they were not suitable for analysis. Altogether 59 respondents' answers were analyzed, out of which 5 were women and 54 were men. Most of them, 30 respondents, had a BA/college degree, 19 had university or MA, 5 had Ph.D., and 5 people's highest education is high school. The average age was 37,5 years (ranging from 22 to 64, with a median of 35 years), while 13.7 years was the average work experience (ranging from 1 to 40 with a median of 12 years). They work in the current position for 3.5 years on average (ranging from 0 to 14 with a median of 3 years), and in a managerial role for 3.2 on average (ranging from 0 to 19). However, these demographic data were not used in the analysis since we were focusing on the project management methodology (where 12 people worked in a waterfall environment, and 47 in agile). This was the only factor we considered for categorizing the sample.

The number of responses can be considered low<sup>1</sup>, and the answers were measured on an ordinal scale, thus non-parametric tests were applied [56]. During the analysis, we used the following methodologies:

- Comparing two groups, the Mann-Whitney test was used<sup>2</sup>.
- Comparing more than two groups, Kruskal–Wallis test was used<sup>3</sup>.
- For post hoc tests, the Mann-Whitney test was used with Bonferroni correction.

The significance level was analysed on 5%.

The aim of the research was to answer the aforementioned research question and find out whether there could be a difference in the level of perceived creativity in case of agile and waterfall project management methodology. Based on the results of this research, the authors acknowledge that the sample should be further expanded both horizontally and vertically to formulate more general conclusions.

## 4 Research Findings

During the analysis, we focused on the four creativity factors and the project management methodology related questions, such as which methodology they used in their project, and whether there were any daily stand-ups, sprints or cadences, participation in sprint or cadence planning, and use of user stories. The basic description of the first four questions based on the project management methodology is summarized in the following table:

Table 2  
Median and mean rank of the factors based on the project management methodology

Factors	Methodology	N	Median (7-point-Lickert-scale)	Mean rank <sup>4</sup>
<b>Innovation content of the project</b>				
	Waterfall	12	2.5	20.33
	Agile	47	4	32.47
<b>Challenge level of tasks</b>				
	Waterfall	12	3.5	21.25

<sup>1</sup> but according to Pesämaa et al. [57], suitable for analysis with certain conditions

<sup>2</sup> nonparametric alternative to independent samples t-test

<sup>3</sup> nonparametric alternative to one-way ANOVA

<sup>4</sup> Calculated after transforming the original data into ranks for the Mann-Whitney test

Factors	Methodology	N	Median (7-point-Lickert-scale)	Mean rank <sup>4</sup>
Learning from the project	Agile	47	5	32.23
	Waterfall	12	3.5	21.13
Appreciation for the project work	Agile	47	5	32.27
	Waterfall	12	5	22.75
	Agile	47	5	31.85

Source: authors' own research, 2022, N=59, main descriptive statistics

Based on the Mann-Whitney test, it can be concluded, when people worked with waterfall project management methodology, they gave significantly lower values (on 5%) in each creativity category, than in the case of those, who worked with agile project management methodology, as seen in Table 3:

Table 3  
Perceived level of creativity factors based on the project management methodology

Results					
Factors/Methodology		N	Sum of Ranks	Z	P (one-tailed)
Q2.5 How innovative was your last project? (1 – not at all, 7- completely)	Waterfall	12	244	2.24	0.013
	Agile	47	1526		
Q2.6 How challenging was your task in your last project? (1 – not at all, 7 – completely)	Waterfall	12	255	2.03	0.021
	Agile	47	1515		
Q2.7 How much have you learnt from your last project? (1 – nothing, 7 – outstanding learning experience)	Waterfall	12	253,5	2.04	0.020
	Agile	47	1516,5		
Q2.8 How was your work appreciated during the project by others? (1 – not at all, 7 – outstanding appreciation)	Waterfall	12	273	1.70	0.045
	Agile	47	1497		

Source: authors' own research, 2022, N=59, results of Mann-Whitney test

We can see from table 3 that both the perceived innovation content, the perceived challenge level, the amount of learning from the project, and the appreciation received are significantly higher in agile projects. Therefore, we conclude that **all of the four hypotheses can be accepted on 5% significance level.**



In order to have a complete overview of the impact of agile project management methodology on the perceived level of creativity, we also analysed the most well-known agile project management tools and techniques to understand whether in those cases, where agile techniques are applied, the creativity factors are significantly higher than without these techniques. We analysed them with Kruskal–Wallis (K-W) test, and, in case of significant results, we also used Mann-Whitney tests with Bonferroni correction as post hoc tests

The authors analysed the answers regarding the daily stand-ups. Three kinds of answers were given: there were *no daily stand-ups* in the respondent's project, there were *frequently*, and *every day or multiple times a day*. We found on a 5% significance level that, the values received for the following factors in terms of the three aforementioned categories do not differ; innovation content (K-W H:5.187; df=2; p=0.075), challenge level of the tasks (K-W H:4.875; df=2; p=0.087), and appreciation (K-W H:3.258; df=2; p=0.196), but do differ in learning amount (K-W H:8.348; df=2; p=0.015). If we further analyse visually this latter factor (see Figure 2), we can conclude that the frequency of the daily stand-ups is less important because there is no visual difference between the *frequently*, and *every day or multiple times a day* answers, while the *doesn't have stand-ups* and the latter two categories have, as shown in Figure 2:

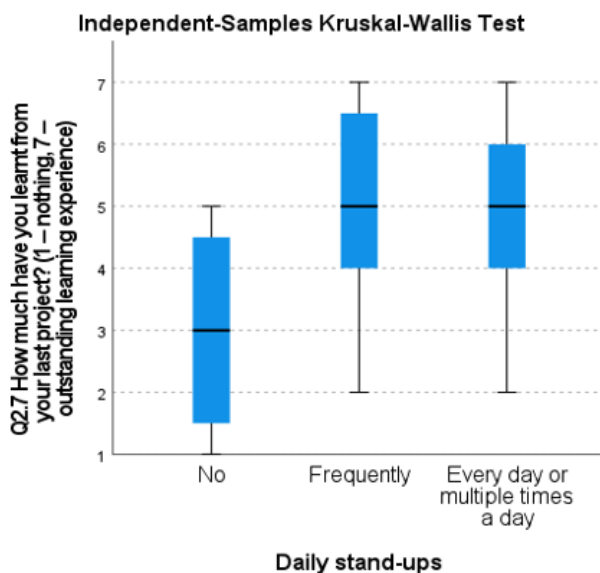


Figure 2

Boxplot diagram showing the distribution of the learning amount in terms of the different daily stand-up categories

Source: authors' own editing

This is partially reinforced by the post hoc test, the pairwise comparisons of the evaluation of the three groups. Between those who don't have daily stand-ups and who frequently have, the difference is not significant ( $Z = -2.204$ ;  $p(\text{with Bonferroni correction}) = 0.083$ )<sup>5</sup>. Between those who don't have, and those who have every day or multiple times a day, the difference is significant ( $Z = -2.852$ ;  $p(\text{with Bonferroni correction}) = 0.013$ ). Between those who frequently have, and every day or multiple times a day have, the difference is not significant ( $Z = 0.01$ ;  $p(\text{with Bonferroni correction}) = \sim 1$ ).

We also analysed the other three agile tools and techniques (existence of stand-ups, existence of sprints or cadences, participation in sprint or cadence planning, using user stories), but on 5% significance level, there was no difference in the creativity factors. This means that the scores for the innovation content, challenge level, and appreciation were not significantly different based on the existence of sprint or cadence planning, participation in sprint or cadence planning, and using user stories. This is encapsulated in the following table:

Table 4  
Kruskal-Wallis test on creativity factors in terms of the other three agile tools and techniques

	Innovation content of the project	Challenge level of tasks	Learning from the project	Appreciation for the project work
<b>Existence of sprints</b>				
<b>K-W H (df=2)</b>	1.380	0.532	2.807	0.788
<b>p</b>	0.502	0.767	0.246	0.674
<b>Sprint planning participation</b>				
<b>K-W H (df=2)</b>	1.396	0.427	2.834	1.609
<b>p</b>	0.498	0.808	0.242	0.447
<b>Use of user stories</b>				
<b>K-W H (df=3)</b>	2.541	1.908	1.803	3.725
<b>p</b>	0.468	0.592	0.781	0.293

Source: authors' own research, 2022,  $N=59$ , Kruskal-Wallis test

## Conclusions

Creativity on project level is regarded as an important factor, which could contribute to project success in a considerable manner (see, e.g. Schulz et al. 2015). Researchers highlighted that both the input and output sides of creativity should be analysed in order to have a comprehensive picture of it. Thus, based on Görög [3], Csíkszentmihályi [33], Müller and Turner [37], Goleman [24], Horváth [55], and Hennessey and Amabile [30] we decomposed creativity into i) perceived innovation content of the project, ii) challenge level of the tasks, iii) learning from the project,

<sup>5</sup> Note that, the number of respondents in each group was fairly low ( $n_1=n_2=8$ ).

and iv) perceived appreciation. We analyzed them in terms of the project management methodology to understand whether the agile project environment could generate a higher level of creativity than the waterfall environment. We analyzed in the course of an explanatory manner and formulated four hypotheses focusing on whether the creativity elements have a higher manifestation in an agile environment than in a waterfall. We have selected one leading software development company, and we analysed the received answers with the Mann-Whitney and Kruskal-Wallis tests on 5% significance level. The findings are summarized in Figure 2.

The current research (considering its limitations) highlighted that, for the given sample, agile project management methodology does generate a higher level of creativity. Therefore, we can conclude that:

- The perceived innovation content is higher in case of agile project management methodology than in waterfall methodology (H1 is accepted based on the result of Mann-Whitney test on 5% sign. lvl.).
- The perceived challenge level of the tasks in case of agile project management methodology is higher than in waterfall methodology (H2 is accepted based on the result of Mann-Whitney test on 5% sign. lvl.).
- People learn more in case of agile project management methodology than in waterfall methodology (H3 is accepted based on the result of Mann-Whitney test 5% on sign. lvl.).
- The perceived appreciation in case of agile project management methodology is higher in waterfall methodology (H4 is accepted based on the result of Mann-Whitney test on 5% sign. lvl.).
- In those projects, where there were daily stand-ups every day, people learn more than in those projects, where there weren't any (tested with Kruskal-Wallis test and Mann-Whitney post-hoc test on 5% sign. lvl.).

Thus agile project management methodology – considering the limitations of the research – generates a higher level of creativity than a waterfall project management methodology.

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# Analysing the Role of Responsible Consumer Behaviour and Social Responsibility from a Generation-Specific Perspective in the Light of Primary Findings

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*Abstract: Nowadays, corporate social responsibility (CSR) is an indispensable factor in the operation of companies so successful businesses need to integrate CSR into their corporate strategy. A new consumer perspective has also emerged: conscious consumers have appeared, who place great emphasis on buying environmentally oriented, ethical products and for whom the relevant credible communication of companies is also essential. In the present study, we have used primary data to investigate the perception of corporate social responsibility and the generation-specific elements of consumer behaviour. Our findings confirmed that the general characteristics of the values and behaviour of each generation can be used as a segmentation criterion for the perception of corporate social responsibility.*

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*Keywords: social responsibility; conscious consumer; generational marketing*

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## 1 Introduction

Corporate social responsibility is clearly gaining ground in the way companies operate today. In addition to maximising profits, companies are also concerned with minimising the negative environmental and social impact that may be associated with their activities.

The concept of corporate social responsibility can be examined from various aspects. To this day, the cornerstone of CSR is Carroll's four-element pyramid: the bottom level is economic responsibility, profitability, legal responsibility, compliance with legal requirements, followed by ethical behaviour, which is society's expectation, and finally, at the top of the pyramid, philanthropic responsibility [1].

Braun puts sustainability at the centre of the definition: drawing a parallel between the concepts of CSR and stakeholder management, the main objective of the company is to reduce or eliminate risks to stakeholders [2].

Sarkar-Searcy also adds an economic dimension to the aforementioned stakeholder-focused theory, according to which companies must voluntarily go beyond minimum legal requirements to operate ethically and take into account the impact of their operations on society and its stakeholders [3].

## **1.1 The Conscious Company - CSR in Corporate Strategy**

Moving beyond the theoretical approach, the practical implementation of CSR, according to Tahniyath & Said, is a process that involves awareness of social issues, internal and external communication of CSR initiatives, and embedding CSR values within the organisation. It also aims to increase the commitment of internal stakeholders to social values, which it seeks to achieve through the use of specific communication tools. These include, for example, meetings, internal newsletters, training for employees, board members, advertisements to external stakeholders and CSR reports [4].

Newman *et al.* found that the positive impact of CSR initiatives on corporate performance was stronger in non-competitive industries. The impact of campaigns targeting the local community was particularly significant. These include environmental activities, participation in local poverty reduction programmes or education and health programmes [5].

Horváth's research on more than 40 companies in Hungary revealed that among the companies that had engaged in corporate responsibility, philanthropic activities were the most frequently selected, with almost two-thirds of respondents mentioning this form of action, and a similar proportion indicating environmentally conscious operations [6].

Several studies therefore support the research findings that companies that want to be successful in the future need to integrate CSR into their business strategy [7]

From the point of view of corporate strategy, however, we must distinguish the concept of CSR from the definition of social marketing. CSR is defined as a company voluntarily doing more for society or the environment than the minimum required by law, whereas social marketing focuses on the voluntary change in consumer behaviour by focusing on responsible consumption [8].

Social marketing refers to the planning and implementation of marketing strategies of organisations to address social issues and problems. Through practising social marketing, a company sets socially relevant goals and uses its resources to achieve them, as well as facilitating the widest possible involvement of consumers [9].

Further research has shown a link between CSR activities and employer branding: if a company is active in socially responsible activities, this contributes to a positive image. Existing and potential employees appreciate the company's activities in this direction, which ultimately supports local communities. [10].

## **1.2 The Conscious Consumer - Perceptions of Corporate CSR Activities and Communication**

In terms of CSR, it is not enough for companies to adopt this philosophy, but a new perspective is needed from the consumer's point of view: conscious consumption at the individual and corporate level, where sustainability is a shared responsibility of both sides [11].

Dagevos and Gaasbeek define the 'responsible consumer' as one who is environmentally oriented, who prefers ethical products in their purchases and who is also concerned about the transparent communication of the company [12].

Conscious consumption is closely linked to sustainability. Consumers who care about protecting the environment and aim to pass on a sustainable planet to future generations by reducing their ecological footprint are clearly considered conscious consumers [13] [14].

According to international research, awareness abroad is most evident in environmental protection, whereas in Hungary the need for social responsibility is an important factor for consumers and companies alike [15].

In addition to food consumption, for example, research has shown that conscious consumers constantly seek information on cosmetics in order to make informed decisions [16].

Ásványi et al. investigated consumer perceptions of sustainable products in Generation Y and identified four consumer categories: sustainable consumers, open consumers, persuadable consumers and traditional consumers. Furthermore, they observed that the product hierarchy is different for different consumer groups according to preferences and consumer group characteristics [17].

Further research has shown that Hungarian consumers value and expect responsible behaviour from companies, but do not necessarily take this into account in their purchases. Companies are strengthening sustainability in their CSR activities by targeting the responsible consumer niche and by exploiting the competitive advantage of CSR communication [18].

In her study, Lipták points out that the conscious consumer now expects authentic communication from the company - a clear statement of the brand value. In her results, she details that today's companies do not necessarily promote widely accepted values in their CSR communication, and even launch explicitly divisive CSR campaigns [19].

Simor-Szőke examined consumers' attitudes towards responsible companies from a generational perspective. Their quantitative research reveals that Generation X is not very concerned about financial considerations in their purchasing decisions, while Generation Y is. Generation Z is open to issues of social responsibility but has little information. Through targeted communication and education campaigns, companies can raise awareness among young people in this area [20].

This is also the conclusion of Garai-Fodor's research, which suggests that the basic concept of value-based consumer behaviour models also applies to the members of Generation Z under study [21].

In terms of their purchasing preferences, Generation Z consumers not only consider value for money, but also consider the organisation, value or mission they support and the goals they contribute to. [22] The new generation is even willing to pay more for a product if they know that the company whose product or brand they are buying is working for a good cause or donating part of its revenues to support social causes. This sense of social responsibility seems to be already evident among members of Generation Y and has been further reinforced by the values of Generation Z consumers [23], [24].

Not only in purchasing decisions, but also at the level of job choice preferences, Generation Y and increasingly Generation Z show that the CSR practices of a given organisation influence whether they want to work for that company and whether they are committed to that employer. For members of this generation, it is especially true that it is important for them that their workplace carries out socially responsible activities [25], [26], [27], [34].

For these generations, it is also important to stress that they are sensitive to a brand – be it a product, a service or an employer – which is credible, and that social responsibility is not just a communication promise or a slogan, but an actual activity, a value-creating process found at corporate level [28], [29].

## **2 Material and Method**

We conducted a primary quantitative survey in Hungary using a pre-tested, standardised online questionnaire.

Subjects were recruited using an arbitrary sampling technique, resulting in 1852 assessable questionnaires.

The research tool consisted of twenty-two closed questions and two open questions, the latter serving as spontaneous association tests. For the closed questions, single- and multiple-choice selective questions, as well as Likert scales and semantic differential scales were used to analyse consumer attitudes and values. Scaling questions were asked using a scale from 1 to 4. One reason for this is the individual

scale preference of Hungarian respondents: due to the school grading system, Hungarian respondents are the most stable in interpreting the scale up to five as opposed to scales 1-7, 1-9 or 1-10.

And the even scale was chosen because the middle value (3) for the odd (1-5) scale is an escape route for respondents. In the analysis of attitudes, those who choose the middle value do not tip the scales in either direction, resulting in an excessive proportion of "indifferent" consumers, making it difficult to segment them in a statistically and professionally meaningful way. We therefore opted for an odd-numbered scale, which, by excluding the middle value, leads the respondent to take a more rigorous stance, thus contributing more to a successful segmentation [30].

The topics of the research tool were developed as a result of relevant secondary data analysis. Each response alternative – the pre-testing of the research tool – was finalised in the light of qualitative results. Individual interviews were conducted as part of this qualitative research phase. A total of 20 respondents were interviewed using a semi-structured interview schedule for the baseline research. Qualitative sampling was also conducted using an arbitrary method. The mini-focuses were conducted with 3 participants each, in heterogeneous groups according to the socio-demographic characteristics described in the questionnaire. The main objective of the qualitative research was to establish the quantitative research, finalise the standardised questionnaire and outline the research hypotheses.

The topics of the quantitative research tool finalised as a result of the qualitative phase were general perceptions of corporate responsibility, consumer habits and preferences in the light of corporate social responsibility, a values examination and socio-demographic data.

Descriptive statistics, bivariate and multivariate analyses using SPSS 22.0 software were used to process the quantitative results presented in this study. To examine the relationship between the nominal and metric scale scores, one-way analysis of variance (ANOVA) was applied to compare the one-point multiple sample means. The mean of a metric dependent variable was compared between more than two groups. The post-hoc test was conducted to determine which pairs of groups were significantly different. In doing so, significance values were used to determine the existence of correlations ( $\text{sig} \leq 0.05$ ). Internal correlations were analysed along the comparison of group means using the F-statistic, i.e., the coefficient of variance of the means within samples. For questions at the nominal measurement levels, a Chi-square test with Pearson's significance analysis of variance was used for the correlation test. In each case, the internal correlation test for each relationship was conducted on the basis of the adjusted standardised residuals (AdjR), interpreted as follows: AdjR  $\geq 2$ : 95% confidence in the positive direction relative to the expected value; AdjR  $\geq 3$ : 99% confidence in the positive direction relative to the expected value. For a negative sign, the deviation from the expected value is negative for the same value intervals [31].

According to the main socio-demographic characteristics of the sample, the two genders were equally represented in the sample. Respondents aged 16-25 made up 44% of the sample, with the 26-35 age group being the second largest age group at 20%. They were followed by 46-55-year-olds with 14% and 36-45-year-olds with 13%. The proportion of respondents aged 56-65 was 5% and only 3% for those aged 66 and over.

57% of the respondents had a secondary education, 40% had a higher education, 3% had a primary education and 83% of the sample lived in Central Hungary.

In this paper we focus on the partial results of the quantitative phase of our research project. Within this, we will also focus on the generation-specific perception of corporate social responsibility and the analysis of responsible purchasing habits, also in relation to intergenerational differences.

In this paper, we have sought to test the hypotheses underlying the evaluation of the primary results, which are as follows.

The perception of corporate social responsibility is associated with individual age (H1/a) and also with the level of activism for social causes (H1/b).

Social responsibility as reflected in purchasing decisions has generation-specific elements (H2).

### 3 Results

In order to test Hypothesis 1, we analysed the perception of the importance of corporate social responsibility (H1/a) and social cause activity (H1/b) in relation to age.

The perception of the importance of corporate social responsibility has generation-specific elements (H1/a was confirmed) according to the results of the analysis of variance ( $\text{sig} \leq 0.05$ ).

Most of the areas such as public concern against poverty, working conditions, anti-corruption and healthcare were considered more important by respondents aged 56-65 years on sample average and compared to other age groups.

Human rights was the priority area for young people aged 16-25, which is not a surprising result considering the values that characterise this generation.

Education, environment and sustainability were above average for 45-55-year-olds.

We believe that the general values and mindset of this generation are also reflected in the way in which some areas of social responsibility are perceived.

To test Hypothesis H1/b, we analysed whether active involvement in social issues also shows these generation-specific characteristics.

Table 1  
Perception of the importance of corporate social responsibility by area and age

The importance of areas of corporate social responsibility	generations	N	Mean	sig
environmental protection, sustainable development	between 16-25	824	3.60	0.010
	between 26-35	384	3.53	
	between 36-45	240	3.61	
	<b>between 46-55</b>	<b>270</b>	<b>3.66</b>	
	between 56-65	85	3.64	
	over 66	49	3.33	
	Total	1852	3.59	
human rights	<b>between 16-25</b>	<b>824</b>	<b>3.50</b>	0.020
	between 26-35	384	3.35	
	between 36-45	240	3.44	
	between 46-55	270	3.47	
	between 56-65	85	3.48	
	over 66	49	3.27	
	Total	1852	3.45	
fight against poverty	between 16-25	824	3.08	0.001
	between 26-35	384	3.00	
	between 36-45	240	3.20	
	between 46-55	270	3.20	
	<b>between 56-65</b>	<b>85</b>	<b>3.36</b>	
	over 66	49	3.24	
	Total	1852	3.11	
education	between 16-25	824	3.23	0.000
	between 26-35	384	3.21	
	between 36-45	240	3.31	
	<b>between 46-55</b>	<b>270</b>	<b>3.47</b>	
	between 56-65	85	3.42	
	over 66	49	3.33	
	Total	1852	3.28	
anti-corruption	between 16-25	824	3.31	0.040
	between 26-35	384	3.29	
	between 36-45	240	3.45	
	between 46-55	270	3.44	
	<b>between 56-65</b>	<b>85</b>	<b>3.46</b>	
	over 66	49	3.31	
	Total	1852	3.35	
working conditions	between 16-25	824	3.54	0.004
	between 26-35	384	3.43	

health promotion, disease prevention	between 36-45	240	3.54	0.020
	between 46-55	270	3.56	
	<b>between 56-65</b>	<b>85</b>	<b>3.61</b>	
	over 66	49	3.22	
	Total	1852	3.51	
	between 16-25	824	3.54	
	between 26-35	384	3.48	
	between 36-45	240	3.55	0.020
	between 46-55	270	3.62	
	<b>between 56-65</b>	<b>85</b>	<b>3.68</b>	
	over 66	49	3.37	
	Total	1852	3.54	

Source: authors' own research, 2022, N=1852, analysis of variance; One-way Anova

Pearson's significance value (sig=0.02) for the age-specific analysis of active involvement in social affairs indicates that the two variables are not independent (H1 confirmed).

When assessing the internal correlations based on the values of the adjusted standardised residuals, we found that the 45-55 age group showed a higher than expected level of activity in terms of commitment to social causes.

Table 2  
Active involvement in social issues in age-specific contexts

Campaigns for social causes			Age						Total
			between 16-25	between 26-35	between 36-45	between <b>46-55</b>	between 56-65	over 66	
Do you consider it important to be active in social issues? (e.g., protecting the environment, helping the needy...etc.)	yes	Count	692	325	207	247	76	38	1585
		%	43.7%	20.5%	13.1%	15.6%	4.8%	2.4%	100.0%
		Adjusted Residual	-1.8	-0.6	0.3	<b>3.0</b>	1.0	-1.6	
	no	Count	132	59	33	23	9	11	267
		%	49.4%	22.1%	12.4%	8.6%	3.4%	4.1%	100.0%
		Adjusted Residual	1.8	0.6	-0.3	<b>-3.0</b>	-1.0	1.6	
Total		Count	824	384	240	270	85	49	1852
		%	44.5%	20.7%	13.0%	14.6%	4.6%	2.6%	100.0%

Source: authors' own research, Pearson's Chi-square, sig=0.02

In the second hypothesis analysis, we investigated the correlations by age for two lists of statements on shopping behaviour. According to the results of the analysis of variance (sig<= 0.0.5), a significant relationship was found between social responsibility reflected in shopping habits and the age of the individual (H2 confirmed).



Table 3

Generation-specific analysis of the impact of corporate social responsibility on purchasing decisions

Is your purchasing decision influenced by whether a company is socially responsible? (where 1= not at all influenced, 4= fully influenced)		
	N	Mean
between 16-25	824	2.73
between 26-35	384	2.80
between 36-45	240	2.85
between 46-55	270	2.97
<b>between 56-65</b>	<b>85</b>	<b>3.08</b>
<b>over 66</b>	49	2.86
Total	1852	2.82

Source: authors' own research, 2022,  $N=1852$ , analysis of variance; One-way Anova;  $sig= 0.000$

The results show that respondents aged 56-65 are the most likely to admit that they consider the social responsibility of a company as a key factor in their purchasing decisions.

In terms of purchasing preferences, we found that respondents aged 56 and 65+ were more likely to repair broken appliances, to favour local producers and cheaper products, and to make necessity-driven purchases.

The main buyers of Hungarian products, organic products and non-animal products were respondents aged 35-46 years belonging to Generation X, a preference that is not surprising based on the results of our previous research [21] [32] [33].

Table 4

Purchasing patterns in the light of social responsibility in a generational context

Statements on buying habits (where 1= not at all typical, 4= very typical)		N	Mean	sig
I only buy when I need something	between 16-25	824	2.9939	0.000
	between 26-35	384	3.0990	
	between 36-45	240	3.2125	
	between 46-55	270	3.2000	
	<b>between 56-65</b>	<b>85</b>	<b>3.5059</b>	
	above 66	49	3.2449	
	Total	1852	3.1042	
I only buy Hungarian products	between 16-25	824	1.9672	0.000
	between 26-35	384	2.0130	
	<b>between 36-45</b>	<b>240</b>	<b>2.4775</b>	

	between 46-55	270	2.4000	
	between 56-65	85	2.0588	
	above 66	49	2.0735	
	Total	1852	2.1161	
I usually buy organic products	between 16-25	824	1.9333	0.000
	between 26-35	384	1.9505	
	<b>between 36-45</b>	<b>240</b>	<b>2.5567</b>	
	between 46-55	270	1.9926	
	between 56-65	85	2.1294	
	above 66	49	1.5510	
	Total	1852	1.9946	
I only buy animal testing-free brands	between 16-25	824	2.2925	0.050
	between 26-35	384	2.3151	
	<b>between 36-45</b>	<b>240</b>	<b>2.4708</b>	
	between 46-55	270	2.2185	
	between 56-65	85	2.4988	
	above 66	49	2.19	
	Total	1852	2.3224	
I always buy the cheapest product	between 16-25	824	2.2488	0.000
	between 26-35	384	2.1458	
	between 36-45	240	2.2542	
	between 46-55	270	2.1481	
	between 56-65	85	2.5176	
	<b>above 66</b>	<b>49</b>	<b>2.6531</b>	
	Total	1852	2.2365	
I have my broken appliances repaired	between 16-25	824	2.8228	0.000
	between 26-35	384	2.7552	
	between 36-45	240	2.9667	
	between 46-55	270	2.9111	
	between 56-65	85	3.1529	
	<b>above 66</b>	<b>49</b>	<b>3.1633</b>	
	Total	1852	2.8645	
I try to buy from local producers	between 16-25	824	2.4466	0.000
	between 26-35	384	2.5078	
	between 36-45	240	2.8333	
	between 46-55	270	2.8778	
	between 56-65	85	3.0000	
	<b>above 66</b>	<b>49</b>	<b>3.0408</b>	
	Total	1852	2.6134	

Source: authors' own research, 2022, N=1852, analysis of variance, One-way Anova

## Summary

Based on the results of a primary data collection, the study investigated whether the perception of corporate social responsibility and the impact of corporate social responsibility on consumer behaviour have generation-specific elements. The research used a pre-tested standardised online questionnaire. Self-sampling resulted in 1852 evaluable questionnaires. The results show that the perception of corporate social responsibility is related to the age of the individual (H1/a), which is also true for the level of activism in social causes (H1/b). Social responsibility in purchasing decisions is also found to have generational elements (H2).

We believe that the issue of social responsibility is not perceived in the same way between age groups. The generation-specific elements that characterise them are reflected both in the corporate social responsibility activity and in the impact of social responsibility on purchasing decisions.

We conclude that the general characteristics of the values and attitudes of each generation can be used as segmentation cognitions for the assessment of social responsibility.

Based on the results, we consider that differentiation may be a good solution for campaigns promoting social issues, which address individuals taking into account the generation-specific characteristics of the target group instead of standardised messages.

One limitation of the research is the sampling procedure, which only provides results valid for a selected sample. In the continuation of this research, we would like to carry out an international sample to investigate cultural specificities in more depth and with a particular focus on Western Europe, which is at the forefront of conscious behaviour. We believe that this would provide an opportunity to conduct a comprehensive analysis of the links between awareness and cultural values, which could provide an even more comprehensive understanding of the values and purchasing behaviour of Generation Z.

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# Forecasting Economic Growth with V4 Countries' Composite Stock Market Indexes – a Granger Causality Test

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*Abstract: In this paper, the findings from the previous work: “Forecasting economic growth with the BUX composite stock market index – a Granger causality test” are validated for the remaining countries in the Visegrád 4 Group. The role of the stock market, as a composite leading indicator of an economic cycle, has been subject to scrutiny, since the late 60s. This research builds on previous work involving stock market recession forecasting capabilities, with reasoning as to the choice of the specific composite stock indexes. As a means of revisiting the concepts, the methodologies, and the findings of previous works in this research field, the algorithm introduced in the first part of the research is further applied to the composite stock market log-returns indicators and the GDP growth rates of the Visegrád 4 group countries. The quarterly data from the stock indexes (PX, SAX, and WIG) are from the second quarter of 1995 through the second quarter of 2021 - comprising 86 observations over 26 years. We apply the ADF and the KPSS tests to test stationarity. An OLS regression test is performed, whereby, the lagged coefficients and their significance in the model are determined. Finally, a Granger causality test is run, to determine whether the stock indexes of the V4 group are helpful in predicting GDP declines within the economies in question. The research finds that changes in the Polish, Slovakian and Czech GDP, directly affect the immediate changes in the WIG, SAX, and PX composite stock indexes, correspondingly, in a expected way.*

*Keywords: economic growth; stock market; leading indicators; composite stock market index; efficient market hypothesis; johansen cointegration test; stationarity testing; autoregressive distributed lag model; granger causality*

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## 1 Introduction

It has been established in the first part of this work [1] that leading indicators are often used in predicting future economic conditions. The efficient market hypothesis is the underlying theoretical basis for this research, which states that security markets are efficient in reflecting all available information in equity and debt instrument prices. It introduces the idea that essentially beating the stock

market is impossible in the long run since at best, the returns will be in line with the market or with a composite stock index.

Evidence from the previous research indicates that Moore and Shiskyn's [2] criteria for determining whether an indicator can be used in forecasting recessions efficiently do hold. The selection criteria support the transparency, wide availability, and precision of stock prices as an economic indicator of a country's financial condition. The 2<sup>nd</sup> and 3<sup>rd</sup> criteria for determining if an indicator can be considered worthy of consideration in an early warning system show that both statistical frequency and conformity to business cycles are present in a composite stock market indicator, and therefore provide strong support to the argument that the stock market is a leading economic indicator [3].

Economic indicators are classified into leading and lagging indicators. Future economic condition forecasting is conducted through the analysis of leading indicators. Per Comincioli, stocks reflect the future earnings potential of companies and therefore are showing which direction the economy is headed in terms of company profitability and therefore tax revenue [4].

It is essential to understand that because of the strong interconnectedness of the stock market and the economy – practically a direct relationship – this means that the market value of a company (conventionally calculated by the sum of all of its outstanding shares) signifies both the credit of the investors and the confidence of the consumers in the business and hence the economy. It's difficult to imagine a rational consumer spending hard-earned dollars on shares of a company during tightening monetary policy as a means of countering the effects of an impending recession.

The objective of the research is to evaluate the composite stock indexes of V4 group countries the Prague Stock exchange (PX), the Warsaw stock exchange (WIG), and the Slovakian stock index SAX for their capabilities as recession forecasting leading indicators through an algorithm developed by the authors. Firstly, the research proposes building a regression model of the individual countries' GDP on past values of its stock indexes, whereby through determining the lagged coefficients the forecasting power of the index is evaluated in a given timeframe. The Granger Causality Test will show if past values of the PX, WIG, and the SAX are useful in predicting values of the Czech, Polish, and Slovakian GDP growth rates.

The rest of the research is organized the following way. The literature review presents the influence of variability on the stochastic dynamics of the stock market and highlights three pillars based on which stock markets predict a recession. The third chapter presents the methodology akin to the one presented in the first part of the paper. The fourth section presents how the data was procured, cleaned, and operated on. The fifth section presents the results of the Czech, Polish and Slovak stock indexes' relationship with their respective GDP growth percentage through the application of the Granger causality test. Lastly, the sixth presents a discussion and the seventh and final section, presents a summary.



## 2 Literature Review

Testing the relationship between the stock market and the economy has been the subject of thorough investigation, beginning in the late 80s, of the 20<sup>th</sup> Century. These seminal works included those of Campbell [5], Madhavi and Sohrabian [6] and Peek and Rosengreen [7]. It has been widely known that recessions are generally preceded by significant declines in stock prices that result in bear markets sometimes the stock market generated false recession signals, while sometimes the recession came without a signal from the stock market whatsoever. Evidence of this can be found in Peek and Rosengreen's assessment. While Shapiro [8] points out that there was no reduction in variance between pre-World War I stock prices and post-World War II period prices, essentially indicating that the nature of the stock markets dynamics hasn't changed, rather the opposite, the variances in fundamentals have increased, rendering the stock market forecasting ineffective, Barro [9] ascertains that when stock index changes predict economic slowdowns instead of recessions, suddenly, three out of five signals are examined. From 1926 to 1987, eight out of nine recessions have been successfully predicted through the stock market indicator.

Three major conclusions can therefore be made, the first is: (i) Shapiro empirically proved that the nature of stochastic dynamics hasn't changed in the stock market, rather the opposite, the number of shocks and their magnitude increased, while their length decreased, indicating that the possibility of more false signals statistically increases. The variance between fundamentals and the performance of stocks has also been raising questions on how correctly are assets priced in the market.

Second, (ii) Pearce [10] finds overwhelming evidence on stocks successfully forecasting recessions and also provides theoretical support – the price of a stock being the discounted present value of all of the dividends earned by the investor whilst holding the security, factoring in corporate earnings of an inherently forward-looking asset class, it becomes trivial to regard the stock market as a leading economic indicator. Further evidence presented by Pearce includes Keynesian psychological elements, consumption decisions, and their causal connection with stock prices and the wealth effect. In support, Bosworth [11] presented an additional behavioral hypothesis comingled with wealth variables that assume causality between the stock market and the economy.

Third (iii) and finally, concrete and quite recent empirical evidence by Levine and Zervos [12] and Mauro [13] using the data from over 47 countries show an overwhelming amount of evidence of a positive correlation between stock market development and long-term economic growth. In the paper of [14], Lastly, by abstracting from previous empirical studies, and approaching the topic from a statistical standpoint – the research, as stated in its first part, proposes the full algorithm with an autoregressive distributed lag model, additional tests for cointegration, and autocorrelation, concluding in the Granger causality test.

The reason the Granger test is adopted concerns the fact that it can define causality bi-directionally. There is little to no empirical evidence of the stock markets and the economic relationship in the V4 group. Therefore, this study aims to test the relationship between the V4 economies and their respective stock markets.

### 3 Material and Method

This study evaluates the composite stock market index of Visegrad group countries by empirically testing for causality and cointegration, similarly to Sayed [15], Ikoku [16], and Comincioli and the previous research authors. The introduction and the literature review present the concept of the efficient market hypothesis – an idea that states that all past present and future information on earnings is already priced in the value of a share, as well as that all market participants have the same access to the information [17]. This is the theoretical background for deeming the stock market as an efficient leading economic indicator. The quarterly alert mechanism report issued by the IMF for individual countries has a number of disadvantages ranging from a mechanistic approach to economic indicator selection and the early warning system being too general in identifying potential areas of weakness in the economy.

The previous part of the research highlighted evidence on the ability and inability of stock movements to predict recessions. In this research, a more conclusive and assertive definition of a recession is introduced and evaluated for the rest of the V4 group countries. A Granger causality test in a nondeterministic continuously stochastic system is therefore implemented to determine if the V4 countries' individual stock markets are able to predict GDP growth downturns.

The algorithm, schematically defined in the previous research consists of seven logical steps, integral to the Granger causality test:

- (i) Gathering the data
- (ii) A visual inspection of the data for the presence of a trend, cyclicity and seasonality
- (iii) Testing for stationarity – determining if the time series contains a unit root
- (iv) Performing a normalization or a log transformation, of the time series, making it stationary around the mean, by Hassler [18]
- (v) Running the OLS regression test within the autoregressive distributed lag model to determine the coefficients of the lags
- (vi) Johansen cointegration test – to determine if a long-run relationship exists between the individual time series
- (vii) Performing the Granger Causality test

As in the previous work, we consider a stationary stochastic process. Both the ADF and the KPSS tests, described in detail in the latter part of the research are to determine whether the time series is stationary, we compute the Augmented Dickey-Fuller (ADF) test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test as a means of getting two independent answers. A more detailed explanation of stationarity and its testing methodologies is provided in the subsequent chapters of this research.

To make inferences based on statistical computations, the Czech, Polish, and Slovakian GDP percentage change, the time series is regressed on the composite stock indexes of the respective countries back up to 4 quarters. Similarly, to the previous research, the number of lags was chosen to avoid variable bias.

The model for the autoregressive distributed lag test is specified below:

$$GDP = \alpha + \beta_0 StockMarket_t + \beta_1 StockMarket_{t-1} + \dots + \beta_4 StockMarket_{t-4} \quad (1)$$

The OLS regression will show which  $\beta$  is statistically significant and will enable to determine a reasonable approximation of a lagged stock variable's ability to predict the value of the GDP. The application of the Johansen cointegration test from the perspective of determining autocorrelation between two nonstationary timeseries is superfluous. The assessment is in scope of proving or disproving the existence of a long-term relationship equilibrium between the stock market indicator and the corresponding GDP indicator, as well as finding if a stochastic trend exists between the variables.

In 1956 Wiener [19] introduces causality and Granger [20] introduces a feedback loop that shows causal relationships between two time series. Following Granger, if the past values of  $Y_t$  can predict  $X_t$ , then  $Y_t$  causes  $X_t$ . The novelty of Granger's work lies in the perception of causality as precedent of information. Granger defines  $U$  as all of the information accumulated since time  $t - 1$ , and therefore states, that causality is  $\sigma^2(X|U) < \sigma^2(X|\overline{U} - \overline{Y})$ , where  $Y$  is causing  $X$ . The test also checks if adding the lagged values of  $X_t$  improves the predictive power  $Y_t$ .

The research ascertains if the V4 stock indexes actually cause changes in the V4 group countries individual GDP growth rates (Stock market  $\rightarrow$  GDP).

The models for the Granger causality test are specified below:

$$GDP = \sum_{i=1}^n \alpha_i StockMarket_{t-i} + \sum_{i=1}^n \beta_j GDP_{t-i} + u_{1t} \quad (2)$$

$$StockMarket = \sum_{i=1}^n \lambda_i GDP_{t-i} + \sum_{i=1}^n \delta_j StockMarket_{t-i} + u_{2t} \quad (3)$$

The regressions in equations 2 and 3 show that the variables are related to the past values of themselves, as well as the OAST values of the time series they are tested against.

As defined in the previous part of the research, in order to perform the Granger Causality Test the time series must be stationary, the lags must be justified by the Akaike information criterion and the error terms must be tested for independence.

The methodology follows Gujarati's [21] definitions. The algorithm runs in four steps. First, a regression is run on the individual GDP time series, where the current GDP data are regressed on their own lagged values, thereby obtaining the restricted residual sum of squares. Next, the same procedure is performed on the stock market variable, whereby the unrestricted residual sum of squares is obtained. *Then, the null hypothesis is declared,  $H_0: \sum \alpha_i = 0$ , which states that since lagged stock market variables cannot predict the economy and therefore don't belong in the regression.*

The hypothesis is tested in the next step through the following  $F$  test (Equation 4), where  $m$  is the number of lagged stock market terms, and  $n - k$  is the degrees of freedom

$$F = \frac{\frac{(RSS_R - RSS_{UR})}{m}}{\frac{RSS_{UR}}{n - k}} \quad (4)$$

Lastly, the  $F$  statistic is compared to critical values of 95%, and inferences are made.

## 4 Preparing the Data

The PX, WIG, and SAX index time series going back until Q3 1995 have been obtained from marketwatch.com. The GDP data on the aforementioned countries were obtained from the IMF data warehouse. Both seasonal and trend adjustments were performed on the GDP data, however, it was unsuccessful in removing the unit root from the time series.

The skewness of the data is removed by the application of the following transformation:  $S_t = \frac{P_t - P_{t-1}}{P_t}$  and  $S_t = \ln(P_t) - \ln(P_{t-1})$ . This allows to normalize the values, so that they move between 1 and -1 [22]. Patterns can therefore be investigated through inferential statistics. The data from PX represents the fifty biggest companies in the Czech Republic. The WIG index consists of a portfolio of 23 companies that operate in most Eastern and Western European countries, and therefore have big exposure to the economies of other European nations. The SAX Slovakian stock exchange listed on the Bratislava stock exchange has the smallest basket of domestic companies – only 4. Real economic activity is reflected in the

GDP growth rate, and therefore, the research utilizes the concept of going forward as the independent variable.

The data are of the same frequency and the number of observations is 86 – spanning 26 years from 1995 quarter 3 to 2021 quarter 2.

## 5 Results

### 5.1 Testing for Stationarity

The previous part of this research introduced the concept of stationarity and showed why non-stationary data could yield spurious results in research. When a time series is stationary, its statistical properties do not change over time. It would be mathematically incorrect to continue this research with the raw data presented by the IMF website. Therefore, the research proposes the utilization of both the ADF and the KPSS tests to determine whether the time series is stationary. Homoskedasticity can't capture or model the errors present in univariate systems according to Phillips [23] and therefore, they aren't considered random walks.

Within the scope of this research, the Augmented Dickey-Fuller (ADF) [24] and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests are considered. Once both of the tests show supporting results in favor of the time series being stationary, it will be safe enough to assume that neither of the time series contain a unit root. Both the ADF and the KPSS test have the null hypothesis  $H_0$  = the series has a unit root.

The outputs of the ADF test are presented in the tables below.

Table 1  
ADF tests of PX and Czech GDP time series

ADF Statistic: -8.572425 p-value: 0.000000 Critical Values: 1%: -4.067 Reject $H_0$ - Time Series is Stationary	ADF Statistic: -9.461101 p-value: 0.000000 Critical Values: 1%: -4.068 Reject $H_0$ - Time Series is Stationary
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Source: Authors research and own compilation,

Table 2  
ADF tests of SAX and Slovakian GDP time series

ADF Statistic: -7.917281 p-value: 0.000000 Critical Values: 1%: -4.049	ADF Statistic: -7.825711 p-value: 0.000000 Critical Values: 1%: -4.049
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Reject Ho - Time Series is Stationary	Reject Ho - Time Series is Stationary
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Source: Authors research and own compilation,

Table 3

ADF tests of WIG and Poland GDP time series

ADF Statistic: -9.783205 p-value: 0.000000 Critical Values: 1%: -4.049 Reject Ho - Time Series is Stationary	ADF Statistic: -8.892660 p-value: 0.000000 Critical Values: 1%: -4.067 Reject Ho - Time Series is Stationary
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Source: Authors research and own compilation

Tables 1-3 display the results of the ADF test on the log returns of the Prague, Warsaw, and Slovakian stock indexes as well as the respective GDPs of the countries. Both the log-transformation of stock returns and the normalization of the GDP growth rate have proven to be successful in eliminating the unit root. Since the ADF test statistic doesn't reach the predetermined thresholds, it can therefore be concluded that in all of the cases the time series are stationary.

The reason why there are two stationarity tests involved in this research is that, according to Perron [25], ADF tests may not be fully powerful enough on their own to reject the null hypothesis and are required to be supplemented with a test that takes into the consideration a broken linear trend. The KPSS test accounts for structural breaks that may happen cyclically over specific dates. The left side of the table represents the stock indexes test statistic, while the right-hand shows the GDP time series.

Table 4

KPSS test of PX and Czech GDP time series

KPSS 0.10222623455544386 p-value: 0.1 num lags: 3 Critical Values: 10% : 0.347 5% : 0.463 2.5% : 0.574 1% : 0.739 Result: The series is stationary	Statistic: KPSS 0.2787832590461547 p-value: 0.1 num lags: 1 Critical Values: 10% : 0.347 5% : 0.463 2.5% : 0.574 1% : 0.739 Result: The series is stationary
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Source: Authors research and own compilation

The log transformation of the data has evidently improved the degree of stationarity of the data. While the unadjusted data had a linear trend, a seasonality, and a random walk. The elimination of these variances through the application of a log transformation has been successful.

Table 5  
KPSS test of SAX and Slovakia GDP time series

KPSS 0.2787832590461547 p-value: 0.1 num lags: 1 Critical Values: 10% : 0.347 5% : 0.463 Result: The series is stationary	Statistic:	KPSS 0.3155400898580037 p-value: 0.03816 num lags: 3 Critical Values: 10% : 0.347 5% : 0.463 Result: The series is stationary	Statistic:
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Source: Authors research and own compilation

Table 6  
KPSS test of WIG and Poland GDP time series

KPSS 0.10281641482077652 p-value: 0.1 num lags: 1 Critical Values: 10% : 0.347 5% : 0.463 Result: The series is stationary	Statistic:	KPSS 0.3921942922366165 p-value: 0.08051970162214805 num lags: 3 Critical Values: 10% : 0.347 5% : 0.463 Result: The series is stationary	Statistic:
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Source: Authors research and own compilation

Kwiatkowski et. al. [26] use parametrization and propose the Lagrange multiplier as a means of testing the null hypothesis for stationarity. The data generating process is taken as the basis for the test. The KPSS is most commonly used to verify the results of the ADF test and is both easy in understanding and essential in a full stationarity test.

To ensure that the data are stationary, the authors of the research performed the normalization of the GDP data, as well as a log-transformation of the stock returns.

The KPSS test affirms the results of the ADF test. All of the time series is stationary. A time series that doesn't have any long or short-term correlations with its values and that doesn't show any trends is close to a random set of observations. It is important to have tested the time series for cointegration, as it might also yield spurious results in the further steps of the Granger Causality test.

## 5.2 Testing the Relationship between Stock Prices and the Economy with an Autoregressive Distributed Lag Model

The PX, SAX, and WIG stock indexes are regressed to the individual countries' GDP growth rates to determine whether there exists a relationship between the variables. The null hypothesis states that the individual stock indexes' effect on the

GDP growth rate is zero. The variables are lagged back to four quarters to see how accurate is the model's movements compared to actual observations. The reason why the model looks back four quarters is also that it is within the scope of this study to determine whether a pattern of moves in the stock market could signal a move in the GDP one year in advance.

The results of the OLS regression are detailed in the tables below. The stationarity of the variables was a natural prerequisite of this test. A large F-statistic corresponds to a more significant degree of correlation. The null hypothesis states that the regression coefficients are zero. The test attempts to determine if the alternative hypothesis holds. The closer the regression coefficients are to zero, the better the model is. The table represents the model introduced in the methodology of the previous work. The coefficients along with the standard error, the t-statistic, and the p-value are displayed corresponding to the lag they represent. This is to determine the degree of accuracy of the stock markets' reaction to GDP changes. The program also outputs some additional information on the accuracy of the model. The homoscedasticity and the distribution of the residuals can both be interpreted from the results.

Table 7  
OLS regression analysis for PX and CZGDP

OLS Regression Results						
Dep. Variable: CZGDP			R-squared: 0.231			
Adj. R-squared: 0.181						
F-statistic: 4.622						
Prob (F-statistic): 0.000967						
Log-Likelihood: 232.61						
No. Observations: 83			AIC: -453.2			
Df Residuals: 77			BIC: -438.7			
	coef	std err	t	P> t	[0.025	0.975]
Intercept	0.0102	0.002	6.045	0.000	0.007	0.014
lag(PX, 0)	-0.0028	0.015	-0.181	0.857	-0.034	0.028
lag(PX, 1)	0.0588	0.015	3.871	0.000	0.029	0.089
lag(PX, 2)	-0.0114	0.015	-0.775	0.441	-0.041	0.018
lag(PX, 3)	0.0253	0.015	1.714	0.091	-0.004	0.055
lag(PX, 4)	0.0262	0.015	1.775	0.080	-0.003	0.056
Omnibus:	35.482		Durbin-Watson:		2.047	
Skew:	-1.094		Prob(JB):		2.26e-41	
Kurtosis:	10.024		Cond. No.		9.98	

Source: Authors research and own compilation



The change in the log returns of the PX Czech stock index can explain 23.1% of the change in the GDP. The PX has been found to be positively related to the Czech GDP when lagged back as much as three quarters. Judging by the p-value, the PX lagged back one quarter is statistically significant at the 0.01 level, since  $P > |t|_{PX,1} = 0.000$ . The values of the third and fourth quarters are both statistically significant at the 0.1 level.

Another statistic of interest would be the Durbin-Watson statistic, indicating the value of 2.047, which means that there was no autocorrelation detected in the sample.

Thus, we are able to define the equation for the Czech GDP, expressed as:

$$CZGDP = 0.010 - 0.002PX_t + 0.058PX_{t-1} - 0.011PX_{t-2} + 0.025PX_{t-3} + 0.026PX_{t-4}$$

The above equation's interpretation is given by the following assessments:

1. An increase in the Czech GDP will result in an immediate increase of PX by 1% and other things equal
2. An increase in the PX by 5.8% in the next quarter

Table 8

OLS regression analysis for SAX and SGDP

OLS Regression Results						
Dep. Variable:	SGDP		R-squared:	0.084		
Adj. R-squared:	0.035					
F-statistic:	1.717					
Prob (F-statistic):	0.138					
Log-Likelihood:	223.32					
No. Observations:	99		AIC:	-434.6		
Df Residuals:	93		BIC:	-419.1		
	coef	std err	t	P> t	[0.025	0.975]
Intercept	0.0166	0.003	6.267	0.000	0.011	0.022
lag(SAX, 0)	0.0321	0.028	1.165	0.247	-0.023	0.087
lag(SAX, 1)	0.0459	0.028	1.641	0.104	-0.010	0.101
lag(SAX, 2)	0.0111	0.027	0.406	0.686	-0.043	0.065
lag(SAX, 3)	0.0240	0.027	0.879	0.382	-0.030	0.078
lag(SAX, 4)	0.0045	0.027	0.168	0.867	-0.048	0.057
Omnibus:	12.374		Durbin-Watson:	1.545		
Skew:	-0.265		Prob(JB):	9.19e-08		
Kurtosis:	5.752		Cond. No.	12.5		

Source: Authors research and own compilation

The SAX Slovak stock market index was found to have one of the weakest correlations with the economy, with the SAX only being able to explain less than 8.4% of the change in Slovak GDP. The probability that the coefficients determined in the table below have a zero effect on the model is 13.8%, which is higher compared to Czech Republic and Hungary. The coefficient corresponding to the 1-quarter lag was barely statistically significant at the 0.1 percent level, with  $P > |t|_{pX,1} = 0.104$  the rest of the coefficients have little to no statistical significance in the model. The Durbin Watson statistic shows 1.545, indicating little to no autocorrelation.

The Slovak GDP model is expressed as follows:

$$SGDP = 0.016 + 0.032SAX_t + 0.045SAX_{t-1} + 0.111SAX_{t-2} + 0.024SAX_{t-3} + 0.0045SAX_{t-4}$$

There was hardly a coefficient to be found in the output that was of a statistical significance in the model. This implies that the Statistical inferences based on this model are weaker than the others, nevertheless, since stock prices are positively related to the economy, we proceed with the examination of this particular model. We therefore conclude the following:

1. An increase in the percentage change of the Slovak GDP will immediately result in an increase of SAX by 1.6%
2. An increase of the SAX index by 4.5% in the following quarter

Table 9  
OLS regression analysis for WIG and PGDP

OLS Regression Results						
Dep. Variable:		PGDP		R-squared:		0.081
Adj. R-squared:		0.032				
F-statistic:		1.646				
Prob (F-statistic):		0.155				
Log-Likelihood:		263.82				
No. Observations:		99		AIC:		-515.6
Df Residuals:		93		BIC:		-500.1
	coef	std err	t	P> t	[0.025	0.975]
Intercept	0.0088	0.002	5.009	0.000	0.005	0.012
lag(SAX, 0)	0.0013	0.014	0.090	0.928	-0.027	0.030
lag(SAX, 1)	0.0366	0.014	2.555	0.012	0.008	0.065
lag(SAX, 2)	-0.0016	0.014	-0.111	0.912	-0.030	0.027
lag(SAX, 3)	0.0075	0.014	0.555	0.580	-0.019	0.034
lag(SAX, 4)	0.0162	0.014	1.197	0.234	-0.011	0.043
Omnibus:	49.272		Durbin-Watson:		2.692	

Skew:	-1.170	Prob(JB):	7.65e-115
Kurtosis:	14.042	Cond. No.	8.45

Source: Authors research and own compilation

The WIG log returns have shown the weakest explanatory capabilities in the variation of the PGDP dependent variable from the perspective of the R-squared statistic – an 8.1% value. There is an 84.5% chance that the effect of the coefficients on the model is nonzero, given by the Probability F-statistic. The coefficient corresponding to the 1-quarter lag was the only one to have been found to be statistically significant at the 0.05 level, with the p-value being 0.012.

The Durbin-Watson statistic shows a value of 2.69 indicating some negative autocorrelation. We define the Poland GDP model as follows:

$$PGDP = 0.088 + 0.001WIG_t + 0.036WIG_{t-1} - 0.0016WIG_{t-2} + 0.007WIG_{t-3} + 0.016WIG_{t-4}$$

We interpret the findings as follows:

1. An increase in Poland's GDP will result in an immediate 8.8% increase of WIG, and, other things equal
2. An increase of WIG by 3.6% in the following quarter

### 5.3 Johansen Cointegration Test

To find whether V4 stock indexes have a long-run relationship with the economies, the Johansen cointegration test is performed. To understand the output from the Python IDE, two key components must be taken into consideration: the maximum eigenvalue statistic and the trace statistic. The former shows the extent of the cointegration of the time series and the likelihood of their mean reversion. The null hypothesis is rejected if the matrix rank is greater than the confidence value at 95%.

The test is run on PX, SAX, and the WIG stock market indexes and the corresponding GDPs.

Table 10

Johansen cointegration test of PX log returns and CZGDP

```
max_eig_stat trace_stat
r<0 25.305611 33.369268
r<1 8.063657 8.063657
CV(90%, 95%, 99%) of max_eig_stat
[[ 9.4748 11.2246 15.0923]
 [ 2.9762 4.1296 6.9406]]
CV(90%, 95%, 99%) of trace_stat
[[10.4741 12.3212 16.364 ]
 [ 2.9762 4.1296 6.9406]]
```

Source: Author's research. Own compilation

Table 11  
Johansen cointegration test of SAX log returns and SGDP

max_eig_stat	trace_stat
r<0	18.543911 28.282130
r<1	9.738219 9.738219
CV(90%, 95%, 99%) of max_eig_stat	
	[[ 9.4748 11.2246 15.0923]
	[ 2.9762 4.1296 6.9406]]
CV(90%, 95%, 99%) of trace_stat	
	[[10.4741 12.3212 16.364 ]
	[ 2.9762 4.1296 6.9406]]

Source: Author's research. Own compilation

Table 12  
Johansen cointegration test of WIG log returns and PGDP

max_eig_stat	trace_stat
r<0	33.273549 48.053206
r<1	14.779656 14.779656
CV(90%, 95%, 99%) of max_eig_stat	
	[[ 9.4748 11.2246 15.0923]
	[ 2.9762 4.1296 6.9406]]
CV(90%, 95%, 99%) of trace_stat	
	[[10.4741 12.3212 16.364 ]
	[ 2.9762 4.1296 6.9406]]

Source: Author's research. Own compilation

In the case of Hungary, we observe the trace statistic to be 42.137, therefore we reject the null hypothesis, meaning that the sum of the eigenvalues is 0. This implies that the BUX and HUGDP time series are cointegrated. We similarly reject the null hypothesis of the trace statistic for the PX and CZGDP time series and assert that they are cointegrated as well. At 28.28, the Slovak SAX index exceeds the 99% critical value, allowing us to assert that SAX log returns and SGDP percentage change are cointegrated. The case is the same for WIG log-returns and PGDP - the time series are cointegrated, based on the trace statistic.

## 5.4 Granger Causality Test

Similarly, to the previous research, the Granger causality test is performed by lagging the stock market variable by 1 quarter. The null hypothesis is rejected in case the results show that the individual V4 stock indexes Granger Cause the GDP.

The tables below show the number of lags used in finding causality, the F-test shows if the lagged values of the *StockMarket* variable improve the forecast of *GDP*.

Table 13  
PX log returns and Czech Republic GDP time series Granger Causality test results

Granger Causality 1 -lag	
ssr based F test:	F=0.0312 , p=0.8602 , df_denom=82, df_num=1
ssr based chi2 test:	chi2=0.0324 , p=0.8572 , df=1
likelihood ratio test:	chi2=0.0324 , p=0.8572 , df=1
parameter F test:	F=0.0312 , p=0.8602 , df_denom=82, df_num=1
Granger Causality – 2 lags	
ssr based F test:	F=7.3769 , p=0.0012 , df_denom=79, df_num=2
ssr based chi2 test:	chi2=15.6877 , p=0.0004 , df=2
likelihood ratio test:	chi2=14.3829 , p=0.0008 , df=2
parameter F test:	F=7.3769 , p=0.0012 , df_denom=79, df_num=2
Granger Causality – 3 lags	
ssr based F test:	F=5.7609 , p=0.0013 , df_denom=76, df_num=3
ssr based chi2 test:	chi2=18.8746 , p=0.0003 , df=3
likelihood ratio test:	chi2=17.0069 , p=0.0007 , df=3
parameter F test:	F=5.7609 , p=0.0013 , df_denom=76, df_num=3
Granger Causality – 4 lags	
ssr based F test:	F=5.3591 , p=0.0008 , df_denom=73, df_num=4
ssr based chi2 test:	chi2=24.0793 , p=0.0001 , df=4
likelihood ratio test:	chi2=21.1123 , p=0.0003 , df=4
parameter F test:	F=5.3591 , p=0.0008 , df_denom=73, df_num=4

Source: Author's research. Own compilation

As it can be observed in the above table, in case of the Czech time series, the F-statistics are significant for lagged quarters 2 – 5. Therefore, for these lags we reject the null hypothesis that PX does not Granger cause CZGDP. For lag 1, we accept the null hypothesis. Lag 2, is associated with the highest F-statistic.

Table 14  
WIG log returns and Poland GDP time series Granger Causality test results

Granger Causality -1 lag	
ssr based F test:	F=1.1463 , p=0.2869 , df_denom=99, df_num=1
ssr based chi2 test:	chi2=1.1811 , p=0.2771 , df=1
likelihood ratio test:	chi2=1.1743 , p=0.2785 , df=1
parameter F test:	F=1.1463 , p=0.2869 , df_denom=99, df_num=1
Granger Causality -2 lags	
ssr based F test:	F=0.2789 , p=0.7572 , df_denom=96, df_num=2
ssr based chi2 test:	chi2=0.5869 , p=0.7457 , df=2
likelihood ratio test:	chi2=0.5852 , p=0.7463 , df=2
parameter F test:	F=0.2789 , p=0.7572 , df_denom=96, df_num=2
Granger Causality-3 lags	
ssr based F test:	F=1.7401 , p=0.1642 , df_denom=93, df_num=3
ssr based chi2 test:	chi2=5.6132 , p=0.1320 , df=3
likelihood ratio test:	chi2=5.4613 , p=0.1410 , df=3
parameter F test:	F=1.7401 , p=0.1642 , df_denom=93, df_num=3

## Granger Causality -4 lags

ssr based F test:  $F=2.0134$  ,  $p=0.0993$  ,  $df\_denom=90$ ,  $df\_num=4$ ssr based chi2 test:  $chi2=8.8592$  ,  $p=0.0647$  ,  $df=4$ likelihood ratio test:  $chi2=8.4849$  ,  $p=0.0753$  ,  $df=4$ parameter F test:  $F=2.0134$  ,  $p=0.0993$  ,  $df\_denom=90$ ,  $df\_num=4$ 

Source: Author's research. Own compilation

As for the WIG's and the PGDP's Granger causality test, we can observe that the p-values are statistically significant only at 5 lags. If more lags were added, the influence of WIG on the GDP would increase.

Table 15

WIG log returns and Poland GDP time series Granger Causality test results

## Granger Causality -1 lag

ssr based F test:  $F=3.7945$  ,  $p=0.0543$  ,  $df\_denom=99$ ,  $df\_num=1$ ssr based chi2 test:  $chi2=3.9095$  ,  $p=0.0480$  ,  $df=1$ likelihood ratio test:  $chi2=3.8364$  ,  $p=0.0502$  ,  $df=1$ parameter F test:  $F=3.7945$  ,  $p=0.0543$  ,  $df\_denom=99$ ,  $df\_num=1$ 

## Granger Causality -2 lags

ssr based F test:  $F=2.8040$  ,  $p=0.0655$  ,  $df\_denom=96$ ,  $df\_num=2$ ssr based chi2 test:  $chi2=5.9002$  ,  $p=0.0523$  ,  $df=2$ likelihood ratio test:  $chi2=5.7343$  ,  $p=0.0569$  ,  $df=2$ parameter F test:  $F=2.8040$  ,  $p=0.0655$  ,  $df\_denom=96$ ,  $df\_num=2$ 

## Granger Causality -3 lags

ssr based F test:  $F=1.6900$  ,  $p=0.1745$  ,  $df\_denom=93$ ,  $df\_num=3$ ssr based chi2 test:  $chi2=5.4517$  ,  $p=0.1416$  ,  $df=3$ likelihood ratio test:  $chi2=5.3083$  ,  $p=0.1506$  ,  $df=3$ parameter F test:  $F=1.6900$  ,  $p=0.1745$  ,  $df\_denom=93$ ,  $df\_num=3$ 

## Granger Causality -4 lags

ssr based F test:  $F=1.3185$  ,  $p=0.2692$  ,  $df\_denom=90$ ,  $df\_num=4$ ssr based chi2 test:  $chi2=5.8015$  ,  $p=0.2145$  ,  $df=4$ likelihood ratio test:  $chi2=5.6379$  ,  $p=0.2279$  ,  $df=4$ parameter F test:  $F=1.3185$  ,  $p=0.2692$  ,  $df\_denom=90$ ,  $df\_num=4$ 

Source: Author's research. Own compilation

At 2 lags a statistical significance exists between the causal relationship of the SAX and SGDP at the 0.1 level, with the p-value being 0.0655.

## 6 Discussion

The goal of this research was to examine if a composite stock market index can predict the economy through an intrinsic assertive algorithm involving a stationarity test, a distributed lag analysis, a cointegration test, and finally, a granger causality test. Similar to the previous research, the lags were chosen based on the Akaike Information Criterion, and the results were computed in the Python IDE.

The data was retrieved from the IMF data warehouse and the member countries' official stock exchange websites. Following a log transformation of the data, it was tested for stationarity, which it passed. The coefficients obtained from the OLS regression have been fitted to a model that predicts GDP changes from lagged stock market returns. It has been found that the lagged coefficients of WIG were the least reliable in explaining the changes in the PGDP, nonetheless, based on the t-statistic, it was concluded that a relationship does exist. The Johansen cointegration test proved that there exists a long-run relationship between the composite stock indexes and the GDPs of V4 economies. Stock prices lead to economic growth do not Granger cause the economy. The Granger causality tests showed that there exists a causality between the composite stock indexes and the GDPs of the V4 countries. Some of the issues raised in the former work have been answered with the availability of more observations and more samples. The seasonal adjustment has been identified in the previous work to be a source of potential inconsistencies the extent of which has not been determined. In this work, however, it is pointed out in the 'data' section that within the data cleaning procedure seasonal adjustment have been omitted and the calculations were performed on unadjusted raw data. The nondeterministic nature of the data should be attributed to the logical conclusion that was the data non-stationary – no computations resulting in inferences could have been performed and there wouldn't have been any way to obtain the needed results. The reason stock index baskets were chosen instead of individual stocks, and the very reason why the equity market has been subject to this research is that, as it has been previously assessed, the stock market provides a forward-looking aspect of company earnings. Since a stock index, sometimes referred to as a basket of stocks, consists of many companies, the assumption that it provides a single reasonable estimate of forwarding earnings is of all of the companies in the basket is considered valid within the scope of this research.

## Summary

The juxtaposition of economic indicators and forecasting has been the subject of many publications and research papers ever since the "Keynesian Revolution". Predicting the exact moment, a cycle shifts in a market environment and the length of the cycle itself is notoriously hard, and so far, very few, if any, economic indicators have stood the test of time. Economic recessions and crises are preceded by weak fundamental economic indicators such as unemployment, inflation, treasury, corporate bond yield curves, industrial production indexes, and the stock market, just to name a few. This research focuses on one specific fundamental indicator – the stock market. While other macroeconomic indicators may be more effective in predicting recessions and may show fewer errors, such as the yield curve inversion, the stock market is a more transparent, easily accessible, and regulated indicator that, through the reasoning established in the first part of the research, enables all market participants to obtain the same information at the same time without delay, provided that the efficient market hypothesis holds.

The question of the accuracy of the GDP's measure of an economy's success is debatable, however, as it has been mentioned in the first part of this work – this measure is the best and most reliable one yet. The GDP is therefore, used as the independent variable in the model of this research.

Emerging markets such as the countries of the V4 group are particularly interesting subjects for research of this kind, since the investigation of these countries' stock markets as recession forecasting tools hasn't been thorough before this research.

Within the autoregressive distributed lag model framework, it has been established that the stock index, which is most reactive to sudden GDP growth or decline is the Czech stock market index – the PX, which reacts by instantaneous 5.8% price movements. The least reactive – 3.6% change was the Polish stock market index - WIG. The reason for such discrepancy in a reaction is the fact that while the WIG incorporates all companies listed on the main market, the PX only includes the biggest and most influential companies. This research supports the studies of Sayed, Comincioli and Ikoku, who have all found that the stock market is justifiably, a leading indicator for the economies.

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# Digital Skills of Civil Servants: Assessing Readiness for Successful Interaction in e-society

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*Abstract: In spite of the exceptional role of digital skills in the development of e-society, there is an obvious lack of agreed tools to assess the level and deficit of those digital competencies, regarding the functional responsibilities for any professional tasks. In this research, the authors tested the most ubiquitous approach to measure digital skills development, which is justified by EU experts, in DigComp 2.1. Our analysis is performed using the survey of civil servants, as a group of frontline professionals, responsible for digital society development, particularly for, e-government development. Our representative survey covered 428 civil servants in Ukraine. This group was chosen considering the high impact of e-government development on economic results (GDP and global competitiveness index), which is defined by authors with correlation coefficients of 0.649 and 0.872 respectively, in the EU. At the same time, we found that the digital skills of civil servants in Ukraine cannot be considered as well-developed, since their average best level, is equal to 6 points on an 8-point scale. The most obvious lack of digital skills, is a character for the field of competencies “digital content creation”. In addition, obstacles in public servants’ digital skills development are connected with a low level of population’s readiness to digital services and other digital tools usage. These results can be considered not only in the light of inappropriate digital competencies development in the public administration sphere but also with the methodological gaps in digital competencies measurement. Particularly, in our research, we proved that the framework for digital skills assessment should be developed using a flexible approach (optional skills of certain levels of professional orientation and complexity), but at the same time, functional responsibilities for professional tasks within the qualification characteristics of certain positions should be considered.*

*Keywords: digital skills; DigComp 2.1; e-society; civil servants*

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# 1 Introduction

Digital skills are becoming an important component of professional competences in almost all areas – this is emphasized by experts from the International Labor Organization (ILO) in their World Employment and Social Outlook, dedicated to transforming the world of work. Understanding the importance of such skills and the rapid development of opportunities for their implementation leads to the fact that “many governments in developing countries are investing in digital infrastructure and supporting training programs developed by the private sector to equip the workforce with digital skills” [1, p. 31]. An important factor influencing the understanding of the role of digital skills was the pandemic and the resulting limitations on traditional communication and employment opportunities. At the same time, even before the pandemic, the importance of developing IT skills was recognized internationally. Thus, in the thematic report of the UN Secretary General in 2018, attention was focused on the fact that IT has become an objective reality of life, as a result of which up to 90% of jobs will inevitably be associated with their use by 2030, and 75 to 375 million people (from 3 to 14% of the human workforce) will be forced to change professions due to the spread of IT [2, p. 12]. At the same time, a significant challenge for reaping the benefits of innovative development is that even in the most developed OECD countries, 56% of the population do not have IT skills [2, p. 3]. By the esteems of the International Telecommunication Union (ITU), a third of individuals lack basic digital skills, such as copying files or folders or using copy and paste tools; a mere 41% have standard skills, such as installing or configuring software, or using basic formulas on spreadsheets. Only 4%, are using specialist languages, to write computer programs” [3].

The low level of digital skills sometimes has a catastrophic impact on business due to sudden stops in sales and revenues because of the low development of digital communication channels with customers, underdeveloped opportunities and skills of remote activity. But digital skills shortage is particularly dangerous in the area of public administration, given the crucial importance of this area in ensuring the functioning of the economy, the social sphere and national security. The development of e-society in the context of many challenges that limit the spatial mobility of the population is becoming more than just an additional and convenient way of interaction. Improving and gaining a sufficient level of digital competence, especially for civil servants, is vital to maintain security and effectiveness in the face of large-scale threats, including pandemics, wars and other global risks.

Despite the importance of digital skills for modern society, there is no reliable and agreed Framework for Digital Competencies of the Population. With varying levels of detail according to research objectives, the ITU Digital Competence Classification (too generalized three-level digital skills scale) [3] and the updated version of the DigComp 2.1 Digital Competence Framework, developed by EU experts, in which 21 digital skills are assessed according to eight levels of mastery [4]. The disadvantage of this and other methods of assessing digital skills is their

low adaptability to the specifics of professional responsibilities, the difficulty of applying in order to identify the shortage of digital skills for a position at a certain level. At the same time, the assessment of digital skills of specialists involved in public administration is the most relevant area of relevant research, given the growing role of their professional qualifications in ensuring the development of countries. Thus, significant social progress has been made in countries where such skills are well developed in e-government systems. This is shown in the experience of Estonia, where 99% of government services are digitally based [5, p. 8].

Due to the underdevelopment and debatable methodological framework for assessing the level of digital skills, the problem of linking digital skills of civil servants and their role in the development of e-society is considered mainly in light of related issues – the formation of digital public administration, risks associated with digitalization of public administration processes, the impact of e-government on the economic success of countries, etc. At the same time, the assessment of the level of civil servants' digital skills and the lack of their digital skills to perform professional tasks belongs to those research objects to which scientific attention is many times lower than the importance for the development and security of society.

Considering this, we aim to assess the links between e-government and economic development (GDP and competitiveness) in our study, as well as to test the most ubiquitous approach to measure digital skills development, justified by EU experts in DigComp 2.1, for analysis of public servants' digital skills.

## 2 Literature Review

Digital skills are among those skills that determine the possibilities of professional success in various fields. Even in the pre-pandemic period, the benefits of employment with a combination of digital tools were evaluated in many professional fields. Their list has expanded significantly from the IT market and online commerce to the use of physicians for therapeutic purposes [6], significant progress in the use of digital technologies by school teachers [7], entrepreneurship education [8] and even in music with active involvement of students in musical instruments making by means of digital technologies [9]. Of course, the main area of implementation of digital tools, and hence the development of digital skills, remains the field of IT, which due to its own rapid development has given a powerful impetus to the improvement of electronic data exchange, e-commerce. As a result, it has provided rapid economic growth and enhanced macroeconomic stability in countries where the economy is based on the benefits of digital development [10-15]. This pattern is characteristic both of the economy as a whole and of the digital development of its individual segments, such as financial services [16-20], industrial technologies using robotics [21] etc. At the same time, not only in IT, but also in other activities, the use of digital technologies and, consequently,

the development of digital skills has made it possible to benefit from competitive advantages and avoid or reduce economic devastation, the risk of which is high due to the global pandemic. Under these conditions, the use of remote employment on the basis of telework [22] [23], in particular, in the form of “home office” [24] and employee training opportunities, which includes relevant professional development programs, in employer value propositions, became relevant and widespread [25].

As a result, digital skills are increasingly referred to as “must-have soft skills” [26] and not only in the professional sphere. Thus, according to experts of the European Commission, “Basic digital skills have become necessary for both daily lives and employability, setting foundations for embracing the digital world. In the near future, 9 out of 10 jobs will require digital skills” [27].

Because of the importance of digital skills, experts of the European Training Foundation emphasize that the ability to correctly apply digital skills is the basis of digital competence, which, in turn, is one of the eight key competencies for lifelong learning in the EU since 2006 [28, p. 25]. In addition, the report clearly defines the relationship between digital competence and skills: “Digital competence referred to as digital literacy, encompasses a set of basic digital skills, covering information and data literacy, online communication and collaboration, digital content creation, safety and problem solving. Digital competence is about the ability to apply those digital skills (knowledge and attitude) in a confident, critical and responsible way in a defined context ” [28, p. 25].

At the same time, while scholars focus on the development of digital skills, in the field of public administration such research focuses mainly on communication using digital capabilities, rather than the development of digital competencies of civil servants. Thus, the well-known positive consequences of the digital transformation of public administration, which is manifested in the successful use of e-government, undoubtedly include overcoming corruption and increasing transparency of public dialogue [29] [30], general improvement of public services [31] [32], increasing the opportunities for cooperation with the community to achieve various goals set in their own strategies [33], including sustainable development [34] [35], etc. Achieving these results requires high professionalism of civil servants, which prompted the relevant research. At the same time, attention paid to the development of digital skills is insufficient – such skills are analyzed mainly from the standpoint of the application of other skills typical of managerial positions. In particular, in the study of Romanian scientists, digital / IT skills are identified as the most important of the soft skills among the competencies required for employees of e-government services; of high importance with them are such skills as collaboration, problem-solving approach, customer orientation, design for solutions, flexibility, initiative, ability to innovate [36, p. 10].

The economic impact of better application of digital skills in e-government is very high. According to the study conducted by the European Commission, only part of e-government services such as electronic invoicing and e-procurement leads to very

significant budget savings: “In Denmark, electronic invoicing saves taxpayers € 150 million a year and businesses €50 million a year. If introduced across the EU, annual savings could exceed €50 billion. Meanwhile, in Italy, e-procurement systems cut over €3 billion in costs” [37].

Understanding the benefits of digital development in public administration, considerable attention is paid to the development of networks, the pressure imposed on civil servants, including their burnout [38], training of civil servants in the proper use of ICT [39] and general training in digital technology, [40] [41], digital leadership [42]. At the same time, it is common to study the impact of digital skills of civil servants on macroeconomic indicators such as GDP, as well as some partial characteristics of civil servants themselves – as it is proposed to analyze, for example, using the results in productivity and efficiency, effectiveness, inclusion and sustainability, legitimacy and trust [43] or performance indicators under conditions of improving ICT network readiness [44].

At the same time, due to the lack of a unified global framework for the assessment of digital competencies, research on their development in the field of public administration is mainly reduced to the use of the authors of too generalized characteristics of digital skills. Such approaches are often a continuation of the classification used by the ITU [3]. But even such approaches can reveal a huge shortage of digital skills. In particular, in Ukraine, on the example of which our study was conducted, the Ministry of Digital Transformation has twice conducted an analysis of digital skills development of the population. According to the organizers of the study, from 2019 to 2021, there was some progress, but, in our opinion, it cannot be evaluated as significant: the share of the population with “No skills” and “Low skills” decreased from 53.0% (15, 1% “No skills” and 37.9% “Low skills”) in 2019 to 47.8% in 2021 (11.2% “No skills” and 36.6% “Low skills”) [45, p. 27]. Only the decrease in the share of the population with completely absent skills has a certain positive effect, but the general level of the low development of digital skills of the population, of course, will not allow using all the advantages of e-government effectively. For Ukraine, such opportunities are extremely important, given the high share of the shadow economy [46], which can be most effectively eradicated by increasing transparency in relations with government. In addition, digital skills, especially their development in civil servants, will allow implementing ambitious plans for the development of information society till 2024: 100% of public services should be available to citizens and businesses online; six million Ukrainians will be involved in the digital skills development program [47].

Given the existing limitations in the methodology of research of digital competencies and the lack of methodological foundations for assessing the digital skills of civil servants, our study is aimed at assessing the willingness and readiness of civil servants to interact in e-society.

In this regard, our research tasks (RT) are:

- RT1** Examining the links between e-government and the macroeconomic success of countries
- RT2** Assessing current level and deficit of digital skills of civil servants on the basis of the most detailed framework of digital competencies used today in European countries - DigComp 2.1
- RT3** Assessing changes in the communications efficiency by the introduction of electronic services for the G2C segment (government to citizens)

### 3 Methodology

The answers to the research tasks were obtained by the authors using information that characterizes the results of the implementation of e-government in the international and national dimensions.

Thus, data on the E-Participation Index (the EPI) [44] and the E-Government Development Index (EGDI) [48] for 2012-2020 were used to solve **RT1**. Based on this information, the authors studied the dynamics of the digital transition of the world in four groups studied within the UN e-Government Survey. In particular, 8 years of observations allow assessing trends in the distribution of countries according to the level of development of e-government – according to the division into 4 groups: low, medium, high and very high levels of development.

The assessment of the development of e-government in the international dimension is based on these factors, given that EGDI illustrates the general readiness and capacity of national governments to use information and communication technologies (ICT) to provide public services, and EPI is frequently used to operationalize the success of government efforts to promote electronic tools of engaging citizens in policy-making, and to test theories on e-participation development and diffusion across nations.

That is, in our chosen segment of research and implementation of digital skills of civil servants (G2C), these indicators best characterize the current state of the digital infrastructure of public administration (EGDI), as well as the results of its perception by the population (EPI).

The assessment of the impact of these factors on macroeconomic results was carried out in the group of EU countries using the following results, which most comprehensively characterize macroeconomic success:

- Real GDP per capita [49]
- Global Competitiveness Index (GCI) [50]

Thus, indicators of the level of e-government (EGDI, EPI) are considered to be the independent variables and the performance indicators (GDP, GCI) are considered to be the dependent variables.



For the purpose of data comparability, the data for 2018 in which all estimated indicators are available are used. The analysis of relationships was performed on the basis of correlation analysis, in particular Pearson's correlation coefficient.

To respond to **RT2** and **RT3**, the authors conducted a survey of civil servants as a group of frontline professionals responsible for e-government development. Our representative survey covered 428 civil servants in Ukraine. The sample is formed of civil servants directly involved in e-government relations, who are undergoing advanced training at the Institute of Postgraduate Education of the National University of Water and Environmental Engineering at the request of the National Agency of Ukraine for Civil Service. Respondents were civil servants from 13 regions of Ukraine, who underwent advanced training during September - December 2021. The training of the civil servants was organized using online services in order to ensure the possibility to be involved from different regions even under the pandemic threats. Considering this fact, our review was conducted using online tools, particularly, google forms questionnaire, which does not require advanced digital skills. Therefore, even servants the minimal digital competences could provide their responses.

Thus, taking into account the total number of civil servants (registered number is 184,944 persons as of the 4<sup>th</sup> quarter of 2021, according to the National Agency of Ukraine for Civil Service [51, p. 2]), the margin of error is 4.73% at the confidence level of 95%, which indicates a high correlation for the results of the study.

Assessment of digital skills of civil servants was conducted on the basis of DigComp 2.1 - Digital Competence Framework [4]. According to it, the availability of 21 digital skills at 8 levels of proficiency was assessed (as recommended by the authors of the Framework). To facilitate the visualization of the results, we used the symbols shown in Table 1.

Table 1  
Digital Competence Framework

Symbol	Digital skill
<b>S1</b>	<b>INFORMATION AND DATA LITERACY</b>
S1.1	Browsing, searching and filtering data, information and digital content
S1.2	Evaluating data, information and digital content
S1.3	Managing data, information and digital content
<b>S2</b>	<b>PROBLEM SOLVING</b>
S2.1	Solving technical problems
S2.2	Identifying needs and technological responses
S2.3	Creatively using digital technologies
S2.4	Identifying digital competence gaps
<b>S3</b>	<b>DIGITAL CONTENT CREATION</b>
S3.1	Developing digital content
S3.2	Integrating and re-elaborating digital content

S3.3	Copyright and licenses
S3.4	Programming
<b>S4</b>	<b>COMMUNICATION AND COLLABORATION</b>
S4.1	Interacting through digital technologies
S4.2	Sharing through digital technologies
S4.3	Engaging in citizenship through digital technologies
S4.4	Collaborating through digital technologies
S4.5	Netiquette
S4.6	Managing digital identity
<b>S5</b>	<b>SAFETY</b>
S5.1	Protecting devices
S5.2	Protecting personal data and privacy
S5.3	Protecting health and well-being
S5.4	Protecting the environment

In the assessment of digital skills, using the approach of the authors of the framework [4], respondents were asked to rate their own level of proficiency on a scale from 1 to 8, given that 1 is the lowest level.

To assess changes in the effectiveness of communications in the implementation of public administration through the introduction of electronic services, a traditional approach was used – self-assessment in the range from 0% to 100% of the positive impact of change. In each interval, which characterizes the increase in the efficiency of communications (1-10%; 11-20%; ...; 91-99%, as well as the threshold scores of 0 and 100%), there was found, that the percentage of respondents who indicated the presence of a corresponding positive impact, on some results of civil servants' daily work (reduction of the share of routine functions, improvement of feedback, etc.).

## 4 Results

As a result of the study of the links between e-government and the macroeconomic success of countries (within *RTI*), we found the following dependencies. First, as we can see, the number of countries, in which EGDI and EPI gain medium, high and very high levels, increased significantly in 2020 compared to previous years. Positive developments in EGDI in Lithuania (rank change +20), the Czech Republic (rank change +15), Poland (rank change +14), Estonia (rank change +13), and Romania (rank change +12) are particularly significant. At the same time, the most positive changes in the EPI are observed in Austria (rank change +39), Bosnia and Herzegovina (rank change +38), Croatia (rank change +34), North Macedonia (rank change +26), Ukraine (rank change +29), the Czech Republic (rank change +27), Estonia (rank change +26). However, it should be noted that in some countries there have been negative changes in these indicators, in particular Luxembourg lost 51 in

the EPI and moved from 19<sup>th</sup> place to 70, Germany lost 34 points and took 57<sup>th</sup> place; according to EGDI, the largest losses are observed in Monaco (-36).

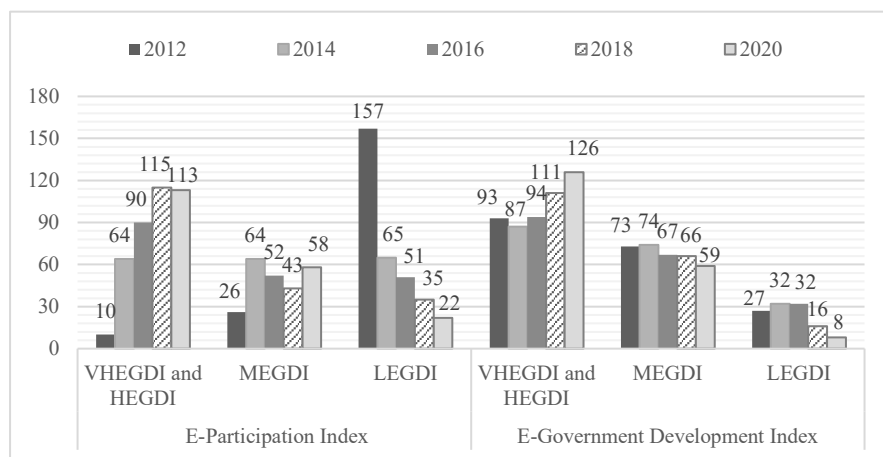


Figure 1

Dynamics of the number of countries at different levels of E-Participation Index, E-Government Development Index

As for Ukraine, its position during the analyzed period was quite unstable in the world ranking of countries for the development of e-government: 68<sup>th</sup> place - in 2012, in 2014 - 87<sup>th</sup>, in 2016 - 62<sup>nd</sup>, in 2018 - 82<sup>nd</sup> and 69<sup>th</sup> in 2020. As we can see, the rating position in 2018, was much lower than in 2016, which indicates that there are problems in ensuring effective public administration using e-government capabilities. It should be noted that the situation improved in 2020, but still did not reach the level of 2016. Such results are somewhat controversial, compared to the global dynamics of improving e-government.


Furthermore, the assessment of the correlations between e-government (according to our selected indices) and macroeconomic success of countries reveals a significant impact of e-government on GDP per capita and competitiveness of countries in the EU group (Table 2).

Table 2

Relationships between indicators of e-government, GDP per capita and competitiveness of EU countries in 2018

Countries	Indicators			
	EPI score (0-1)	EGDI score (0-1)	Real GDP per capita, euro	GCI score (1-100)
Austria	0.8258	0.8301	37720	78.9
Belgium	0.7584	0.8080	35520	76.6
Bulgaria	0.8708	0.7177	6330	63.6
Croatia	0.7697	0.7018	12200	60.1

Cyprus	0.8202	0.7736	24430	65.6
Czechia	0.6180	0.7084	17990	71.2
Denmark	1.0000	0.9150	48450	80.6
Estonia	0.9101	0.8486	14970	70.8
Finland	1.0000	0.8815	36740	80.3
France	0.9663	0.8790	32820	78.0
Germany	0.9213	0.8765	35690	82.8
Greece	0.8764	0.7833	17430	62.1
Hungary	0.7079	0.7265	12690	64.3
Ireland	0.9326	0.8287	58100	75.7
Italy	0.9551	0.8209	27030	70.8
Latvia	0.6854	0.6996	12140	66.2
Lithuania	0.8034	0.7534	13400	67.1
Luxembourg	0.9382	0.8334	84040	76.6
Malta	0.8483	0.8011	22320	68.8
Netherlands	0.9888	0.8757	41450	82.4
Poland	0.8933	0.7926	12420	68.2
Portugal	0.8989	0.8031	18190	70.2
Romania	0.7079	0.6671	8700	63.5
Slovakia	0.8090	0.7155	15510	66.8
Slovenia	0.8146	0.7714	20240	69.6
Spain	0.9831	0.8415	24880	74.2
Sweden	0.9382	0.8882	43760	81.7
United Kingdom	0.9831	0.8999	32640	82.0
Average value	0.8652	0.8015	27421	72.1
Correlation coefficient with real GDP per capita	0.5258	0.6488		
Correlation coefficient with GCI	0.6205	0.8682		

 - the value of the indicator is above average

*Source: authors' calculation based on [48; 49; 50]*

From Table 2 it can be seen that the values of indicators that characterize macroeconomic results are mostly above average in those countries where e-government indicators are also above average. According to the results, 11 countries from 15 where E-Government Development Index is above average (0.8015), have real GDP per capita above average (27421 euro) and 12 countries have Global Competitiveness Index above average (72.1). Exceptional links are typical only for Estonia, Italy and Portugal.

As can be seen from Table 2, there were quite strong links between these indicators in 2018, especially quite strong between the state of digital infrastructure of public administration (EGDI) and economic competitiveness (GCI), which confirms the

value of the pairwise correlation coefficient (0.8682). The positive relationship is confirmed also between civil servants’ digital competences and GDP per capita with a correlation coefficient value of 0.6488.

In response to **RT2**, we obtained the results illustrated in Figure 2. The data show the current level of digital skills of civil servants, obtained on the basis of their self-assessment. The obtained results reflect the levels of digital competences measured from 1 to 8. As you can see, most civil servants are at the 5<sup>th</sup> or 6<sup>th</sup> levels of digital skills. The best level of mastery (6) can be traced in the groups of skills “Information and data literacy” and “Communication and collaboration”. That is, civil servants at a sufficient level (6<sup>th</sup> out of 8) are able to search, analyze, use and disseminate information in the digital environment, as well as interact and communicate with others through the use of digital technologies. At the same level, they have the skills S5.3 and S5.4, i.e., with a high level of awareness, they still cannot fully determine the impact of digital technology on the environment, as well as protect themselves and others from possible dangers in the digital environment.

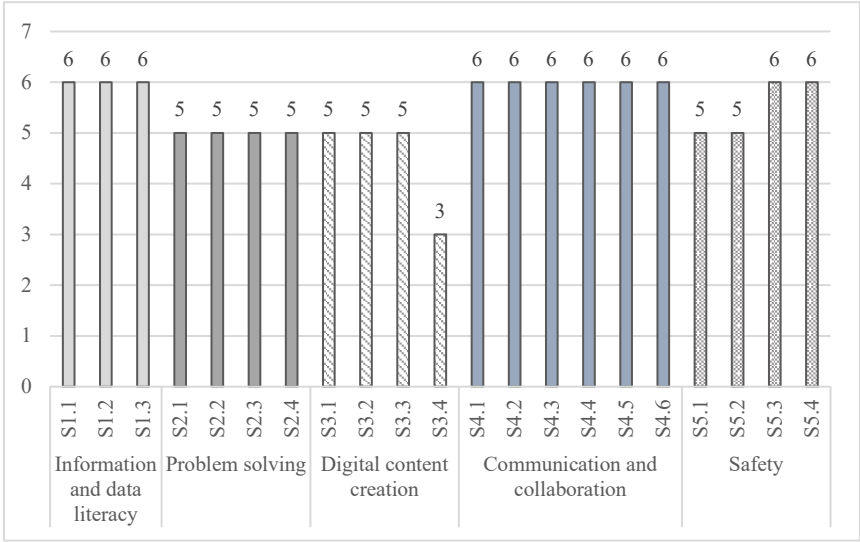


Figure 2  
Average assessment of one's own level of digital skills of various types

A slight deficit (the 5<sup>th</sup> level out of 8) was found in the groups of digital skills “Problem solving”, “Digital content creation”. That is, government officials cannot always: solve technical problems with computers, software, and networks; customize digital technologies to their own needs and use them creatively. Civil servants have also difficulty in creating new and editing existing digital content in a variety of formats. And without a doubt, the lack of skills of the “Safety” group is quite dangerous in the current environment, namely the ability to protect devices, content, personal data and privacy in digital environments, the use and dissemination of personal information.

The lowest level of mastery (3<sup>rd</sup>) of civil servants is observed in the skill S3.4 - Programming, which is partly due to the specifics of their job functions that do not require the ability to write complex program codes.

The assessment of changes in the effectiveness of communication between civil servants and the public through the introduction of electronic services in the G2C segment (within **RT3**) is illustrated in Figure 3 and Table 3.

As can be seen from Figure 3, civil servants' assessment of the readiness of the national system to operate in e-government is quite critical – 67.9% of respondents believe that the development and quality of e-services is in the range of up to 50% out of 100 possible.

At the same time, the level of readiness of civil servants to provide electronic services to the population is slightly higher – only 53.8% of respondents received answers within 50% of readiness. That is, according to the results of self-assessment, civil servants are more willing to work in a digital economy, than the system itself.

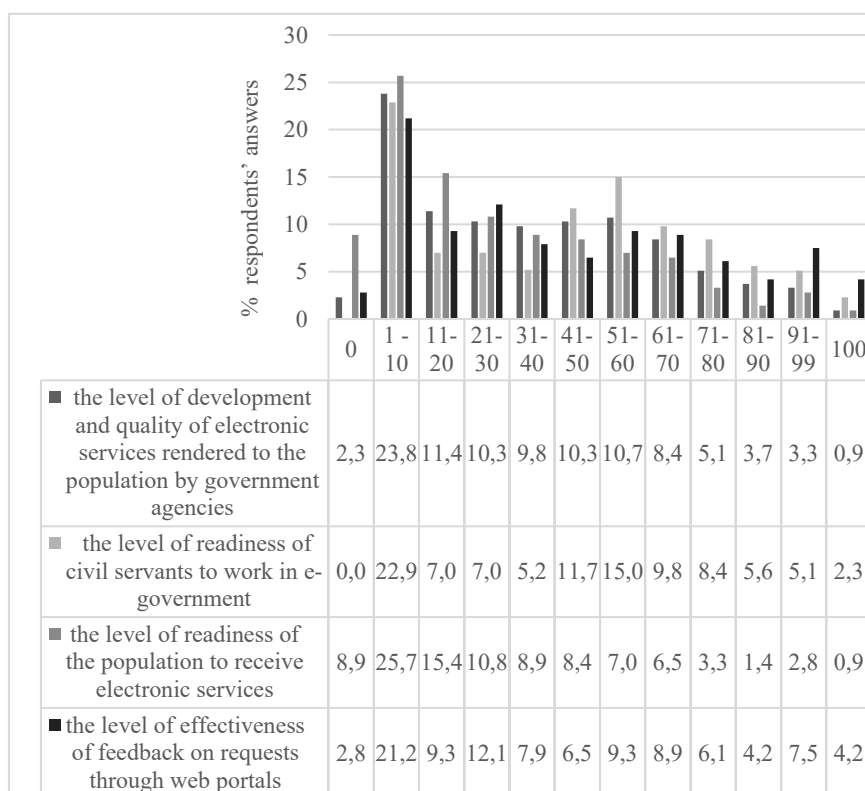


Figure 3

Assessment by civil servants of the effectiveness of communication with the public through the introduction of electronic services in the G2C segment

The level of readiness of the population to receive the services of national institutions through electronic services is extremely critical. Unfortunately, 78.1% of civil servants believe that the level of readiness of the population is in the range of 0-50%. At the same time, it is necessary to note the rather low level of effectiveness of feedback on requests through the web portal, as 59.8% of respondents rated it from 0% to 50%.

That is, in the direction of improving the efficiency of communication between civil servants and the public through the introduction of electronic services, there are still significant reserves for development.

However, civil servants' assessment of changes in labor processes due to the introduction of electronic services allows stating positive changes in this direction. As can be seen from Table 3, due to the service of the population through electronic services, the queues for reception in government agencies decreased by an average of 30.9%, as 34.2% of requests were transferred to electronic form. At the same time, the routine functions of daily work of civil servants decreased by an average of 30.2% and the efficiency of obtaining information on changes in public policy and legislation increased by 38.8%.

Table 3

Civil servants' assessment of changes in labor processes due to the introduction of electronic services in the civil service

Consequences of introduction of electronic services % of respondent's answers	Evaluation of the effectiveness of the introduction of electronic services											Mean value %	
	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-99%		100%
✓ decrease in queues for reception in government agencies	9.8	23.8	18.2	7.5	6.5	7.5	6.1	6.5	6.5	1.9	5.1	0.5	30.9
✓ requests (appeals) that have been transferred to electronic form	3.3	30.8	11.2	11.2	4.2	8.4	7.5	6.5	5.1	4.2	7.0	0.5	34.2
✓ reduction of routine work of employees	8.9	28.0	13.6	8.4	6.5	9.8	6.1	7.0	3.7	2.8	4.7	0.5	30.2
✓ increase in the efficiency of obtaining information on changes in public policy and legislation	2.3	19.2	15.9	9.3	8.9	10.3	7.9	7.9	5.1	4.7	7.5	0.9	38.8

## 5 Discussion

According to our findings, we can state that there are strong links between the state of the digital infrastructure of public administration (EGDI) and economic competitiveness (GCI).

Regarding GDP per capita, the results obtained allow drawing the opposite conclusions from [36] based on the study conducted on the example of the United States and Europe – “there is no correlation with GDP, but it is always hampered by the digital divide.” In 2018, such links in the EU were quite obvious, which, in contrast to the above results, may indicate a positive impact on GDP, and that such links should be assessed in homogeneous groups of countries – in our case we can state the high similarity of countries in the strategies of building e-government and, accordingly, the lack of a significant digital gap in this area in the EU. These results mean that, with high attention to the formation of a quality e-government system, such efforts have the expected positive economic consequences.

In measurements of the readiness of the civil servant to interact in e-society using their digital competencies, we found an important methodological omission of existing systems for assessing the digital skills of civil servants (as well as other professional groups) is the lack of a single, unified framework of digital competencies, which would be suitable for assessing existing skills, periodic certification of public servants and professionals in other occupational fields whose activities require digital competence. Existing approaches, including the most advanced DigComp 2.1, are too general and do not allow assessing the digital skills shortage in the relevant professional group – a shortcoming in the digital skills assessment of all employees, not just civil servants.

Except for DigComp 2.1, some other approaches are often used. They can assess only a single competence score or vice versa, many of them are multi-dimensionally structured like DigComp frameworks. In this regard, we support the point of view that the European Commission has proposed one of the most integrative frameworks of digital competences for citizens [53]. Based on their critical review of existing frameworks, Ulfert-Blank and Schmidt [53] fulfilled the conclusion aligned with our research that the measurement of digital skills and self-efficacy scale is discussible regarding application fields. Furthermore, the steep development of new technologies, particularly artificial intelligence leads to the need for constant review of digital competences frameworks. So, even the most advanced, which is used in our research, DigComp 2.1, is revised in March 2022, stressing some new skills connected with AI usage. These improvements are highlighted in some new citizens’ digital competences within DigComp 2.2 [54]. It, however, could not be used in our research due to its update in 2022. Besides, it focuses on AI technologies usage which is not typical for the professional duties of civil servants to a great extent at the current stage of their work.



However, even with the usage of the most advanced but generalized framework (DigComp 2.2), developed for all citizens regardless of their professional duties, and consequently, those should be simplified for such professionals as civil servants, we obtained very critical self-assessment results. The most obvious deficit was found in the groups of digital skills “Problem solving”, “Digital content creation” and “Safety”. The shortcomings in mastering these skills can create essential obstacles not only for the development of the public administration sphere in terms of its modernization on a digital basis. In light of growing risks in the information security field (especially in Ukraine during the war), the lack of skills aiming at safety in digital services can negatively affect this and connected spheres ensuring the national security.

### **Conclusions**

Thus, from our study, we can conclude that in countries where the development of the digital skills of civil servants is given due attention, there can be a positive impact on the formation of macroeconomic performance and competitiveness. Such patterns are typical in EU countries and can serve as a guide to improve the systems of professional development of civil servants in the context of the formation of their digital competence for countries with economies in transition.

Considering the existing shortcomings in digital competences measurement, it is necessary to develop and use not one, but several, adapted for different professional groups, assessment frameworks, suitable for use at different levels and with different functional orientation of professional tasks. There are already attempts to create such a framework by the Ministry of Digital Transformation of Ukraine, for educators, entrepreneurs and civil servants [52]. But a detailed study of their content leads to the conclusion that these are only simplified variations of DigComp 2.1, where the consideration of professional responsibilities is done to some extent artificially – through clarifications in known formulations. A “too narrow” 3-level assessment (basic, medium, high) with gradation from A1 to C2 is used, and the list of digital competencies is also an abbreviated modified borrowing from DigComp 2.1, which obviously requires improvement and greater consideration of professional characteristics.

At the same time, we have confirmed the high motivation for action in e-society, by civil servants themselves – they rate it higher, than the institutional support for the implementation of digital dialogue with society today. Therefore, obstacles, in the form of low digital competence, of the population, as another subject of digital dialogue and existing shortcomings in internal labor processes, can be considered as barriers, that can be overcome relatively quickly, in the digital development of a society, including, improving the digital dialogue between civil servants and the public.

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# The Influence of Brand Orientation Dimensions on Organizational Performance of Non-Profit Organizations in Albania

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*Abstract: The not-for-profit sector has become crucial over these decades. These may be because of their importance, role, or impact they have on our society. Changes in the environment in which these organizations operate and increased competition have made them more difficult to secure funding to support their mission. This has forced them to think of ways or strategies to be more interesting and attractive to stakeholders. The application of some principles of for-profit organizations to not for-profit ones, such as marketing orientation and specifically brand orientation is essential.*

*The purpose of this paper is to assess whether the not-for-profit organizations that operate in Albania are brand-oriented and whether this influence their performance. To conduct this research, an extensive review of literature on marketing, brand, and brand orientation in the not-for-profit sector was carried out. After that, it has become possible to build a conceptual model based on the elements of brand orientation suggested by Hankison (2001), Ewing and Napoli (2005), Daw and Carol (2001), and performance measures in the nonprofit organizations suggested by Napoli (2005). Based on the elements of brand orientation suggested by Hankison (2001), Ewing and Napoli (2005), Daw and Carol (2001), and performance measures in nonprofit organizations suggested by Napoli (2005), a conceptual model was developed. Four dimensions were identified: "Brand Culture", "Brand Trust", "Internal and External Brand Communication", and "Brand Management". Performance in these non-profit organizations was measured based on two elements suggested by Napoli (2005): the ability to achieve objectives and to assist stakeholders better than competitors. The data indicates that not for profit organizations operating in Albania are brand-oriented, and this is an added value for them.*

*Keywords: non-profit organization; marketing; brand orientation; performance; objectives; competition*

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# 1 Introduction

Over the past 30 years, governments have shifted from their usual role of offering public services. Many of these responsibilities to guarantee the common good have been passed down at the community level. In response to this change, nonprofit organizations grew in significant numbers to address these unfilled needs. They played a major role in alleviating poverty, protecting the right, environmental protection, and the provision of worldwide assistance [1]. Those have increased in number, impact, and visibility [2]. The increased number of NGOs is accompanied by increased competition in the search for providing resources and volunteers. In 2008, there were more than 2 million not for profits around the world, with more than 1.5 million in US and 161,000 in Canada. Compared to 1940, when they were in the US 12,000 charities [3]. Thus, competition, globalization, radical transparency, and the dominance of social media have changed forever the way stakeholders view and interact with nonprofit organizations. In the era of great social engagement, strategic marketing, and communications have never been so important. Today it is not sufficient for nonprofits to represent the social issue and participate in traditional fundraising and development activities. Indeed, marketing academics have been studying the role, significance, and transfer of different marketing theories and activities to NGOs [4]. Some not for profits are using currently brands as a marketing tool to increase their funds or create efforts more broadly strategic to manage their brand, to create a stronger social impact [5].

Given the value that the brand has, it becomes very necessary for not for-profit organizations [6]. However, managers and top executives of nonprofits have appeared reserved to apply brand value to current activities [7]. This may be in part because they do not exist brand value models especially for non-profit organizations [8].

The not-for-profit organizations play a critical role in our society and their brand now are considered the most strong and reliable brands in the world [9]. Amnesty International, Red Cros, and World Wildlife are some of the very famous brands, far more trusted by the public than the most popular brands of for-profit organizations. These non-profit organizations possess detailed policies for managing their name, and logos [3].

During the last decades, the brand has been the focus of the for-profit sector [10], [11], [12], [13], [14], as the need to differentiate in a competitive environment. Similarities appear in the competitive environment between for-profit organizations and nonprofits. Brand and reputation are more important in the nonprofit sector than in the world of for-profit [15]. In the business sector, consumers provide financial resources in exchange for tangible goods or services. In the non-profit sector, supporters provide financial resources based on the recognition that their money will be used to achieve important but intangible social objectives and they do not get anything concrete in return. Thus, the main challenge for nonprofits is to create for themselves an image that communicates fast and effectually a significant piece



of evidence about the organization, each of these actors. This communication needs to be adapted, as each of these audiences certainly has different needs. But there is also a need for overall sustainability, thus the organization should not represent different core values for different groups [16]. Therefore, reputation, sense of purpose, and relationship make important differentiators. Built on tangible results and emotion from the heart, the brand reputation encourages potential supporters to believe in the mission of a charity, but also in the ability of the group to distribute this mission [15].

A brand can describe total insights and knowledge around a nonprofit organization. Insights and experiences can be grouped based on two elements: useful- what brand can do and figurative- what brand it symbolizes [17]. These components together create the character of the brand, the core of the brand [18].

Although there is some evidence that brand orientation is associated with the performance of nonprofits, has yet a need to fully study the nature of this relationship. This study aims to present a multidimensional measure of brand orientation and its impact on the performance of the organization.

This study aims to evaluate whether the nonprofit organizations that perform in Albania are brand-oriented and if this affects their performance.

***The objectives:***

- to explore how the non-profit sector was born and developed in the world and Albania.
- to describe the current situation that non-profit organizations are facing in the world and Albania.
- to describe the use of branding practices, application challenges, and its development by non-profit organizations.
- to describe the factors of brand orientation.
- to explain the relationship between brand orientation and performance, in the not-for-profit organization.

***Research questions:*** Based on what was presented above, brand orientation is considered one successful business philosophy to be followed by non-profit organizations. The main research questions in this paper are:

- Non-profit organizations in Albania, are brand-oriented?
- What are the factors related to the brand orientation of organizations nonprofit?
- Are brand orientation factors related to the organization's performance non-profit?

## Importance of the work and its specific contribution

This paper brings several contributions, such as:

- It is the first of its kind that is done in Albania, it studies the brand of NGOs and not only that, but studies related to this field in the world are not numerous.
- Proposing a conceptual model derived from the integration of several main theoretical concepts, in a study for the nonprofit sector. The model defines the nature and understanding of the causal relationship between the dimensions of right orientation branding and performance in nonprofits.
- It is more objective and reliable than some international studies on the brand orientation of not-for-profit organizations (NPOs). In the study is selected more than one respondent/representative within an organization non-profit for the collection of primary data through the questionnaire. This is one innovation of the work because, in previous works undertaken in connection with the orientation of the brand in the NGO, the answers were provided only by one respondent per organization, such as the chief executive of these NGOs.
- Helps NGOs be more successful. Their success is reflected as one stronger support for the great causes of our society.
- Serves as a starting point for more in-depth studies in this field.

## 2 Literature Review

The not-for-profit sector is experiencing a phase of drastic transformation. Great growth in the not-for-profit sector has been recorded during this decade, as a reaction to societal, and economic changes [19]. Almost all contemporary charities are experiencing great pressure. How these concerns are addressed are important to the ability of these organization to survive [20]. Size of the not-for-profit sector will change dependent on [21];

1. Population Diversity: The more diverse ethnicities and religious beliefs are, the more discussion will be about the role of government.
2. Size of government: The more a government does, the fewer necessities there are for the nonprofit sector.
3. Amount of funding for non-profit organizations coming from charitable donations.

Civil society and NGOs have an essential role in the progress of Albania through building community consent. There is an evidenced of rise of the number of NGOs in the country of Albania. Those that are estimated to be active and have the potential for the accomplishment of large projects, etc. NGOs are much more active and successful in the social field than in other fields. Regarding the location of NGOs, it turns out that there is some imbalance between Tirana and other cities.

A good part of NGOs is based in Tirana and in recent years there is a tendency to increase the number of NGOs outside Tirana, as well as the extension of their activity in peripheral areas and regions [22].

While several donors are leaving Albania, European Union funds are the main source of financial donors to secure financial contributions from different exterior sources such as person and/or business sources [23], support for NGOs in Albania. This is a concern for these NGOs, as the application procedure for EU funds is complex. However, they progressively are changing the [24]. In this perspective, nonprofit organizations must expand their fundraising through donations [25]. These nonprofit organizations need to examine the behavior of donators, finding what inspires them to donate [26], [27]. It is important to identify and categorize exterior factors that inspire people from developing countries to donate to nonprofit organizations [28], evaluated the impact of trust on in person's financial contributions to nonprofits organizations [29], and to test the impact of advertisement on donation purposes [30].

Only a limited number of NGOs, mainly in Tirana, show good management capacity. There is a lack of progress in improving the support infrastructure for NGOs in remote areas. State authorities and other stakeholders do not engage NGOs in product distribution in other areas such as economic development, policy design, and environmental monitoring. Well-positioned NGOs enjoy good media coverage, especially on issues that are likely to generate political debate. However, public skepticism about NGO objectivity and independence remains relatively high [31].

## **2.1 Marketing and Brand Management by Non-Profit Organizations**

Traditionally, nonprofits have considered themselves of being commercially free [32]. But the situation that they are facing suggests an increased need to apply the business strategies, which was developed in the business sector [33]. The idea behind the use of business strategies is that unable an organization with the ability to "adapt to the environment changes" [34]. Marketing is an important section of management, for non-profit organizations [35], [36].

Marketing is being applied by many successful organizations, and this involves not only promotion but more elements from the marketing mix [37]. The success of an organization depends on the ability to specify the needs, desires, and demands of consumers and satisfy them more than competitors [38]. Kotler and Leavy (1969) were the first to identify the role of marketing in not for profits organizations. They consider the role of marketing beyond for-profit business to the social meaning [39].

An important marketing tool is branding, which nonprofits are considering. Branding offers the not for profits organization the possibility to deal with competition and increase its social impact. The brand is a very important element of a nonprofit's identity [6]. The word "brand" itself originates from a Scandinavian

word. "Fire" was the same as the word brand and marking, which meant to seal something with fire, as was done with cattle in the Wild West [40].

Many different definitions exist about of the brand. Some definitions adopt general efforts such as:

- A brand is a sense of trust and expectation around the products which make it distinct and superior [41].
- A brand can describe total insights about products of a nonprofit [17].
- A brand is everything that can be used such as names or symbols to identify the products of an organization.
- A brand can be used to differentiate a product from the competition [42].
- A brand can represent the organization himself [43].

## **2.2 Main Models about Brand Orientation**

The conceptual model presented in Figure 1 will be used to measure brand orientation and the performance of nonprofit organizations. This model is constructed based on the dimensions proposed about brand orientation by Hankinson (2001), Ewing and Napoli (2005), Daw and Carol (2011), and dimensions related to performance measurements by Napoli (2006) [18], [4], [3], [46].

After analyzing the dimensions suggested by these authors are proposed some new dimensions that measure the brand orientation of non-profit organizations. These dimensions are nothing but the combination of those suggested in the studies highlighted above. Studies based on the construction of new dimensions of brand orientation are among the few studies that have managed to identify dimensions that reflect the brand orientation of an NGO. This may also be since brand orientation is still considered a new concept for these sectors today. From a review of the literature, brand significantly influences the performance of nonprofit organizations. Organizations that address their managerial strategies toward brand improvement have a chance to achieve benefits in performance [44], [45]. Researchers are confused about the performance results of nonprofits. It remains a complicated issue as there is still uncertainty as to how it should be measured. Unlike for-profit firms, the outcome of nonprofits is unclear and difficult to observe. Thus, the theory suggested by Napoli (2006) will be required to evaluate the performance of non-profit organizations in Albania [46]. The author recommends two measures of performance in the nonprofit organization, which are "the organization's ability to support stakeholders better than competitors" and "achieving short-term and long-term goals".

### **2.2.1 The Model Suggested by Hankinson**

Hankinson (2002) analyzed the brand orientation in the nonprofit organizations [47]. She presents that a manager with a greater concentration on brand orientation can motivate others to have positive attitudes towards the brand and can take sustain the group of interest. Hankinson's study is very important to realize the importance of brand orientation in the not-for-profit sector.

The author identified four elements that represent branding in the nonprofit sector [18].

These elements are:

1. Understanding branding in terms of what it achieves, the cause, and the beliefs it symbolizes.
2. Brand communication.
3. Using the brand as a strategic means to reach organizational goals.
4. Manage the brand actively and carefully.

### **2.2.2 The Model Suggested by Ewing and Napoli**

Researchers Ewing and Napoli (2005) built a powerful psychometric gauge for NGO brand orientation, which they define as the organizational practice of creating and maintaining a consistent brand understanding that offers an added benefit to stakeholders, and improved performance for the organization [4]. This is in line with Hankinson (2000) who conceived of brand orientation in NGOs as placing the brand at the center of an organization's decision-making process [18]. These activities pertain to identity architecture, communication, and brand value [48], [49], [50], [51]. From this point of view, brand orientation in non-profit organizations according to Ewing and Napoli (2005) is seen as a structure consisting of three elements such as orchestration, interaction, and influence [4].

### **2.2.3 The Model Suggested by Daw and Carol**

Discovering the authentic meaning of the brand: The first dimension identified by Daw and Carol (2011) is discovering the authentic meaning of the brand [3]. Identifying the true meaning of the brand is the first step in developing a brand in an NGO. The meaning of the brand answers the question "Why does this NGO exist?". Here, the meaning of the brand goes beyond a static identity and describes a comprehensive idea that is meaningful to NGO supporters. Understanding the brand is seen as a daily inspiration to employees and as an invitation to supporters to be actively involved with the organization. A strong brand understanding is a combination of what the organization is today and to some extent what it aspires to be in the future. Appeals to the "heart" of stakeholders, creating an emotional and personal connection with them, the NGO exists for a cause that is greater than itself or its programs. Understanding the brand becomes the main principle of the activity of the organization that serves as a structure and filter for its daily activities.

A strong brand understanding links a nonprofit organization's strategies to its market identity. Provides deep rationality to those who serve and support the organization and its mission. Conducting an internal and external analysis regarding the meaning of the brand determines the current attitudes and perceptions of stakeholders about the organization [3].

After analyzing the dimensions suggested by Hankinson (2001); Ewing and Naples (2005); Daw and Carol (2011), it was possible to propose several new dimensions that measure the brand orientation of non-profit organizations [18], [4], [3].

### 2.3 Theoretical Framework

Based on the above arguments, a theoretical framework has been built that suggests an interaction between the mentions of brand orientation and performance (Fig. 1).

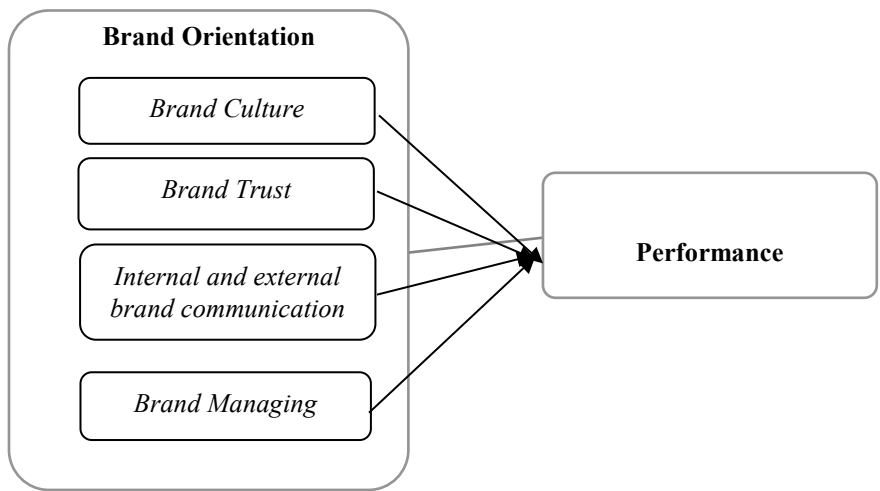


Figure 1

The theoretical framework of the brand orientation and performance

Source: Elaborated by authors based on Hankinson (2001); Ewing and Naples (2005); Daw and Carol (2011)

### 3 Research Methodology

The mixed research method was used in this study. From the theoretical framework and exploratory factor analysis, the key components of brand orientation were identified and based on them the following hypotheses are proposed.

H1: The Brand Culture dimension positively influences the performance of non-profit organizations.

H2: The Brand Trust dimension positively influences the performance of non-profit organizations.

H3: Internal and external brand communication positively influences the performance of non-profit organizations

H4: The Brand Managing dimension positively influences the performance of non-profit organizations.

The questionnaire was developed as a tool to collect primary data. It was constructed based on a literature review and in-depth interviews conducted with managers and executives from several not-for-profit organizations.

### 3.1 Questionnaire Design

The questionnaire conducted for this study consists of three sections.

*The first section* contains general questions about the type of NGO, the position within this organization of the respondent, the financial balance of the NGO, etc.

*The second section* contains 44 statements related to measuring the dimensions of the brand orientation of NGO-s. These statements are provided by four studies related to a brand orientation as Hankinson (2001, 2002), Ewing and Napoli (2005), Daw and Carol (2011) [18], [47], [4], [3]. The respondents were asked to rate, on a five-point Likert type scale, the degree of agreement or disagreement with 44 statements.

*The third section* contains two statements according to Napoli (2006) that measure the managers' perception of the performance of nonprofits organizations:

1. *Our NGO can serve the stakeholders better than our competitors.*
2. *Our NGO can achieve short-term and long-term objectives.*

These two subjective measures have been proven to be reliable in measuring the performance of the organization [52], [53] and tend to produce results consistent [54]. To avoid giving distorting responses, it is necessary to formulate statements about managers' perceptions of performance rather than performance numbers [55].

A pre-testing of the questionnaire was conducted on a sample of 15 managers.

### 3.2 Sampling

In-depth interviews were conducted with a snowball sample of 5 managers from NGOs, where each organization's activities related to branding policies and strategies were discussed.

A survey was also conducted with 200 NGOs operating in Albania. A total of 600 questionnaires were distributed, with 3 questionnaires sent to each NGO. The questionnaires were completed by 474 respondents, resulting in a response rate of 78.5%. The survey population consisted of managerial level personnel from NGOs, such as the executive director or general manager, project manager, and financial manager, who provided information about their organization's values and behaviors.

## 4 Data Analysis and Results

### 4.1 Respondents' Profiles

The profile of respondents is: the type of NGO that dominates Albania is a social service organization 51%. A limited number of employees and in most cases one employee can perform many functions within it. There is an exact division between positions, there are plenty of cases in which an employee can perform several functions. Most parts of these NGOs have a financial balance of about 50 million ALL, but some are very active and provide an even better financial balance. Financing from the central and local governments is more limited and not everyone benefits from them. Also, private national organizations have a lower level of philanthropy.

### 4.2 Factor Analysis

KMO index of 0.715 (Table 2), indicates that the data support the use of factor analysis and suggest that the data may be grouped into a smaller set of underlying factors. Bartlett's test is significant ( $p < 0.001$ ); therefore, factor analysis is appropriate for the 44 statements of brand orientation.

Table 2  
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.715
Approx. Chi-Square	312.401
Bartlett's Test of Sphericity	Df
	Sig.
	.000

Reliability analysis resulted in Alpha Cronbach = 0.762 - 0.909. These coefficients indicate a good match between variables within a factor [56].



Table 3  
Reliability Analysis

Component	Cronbach's Alfa	Items
1. Brand Culture	.909	14
2. Brand Trust	.902	13
3. Internal and external brand communication	.843	8
4. Brand Managing	.762	4
Overall Cronbach's Alpha	0.943	44

Overall model fit of this scale met the standard. 39 statements are grouped in four components based on a correlative relationship between them. Only 5 statements were deleted due to a commonality score of less than 0.5 and having a very low factor loading score (see Table 4).

Table 4  
Rotated Component Matrix

Statements		Component
Everything we accomplish is oriented towards supporting the brand value (logo, name) of our organization.	.881	1
We have a system to get feedback from stakeholders.	.863	
We communicate on the ground to spread the meaning of the brand (logo, name).	.788	
We know in detail what our stakeholders like about the brand (logo, name) of our organization.	.772	
Long-term survival as a non-profit organization lies in its development as a brand (logo, name).	.766	
Managers know marketing actions that involve brand (logo, name).	.703	
We coordinate mission-based programs to spread the meaning of the brand (logo, name).	.703	
We invest the right resources in improving the product/service to provide a better value to our stakeholders	.696	
All staff work consistently with the brand values (logo, name) of our nonprofit	.694	
We develop strategies to spread the meaning of the brand (logo, name).	.667	
We train our employee's how to communicate with the organization as a brand (logo, name).	.627	
We have created the right message link, using the right media, for the right stakeholders.	.623	
Presenting the organization as a non-profit brand (logo, name) raises public awareness of it.	.615	
Make sure the brand meaning (logo, name) is always represented in all communication marketing activities.	.576	

We stay informed on current market conditions.	.922	
Marketing activities are designed to stimulate customers to use our products or services.	.903	
Marketing activities are designed to stimulate key stakeholders to promote our products/services to the customer.	.843	
A clear understanding of what our organization stands for is very important to its public presentation.	.786	
We have included a system to monitor our organization's brand perceptions (logo, name) from stakeholders.	.711	
The meaning of the brand (logo, name) is integrated into the organization through appropriate human resource structures.	.684	2
We develop marketing programs that send ongoing messages for our brand (logo, name), to stakeholders.	.674	
The brand (logo, name) of our organization is considered an important strategic element.	.643	
The brand (logo, name) of this not-for-profit organization creates a sense of belonging and ownership in its staff.	.634	
Brand (logo, name) distinguish our not-for-profit organization from other "competitors" in this sector.	.608	
The brand (logo, name) expresses what our organization achieves and the values it represents.	.579	
We are in constant recognition of the needs of our stakeholders.	.578	
The staff and volunteers of this organization feel proud and part of the internal community, which helps to convey the brand (logo, name) to the external audience.	.898	
Staff and volunteers regularly feel motivated by the brand of this organization.	.892	
Educate and explain the brand (logo, name), internal staff, and volunteers.	.828	
We have created a unique identity, verbal and visual, to reflect the meaning of the brand (logo, name) of the organization.	.797	
The brand (logo, name) of our organization presents its message.	.796	3
Everyone is passionate about the brand (logo, name) of our organization.	.758	
Brand empowerment in our organization is achieved by a clear understanding of what the brand represents.	.669	
We have created an internal culture and system to carry out simple sales efforts to connect people with brand meaning and provide additional revenue.	.644	
We consistently observe the perceptions of the brand value (logo, name) for our organization through research.	.885	
The employees of our organization must believe in our brand and the values it represents.	.885	4
The branding of a non-profit organization is more important than that of a profitable business.	.670	
Managers need to communicate the values of our organization, through personal communication.	.666	

Source: authors

The percentage of variance explained is 66.003 (Table 5). The solution satisfies both Kaiser's criteria of selecting only those with a minimum eigenvalue of 1 and the "percentage of variance" which requires that the extracted factors account for a minimum of 60% of the total variance [56]. The factors are named by the meaning of the correlated variables and hypotheses.

Table 5  
Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	Total	% of Variance	Cumulative %
Brand Culture	17.450	38.778	38.778	17.450	9.207	20.459	20.459
Brand Trust	5.725	12.723	51.501	5.725	8.467	18.815	39.274
Internal and external brand communication	5.161	11.470	62.970	5.161	7.754	17.230	56.505
Brand Managing	4.026	8.946	71.917	4.026	4.274	9.498	66.003

Source: authors

- **Factor 1:** *Brand Culture*- includes all the statements that emphasize the importance of the brand for the survival of the non-profit organization. Brand culture is seen as essential for creating value and is a key element that can influence the behavior of stakeholders and their decisions. At this stage, the brand is considered a strategic element of marketing that helps distinguish the non-profit organization from others operating in the same sector.s.
- **Factor 2:** *Brand Trust* - includes all the statements related to marketing activities, branding as a component of marketing strategies, and their impact on stakeholders. It is the connection between the brand image and the promise to provide quality services, which increases stakeholders' confidence in the organization.
- **Factor 3:** *Internal and external brand communication* - includes all statements related to the importance of consistently communicating the NGO's brand values. Managing employees and volunteers helps to convey the brand of the organization to the external audience. The value of the brand can be seriously considered only if there is a sustainable and inclusive effort throughout the organization.
- **Factor 4:** *Brand Managing* - includes statements related to the importance of actively and carefully managing the brand for NGOs and engaging others in the process. Some non-profit managers consider their organization as a brand and engage in brand management practices, but often in a fragmented way over the years. These managers may feel isolated in their approach to branding and perceive a lack of organizational responsibility for the brand. Therefore, central coordination of brand management has become a crucial step in the process.

### 4.3 Correlation Analysis between Variables

The results of the Pearson correlation tests for a 95% confidence interval are summarised in Table 6. These results indicate that the correlation coefficient between *brand management* and *performance* alerted a weak correlation, whereas the correlation coefficient between other variables *brand culture*, *internal and external brand communication*, *brand trust* and *performance* were moderate and statistically significant.

Table 6  
Performance Correlations with the dimensions of brand orientation

Dimensions		Performance
Brand Culture	Pearson Correlation	.440**
	Sig. (2-tailed)	.000
Brand Trust	Pearson Correlation	.525**
	Sig. (2-tailed)	.000
Internal and external brand communication	Pearson Correlation	.415**
	Sig. (2-tailed)	.000
Brand Managing	Pearson Correlation	.453*
	Sig. (2-tailed)	.000

\*\* Correlation is significant at the 0.01 level (2-tailed)

Source: authors

### 4.4 Regression Analysis

To test the hypothesis a multiple linear regression was run to determine. The regression model was statistically significant,  $p < 0.0005$ . The results are presented in Table 7. The model explained 42.0% ( $R^2 = 0.490$ ) of the variance in performance. These data show that there is a significant relationship between dimensions of brand orientation and performance. Each dimension influences positively the performance, thus our 4 hypotheses are accepted. but *brand trust* and *internal and external brand communication* dimensions have a higher impact.

Table 7  
Multiple Regression

Model summary						
Model		R	R <sup>2</sup>	R <sup>2</sup> adjusted	Standard estimation error	Durbin-Watson
1		.648	.420	.410	.646	1.937
ANOVA						
Mode		The sum of the squares	Df	Average in squares	F	Sig.
1	Regression	50.463	4	16.821	40.336	.000

		Residuals	69.642	368	.417		
		Total	120.105	472			
Coefficients							
Model		Non-standardized coefficients		Standardized coefficients	t	Sig.	
		B	Standard error	Beta			
	(Constant)	1.685	.434		3.884	.000	
	Brand Trust	.507	.088	.424	5.762	.000	
	Internal and external brand communication	.327	.093	.257	3.525	.001	
	Brand Culture	.286	.086	.247	3.317	.001	
	Branding managing	.116	.044	.158	2.661	.009	

*Dependent Variable: Performance*

Source: authors

Based on our results, we can conclude that organizations that focus their managerial actions and practices on the development, acquisition, and improvement of their brand's products and services have a greater chance of experiencing a positive impact on their performance.

### Conclusion and Implications

Today it is not enough for non-profit organizations to represent the social cause and participate in traditional fundraising and development activities. Some non-profits are currently using the brand as a marketing tool to increase their funding, or create broader strategic efforts to manage their brand, to create a stronger social impact. The development of the marketing offer begins with the product concept [57]. The branding notions provide non-profit organizations with new abilities to compete. Branding orientations are considered a business vision that gives to the organizations the possibility to build and support a common understanding of the brand with the actor of interest. In this study, the connection between the dimensions of brand orientation and performance in non-profit organizations is presented.

It has been evidenced that successful organizations are more brand-oriented than those NGOs that are unsuccessful. This paper also evidenced that strong brands are very important for the survival of not-for-profit organizations. Creating a strong not for profit brand can help them in creating a solid relationship with donors or the public [18]. Although the value of branding for charity has been discussed by some researchers [45], the benefits from a good portion of the not-for-profit community have been underestimated. Focusing on these aspects increases the organization's capacity to better serve stakeholders or actors of interest and accomplish its objectives, which is confirmed by Hungarian examples [58], [59].

The results of the survey show that non-profit organizations in Albania are brand oriented; the brand management remains with senior executives, while the employees know the decisions and policies pursued by senior executives of the organization. The four dimensions of brand orientation are identified: "brand culture", "brand trust", "internal and external brand communication", and "brand managing". Thus, the higher level of brand orientation dimensions results in the higher performance of not-for-profit organizations. The higher levels of implementation of these dimensions lead to higher stakeholder service outcomes better than competitors and the achievement of short-term and long-term objectives.

This study offers suggestions to non-profit organizations operating in Albania, including: focusing on mission-based programs and engaging in brand development activities, creating a unique and strong brand identity that reflects the brand's meaning both verbally and visually, managing the brand actively and carefully by regularly monitoring and improving as necessary to maintain stakeholder loyalty, and placing importance on both internal and external branding by integrating the brand's meaning into the organization's structure and human resource management system. Additionally, non-profits should regularly gather and consider stakeholder opinions.

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# The Purposes and Motivations of Savings Accumulation based on Generational Affiliation, Financial Education and Financial Literacy

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*Abstract: In today's fast-paced world, we have had to learn that uncertainty is constant, and that we have to face it in unexpected situations. It is not only our income that is affected by uncertainty in the future, but also our jobs and our livelihoods, which, in many cases, depend on other factors. Global conflict situations only add to this sense of insecurity. In uncertain situations, the fundamental goal of individuals and organisations is to seek security through the means at their disposal. This is no different for our finances. Savings are a key element in the lives of individuals, households and businesses in managing such uncertainties. Savings have always been crucial at the level of the national economy as well, as they have been the source of investment according to classical economics. Nations with a high savings rate have always been able to invest more and have thus enjoyed greater economic growth. Savings, by their role as a store of wealth, help to deal with sudden and unexpected situations. Today, however, savings no longer have only a security function, but must be seen as a collateral for future consumption, a source of future consumption needs, a guarantee of maintaining the standard of living to which we have become accustomed. The current paper sets out to observe and examine the rationale behind savings accumulation from the point of view of households in the light of the pandemic. It is also an objective to identify the impact of the pandemic on the security function of savings formation, providing a picture of the motivations of different generations to save and make savings for the future, based on the results of a questionnaire survey conducted in Hungary.*

*Keywords: savings; financial literacy; generations; financial education*

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## 1 Introduction

Savings play a crucial role in every country and national economy, both domestically and internationally. If we look at the structure of the classical four-sector model known from economics, we can see that in order to keep an economy

alive and in balance, it is always necessary to have savings from the four classical players (households, businesses, governments and foreigners), which are the source of investment. If we use the theory of the model to imagine the functioning of the macro-economy, we can see that there is no investment without savings, and therefore no credit without savings, which can provide significant financial security. Increasing savings can be a source of economic growth for a country, so their level is of paramount importance for any economy [1]. Countries with high savings rates also clearly show a rapid increase in investment, which is a stimulus for the economy [2]. The availability of savings also has a positive impact on crisis management [3]. Nevertheless, in modern financial systems, this theory of the four-sector model is unfortunately no longer fully viable, as there are countless forms of creating money, whether traditional or virtual. Nowadays, savings are no longer important as a basis for investment, but rather as a security or even as a means of accumulating wealth. In this paper, we look at household savings formation, with a particular focus on the post-pandemic situation. The pandemic crisis has given a new dimension to the issue of savings accumulation. Sudden changes and overnight closures have created new challenges for households and businesses. Businesses, especially small businesses, were severely affected by the crisis [4]. The problems of supply chain disruption on the business side, the loss of turnover, the new organisation of work and the resulting revenue shortfall have highlighted the importance of business savings. Businesses can be seen as one of the biggest losers in the aftermath of the coronavirus crisis [5]. On the other side of the same coin, on the household side, savings were also used to replace, or supplement lost or reduced wages in those families where this was possible. Savings are generally based on the decision criteria of how much return they will yield, how liquid they are, or how safe they are.

The 2008 crisis also highlighted the importance of financial awareness and forward-looking planning. It was then when the world and the profession began to look more deeply into financial awareness and literacy, of which savings management is an integral part. However, savings are important not only at the individual level to avoid difficult life situations and thus reduce exposure to negative shocks, but also to reach a level of wealth that enables them to achieve their preferred level of consumption [6]. However, the underlying rationale and background for saving differs from one individual to another. The current paper aims to explore the rationale behind this household saving intention along generational differences in the difficult situation caused by the pandemic.

## 2 Literature Review

Individual savings are linked to financial literacy. Financial literacy enables individuals to make more conscious decisions about their finances, which includes their savings decisions. Low levels of financial literacy often declare future

financial hardship, precisely because of a failure to save [7]. In the absence of financial literacy, a lack of financial planning, consciously planning for the future can lead to a failure to save, which leaves individuals vulnerable to unexpected situations [8]. In examining this issue, it is also important to mention the notion of financial self-efficacy, which is the ability of individuals to manage money [9]. Financial self-efficacy is primarily based on the individual's self-confidence and implies a stable level of financial awareness and competence. Financial self-efficacy is also an individual psychological characteristic that motivates people to make better financial decisions and take steps to achieve well-being [10]. Individuals who have high levels of financial self-efficacy are more confident, better able to cope with certain unexpected financial situations, and find ways out of difficulties more easily, compared to their counterparts who have lower levels of self-efficacy. These groups are more vulnerable, more likely to get into debt, tend to accept less efficient financial arrangements for credit and lack savings to help them out of unexpected financial situations. The low level of financial inefficiency can be seen as a specific form of financial exclusion, which does not result from digitalisation but from the lack of competence of individuals. It is highly recommended to develop digital competences to recognise and identify the opportunities and threats of new technologies [11].

Savings decisions are closely linked to consumption decisions. Consumer behaviour is a dynamic process that involves the emergence of a demand for goods, the selection, the satisfaction of the demand, and the satisfaction that results from the consumer decision [12]. The part of income that is not consumed today will serve as future consumption in the form of savings [13]. In exchange for not using up part of consumption, financial agents offer compensation in the form of interest. The guarantee of future consumption and the correct interpretation of the role of interest depend on our financial awareness. In many cases, we interpret savings as a deposit in a bank account, as a source of loan repayments, or even as speculation, but in all cases we represent it by limiting our current consumption. The purposes of savings vary over the individual's life cycle, with older and younger generations saving for different purposes [13].

When examining savings, it is also important to address issues related to financial socialisation. Growing generations acquire financial knowledge, skills and attitudes through financial socialisation [14], the main arenas, of which are family, peers, education and, in the digital age, the media. Financial socialisation is also part of the socialisation process, the process by which people acquire and retain financial knowledge, skills and abilities from their environment and use them to shape their own behaviour [15]. Financial socialisation has a number of dimensions. Our behaviour is influenced by impulses from our parents, school, peers, our workplace and the economy. A large amount of research has shown that poor financial attitudes and behaviours acquired in childhood and young adulthood lead to financial problems later in life [16]. The most important of these is the set of patterns that come from parents [17]. Parents are the ones who teach the next generation how to

manage finances, the sources and forms of saving and its importance, and the patterns they bring are also decisive for our consumption decisions [18, 19]. When an individual decides to save part of the income, it is a conscious individual decision, which is significantly reinforced by the patterns brought in and thus influenced in a positive direction. Children who are accustomed to saving part of their money from childhood will continue to do so into adulthood, building up a reserve for future difficulties and situations [20].

If the early acquisition of savings education and management habits is started in childhood, children (individuals) will acquire key skills that will positively influence their future lives. They will be able to develop a rational spending structure, take control of their financial decisions and be prepared to deal with various unexpected situations [21]. This awareness, however, can be significantly influenced in positive and negative directions by friends and colleagues in later life cycles of individuals, in addition to family and the education system [22]. However, savings education manifests itself differently at various stages of life, and there are situations where it is particularly difficult [23]. Since we do not know our future life situations in advance, we tend to be optimistic about them, and thus tend to erode the importance of savings in favour of our consumption decisions in the moment, while we define savings as a risk reduction tool due to the inability to foresee the future, which is essential to deal with certain and unavoidable unexpected life situations (loss of job, health problem, etc.).

Early theories and studies on savings focused on the entire individual life cycle of individuals. These theories were based on the assumption that savers would want to maintain a level of consumption based on a constant income throughout their life cycle, which would necessitate savings. Saving behaviour always involves two actions, a store of wealth in the knowledge of future consumption needs and a saving behaviour in the light of future risks [24].

Nowadays, the focus of the study of savings is on the changes brought about by digitalisation. Individuals belonging to the younger generations (Generation Alpha and Generation Z, complemented by a part of Generation X and Y) are fully at home in the digital space, active participants in the world of the internet, almost born into the digital age, and use various IT tools at a skill level [25] [26]. On the one hand, the skill level of using IT tools is positive, as they can get the information they need almost instantly, whether it is about financial or investment issues. It is important to highlight the benefits of unlimited access to information, but also the risks. Unfortunately, the positive information that flows through the myriad channels tends to make us forget about the risks and disadvantages [27]. Without a sound financial attitude and an appropriate level of awareness, the often misleading or incorrect information that is often provided by websites can lead to dangerous situations and poor decisions [28]. Among the changes brought about by digitalisation, it should also be mentioned that the online space offers many more opportunities to supplement needed income in the form of loans and credit than the traditional financial system. Easier access to money (easier credit assessment,

greater availability of funds, seemingly easier conditions) all work against the importance of saving [29]. Several studies have confirmed that the flow of information, its better accessibility and dissemination due to digital achievements is beneficial for the catching-up of certain social strata, and thus can also contribute to poverty reduction [30] [31]. However, it is also important to note that while some groups are able to catch up in the financial arena thanks to internet-based solutions, others are excluded from these opportunities, widening the gap with the rest of the developed world. Unfortunately, knowledge asymmetries, regulatory gaps and inconsistencies, and information distortions work against progress [32] [33]. Therefore, it is important to address the issue of financial exclusion as a priority. Individuals and households who are not financially excluded are able to increase their savings, invest in education, start businesses, all of which are beneficial for future financial security [34]. Innovations due to the revolution in technological tools have given a significant boost to this process [35]. The spread of mobile communication devices has greatly improved the process, opening the door to more socially disadvantaged groups, thus contributing to reducing their disadvantage [36]. The spread of mobile phones and their everyday use has brought the digital space significantly closer. Mobile phones are now not only communication tools, but also financial tools, allowing us to transfer money, make payments, manage our consumption decisions and manage our savings [37]. An interesting discovery in this respect was made by [38], who showed that people who do not save through traditional banking channels use their mobile phones to manage their savings transactions, i.e., they prefer using the services offered by fintech companies.

### 3 Material and Method

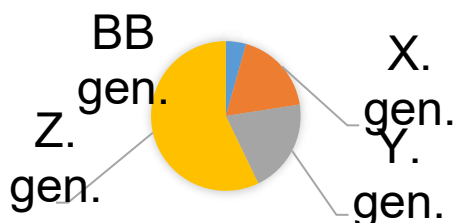
The research on which the study is based comes from a questionnaire survey carried out in spring 2022. The research used a comprehensive, pre-tested, standardised questionnaire to survey respondents. The design of the questionnaire was preceded by several qualitative and quantitative rounds, so that the experience gained from these was used to create the questionnaire format used. The questionnaire included questions focusing on financial awareness, the impact of digitalisation and changes in consumer behaviour in the post-pandemic world of digitalisation. As a result of the survey, 3,515 of the 3,765 questionnaires received were fully assessable, and this paper draws conclusions about one area of financial behaviour, the motivations for saving, based on the latter sample size. The survey was conducted online, ensuring full anonymity of respondents, and therefore no data is collected to identify respondents. No filtering or restriction criteria have been applied in order to achieve the largest possible sample size. In the present study, I have divided the respondents into groups based on their age (generational), previous participation in financial education and subjective perceived level of financial knowledge in order to get an

idea of the main motives, motivations and purposes of accumulating savings. With the present research purposes for savings accumulation that are more focused on the present or the near future were evaluated. Savings for retirement was not in the focus, as this is perceived as a more long-term goal in the eyes of younger generations, and previous research suggests that respondents are not very confident about their retirement. The same was confirmed by the results of the qualitative and quantitative rounds preceding the questionnaire. Thus, the present study explores the reasons for saving that motivate individuals to set aside part of their income in the present or near future.

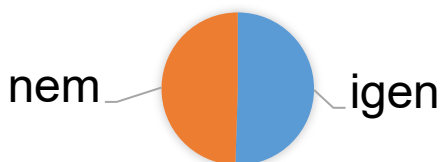
Each purpose and direction was evaluated by using a four-point scale, where a value of 1 represented total rejection of the objective and a value of 4 represented total acceptance. The tests were carried out using SPSS 22.0 software and in this study the results using ANOVA tables are presented.

In this work, the following hypotheses were formulated.

1. Savings accumulation clearly reflects the security consciousness of older generations and the short-term future focus of younger generations.
2. Participation in previous financial education leads to more rational savings motives.
3. Perceived strength of financial knowledge does not always translate into a clear strong commitment to some features of savings formation.



*Breakdown of  
respondents by  
generation*



*Participation of the  
respondents in previous  
financial education*





Figure 1

The composition of the sample based on certain grouping characteristics

Source: author's own research, 2022, N = 3515

## 4 Results

The research on which this study is based was conducted in the shadow of the pandemic, in the spring of 2022. The results clearly suggest the impact of the pandemic crisis in the minds of respondents. The highest proportion of individuals in the sample, close to the maximum value, most want to save for an emergency in the present, as indicated by the mean value of 3.541 for this motivational purpose. Subsequently, a very high number of individuals wish to save money to be safe, to keep themselves or even their family safe, and an important motivational goal is also to save money for future investments, which includes the purchase of cars, technical devices or durable goods. Respondents are the least likely to want to save because they consider themselves more valuable. The mean value of 1.833 clearly demonstrates the irrelevance of this reason. Similarly, the motivation to save money in order to feel prouder is rejected by respondents (mean 1.888). These objectives were found to be completely irrational in the opinion of the sample. People are also less inclined to save because of interest rates, which may be due to the fact that market and bank interest rates were at very low levels at the time of the survey. Above an average of 3, in the middle range, a very high number of people would like to save for future business and education and to put money aside, which clearly represents a prudent and rational motivation.

Table 1

Mean and standard deviation of purposes for savings

	Mean	Std. dev.
Emergency	3.541	0.932
Studies	3.066	0.999
Future enterprise	3.043	1.046
Security	3.480	0.927
Investing in durable assets in the future	3.319	0.978

Interests	2.392	1.140
Feeling more proud	1.888	1.108
Feeling more valuable	1.833	1.090

Source: author's own editing, 2022, N = 3515

Furthermore, I wanted to find out to what extent certain factors, such as generational affiliation, participation in previous financial education and subjectively perceived level of financial literacy, influence respondents' value judgments regarding purposes for savings. To this end, I conducted an analysis of variance using an ANOVA table. First, I examined whether there is a correlation between the grouping criterion and the individual savings objectives, based on generational affiliation. It is clear from the significance value that there is a significant relationship between savings for studies, savings for future enterprise and savings for interest, i.e., they are influenced by age. The same is true for the two factors at the very end of the list, savings from pride and savings from subjective personal worth (feeling more valuable). When looking at the groups, it can be seen that for all the generational groups studied, savings for emergencies, reserves for security purposes and money set aside for future long-term investment are at the top of the list. The ranks of the oldest generations, BB and Generation X, are exactly the same and they are the ones who will not save because it makes them feel more valuable or makes them feel prouder. The reason for this is that respondents in these age groups already have a decent existence, which may not primarily involve their savings. For the younger generations, Generations Y and Z, the first three savings purposes are the same, but in fourth place for Generation Y is savings for entrepreneurial purposes. In their case, the last two are savings for pride and for personal appreciation. However, it can be seen that they placed a higher value on these two factors than was the case for the previous two generations.

Table 2  
Correlation between motivations to save and respondents' generational affiliation

		N	Mean	Std.dev.	F	Sig.
Studies	Gen.BB	154	2.799	1.207	5.979	0.000
	Gen. X	639	3.036	1.008		
	Gen. Y	713	3.017	1.008		
	Gen. Z	2009	3.113	0.972		
	Total	3515	3.066	0.999		
Future enterprise	Gen.BB	154	2.708	1.220	7.860	0.000
	Gen. X	639	2.978	1.074		
	Gen. Y	713	3.025	1.060		
	Gen. Z	2009	3.095	1.013		
	Total	3515	3.043	1.046		
Interests	Gen. BB	154	2.078	1.207	9.396	0.000
	Gen. X	639	2.246	1.119		
	Gen. Y	713	2.446	1.154		

	Gen. Z	2009	2.444	1.130		
	Total	3515	2.392	1.140		
Feeling more proud	Gen. BB	154	1.565	1.035	19.635	0.000
	Gen. X	639	1.642	1.010		
	Gen. Y	713	1.980	1.130		
	Gen. Z	2009	1.959	1.119		
	Total	3515	1.888	1.108		
Feeling more valuable	Gen. BB	154	1.649	1.106	8.492	0.000
	Gen. X	639	1.667	1.035		
	Gen. Y	713	1.905	1.128		
	Gen. Z	2009	1.875	1.086		
	Total	3515	1.833	1.090		

Source: author's own research, 2022, N = 3515

I further investigated the relationship between participation in previous financial education and specific savings motives using the same method. Here again, participation in previous financial education was found to significantly affect saving motives, with no association found for savings for enterprise, savings for interest, and money set aside for personal valuation. If we look at participation in education, we see here exactly the same order as in the previous ones, i.e. there is no difference in the average values, but the averages for each factor are different. It can be seen that those who have participated in previous financial education have a more pronounced opinion, i.e., higher average scores on the four-point scale for the three savings purposes at the top of the list. However, the ratio reverses towards the end of the list. They are less likely to save because it makes them feel more proud or more valuable, which is the opposite for corporate respondents who have not received financial education. So, it can be concluded that previous financial literacy makes respondents more aware of the reasons behind savings formation.

Table 3

Relationship between motivations to save and respondents' participation in financial education

		N	Mean	Std.dev.	F	Sig.
Emergency	Studied	1775	3.606	0.867	17.252	0.000
	Not studied	1740	3.475	0.990		
	Total	3515	3.541	0.932		
Studies	Studied	1775	3.106	0.946	5.892	0.015
	Not studied	1740	3.025	1.049		
	Total	3515	3.066	0.999		
Security	Studied	1775	3.512	0.894	4.175	0.041
	Not studied	1740	3.448	0.958		
	Total	3515	3.480	0.927		
Durable assets in the future	Studied	1775	3.363	0.932	7.052	0.008
	Not studied	1740	3.275	1.021		

	Total	3515	3.319	0.978		
Feeling more proud	Studied	1775	1.839	1.072	7.043	0.008
	Not studied	1740	1.939	1.141		
	Total	3515	1.888	1.108		

Source: author's own research, 2022, N = 3515

Finally, I was also curious to see how respondents' perceived level of financial literacy influenced their individual saving motives. Here, we can see that the significance value for each savings motive shows a significant correlation with the perception of each factor. Respondents whose financial knowledge is self-reported to be inadequate are more likely to save to be safe, followed by saving for emergency purposes and for future investment. Respondents with sufficient, medium and good financial knowledge would like to save for emergencies first, followed by savings to be safe and to build up reserves for future investment. For financial knowledge rated as excellent, the security function is the first priority, followed by future investment, with emergency being the third most popular option. In their case, the appreciation of the security function is most noticeable when looking at the average scores obtained. Respondents are least likely to want to put money aside for interest (the third most likely reason from the bottom of the list), or because it makes them feel more valuable or more proud. This order was also observed across the whole sample. For respondents with insufficient financial knowledge, the order is as described above, but reversed for all other respondents. They are least likely to save money because it could increase their personal worth. However, it is worth paying attention to the magnitude of the average values. In all cases, until financial knowledge reaches the excellent level, the average value of the last two factors is below 2, but for respondents with excellent financial knowledge it was above 2. When looking at the first factors, the highest average scores were for respondents who self-reported only medium financial knowledge, with the security function behind savings being most prominent. This again underlines the importance of financial awareness.

Table 4

Correlation between motivations to save and respondents' subjective financial literacy

		N	Mean	Std.dev.	F	Sig.
Emergency	Insufficient	125	3.016	1.344	22.390	0.000
	Sufficient	585	3.474	0.967		
	Satisfactory	1781	3.600	0.856		
	Good	870	3.617	0.855		
	Excellent	154	3.117	1.323		
	Total	3515	3.541	0.932		
Studies	Insufficient	125	2.576	1.321	10.336	0.000
	Sufficient	585	3.022	1.024		
	Satisfactory	1781	3.107	0.951		

	Good	870	3.113	0.972		
	Excellent	154	2.890	1.164		
	Total	3515	3.066	0.999		
Future enterprise	Insufficient	125	2.592	1.351	9.644	0.000
	Sufficient	585	2.923	1.066		
	Satisfactory	1781	3.069	1.002		
	Good	870	3.131	1.041		
	Excellent	154	3.058	1.110		
	Total	3515	3.043	1.046		
Security	Insufficient	125	3.080	1.286	10.464	0.000
	Sufficient	585	3.415	0.969		
	Satisfactory	1781	3.522	0.866		
	Good	870	3.533	0.894		
	Excellent	154	3.260	1.136		
	Total	3515	3.480	0.927		
Investing in durable assets in the future	Insufficient	125	2.704	1.344	16.287	0.000
	Sufficient	585	3.239	1.012		
	Satisfactory	1781	3.365	0.903		
	Good	870	3.390	0.977		
	Excellent	154	3.201	1.128		
	Total	3515	3.319	0.978		
Interests	Insufficient	125	2.192	1.223	4.779	0.001
	Sufficient	585	2.299	1.171		
	Satisfactory	1781	2.381	1.121		
	Good	870	2.462	1.116		
	Excellent	154	2.649	1.245		
	Total	3515	2.392	1.140		
Feeling proud more	Insufficient	125	1.760	1.146	5.454	0.000
	Sufficient	585	1.921	1.114		
	Satisfactory	1781	1.850	1.069		
	Good	870	1.898	1.127		
	Excellent	154	2.260	1.298		
	Total	3515	1.888	1.108		
Feeling valuable more	Insufficient	125	1.768	1.123	6.633	0.000
	Sufficient	585	1.788	1.109		
	Satisfactory	1781	1.799	1.038		
	Good	870	1.870	1.124		
	Excellent	154	2.247	1.290		
	Total	3515	1.833	1.090		

Source: author's own research, 2022, N = 3515

## Conclusions

The results of the present study suggest that savings are very important in the lives of all individuals and households. Financial awareness and financial literacy have a significant impact on the willingness and motivation of individuals to save. However, it is also very important to look beyond savings patterns to see for which social strata these factors are examined. Households with a higher income level have a greater potential to save, to set aside funds for the future. The issue of financial exclusion is also important when looking at the main purposes and amounts of savings. Individuals and households with a sufficient level of income and financial awareness clearly have a more positive attitude towards saving. In the shadow of the pandemic, respondents in the sample of the present study clearly emphasised the importance of saving for emergencies and its security function, and the future investment objective was also strongly and prominently mentioned. This clearly shows that the pandemic has completely shifted the focus of savings towards the security function. It should be stressed that, irrespective of financial education and generational affiliation, the underlying motives for saving did not include the individual, subjective goal of feeling more valuable or proud. At the time of the study, market interest rates were at very low levels, so this also overshadowed savings for income purposes. As for the hypotheses formulated in the study, the first hypothesis, that older generations are more security-conscious and younger generations are more future-focused, can only be considered partially accepted. The ordering of savings objectives is almost the same, with minimal differences, but the future investment objective is more prominent for younger generations in terms of average values. The second hypothesis, that previous participation in financial education leads to more rational saving motives, is accepted, as in all cases they are more pronounced for respondents who have previously participated in financial education, as they have more pronounced future-focused purposes for savings than their non-participating counterparts. For the latter group, individual goals of subjective value tend to be more prominent. Based on the third hypothesis that the perceived level of financial knowledge does not result in marked differences in purposes for savings, we accept that the higher the level of financial literacy individuals perceive, the stronger their opinions on the individual motives. All this clearly shows that previous financial education, the timely development of financial awareness, has a clear positive impact on this aspect of our financial decisions. It has also been shown that individuals who have been exposed to financial literacy at an earlier age have higher financial efficiency. Here again, the key role of the educational system should be emphasised, which, alongside the financial socialisation of the family, is an important arena for the development of financial literacy in later life. Awareness and financial literacy in financial decisions leads to greater self-efficacy, with positive effects in all areas of our lives. If financial education can be strengthened and started from a very young age, we can achieve the desired goal of a more financially aware generation of children and adults. The importance of the topic and the growing uncertainty mean that research should continue. In the future, I plan to continue it by expanding the sample, subjects and

by investigating several aspects of savings behaviour in order to get a more accurate picture of the motivations behind savings, the impact of digitalisation on savings behaviour and, based on this, the deeper dimensions of the financial culture of the Hungarian population. I also plan to extend the study to other countries, especially in the region, to understand our position and situation in this area.

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# Comparative Analysis of the Workplace Expectations of Generations Y and Z

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*Abstract: It is important to know the job expectations of potential employees because nowadays there is fierce competition on the labor market not only for jobs, but also for employees. The two generations that can currently be found in the largest proportion on the labor market are Generations Y and Z, therefore the aim of our study is to examine the expectations of these two generations towards their workplace and to establish any differences and similarities between them. To conduct our research, we used a questionnaire survey, to which a total of 160 evaluable responses were received between February and April 2022. We examined the main workplace motivations of generations Y and Z, their preferred working hours, type of work, form of work and company size. When examining the two generations under investigation, we discovered many similarities in their attitude to work. We have confirmed that higher salaries, recognition and a good atmosphere in the workplace are highly motivating factors for both Generation Y and Generation Z. The representatives of the examined generations also showed similarity in that they would prefer to work in flexible working hours. In terms of company size, members of Generation Y and Z would also prefer to work in a private enterprise or a medium-sized company. Regarding the type of work, the majority of Y and Z generation individuals involved in our research would do a mix of physical and intellectual work. The willingness to work abroad is more characteristic of the representatives of Generation Z.*

*Keywords: generations; expectations; work; workplace*

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## 1 Introduction

According to the traditional (biological) definition, the term generation means the average time interval between the birth of parents and their children. That means about 20-25 years. However, due to the appearance of new technologies, changing values and career paths, as well as shifting social interests, this has already lost its validity. Nowadays, the concept of generation should be approached from a sociological point of view. In sociological terms, a generation means a group of

people who were born in the same era and who are connected by specific events, processes and trends [1]. According to Nemes [2], the individual generations are loosely connected to each other by their year of birth and shared experiences, since much more details than these influence the way of thinking, behavior and decision. Today, they have to face global challenges such as climate change, social and income inequality, or artificial intelligence. To deal with these challenges, it is necessary that each generation be able to learn from each other.

Based on Steigervald [3], the generations are divided into 6 groups, these groups are the following: the silent generation, the baby-boom generation, the X-generation, the Y-generation, the Z-generation and the Alpha generation. The main characteristics of each generation [3]:

Table 1  
Characteristics of generations [3]

Silent generation	Before 1945	the oldest and at the same time the most experienced generation can be characterized by inadequate living conditions, as a result of which a feeling of insecurity, lack and loss often arose, with them the values, way of life and the handing down of skills from parent to child were still strong
Baby boomers	1946-1964	the last generation, who still used formal communication with their predecessors, they were characterized by hard work, they did everything for their children, but they were not good at showing emotions, this generation appreciates the traditional values that are important to them, as well as the old customs
Generation X	1965-1979	the first technology-oriented generation, household appliances appeared in more and more places, representatives of the generation often strive for perfection, thus spending too much time at work, maximalism is also visible in child-rearing, as they want to give everything to their children and are constantly in a state of trouble-prevention
Generation Y	1980-1994	they were not yet born into the online world, the expectations of this age group regarding the media have changed, the Y's are experience-oriented, problematic employees, the reason for this is the lack of respect for their elders, this generation is active in the world of social media and this helps them to for change in the field of work
Generation Z	1995-2009	the parents of the young people in this group are maximalists, so they are constantly under surveillance, they have several negative qualities, but the main one is their relationship with money, the Zs do not really like to have conversations with different people, instead they prefer to send messages among themselves

Generation Alpha	After 2010	they are the first generation who were born into the world of the Internet and their parents are also addicted to the world of the online space
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After we have covered the main characteristics of each generation in general, we would like to pay special attention to the representatives of the Y and Z generations, who were the target group of our primary research that will be presented later.

The Y generation is also called the millennial generation, as well as simply millennials. They were born into the world of technology; their understanding of technology is in their veins. They are available in the world of the online space every day of the week with the help of various technical things, such as telephones, laptops, and tablets. Millennials grew up seeing their parents always working hard and living stressful lives. Generation Y has a different opinion on this that they would rather work less [4]. The computer is, therefore, an important tool in their work as well as in their private life [5] [6]. Success, career and money are very important to this generation because they think that they can only get ahead in society with the help of these. They are independent personalities, for them the workplace is just one of many, and if they don't like it, they often move on. Overtime is not characteristic of them, and they do not make various efforts for the sake of their boss or their workplace. Generation Y is classified as multitasking users, which means that they can look at several pages, listen to music, and send e-mails at the same time while talking to 4-5 people. This divided attention results in superficial focusing [7]. This generation quickly learns the possibilities offered by new technology, such as ways to pay with or without a card or by phone [3].

The members of Generation Z have already been born into the digital world [8]. This is the world's first global generation, they are called in different ways, such as: R (responsibility), D (digital). They are very different from previous generations. They grow up on the same music, food, movies and fashion trends. They were born into the smallest families, raised by the oldest mothers, and the parents spent most of their time in education [9]. The character of the Zs develops primarily through the Internet. They already live in the online world and for them the border between online and offline space is blurred. For them, success means recognition in the online world. They are very money conscious, they pay attention to what they spend money on. Generation Z finds personal relationships difficult, they don't like to be in a situation of immediate feedback. In a personal conversation, they don't have time to consider the answers and this creates fear in them. Instead, they prefer the message because they can respond when they get to it [3]. People born in Generation Z are more impatient in their private life and work [10]. Generation Z grew up using various technologies, such as cell phones, laptops, and video games. As we have already mentioned with the Y generation, the multitasking operation that is present in their everyday lives also applies to the Z generation. They can process information at the "speed of light," and thanks to this, they will have exemplary skills at the workplace and thus gain a greater advantage [8].

Nowadays, there is a mixed age group in the workplace: 4 generations can be found on the labor market, these are the baby boomers, Generation X, Generation Y and Generation Z. A multigenerational workplace has several advantages. Each generation has its own characteristics. However, let's not forget that when several age groups work together, various workplace conflicts can arise [11]. The employees must think about what they expect from a workplace. These conditions may apply to working conditions, colleagues, bosses, work atmosphere, salary, and free time [12].

Generation Y is goal-oriented in the workplace, and the balance between work and private life is important to them. They change jobs at any time if they are dissatisfied with their current job [13]. They do not stick to a company, they are ready to quit without compromise [14]. The representatives of this generation can converse in several languages, they like to travel and get to know the cultures of several countries, and if they plan something, they follow it until they reach their goal [15]. They feel motivated when they can do several tasks at the same time, but only as much as they can handle [14]. Generation Y employees require 3 basic conditions. This includes independence, it is important for them to get enough free time from their employer. They require continuous competitive professional sophistication, thus becoming better and better at work. The third is a sense of purpose [16]. This age group has several expectations regarding the ideal workplace [17] [18].

- It is important for them to have a room where they can relax from the overload caused by working.
- The company must see an advantage in teamwork and encourage employees to be creative.
- Work-life balance is essential, along with continuous training, workplace recognition and the acquisition of appropriate expertise.
- It is essential for them to receive adequate financial benefits in exchange for their work, and the most important thing is that the wages are fair.
- For them, the ideal job is that if something comes up in their private life, they can still take care of it.
- They like flexible working hours, when they don't have to be constantly on standby, and this can later be combined with plans to start a family.
- For young employees, it is important that their workplace is easily accessible.
- Y's require working with positive and exemplary personalities.
- Uninterrupted "feed back," i.e. receive feedback, they can strive for the better through these reactions.
- The "open-office" room can be significant.
- It is essential for them to have the appropriate technical equipment and various programs to fulfill their work tasks.

On the other hand, it is worth examining what employers expect of employees:

- The company expects Generation Y to always do work on time and thoroughly.
- In all circumstances, employees must be moral and fully responsible.
- This age group should be able to constantly adapt to the conditions required by their work.
- It may be an important expectation from the company to spend overtime and extra resources in order to complete the task.
- Nowadays, generation Y has also encountered a requirement where work experience is essential as a recent graduate [19] [20].

The members of the Z generation are the youngest on the labor market, and they are still only present in small numbers. As a result of the online world, they acquire a lot of knowledge, thereby becoming a great workforce. The usual motivational tools do not work for this generation, instead freedom and self-realization motivate them. They need their employer to constantly evaluate them at work. This generation has the highest expectations [21]. This generation considers business and financial knowledge and security-oriented behavior very important [22]. Generation Z is similar to Generation Y in many ways. The use of multitasking is also an advantage in their work life. Technology has been present in their everyday lives since childhood, and with its help they can perform almost any task at work [23]. The workplace behavior of Generation Z employees is significantly different from that of older generations, and for this reason company managers must consciously strive to promote good interpersonal relationships among colleagues [24]. Generation Z has several expectations on the labor market, these are:

- Maintain a very good relationship with colleagues, have lunch or coffee together in groups at work, and maintain a pleasant bond in private life as well. The employee also wants to develop a good relationship with his boss.
- With this generation, if any problems arise during tasks, it is good that their boss is there because they can ask for immediate help.
- They expect that they will be involved in the company's events that they can gain as much experience as possible and that there is always something interesting happening around them.
- They like workplaces where they can feel challenged during tasks and are allowed to develop, bosses are only interested in the end result.
- More and more people demand to have their own office, desk or to be able to decide where they want to do their work.
- They also represent flexibility, they want a certain working time or that there is no problem if they arrive later or go home if there is not enough work [25].

Employers have different requirements for Generation Z:

- In many cases, this age group also meets the requirement to have adequate work experience as a career starter.
- It is important for the employer that the employees can be trained easily, that they are interested in the position they have been hired for, and that they can perform the tasks independently.
- If the company has an important deadline task, then in this case the employee can be counted on to meet the deadlines.
- Employees must be determined and decisive, if they plan something, they must carry it out, and they must also be able to take responsibility and be enthusiastic about every task.

In many workplaces, the most basic condition is adequate language skills and the use of computer programs [26].

We conducted our research in Slovakia and Hungary. According to a study in Poland [27], which has a similar culture to these two countries, the digital world is a natural environment for Generation Z. From the point of view of employers, it is also favorable that this generation willingly undertakes business trips abroad. Generation Y expects to be paid above-average for work abroad [28].

High wages and flexibility are also very important factors for Generation Y in Slovakia [28]. Generation Z also considers this very important, but in their case, their expectations are often unrealistically high compared to their work experience [29]. Another important factor is that generation Z changes jobs more often than the older generation, they do not want to spend their whole lives in the same workplace [30].

In summary, it can be said that the two examined generations show similarities in many cases in terms of their attitude to work. The most important difference between the two generations can be identified as work experience, since generation Y has been present on the labor market for years, while generation Z who graduated from university are just starting their careers. Employees of this generation do not yet have many years of experience.

## 2 Methodology

The aim of our study is to examine the expectations of the Y and Z generations towards their workplace and to determine the possible differences and similarities between the two investigated generations. During our primary research, we assessed the different ways the employer could motivate employees. It may be important to know what non-salary benefits employees expect from their employer, knowing this also increases motivation for better performance. Through our research, employers can get an adequate idea of what they should change, for example, what working



hours the employees would like to work, what types of tasks they would like to perform, what kind of company they imagine themselves in, what wages they would accept for various jobs.

In our study, we examine the workplace expectations of Generation Y and Generation Z. In order to carry out our research, we considered a questionnaire to be the most suitable since these two generations are found in high proportion and are easily accessible online. Our questionnaire was filled out voluntarily and anonymously. A total of 160 evaluable responses to our online questionnaire were received during February and April 2022. Since the closure due to the coronavirus epidemic only made it possible to distribute the questionnaire online, we distributed the questionnaire on social media using the snowball method. We first sent the questionnaire to 50 of our friends, who were asked to forward it to 3-5 of their friends.

Among the questions, we have included several types of questions. Our questionnaire contained closed and open questions, as well as questions that the respondents had to rate on a five-point Likert scale. During our questionnaire, the primary and at the same time the most important thing was that only representatives of the Y and Z generations fill it out, therefore the first question of the questionnaire focuses on age. (As we wanted to avoid incorrect filling in, the respondents did not have to choose a generation, but gave their age, on the basis of which we classified them into Generation Y or Z based on the literature definition.)

The answers received were processed using Microsoft Excel and the SPSS statistical program. During our research, we formulated the following hypotheses:

H1: Among Generation Y and Generation Z, a significant difference can be shown regarding their preferred working hours.

H2: Among Generation Y and Generation Z, a significant difference can be shown regarding their preferred company size.

### 3 Results

In our questionnaire, we asked three questions about demographic data. Among them, our most important question was how old the respondent was, as we were able to classify them into the two generations on the basis of this. Since we wanted to avoid the respondents from wrongly classifying themselves in a certain generation, we did not indicate the name of the generation, but the age groups established on the basis of the literature: 13-27 years old or 28-42 years old. For respondents who did not belong to either group, the questionnaire ended at this point. The respondents then had to state their gender and their highest education (Table 2).

Table 2  
Distribution of respondents by age, gender, highest education

Age		Gender		Highest education		
28-42 (Generation Y)	13-27 (Generation Z)	Man	Woman	Primary	Secondary	Higher
41,9%	58,1%	23,1%	76,9%	3,8%	66,9%	29,4%

The first work-related question of the questionnaire (Figure 1) focused on what motivates the respondents during work. Respondents could tick several answer options. According to their own admission, the members of the Y and Z generations are mostly motivated by a higher salary, recognition and a good working atmosphere. For Generation Z, respect, freedom, and the modern design and beautiful furnishings of the workplace are more motivating than for Generation Y. On the other hand, generation Y finds independence at work more motivating than generation Z.

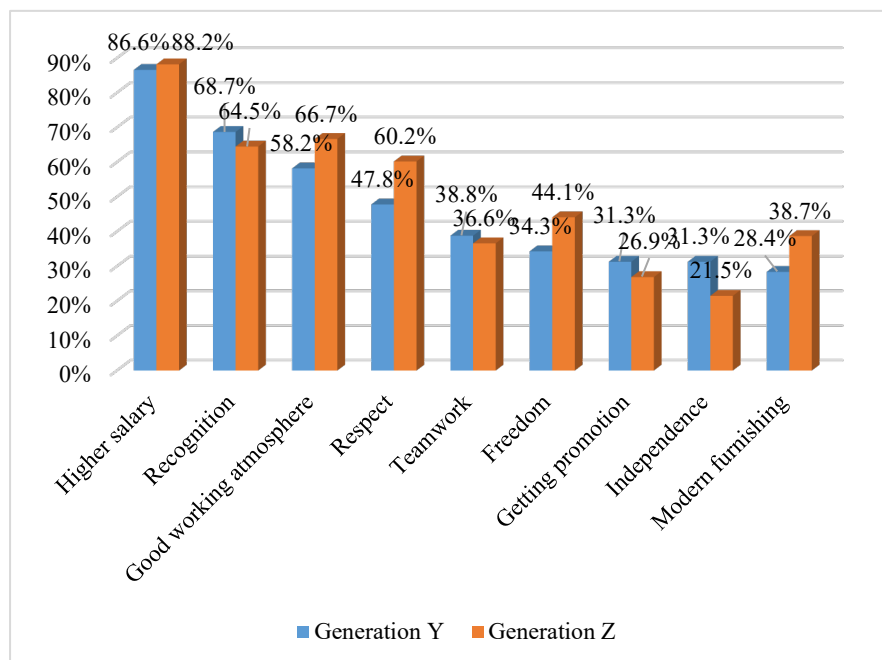


Figure 1  
Motivational factors at work

Our second work-related question focused on what working hours the members of the two generations would most like to work (Figure 2).

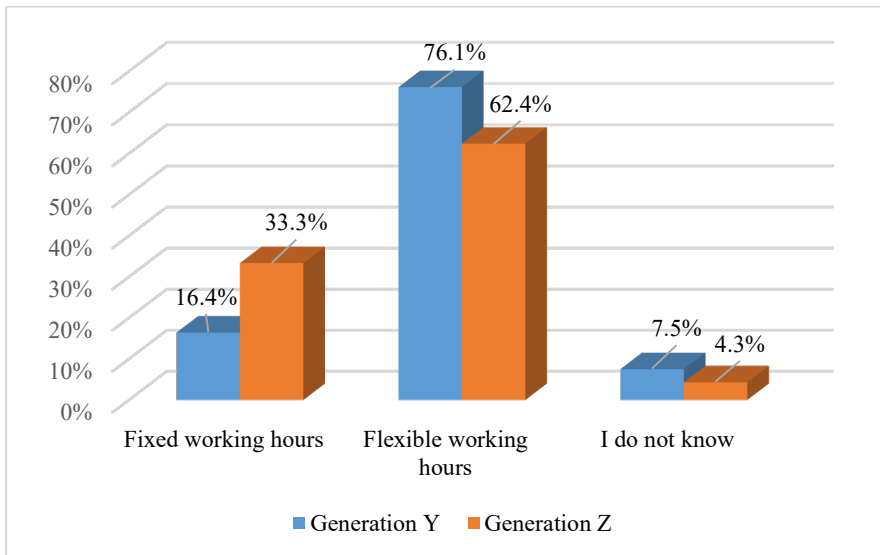


Figure 2  
Preferred working hours

In the case of Generation Y and Generation Z, more people indicated flexible working hours, however, it can be concluded that Generation Y prefers to work in flexible working hours to a greater extent. We assume that this may be due to the fact that many of the representatives of the older generation already have families, so it is easier to create a work-life balance with flexible working hours.

Nowadays companies have to be open to new opportunities. The possibility of a home office, part-time work and helping parents with small children are all factors that can give companies a competitive advantage in the labor market [31].

In this question, we examined whether the difference between the two generations is statistically significant. To do this, we performed a cross-tabulation analysis (Table 3) in the SPSS statistical program since both of our investigated variables were measured on a nominal scale.

The value of Chi-Square is 5.315, the degree of freedom is 1, while the asymptotic significance (2-sided) is  $p=0.021$ . That is lower than the generally accepted level of significance  $\alpha=0.05$ .

Based on the result of the Chi-square test, we were able to show a significant difference. Because of this, our first hypothesis was confirmed, so a significant difference can be shown among the Y and Z generations regarding their preferred working hours.

Table 3  
Testing hypothesis H1

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,315 <sup>a</sup>	1	,021		
Continuity Correction <sup>b</sup>	4,498	1	,034		
Likelihood Ratio	5,517	1	,019		
Fisher's Exact Test				,027	,016
Linear-by-Linear Association	5,280	1	,022		
N of Valid Cases	151				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 17,25.					
b. Computed only for a 2x2 table					

Since we were able to demonstrate a significant relationship between the two variables, we also had to examine the value of Cramer's V coefficient (Table 4) in order to determine how strong the relationship is.

The value of the indicator is 0.188, which, despite the fact that the result is significant, only indicates a weak relationship.

Table 4  
Testing hypothesis H1 – Cramer's V

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	-,188	,021
	Cramer's V	,188	,021
N of Valid Cases		151	

In the next question (Figure 3), we asked what size company the respondent would like to work for. Members of the Y and Z generations would also prefer to work in a private enterprise or a medium-sized company. In the case of Generation Z, small companies were not far behind. Large companies are more popular among Generation Y, for whom the rate is almost 10% higher than that of Generation Z.

It was this question that was related to our second hypothesis. In this case too, the examined variables are not metric, variables measured on a nominal scale.

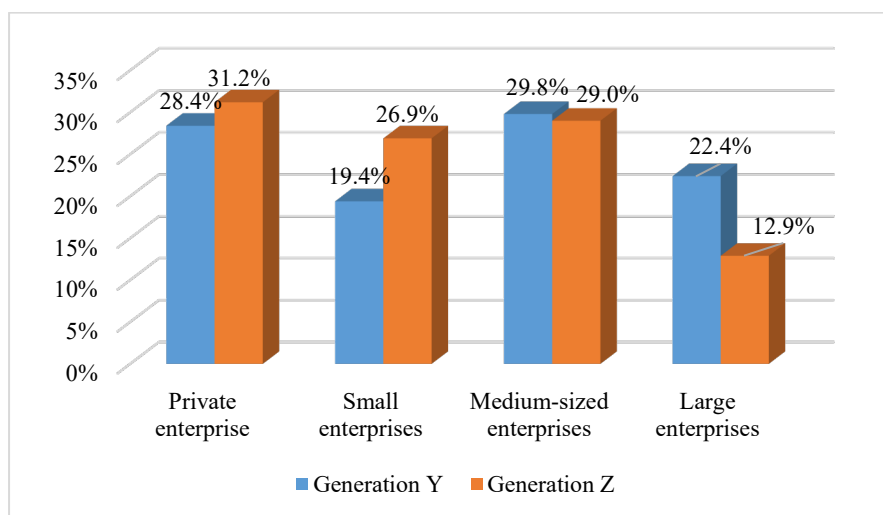


Figure 3  
Preferred company size

The result of the Chi-square test is not significant in this case (Table 5) ( $p=0.376$ ;  $\alpha=0.05$ ;  $p>\alpha$ ), therefore, no further analysis was carried out. Hypothesis H2 was rejected.

Table 5  
Testing hypothesis H2

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3,106 <sup>a</sup>	3	,376
Likelihood Ratio	3,090	3	,378
Linear-by-Linear Association	1,707	1	,191
N of Valid Cases	160		
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,31.			

In our research, we also addressed what type of work (Figure 4) members of the two examined generations would prefer to do: physical or mental. Looking at the generations, we did not identify a big difference since the proportions developed similarly. Both generations would mix physical and mental work. Of the two types of work, mental work was more popular.

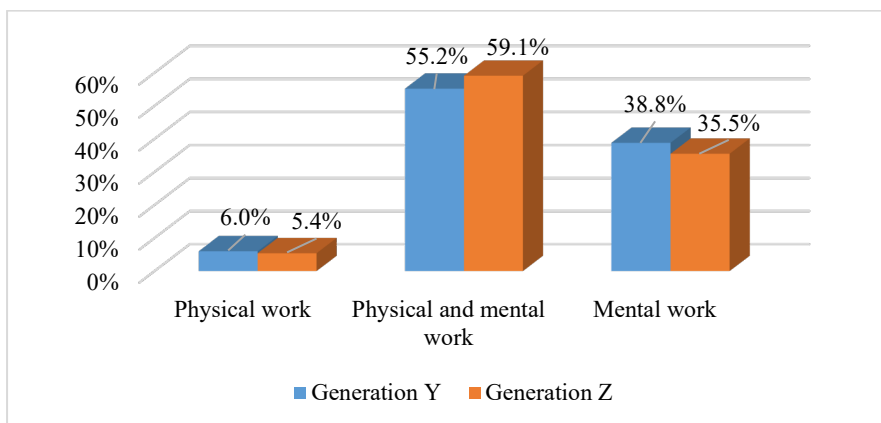


Figure 4  
Preferred type of work

The next question (Figure 5) focused on what type of task the members of the two generations would prefer to perform. Despite the fact that representatives of the Y generation are older, more than 40% of them would like to do a task that allows them to learn and train themselves. The same was indicated by a quarter of members of Generation Z. Generation Z prefers tasks where they can express their creativity. 10% more people of Generation Z than Generation Y indicated that they would prefer tasks that can be solved with minimal effort.

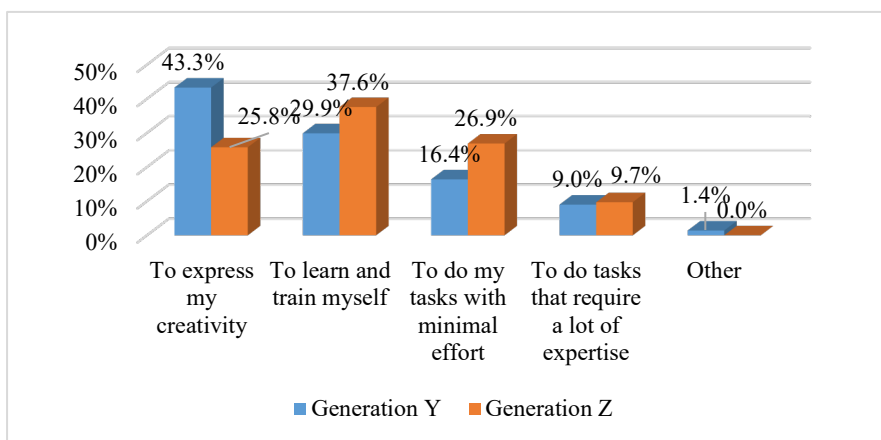


Figure 5  
Expectations about the work

We also asked whether the respondents would work abroad (Figure 6). Among the representatives of the two generations, the Z generation answered the question with a higher proportion of yes.

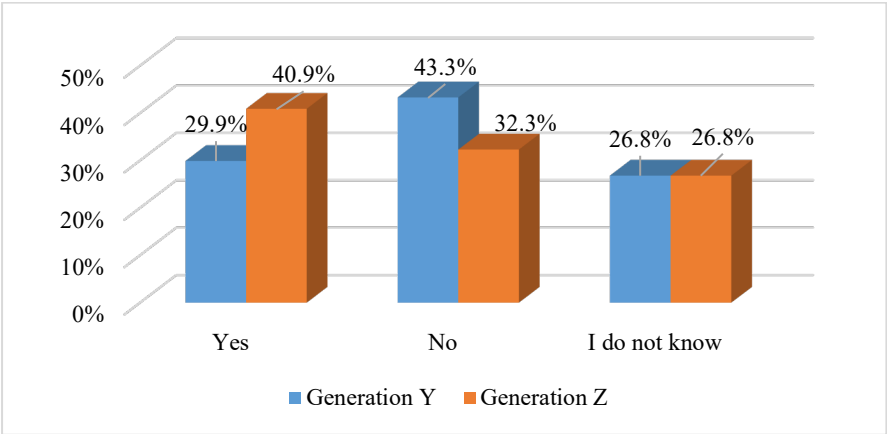


Figure 6  
Willingness to work abroad

Similar to a previous question, we assume that the fact that members of the Y generation are older and have families plays a role in this, so it would be more difficult for them to work abroad. The proportion of those who could not form an opinion on this question was quite high for both generations.

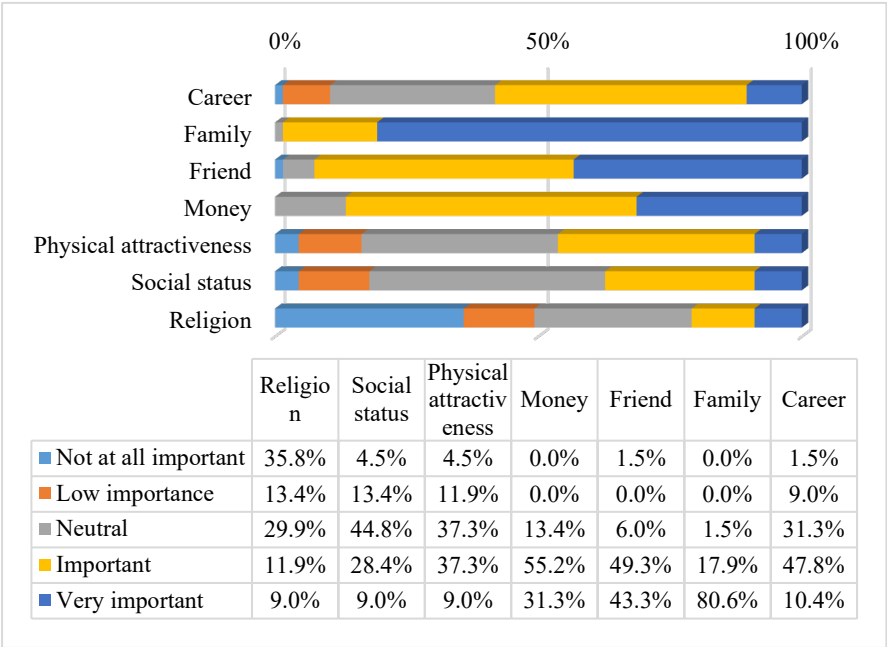


Figure 7  
The importance of factors for the Y generation

In our last question, the respondents had to decide how important it was to them in relation to various factors.

For Generation Y (Figure 7), family is the most important of all factors. This is followed by friends, money, and then career. In the case of Generation Z (Figure 8), the order is almost the same: family, money, friends, career. The least important concept for both generations is religion.

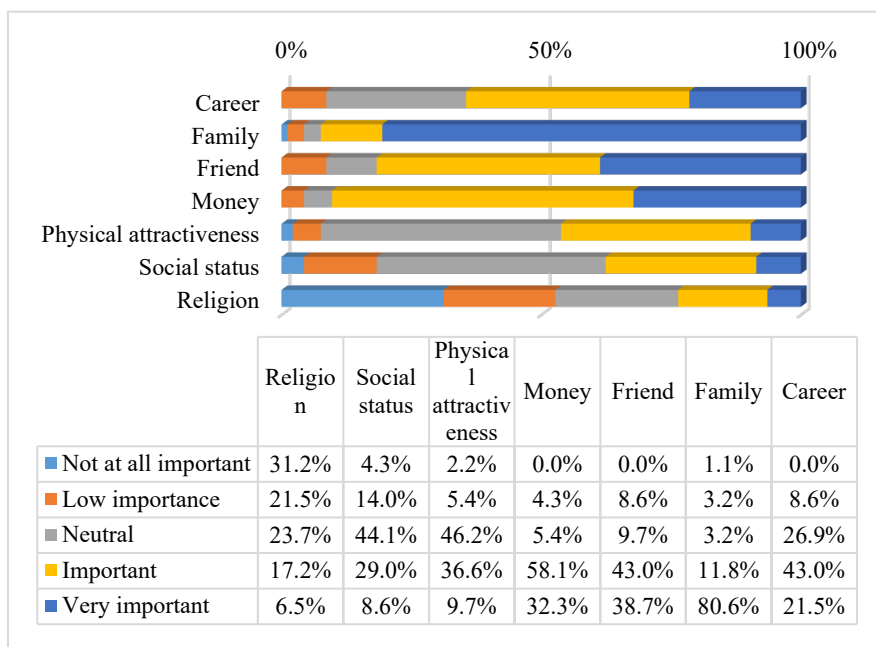


Figure 8

The importance of factors for the Z generation

In order to make the results easier to interpret, averages, standard deviations and medians were calculated (Table 6). Based on these, career, physical attractiveness and religion are more important for Generation Z, and family and friends are more important for Generation Y. Money and social status are equally important to both generations.

Table 6

Important factors – mean, standard deviation

Generation		Career	Family	Friends	Money	Physical attractiveness	Social status	Religion
Generation Y	Mean	3,57	4,79	4,33	4,18	3,34	3,24	2,45
	N	67	67	67	67	67	67	67



	Std. Deviation	,857	,445	,726	,650	,962	,955	1,329
	Median	4,00	5,00	4,00	4,00	3,00	3,00	3,00
Generation Z	Mean	3,77	4,68	4,12	4,18	3,46	3,24	2,46
	N	93	93	93	93	93	93	93
	Std. Deviation	,886	,782	,907	,722	,828	,949	1,273
	Median	4,00	5,00	4,00	4,00	3,00	3,00	2,00
Total	Mean	3,69	4,73	4,21	4,18	3,41	3,24	2,46
	N	160	160	160	160	160	160	160
	Std. Deviation	,877	,663	,840	,690	,886	,948	1,293
	Median	4,00	5,00	4,00	4,00	3,00	3,00	2,00

## Conclusions

Our research results somewhat expand and strengthen the Y and Z generation characteristics that can be read in our summary of the literature. We have confirmed that higher salaries, recognition and a good atmosphere in the workplace are highly motivating factors for both Generation Y and Generation Z [14]. We agree with Vlacseková and Mura's [32] statement that managers of companies must know and understand the motivational theories in order to improve not only individual performance, but also the performance of the company as a whole. And this can be achieved if the employees are happy and satisfied with the working conditions. It should also be taken into account that motivation changes over the years [33], so it is important to continuously monitor and promote employee motivation.

The representatives of the examined generations also showed similarity in that they would prefer to work in flexible working hours [17] [18] [25]. The importance of flexibility is also of great importance in the lives of Generation X, and this is even more typical of the two generations we were examining [34]. One of the biggest advantages of flexible working hours is that it helps create work-life balance [35]. Fixed working hours would be preferred by 16% of Generation Y respondents and one third of Generation Z respondents. In terms of company size, members of Generation Y and Z would also prefer to work in a private enterprise or a medium-sized company. In the case of generation Z, small companies also represent a high proportion. Large companies are more popular among Generation Y, only 12.9% of Generation Z selected this option. This contradicts the research results of Csehné Papp [12], on the basis of which Generation Z people want to be employed by a large company.

Regarding the type of work, the majority of Y and Z generation individuals involved in our research would do a mix of physical and intellectual work. For Generation Y, the most important thing from a workplace perspective is that they can learn and train themselves, as well as - secondly - exercise their creativity. From the point of view of Generation Z, the most important thing is to express creativity, and the answer option to do the job with minimal effort received a higher rate than the possibility of learning and self-training. In her research, Dolot [27] found that representatives of Generation Z like to get to know new technologies in their work to a greater extent than Generation Y. On the other hand, generation Y indicated a higher percentage that they like to receive feedback from those who assign tasks to them.

The willingness to work abroad is more characteristic of the representatives of Generation Z. This confirms the research results of Dolot [27]. For both generations, more than a quarter of the respondents could not take a position on the question of whether they would work in another country. Among the concepts mentioned in our last question, Generation Y considers family, friends and money to be the most important, followed only by career. Despite the fact that money and career came in third and fourth place, they represent a high value in terms of averages, so we can confirm Tari's [7] conclusion, which can also be read in our literature summary that career and money are very important to this generation. In the case of Generation Z, career is also only in fourth place, but material things are more important to them than friendships, and this is also a concept connected to the workplace. Several authors have pointed out that work-life balance is very important for the youngest generations entering the labor market [36] [37] [38] [39] and they put money and reputation before intrinsic values [37] [38].

We consider it important that not only companies understand the needs of generation Y and Z employees, but that this also happens in reverse, i.e. that the employees are also aware of what the labor market expects of them. We can agree with the statement of Csehné Papp [12], according to which: already in secondary school, space should be reserved for informing young people about the state of the labor market. Young people must be led to find out about the shortage professions, the extent of overtraining, outdated professions, and new programs. In this way, they can obtain useful and necessary information for their future employment.

The limitation of the research was due to the coronavirus pandemic, as we could only distribute the questionnaires online. This led to another limitation, the low sample size. In the future, we would like to expand this and, as a continuation of the research, we would like to make a comparison based not only on generations, but also on the basis of other grouping factors.

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# Application of the FUCOM-FUZZY MAIRCA Model in Human Resource Management

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*Abstract: The paper presents the FUCOM-MAIRCA MCDM model for application in human resource management. The proposed model allows the inclusion of all relevant stakeholders in the process of human resource selection, enhances the pool of scientific knowledge in the field of human resource management highlighting selection as a special activity, and uses modern quantitative (mathematical) decision-making methods. Based on the analysis of personality traits of teachers and literature related to this field, the necessary characteristics of teachers of the Military Academy are presented, on the basis of which the selection criteria are formed. The FUCOM method was used to define the weight coefficients of the defined criteria. In order to more precisely determine the qualitative properties and their quantification, triangular fuzzy numbers were implemented in the MAIRCA method, and by applying all the steps of this method, the ranking of alternatives was performed. Finally, in order to test the validity of the model, a sensitivity analysis was carried out.*

*Keywords: FUCOM; fuzzy; MAIRCA; teacher selection; HRM*

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## 1 Introduction

The development of any educational system is determined by numerous factors, and the human factor is certainly one of the most important. Even the most modern technical and technological solutions cannot replace the influence of the human factor in the process of educational work, where the teacher occupies a very responsible and important place and function, at all levels of education. Introducing young generations to what awaits them in life and training them to perform the

expected roles in society, has always been an activity of special interest to all humanity [1] [2] [3] and [4]. The teachers' competencies and personality is the subject of numerous studies that provided different scientific knowledge, depending on the time when they were conducted and the socio-cultural-political circumstances in which the research was conducted. Domas and Tiedeman [5] performed a comprehensive analysis of the literature related to teacher competencies that had been published up to that time. Medley [6] analyzes and synthesizes the results of research studies on the competencies and effectiveness of teachers, from the aspect of teacher behavior in classes. The author in [7] presented previous research in the field of teacher competencies in the United States and proposed measures to improve competencies. Cheong Cheng [8] proposes a holistic approach to improving teacher effectiveness, with an emphasis on improving teacher competencies and performance rather than teacher behavior. Selvi [9] explains the competencies of teachers through several dimensions "as field competencies, research competencies, curriculum competencies, lifelong learning competencies, social-cultural competencies, emotional competencies, communication competencies, information and communication technologies competencies (ICT) and environmental competencies". In their study [10], the authors investigate teachers' pedagogical aspects, professional beliefs, work motivation and self-regulation as aspects of their professional competence and their impact on student outcomes. Hakim [11] studies the impact of teacher competencies on learning performance, where he finds that competencies, such as pedagogical, personal, professional and social, are directly related to the achievement of teacher performance in the learning process. Sulaiman and Ismail [12] in the research entitled "Teacher Competence and 21<sup>st</sup> Century Skills in Transformation Schools 2025 (TS25)" list the following dimensions of teacher competence: Personal Characteristic, Curriculum, Planning, Evaluation & Reporting, Pedagogy, Professional, Information & Communication Technology and School Management & Development. The authors in [13] presented a multi-dimensional approach to teacher competencies in higher education which consists of six dimensions with their respective characteristics, which ensure quality during the selection of teachers and their professional development. Research in the area of teacher professionalism, presented in K, points to the fact that teacher's ideals, professionalism and practice have a direct influence on teacher competence [14]. In addition to previously researched competences, the scientific competences of teachers, described through the ability of teachers to apply modern technologies in the teaching process, are increasingly mentioned in recent researches [15]. As can be seen from previous research, there are different approaches to teacher competence. The first approach is directed towards the teacher's behavior during education, while the second is directed towards the characteristics of his personality. Answering the question of what is key to the success of a teacher is still a great challenge today, and therefore the selection of staff for future teachers, both in the civilian sector and in the military education sector. In the Republic of Serbia, the basic faculty that educates future military officers is the Military Academy.



The Military Academy, as a higher education unit within the University of Defence in Belgrade, integrated into the higher education system of the Republic of Serbia, provides its teaching staff mainly from officers serving in units and institutions of the Serbian Army and the Ministry of Defence. Great attention is paid to the selection of teachers who will educate and train future military officers. The basic conditions that officers who will perform the duties of a teacher must meet refer to the formal criteria defined by the law defining the field of higher education and internal regulations governing this field at the Military Academy, in which the characteristics of teacher as person are not considered. Numerous scientists around the world have researched this problem and come up with a large number of positive qualities that a teacher in higher education should possess. By analyzing the previously mentioned characteristics and literature related to this field, the necessary characteristics of the teachers of the Military Academy were presented, on the basis of which the selection criteria were formed.

The paper presents a model for the selection of candidates for teachers of the Military Academy, which would include all the necessary criteria. The model is based on respect for all modern scientific knowledge in the field of human resource management, with special emphasis on selection, as a special activity, and the application of modern decision-making methods. The model represents a synthesis of the FUCOM method, which defines the weight coefficients of the criteria, and the Fuzzy MAIRCA method, which ranks alternatives and chooses the optimal solution. Also, the analysis of the sensitivity of the model to the change of the weight coefficients of the criteria was performed, as well as the determination of the Spearman's coefficient of rank correlation, on the basis of which conclusions were drawn about the stability of the used methodology.

## 2 Materials and Methods

Although a relatively young scientific discipline, human resource management is the most important factor in the successful functioning of any organization, and the abilities of employees in the organization are an important factor in success [16]. As one of the important activities in the process of human resources management, is a selection. The goal of selection is to correctly predict the candidate's behavior, which will positively affect the achievement of the organization's goals. The selection process generally includes: determination of the required characteristics for the effective and efficient performance of the duties in question and evaluation of the candidate in terms of how well he fulfills the required characteristics of the specified job. In the selection process, the necessary information about the candidate is obtained using certain methods and techniques, the basic characteristics of which are: objectivity, sensitivity, reliability and validity, confirming to us which of the registered candidates is the most competent for the position for which we are making the selection. Candidates differ from each other in many ways in terms of abilities, character traits, competences, etc.

According to Lojic [17], one of the most acceptable determinations of the basic phases in the selection process are: analysis of received applications and supporting documents, preliminary interview, testing, diagnostic interview, reference check, job offer and medical examination. Also, an indispensable part of the final stage of the selection, which represents the verification of a well-executed selection, is the monitoring and analysis of the results of the received candidates, which lasts several months [17]. The teaching staff in military schools consists of teachers with appropriate teaching titles, who teach and can perform other duties at the same time. The teaching base of the Military Academy is formed, in most cases, by officers who are in the defence system, ie in units and institutions of the Serbian Army and the Ministry of Defence, while a smaller number of them have the status of civilians.

The model of selection of officers for teachers of the Military Academy implies that this process takes place according to a clearly defined procedure, in which the superior officers of the candidate who apply for teaching duties would take part, and the implementation of the selection and making the final decision would be realized by the commission of the Military Academy, composed of four teachers from the educational-scientific field for which a teacher and one psychologist are elected, based on the model of multi-criteria decision making and interviews with candidates, respecting the basic stages in the selection process (Figure 1):

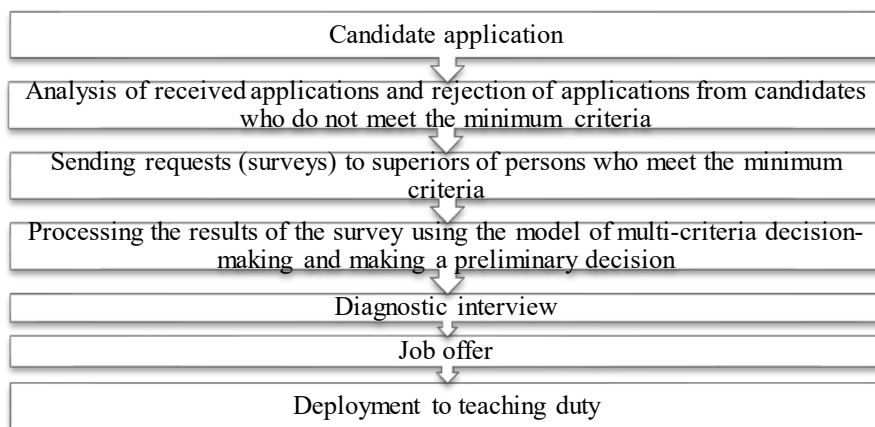


Figure 1

Phases in the selection process (adapted from [17])

In order to integrate knowledge and experience into one whole, a model of multi-criteria decision making for the selection of teaching staff of the Military Academy was developed, presented in Figure 2.

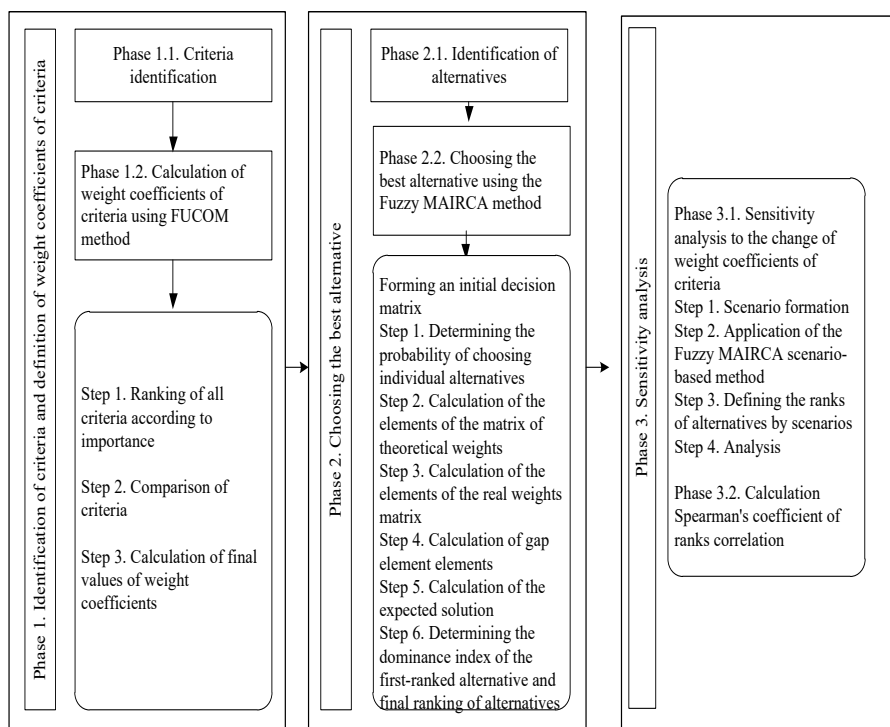


Figure 3

Multi-criteria decision making model for teacher selection

## 2.1 Defining Selection Criteria

Teachers at the Military Academy, as well as at other faculties and schools in the country and abroad, have two basic roles: educational and upbringing. Not only professional and working abilities, but also human values of teachers come to the fore in educational work. With the advent of pedeutology, as independent scientific disciplines of pedagogy, in the twenties and thirties of the last century, more and more importance were given to the study of teacher characteristics, as a factor in the success of the teaching process [18]. Suzic [18] comes up with 97 characteristics and recognizes six basic criteria for the classification of teacher characteristics: the teacher as a personality; relationship - performance towards the listener and teaching; style and way of working in teaching; values and value orientation; social role and status of teachers; physical qualities and physical appearance. According to [19], the result of long discussions was the final list of personal competencies of a university teacher, based on personality traits, moral and ethical characteristics. As the basic positive and desirable qualities of teachers, expressed by students, in the research conducted in [20], [21] desirable qualities of teachers were listed, among others, ambition, responsibility, communicativeness, expertise,

professionalism, etc. Investigating the factors of professional success of teachers of the Military Academy, the author in [21] recognizes the following dimensions and characteristics of teachers (only those significant for the research problem are highlighted): professional competence; didactic-methodical competence; character and other qualities of the teacher; the adragogic-psychological dimension of the participants. Given that one of the basic desirable qualities of an officer is leadership, that leadership according to Lojic [22] represents "the ability of one person to influence other people, so that they cooperate with each other in work and make efforts to achieve the goals of the organization", and that the teacher in his work must influence the students in order to achieve the goal of educational work, it can be concluded that this is one of the necessary characteristics of the teacher of the Military Academy. Also, as the most important factors of leadership, the author in [22] recognizes: personal characteristics of the individual, characteristics of subordinates and characteristics of the environment, while Greenberg and Baron [23], as characteristics of successful leaders, state the following: energy; honesty and integrity; leadership motivation; self-confidence; ability to perceive; job knowledge; creativity; flexibility. Although the previously mentioned authors listed a large number of desirable qualities of teachers, there is still no single generally accepted position on this problem, especially in the field of upbringing and education of future military officers. The analysis of available literature, in which previous research on this problem is presented, as well as the specifics of higher military education, leads to the criteria for selection of candidates for teachers in higher military education (Table 1):

Table 1  
Description of the criteria

Criterion	Description of the criterion
Criterion 1	Professional qualities of teachers.
Criterion 11	Safety and breadth of expertise and general knowledge.
Criterion 12	Striving to acquire knowledge and develop interests.
Criterion 13	Developed communication skills.
Criterion 14	Professional attitude towards work.
Criterion 2	Character and other characteristics of teachers.
Criterion 21	Clearly defined relationships with subordinates and consistency in requirements.
Criterion 22	Respect for the personality of the subordinate.
Criterion 23	Optimism, motivation and enthusiasm in work.
Criterion 24	Creating a pleasant working atmosphere.
Criterion 25	Charismatic appearance and behavior.
Criterion 26	Critically thinking person.
Criterion 27	Willingness to cooperate.
Criterion 28	Leadership ability.

Criterion 29	Flexibility.
Criterion 3	Didactic methodological qualities of teachers.
Criterion 31	Emphasis on the essence of the work.
Criterion 32	Developing creativity in work.

The criteria are arranged in two levels of hierarchy.

## 2.2 Description of Used Methods

The selection model is based on the FUCOM method and the fuzzy MAIRCA method, due to the simplicity of their mathematical apparatus and good output results.

### 2.2.1 FUCOM Method

The FUCOM (Full Consistency Method) method is used to determine the weight coefficients of the evaluation criteria. The method was first presented in 2018 [24] and has since been applied in a large number of papers to solve various problems, such as: to determine the most popular airlines in Indonesia with MABAC method [25], in an integrated RFUCOM-RTOPSIS FMEA model for risk assessment [26], select the best site for a floating offshore wind farm in Norway in hybrid decision making model with a combined compromised solution (CoCoSo) [27], assessment of critical success factors for continuous academic quality assurance and accreditation, with the fuzzy AHP method [28], for selecting a location for a brigade command post during combat operations in MCDM model with Z-numbers and MABAC method [29], selection of the best solution for business balance of the passenger railway operator, together with the fuzzy AHP method [30], selection of the group of construction machines for enabling mobility in model with D numbers and fuzzy RAFSI method [31], construction of a single-span Bailey bridge, with the fuzzy MABAC method [32], etc. Fuzzified version of FUCOM method was used to solve the following problems: selection of reach stacker in a container terminal with fuzzy MARCOS method and Fuzzy Bonferroni Mean (BM) operator [33], prioritization of express packaging recycling patterns with fuzzy GRC-DANP and fuzzy EDAS method [34], selection of renewable electricity suppliers [35], to manage transport requirements in the urban mobility system in Istanbul, in model with Dombi-Bonferroni mean operators [36] etc. The FUCOM method consists of three steps [24], [31]. The steps of the method are presented in Figure 3.

### 2.2.1 Fuzzy MAIRCA Method

The MAIRCA (MultiAttributive Ideal-Real Comparative Analysis) method the method was first presented in 2014 [37]. The FuzzyMAIRCA method has found application in many areas: for determination of constructive elements of weapons [38], to rank failure modes according to risk level [39], to assess occupational risks from a human health and environmental perspective [40], for select a camp space

[41], to locate a logistics platform in a sustainability perspective [42], for the selection of places for crossing tanks under water [43], for the selection of intermediaries-agents in the field on B2B markets [44], and others. Mathematical formulation of the fuzzyMAIRCA method, consists of 6 steps [37], [46]. The steps of the method are presented in Figure 3. Fuzzification was performed using triangular fuzzy numbers and using the degree of confidence of the decision maker in the statements he made [45].

### 3 Results and Discussion

Based on the phases of the formed model of multi-criteria decision making (Fig. 3), we first approach the identification and calculation of weight coefficients of criteria. Criteria  $K_1$ - $K_3$  represent the first level of the hierarchy, while their sub-criteria are the second level, and the calculation of criterion weight coefficients is based on global and local values of criteria and sub-criteria [42], [46]. Ranking and determining the significance of the criteria, by levels, was performed by 10 experts.

Step 1. In the first step, the criteria were ranked from the most important to the least important, according to the levels of hierarchy:

First level:

$$C_1 > C_2 > C_3$$

Second level:

$$C_{11} > C_{12} > C_{13} > C_{14}; C_{21} > C_{22} > C_{23} > C_{24} > C_{25} > C_{26} > C_{27} > C_{28} > C_{29}; C_{31} > C_{32}$$

Step 2. Comparison of the first ranked with other criteria, by levels.

The significance of the comparison of the first ranked in relation to other criteria, by levels, for expert E1, is given in Table 2.

Table 2  
Significance of the comparison of the first ranked in relation to other criteria

Expert	$C_1 > C_2 > C_3$ $\varpi_{C_{j(k)}}$	$C_{11} > C_{12} > C_{13} > C_{14}$ $\varpi_{C_{j(k)}}$	$C_{21} > C_{22} > C_{23} > C_{24} > C_{25} > C_{26} > C_{27} > C_{28} > C_{29}$ $\varpi_{C_{j(k)}}$	$C_{31} > C_{32}$ $\varpi_{C_{j(k)}}$
E1	[(1),(1.5), (2)]	[(1),(1.5),(2), (2.5)]	[(1),(1.25),(1.5),(1.75),(2),(2.25), (2.5),(3),(3.25)]	[(1),(1.5)]

Based on the significance of the criteria, comparative significance of the criteria was calculated. For example, for the level of criteria  $C_1$ - $C_3$ , for expert E1, the following values are obtained:

$$\varphi_{C_1/C_2} = 1.5; \quad \varphi_{C_2/C_3} = 1.333; \quad \varphi_{C_1/C_3} = 2$$

At this level, for example, for expert E1, a vector of comparative priorities of the evaluation criteria is obtained, as in expression (2):

$$\Phi^{E1} = (1.5, 1.333, 2)$$

Applying expression (4) defines the final model for determining the weight coefficients, shown on the example of expert E1, at the level of criteria  $C_1$ - $C_3$ :  
 $\min \chi$

$$\left| \frac{w_1}{w_2} - 1.5 \right| = \chi, \quad \left| \frac{w_2}{w_3} - 1.33 \right| = \chi, \quad \left| \frac{w_1}{w_3} - 2 \right| = \chi$$

$$\sum_{j=1}^3 w_j = 1, w_j \geq 0, \forall j$$

By solving the previous expression, the weight coefficients of the criteria are obtained, for each level of the hierarchy. An example for expert E1 the weight coefficients is given in the table (Table 3).

Table 3  
Weight coefficients of criteria, by levels, for experts E1 and E2

Expert	$C_1 > C_2 > C_3$	$C_{11} > C_{12} > C_{13} > C_{14}$	$C_{21} > C_{22} > C_{23} > C_{24} > C_{25} > C_{26} > C_{27} > C_{28} > C_{29}$	$C_{31} > C_{32}$
E1	[(0.462), (0.308), (0.231)]	[(0.39),(0.26), (0.195),(0.156)]	[(0.199),(0.159),(0.133),(0.114), (0.1), 0.088),(0.08),(0.066),(0.061)]	[(0.667), (0.333)]

After averaging expert opinions (assessments), using the arithmetic mean, according to the expression:  $A_n(w) = \frac{w_{11} + w_{12} + \dots + w_n}{n}$  (1)

for each criterion, at each level, and by multiplying the local values of the weight coefficients of the sub-criteria with the values of the weight coefficients of the criteria, we arrive at the values of the total weight coefficients of the sub-criteria (Table 4).

Table 4  
Weight coefficients of criteria and sub-criteria

Criterion	Weight coefficients of criterion	Sub-criterion	Local value of the sub-criterion weight coefficient	Global value of the sub-criterion weight coefficient
$C_1$	0.491	$C_{11}$	0.363	<b>0.179</b>
		$C_{12}$	0.261	<b>0.128</b>
		$C_{13}$	0.211	<b>0.104</b>
		$C_{14}$	0.165	<b>0.081</b>
$C_2$	0.292	$C_{21}$	0.242	<b>0.071</b>
		$C_{22}$	0.163	<b>0.048</b>
		$C_{23}$	0.127	<b>0.037</b>

		C <sub>24</sub>	0.106	<b>0.031</b>
		C <sub>25</sub>	0.091	<b>0.026</b>
		C <sub>26</sub>	0.079	<b>0.023</b>
		C <sub>27</sub>	0.072	<b>0.021</b>
		C <sub>28</sub>	0.062	<b>0.018</b>
		C <sub>29</sub>	0.057	<b>0.017</b>
C <sub>3</sub>	0.217	C <sub>31</sub>	0.667	<b>0.145</b>
		C <sub>32</sub>	0.333	<b>0.072</b>

After defining the weight coefficients of the criteria, the selection of the optimal alternative from the set of alternatives is approached, ie the ranking of the candidate for teacher, based on the defined criteria using the fuzzy MAIRCA method. The starting point in the application of the mathematical apparatus of the MAIRCA method is the initial decision matrix, in which random values for 5 alternatives (candidates for teachers) were entered, for the purposes of testing proposed model:

	K <sub>11</sub>	K <sub>12</sub>	K <sub>13</sub>	K <sub>14</sub>	K <sub>21</sub>	K <sub>22</sub>	K <sub>23</sub>	K <sub>24</sub>	K <sub>25</sub>	K <sub>26</sub>	K <sub>27</sub>	K <sub>28</sub>	K <sub>29</sub>	K <sub>31</sub>	K <sub>32</sub>
A <sub>1</sub>	4:90	5:80	3:70	5:90	4:80	3:70	4:90	5:80	3:100	4:90	5:80	4:70	3:90	4:80	5:80
A <sub>2</sub>	5:90	4:80	3:50	4:90	4:80	5:70	5:100	4:80	3:100	5:70	3:80	4:70	3:90	4:80	5:80
D = A <sub>3</sub>	5:90	5:80	3:70	4:90	3:80	3:70	4:90	4:90	4:100	4:70	3:80	4:80	5:90	4:50	5:90
A <sub>4</sub>	5:90	4:80	5:70	4:50	3:80	4:70	4:100	4:80	4:100	5:60	5:80	3:70	3:90	3:80	4:100
A <sub>5</sub>	4:90	5:80	4:70	5:90	4:90	5:60	3:90	3:80	3:100	4:90	3:80	4:70	3:90	5:50	4:100

The decision-maker, in the initial decision making matrix, enters the teacher candidate's rating for each criterion (rating scale is from 1 to 5, where 1 is the lowest rating and 5 is the highest), with the degree of confidence in the given statement, in percentages (e.g. rating 4, I am 90% sure of this claim - 4:90). By converting statements into fuzzy numbers [45], a new decision matrix is formed:

	K <sub>11</sub>	K <sub>12</sub>	K <sub>13</sub>	K <sub>14</sub>	K <sub>21</sub> - K <sub>31</sub>	K <sub>32</sub>
A <sub>1</sub>	(3.6, 4, 4.4)	(4, 5, 6)	(2.1, 3, 3.9)	(4.5, 5, 5.5)		(4, 5, 6)
A <sub>2</sub>	(4.5, 5, 5.5)	(3.2, 4, 4.8)	(1.5, 3, 4.5)	(3.6, 4, 4.4)		(4, 5, 6)
D = A <sub>3</sub>	(4.5, 5, 5.5)	(4, 5, 6)	(2.1, 3, 3.9)	(3.6, 4, 4.4)	...	(4.5, 5, 5.5)
A <sub>4</sub>	(4.5, 5, 5.5)	(3.2, 4, 4.8)	(3.5, 5, 6.5)	(2, 4, 6)		(4, 4, 4)
A <sub>5</sub>	(3.6, 4, 4.4)	(4, 5, 6)	(2.8, 4, 5.2)	(4.5, 5, 5.5)		(4, 4, 4)

By applying steps 1 to 5 of the FuzzyMAIRCA method, the fuzzy values of the expected solution are obtained ( $\mathcal{E}_i$ ), Table 5:

Table 5  
Fuzzy values of the expected solution

	$\mathcal{E}_i$
A <sub>1</sub>	(0.16, 0.113, 0.066)
A <sub>2</sub>	(0.152, 0.103, 0.054)



A <sub>3</sub>	(0.149,0.101,0.052)
A <sub>4</sub>	(0.158,0.112,0.066)
A <sub>5</sub>	(0.164,0.116,0.068)

The set of alternatives is ranked based on the defuzzified values of the criterion function assigned to each alternative, using expression (2) [43].

$$D = [\lambda d_3 + d_2 + (1 - \lambda) d_1] / 2 \quad (2)$$

By applying expression (2), the obtained values of the expected solution are defuzzified (for  $\lambda$  is taken the value 0.5), the initial ranking of alternatives was performed, and after determining the index and the threshold of dominance of the first-ranked alternative, the final rank of the alternative is obtained (Table 6).

Table 6  
Defuzzified values of the expected solution

	$\mathcal{D}_i$	IRank	FRank
A <sub>1</sub>	0.113	<b>4</b>	1"
A <sub>2</sub>	0.103	<b>2</b>	1"
A <sub>3</sub>	0.101	<b>1</b>	1"
A <sub>4</sub>	0.112	<b>3</b>	1"
A <sub>5</sub>	0.116	<b>5</b>	5

Based on the results in Table 6, the initial ranking of alternatives is as follows  $A_3 > A_2 > A_4 > A_1 > A_5$ , the alternative  $A_3$  is the best-ranking, but alternatives  $A_1$ ,  $A_2$  and  $A_4$  also come into account when deciding, depending on the number of candidates required.

## 4 Sensitivity Analysis

In such a complex process, such as decision making, it is possible to make mistakes, and it is necessary to perform a sensitivity analysis, using one of the approaches [48] [49] [50] [51] [52] [53] [54]. The paper analyzes the sensitivity of the FuzzyMAIRCA method to changes in weight coefficients, through 16 scenarios (Figure 3).

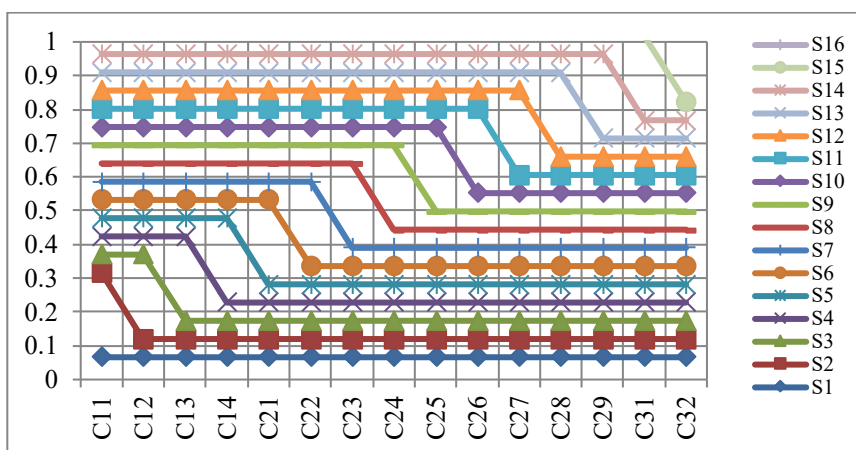


Figure 3

Scenarios with different weight coefficients of criteria

The ranking of alternatives after the application of previously defined scenarios is given in Figure 4.

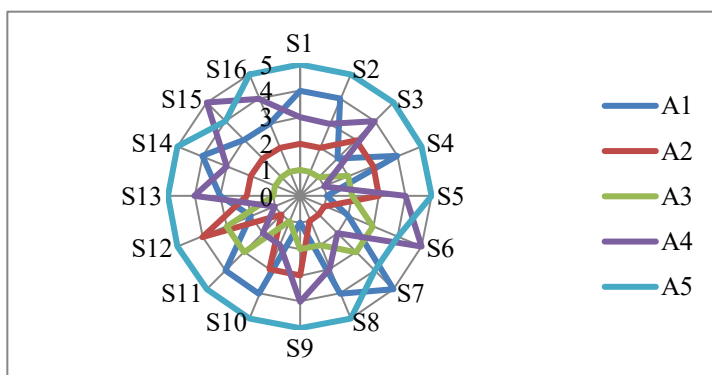


Figure 4

Ranking of alternatives by scenarios

From the previous figure it can be concluded that the FuzzyMAIRCA method is sensitive to significant favoring of a certain criterion. In case all criteria are of equal importance, the method does not show any sensitivity. Also, we can conclude that alternative A<sub>3</sub> in most cases retained its rank or slightly changed it, while alternative A<sub>5</sub> in most cases was the last ranked alternative, which indicates the stability of the results of the method.

Also, one of the ways to check the consistency of the results of MCDM methods is given in [49], [55-57] and represents Spearman's rank correlation coefficient ( $S$ ), which is calculated according to the following expression (3):

$$S = 1 - \frac{6 \sum_{i=1}^n D_i^2}{n(n^2 - 1)} \quad (3)$$

where  $D_i$  – the difference between the rank of a given element in the vector  $w$  and the rank of the corresponding element in the reference vector,  $n$  – number of ranked elements. The Spearman's coefficient has values from the interval  $[-1,1]$ . Using expression (3), the following values of Spearman's coefficient ( $S$ ) are obtained (Figure 5):

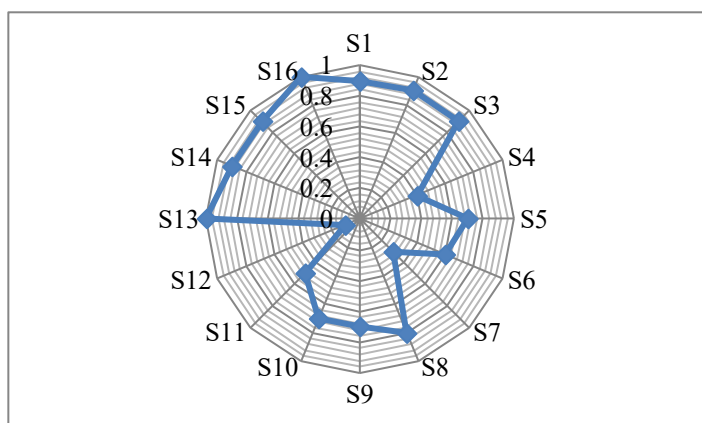


Figure 5

Values of Spearman's coefficient

From the previous figure we can conclude that the correlation coefficients in 16 scenarios tend towards ideal positive correlation and that the defined MCDM model is in most cases stable, in relation to the change of weight coefficients. The Commission of the Military Academy for the selection of officers for teachers may, before entering the data from the survey, conduct a preliminary interview and on the basis of it correct the data (grades, claims) on the candidates. Also, based on the results of the multi-criteria model, the Commission can direct interviews with candidates and make a better final decision. After the final decision is made, the final activities in the selection process are carried out.

## Conclusions

The greatest potential of modern organizations is reflected in the abilities, knowledge and skills of their employees. By recognizing the need for quality staff, the field of human resource management is being constantly improved. The selection of human resources is one of the most important activities of human resource management, and the human factor is a key link in the success and achievement of the set goals of every organization, including higher education institutions, and it must be given maximum attention. Achieving the goals of the educational work of all higher education institutions is primarily the responsibility

of teachers. The quality of the teaching staff influences strongly the outcome of the teaching and educational process. The Military Academy, as an accredited higher education unit, encounters numerous obstacles related to teaching staff in the accreditation process. In order to solve this problem, the question of the selection of teaching staff arises, as well as the conditions and criteria that a candidate for a teacher should meet. The parameters that are taken into consideration when deciding in this process are a key issue in the selection of staff and the quality of the future teacher depends on the correct definition of the selection criteria. Also, the way in which the decision is made must be clearly defined, taking into account all the important factors that influence the final decision. Guided by the previously mentioned problems and scientific facts that treat this area, the paper proposes a new model for candidate selection.

The model is based on the stages of human resources selection, from the aspect of teacher personality characteristics and necessary conditions that they must meet, using the MCDM methods, in a multi-criteria model. The main findings of the research are reflected in several points. First, based on numerous studies that study this area of research, the criteria for evaluating future teachers were defined. Then, the calculation of the unique weighting coefficients of the criteria was carried out, according to expert assessment using the FUCOM method, at two levels of the hierarchy of criteria. After determining the significance of each of the criteria, five alternatives were defined, which represent five different candidates for teachers. With entering the values of alternatives based on the degree of conviction in the given statement, fuzzifying the initial decision matrix and by applying steps of the FuzzyMAIRCA method, ranking of alternatives was performed based on previously defined criteria. During the sensitivity analysis of this model, by changing of weight coefficients of criteria through 16 scenarios, the FuzzyMAIRCA method showed good stability of the output results and the MCDM model was confirmed as sustainable and applicable in practice.

The presented model can be further improved by elaborating the criteria in more detail, by applying other methods for determining the weight coefficients of the criteria, the application of different operators for the aggregation of group decisions, as well as other areas that treat the area of uncertainty well and other methods for ranking the alternatives or choosing the optimal solution. The main limitation of this research is related to the specificity of the research problem, i.e. the fact that the presented model with its criteria was proposed for the selection of candidates for teachers at the Military Academy of the University of Defence in Belgrade (Republic of Serbia) and that due to possible specific andragogic and methodological approaches to education of future military officers, may not be applicable at other higher education institutions, but it is not exclusive.

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# The Challenges of Cost Accounting of Hungarian Higher Education – especially Competitiveness Aspect

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*Abstract: A knowledge-based society is a major contribution to increasing competitiveness. Higher education institutions play a crucial role in the life of a national economy. Higher education in Hungary has undergone several transformations over the past two decades. In order to address the challenges of competition in the higher education sector, it is necessary to provide adequate financial information and to know the costs of activities and training. To improve their sustainability, universities need to develop the right tools to determine the total cost of their training. In our research, we focused on the factors that play a role in the costing of economics courses in Hungary. The research has statistically confirmed that the more prestigious and well-known higher education institutions set their tuition fees at the upper end of the differentiated normative range for a given field of study. Institutions adjust the amounts of the fees they charge to market conditions, to the cost price and to the normative envelope.*

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*Keywords: higher education; cost accounting; managerial accounting; financing; Hungary*

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## 1 Introduction

The European Union has set out its plans for the last decade (2010-2020) in the Europe 2020 strategy, with objectives in the areas of employment, research and development, energy, education, combating poverty and social exclusion. The goal of the strategy is to reduce the rate of school dropouts below 10%, and for at least 40% of the EU population aged 30-34 to have a higher education [1].

In accordance with the education-related goals and financing possibilities of the strategy, our country has also taken steps in the direction of change.

The future objective is to establish a performance-oriented higher education [2]. The determining factor in the competitiveness of a national economy is higher education and a knowledge-based society that can be formed in this way, which greatly contributes to economic development [3].

Over the past 15 years, we have witnessed a new era of higher education facing new challenges [4], and the higher education era has seen a relatively non-competitive environment change. Reliable financial and accounting information is decisive in a competitive environment. The question arises: in a competitive environment, is the information system of higher education institutions sufficiently accurate, reliable and focused to provide up-to-date data for decision making?

## **2 Literature Review**

### **2.1 The Relationship between Financing and Cost Accounting**

In line with the education objectives set out in the Europe 2020 strategy, Hungary has also taken steps towards change in the higher education sector. At the end of 2014, a strategy for the transformation of the higher education sector was adopted, entitled “*A step change in higher education*”, which stated that a funding system based on real training costs is needed, rather than the historically established normative system. Differentiated funding is needed, underpinned by realistic cost accounting. A uniform costing methodology for the recognised costs should be designed to encourage institutional operation while reducing expenditure, thereby achieving more efficient management as a whole [5].

Reducing student dropout, increasing the traction among motivated students, developing skills and competences, and adapting to labour market needs are a key focus [6]. The transfer of knowledge and skills that enable graduates to work effectively, efficiently and sustainably in both the domestic and international markets is a key objective [7]. Students need to be prepared for the challenges of the future and the expectations of finance [8]. They need to be better informed about financial education so that future generations can understand and appreciate the complex economic and financial processes [9]. Strengthening the quality of financial education in higher education contributes to the development of a quality financial culture [10] and a quality higher education network.

The financing of higher education is very complicated and complex, there are no clear models; there is always a mixture of different proportions of state and student contributions [11]. One of the key issues of financing is who should bear the costs of higher education, and what should be the share of state and student contributions

within the revenues, with a view to long-term sustainability [12]. At the EU level, there is also a strong view on the need to increase student and third party revenues, thus reducing the burden on state budgets [13].

Today, financing solutions are increasingly emerging that represent a shift away from pure state maintenance and financing. The need for differentiation of institutional revenues has been highlighted by many researchers [14], as the financing of higher education raises serious social, economic and educational policy issues [15]. The contribution of students to their studies is justified in order to increase their income-generating capacity in the future [16], but social inequalities and social backgrounds should be considered in the context of revenue differentiation [17].

However, the financing of higher education has also faced challenges in recent decades, such as the growth in student numbers worldwide, the development of a knowledge-based society, the limits of state resources, problems with teaching salaries and the rising cost per student [18].

## **2.2 The Development of Cost Accounting Methods, the Difficulties of Cost Allocation Description**

Cost accounting is also critical in higher education, where it can monitor, measure and thus determine the true costs of specific courses as services. The operating environment has changed dramatically, indirect costs have increased significantly, services have become more diversified, competition has become more intense, and greater accuracy in costing is required. New and more efficient allocation methods have therefore been sought to justify the functional utility of accounting information [19].

At the beginning of the 19<sup>th</sup> Century, many management accountants took the view that companies saw classical financial accounting as an obstacle to progress [20]. From the second half of the 19<sup>th</sup> Century, the focus of management accounting shifted towards serving management functions, and interest in more conscious cost accounting systems gradually increased [21]. The cost accounting system has to serve the reporting requirements arising from legal obligations and the needs of management for effective decision making [22]. Understanding and properly managing costs leads to better decision making and more competitive operations [23].

Traditional costing methods emerged at the beginning of the 20<sup>th</sup> Century [24]. The main problem of traditional cost accounting, besides its static nature, is the question of how to determine the cost of expenditures, beyond the quantification of direct costs, and what projection basis for the allocation of overheads would be appropriate, taking into account the principles of accounting (e.g. the cost-benefit principle) [25].

Logically, indirect costs are divided into cost objects based on cause-and-effect relationships, but there will always be distortions in the method, inadequate projection bases. Traditional cost allocation methods are appropriate if the services provided are similar, indirect costs are low, and the processes and customers are equal [26].

Kaplan and Cooper [27] introduced the activity-based costing method (ABC method) in the late 1980s, which was used to solve the weaknesses of the traditional method. Activity-based costing is a proven methodology that accurately and completely measures the cost of resources, activities and products. The ABC method identifies all activities that are performed in the production of a product or the provision of a service.

Activity-based costing is considered by Johnson [28] to be the greatest 20<sup>th</sup> Century of management accounting described it as the innovation of the century. While Horngren [29] reported that, no consulting firm used the ABC method. However, since Horngren's observation, many large service companies have successfully implemented activity-based costing. According to Kaplan and Anderson [30], the ABC method spread more slowly than expected because it was very difficult to follow the complexity of company operations, its introduction was very time-consuming, and its operation was expensive.

The methodological development of cost accounting provides several possibilities to determine the cost of a product or service, so the question arises which cost monitoring system is the most appropriate for higher education to provide efficient, fast and accurate information, taking into account cost allocation requirements and legal constraints?

### **2.3 Application of the Appropriate Cost Allocation Method in Higher Education**

In higher education institutions, it has become essential to provide adequate cost information in the decision making processes, since the institutions have to face an ever-increasing financial rationalization. Higher education institutions must pay more and more attention to their accounting records and accounts [31]. The financial crisis that occurred in some universities in the 1980s also proved that it became necessary for state-funded institutions to examine costs, recover costs and demonstrate losses for all processes and activities [32].

In recent years, it has become clear that the cost of institutional activities is playing an increasingly important role in management decision making. The subject has attracted considerable interest in the 20<sup>th</sup> Century, as evidenced by the work of several researchers [33]. Researchers have pointed out that while universities operate in a relatively uncompetitive environment, little attention is paid to accurate cost information, but the environment is constantly changing [34].

The European University Association (hereinafter: EUA) has been working on costing issues in universities and higher education institutions since 2008, with total cost reduction as a key research objective and implementation [35]. In its reports, it has stated that total costing methods are an essential tool for modern university management [36]. European universities are currently facing a number of funding challenges that they need to overcome in order to continue to provide high quality teaching and conduct excellent research [37]. Total costing systems assume that all costs, direct and indirect, are attributed to an activity. Direct costs are directly linked to the activity and are monitored by taking the process into account [38].

A suitable costing system enables more efficient resource allocation and better-founded pricing. A cost accounting system that takes into account the specificity of the institution should be established. A costing system that takes into account the needs and characteristics of the organisation contributes to the success of the short- and long-term decision-making process, providing appropriate information and making the university's activities transparent [39].

The effectiveness of cost and management accounting in universities was investigated by Cropper and Drury [40] in UK higher education institutions in the mid-1990s. The focus of the survey was the examination of the complexity and extent of the continuous liquidity methods used by the universities. In the study, attention was drawn to the necessity and timeliness of greater transparency of costs related to teaching and research in connection with the cost calculation of the higher education sector.

The renewed interest in costing in educational institutions dates back to the last 25 years. In their study, Goddard and Ooi [41] report that when the ABC method started to be used in practice, it was less effective than in theory. Significant costs were incurred in developing and maintaining it, such as the cost overruns of the general activities associated with the system.

In a later study, Cropper and Cook [19] sought to answer the question of whether activity-based costing has a future in higher education. Its introduction could bring about major changes at the institutional level, providing the necessary background for the operation of cost accounting systems. Its main impact will be felt in higher level functions such as training, communication and data collection.

With an increased demand for institutional accountability, increased scrutiny of university performance and costs, there is pressure on managers to maintain quality services while the funding is reduced [42]. A commitment to greater efficiency requires an understanding and appropriate management of cost behaviour. One of the best tools for understanding cost behaviour and refining the cost system is activity-based costing [43].

Dražić Lutilsky and Dragija [44] present the possibilities and limitations of the implementation of the activity-based costing (ABC) method as a complete costing method in European universities. They analyzed the trends and current movements in universities in EU countries. Using this information, guidelines for the

development of a full costing system at the University of Zagreb have been proposed. Their study shows that, despite public demands for effective management at universities, a very small proportion of universities are implementing a full costing system.

With regard to domestic regulation, state higher education institutions are subject to the provisions of the Government Decree on Accounting for Public Finances [45], according to which: "the internal regulations of the state higher education institution on the system of cost accounting shall provide for the separation of costs of teaching, research, preventive care and other activities. In determining the cost price of educational activities, the cost price per student per semester shall be determined by subject, by level of training and by work schedule." With regard to domestic regulation, state higher education institutions are subject to the provisions of the Government Decree on Accounting for Public Finances [45], according to which: "the internal regulations of the state higher education institution on the system of cost accounting shall provide for the separation of costs of teaching, research, preventive care and other activities. In determining the cost price of educational activities, the cost price per student per semester shall be determined by the major, by the level of training and by the work schedule."

According to the provisions of the Government Decree on Accounting for Public Finances, it is mandatory to determine the cost price per student, however, it does not regulate the method of determining, even though the entire spectrum of institutional management is subject to costs that are difficult to allocate to individual activities [46].

According to the National Act on Higher Education [47], institutions receive basic funding for their basic activities, which is determined by the Government in a decree. This Government Decree is Government Decree No. 389/2016 [48] on the Financing of the Basic Activities of Higher Education Institutions, according to which the amount of basic funding for institutions is determined based on the differentiated normative framework bands. The amount determined by the institution for each subject and the number of students with a Hungarian state (part) scholarship multiplied by the number of students (regardless of private and state higher education institutions). According to the provisions of the National Act on Higher Education, the contribution of students with state scholarships and students with self-financing should be the same, as they use the same services. The training costs per student (own costs) determined by the institution must be set within the differentiated normative framework [47]. It is not possible to depart from (exceed) this framework even if the actual own costs would justify this. It is clear from the legislation governing the funding that the funding, so that all students must contribute to these costs in order to ensure sustainable management, does not cover the 'classical' indirect costs (sales, distribution, administrative and other overheads). Consequently, a student must be charged the full cost of his training (the student's form of financing is therefore irrelevant for the determination of the cost price).

Thus, the method of determining the total cost per student is a critical issue given the funding possibilities and constraints. The research and studies conducted so far provide sufficient evidence that the ABC method can be used to monitor the costs of universities and is a sufficient example for universities to adopt the ABC method as a costing method [49].

### 3 Methodology

A specialized literature search was carried out to establish the basis of the research, with the aim of identifying relevant legislation, the results of previous research, and the background of the financing, financial and accounting literature on the subject. Both quantitative and qualitative analysis methods are used in our research, which takes into account the methodological and other influencing factors of higher education cost price. In the quantitative research phase, data mining methods were used to analyse data tables resulting from the structured collection of publicly available enrolment data. The analyses are descriptive and exploratory in nature. The query covered 5 years of data (2017-2021). A field of study was narrowed down to allow for a manageable sample, resulting in a focus on the most popular field of study today, namely economics. Competition between institutions in this field of study is also evident, due to both its popularity in demand and the relatively large number of institutions in supply. This restriction also limits the scope of the research, as not all higher education institutions have focused on all courses.

During the period under review, the institutions surveyed offered a total of 4,211 courses in the field of economics in higher education junior training courses, bachelor's and master's programmes, with regard to the level of training, the work schedule and the form of financing.

The institutions listed in table (1) below were included in the research. The number of courses included in the sample is 4,211, which consists of 1,109 the higher education junior training courses, 1,762 bachelors' and 1,340 master's courses included in the research, in the selected, relevant institutions in this field of science, in 5 years, shown in Table 1.

Table 1  
The higher education institutions involved in the research  
source: own research

Corvinus University of Budapest	University of Miskolc
Budapest Business School	University of Nyíregyháza
Budapest University of Technology and Economics	Óbuda University
University of Debrecen	University of Pannonia
University of Dunaujváros	University of Pécs



Eötvös József College	University of Sopron
Eötvös Loránd University	Széchenyi István University
Eszterházy Károly Catholic University	University of Szeged
University of Kaposvar	Szent István University (Hungarian University of Agricultural and Life Sciences)

To check the closeness of the association, the usual methods used for nominal scales were cross-tabulations, which contain the distributions obtained for each combination of the values of the two variables under study, and therefore allow the correlation between the two variables to be inferred. The Cramer V index was used to measure the actual existence of the association and to measure the association closeness, as is common in research practice [50].

Since the database built from secondary data contains time-series data, it is important to capture the dynamics inherent in this data. For this purpose, the slope ( $m$ ) of the linear trend line ( $y=mx+b$ ) that can be fitted to each of the classes in the database (assuming that they started in at least two semesters, this is the only way to observe any dynamics) was calculated. Its sign indicates the direction of the trend (increasing/decreasing) and its absolute value indicates the magnitude of the slope of the trend (the indicator allows relative comparisons) [51]. The slopes were determined using the parameters of the linear trend lines fitted by the least squares method. The slopes thus calculated are a single indicator characterising the trends in the cost price of the observation units (courses) and the number of applicants over the period under study.

## 4 Empirical Result and Discussion

### 4.1 The Relationship between the Popularity of the Institutions included in the Study and the Cost Price of their Training

The boxplot diagram below (Figure 1) shows the distribution of the cost price of economics courses in the period under review (2017-2021). For all three types of training, the institutions advertise their courses in the top two-thirds of the statutory normative range.

In the case of the higher education junior training courses with a sample number of 1,109, there is no tuition amount in the lower 55% of the frame band, so the cost prices are between HUF 110,000 and HUF 200,000. In the case of basic training, training is not advertised in the lower 42-43% of the frame range, so the reimbursement amounts are between HUF 150,000 and HUF 350,000. In the case of a master's degree, no training is advertised in the lower 60% of the frame range, so the reimbursement amounts are between HUF 240,000 and HUF 400,000.

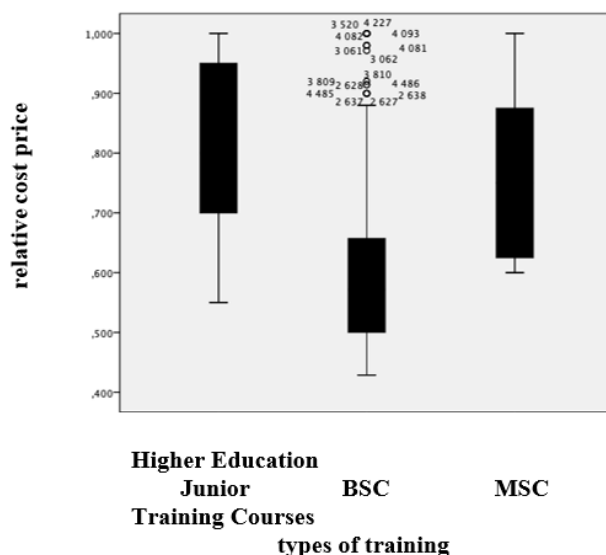


Figure 1

Boxplot diagram of the distribution of relative cost prices

source: own research

The higher education junior training courses are typically positioned close to the maximum, for half of the sample the cost price is 70-95% of the maximum, so for half of the training courses the amount of reimbursement falls between HUF 140,000 and HUF 190,000. In the case of cost price for the basic course, half of the sample falls between 50-65% of the maximum of the normative frame band, so for half of the courses, the cost price amount is between HUF 175,000 and HUF 230,000. In the case of the bachelor's degree, there are special courses whose cost price is close to 100%, HUF 350,000. This study also shows our preliminary expectations experienced from everyday life that the costs of training at the leading institutions in the field of science are at the upper limit of the normative framework. While in the case of the master's courses, it can be established that half of the sample falls between 62-87% of the maximum of the normative frame band, so for half of the courses the cost price amount is between HUF 245,000 and HUF 355,000.

In the examined period, the total number of higher education junior training courses announced was 1,109, of which the institutions advertised their courses at the normative maximum in nearly 250 cases. An outstanding value in the case of the relative cost price is the value of 0.75, which in the case of higher education junior training courses represents the HUF 150,000 reimbursement amount, in more than 200 cases. It is definitely important information that the higher education junior training courses are not at all profitable and feasible in the lower part of the normative framework band and at the same time the value of the training tends towards the maximum.

The number of BA programmes is 1,762, of which, in the case of more than 1,200 basic courses, it can be clearly seen from the figure that the relative cost of the courses ranges from 0.45 to 0.65, i.e. between HUF 150,000 and HUF 230,000. Among our preliminary expectations was that the cost price amounts for BA programmes would be better distributed between the minimum and maximum values.

The number of master's programs was 1,340 during the 5 years under review, the cost of which shows similarities with the higher education junior training courses. In more than 450 cases, institutions advertised training with a reimbursement amount of HUF 250,000. Furthermore, it can be seen that many people advertise master's degree programmes close to the maximum (up to 70-85% of the maximum) or at the maximum value (Figure 2).

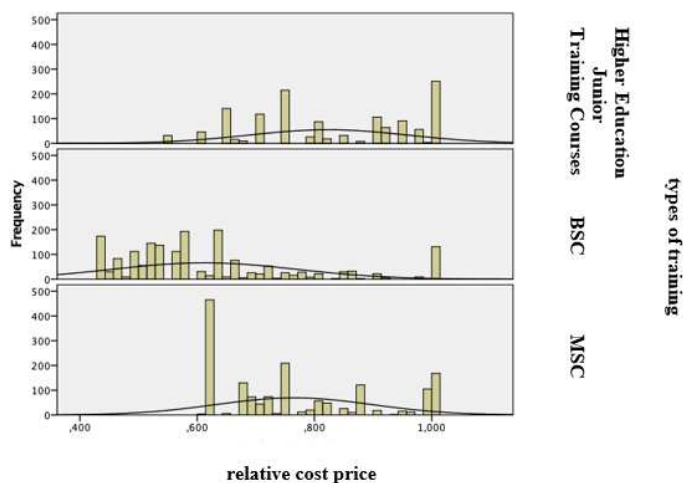


Figure 2

Distribution of relative costs prices per training in the period under review  
source: own research

The research has shown that higher-ranked higher education institutions set the cost of their training at the upper end of the normative range. Table 2 below shows and demonstrates that there is a moderately strong and significant correlation between the cost of the most popular courses, i.e. those with high enrolments, and their cost, indicating the existence of a correlation between the two variables.

The Pearson's correlation coefficient is strongest for bachelor's degree programmes, but a relationship can also be found for the higher education junior training courses and master's degree programmes. Furthermore, the correlation coefficient is significant for all three levels of education. The moderately strong significant **relationship demonstrates that higher-ranked higher education institutions, which are more popular with students, set their tuition fees at the upper end of the differentiated normative bands for a given field of study.**

Table 2

Correlation coefficients and significance levels between total enrolments and cost prices, by level of education

source: own research

Forms of training	r	p
Higher Education Junior Training Courses	<b>0.37</b>	<b>lower than 0.001</b>
Bachelor's programmes	<b>0.49</b>	<b>lower than 0.001</b>
Master's programmes	<b>0.29</b>	<b>lower than 0.001</b>

The analyses carried out confirmed that there is a moderately strong significant relationship between the popularity of institutions and the advertised out-of-pocket costs. The existence of this relationship is the basis for the main research question of whether a relationship can be established between the trend in the change in enrolment and the trend in the change in the cost price, and whether the magnitude and direction of the change can be well and meaningfully characterised.

Table 3 shows the existence and closeness of the relationship between the trends in the evolution of enrolments and self-financing in the form of correlation coefficients. The presentation focuses exclusively on basic education, because this level of education has the largest dispersion of the cost of enrolment between the minimum and maximum values of the normative range. Only those institutions and their training courses that show the strength and direction of the relationship at a reliable level are now included in the table (in several cases, there was not enough information available for the calculations, as at least 2 years of data are needed to establish a trend). For the correlation coefficients, coefficients above 0.2 have been taken into account in the assessment by training level.

When examining the correlation coefficients for the bachelor's programme, it can be seen that all but 2 institutions show a significant positive relationship. This positive relationship, which is in many cases very strong, is a decisive factor for the study and also shows how strong the consistency of the two trends is between the faculties and science universities.

Table 3

The strength of the relationship between the cost price and the average slope of the trend line of all applicants in the case of a bachelor's degree, broken down by institution (faculty)

source: own research

Faculty	Correlation coefficients of undergraduate education
Corvinus University of Budapest - Faculty of Economics	-0.51
Corvinus University of Budapest – Faculty of Public Sciensec	not.
Budapest Business School - Faculty of Commerce, Hospitality and Tourism	0.24

Budapest Business School - Faculty of Finance and Accountancy	0.69
Budapest University of Technology and Economics - Faculty of Economics and Social Sciences	not.
University of Debrecen - Faculty of Economics and Business	0.73
Eszterházy Károly Catholic University - Faculty of Economics and Social Sciences	0.41
University of Kaposvár	not.
University of Miskolc - Faculty of Economics	0.37
University of Nyíregyháza	not.
Óbuda University - Keleti Károly Faculty of Economics	not.
University of Pannonia - Faculty of Business and Economics	0.16
University of Pécs - Faculty of Business and Economics	0.37
University of Sopron - Lámfalussy Sándor Faculty of Economics	-0.49
Széchenyi István University - Kautz Gyula Faculty of Economics	0.85
Szent István University - Faculty of Economics and Social Sciences	-0.13
University of Szeged - Faculty of Economics and Business Administration	0.98

Knowing the correlation coefficients and trend slopes, it can be concluded that **the institutions monitor the trends of changes in applications when determining the cost prices.** The variation in the amounts of the advertised reimbursement reflects the institution's response to the trend in enrolments in the case of undergraduate courses.

## 4.2 Comparison of Cost Accounting Codes and Conclusions to be Drawn

Qualitative analysis (content analysis) is used in the analysis and evaluation of the cost accounting policies of the institutions included in the study. The conditions for the obligation to draw up cost accounting rules are laid down in the Accounting Act [52], but it is important to stress that the Act does not provide for the precise content of the cost accounting rules and the methodology to be applied, so institutions must rely on their experience and accounting literature.

In May 2015, the State Audit Office of Hungary published its audit experience on the operation and management of state higher education institutions. The study shows that a general weakness was that fees and reimbursements were not established in a regular manner, and that fees and reimbursements, which accounted for part of the revenue, were not based on a cost price calculation, which entailed the risk of losses in the respective activities [53].

From the comparison and analysis of the cost accounting regulations of the higher education institutions, it can be concluded that the cost price calculation regulations of the higher education institutions are not uniform, there are differences in the depth and detail of the information content provided. Through knowledge and reflection on the legislation(s) governing the financing of higher education and content analysis of the cost accounting policies included in the study, it was found that institutions are interested in determining the total cost i.e. the cost price.

Conscious cost management, self-financing and ex-post analysis are becoming an increasingly critical area of higher education operations with the ongoing model change. The decline in student numbers is creating an increasingly competitive environment. Cost planning, cost awareness, plan-fact comparisons and the use of various decision support accounting and controlling tools play an important role in supporting management decisions.

The research has shown that the adaptation to the legal requirements and the normative limits justifies the allocation of costs based on the cost-bearer principle. This cost allocation can be carried out using the traditional cost allocation principles based on a supplementary and simple cost allocation method.

## **5 Future Directions**

In order to solve the funding problems that are also appearing in the international higher education space [54], as a result of the university model change [55] that has taken place in Hungary in recent years, institutions can implement their ideas within a more flexible framework [56]. They also have the opportunity to develop competitive education that is also relevant in international terms, which is relevant for the 21<sup>st</sup> Century [57]. The emergence of a corporate management approach in the case of higher education institutions is emerging, so that cost-consciousness and cost discipline in the corporate sector will be inevitable in the future. Starting from the data content in the reports and accounts, indicators of efficiency and profitability will be developed, with a view to comparability [58]. Of course, the focus of the current transformation is not on the area of cost accounting, but in a few years' time, a much greater awareness of the planning, monitoring, grouping and allocation of costs will be inevitable for the sustainability and development of institutions.

## **Conclusions**

Statistical analysis of the relationship between enrolments and the amount of fees advertised, focusing on the field of economics, shows that there is a strong relationship between popularity and the amount of fees advertised for courses at institutions dominating the field of economics and their courses. The experience of the institutions in this research has shown that there is no conscious causal allocation of costs in terms of cost accounting, and that in fact the amounts of

reimbursement advertised reflect market conditions and the normative framework. This finding is confirmed by the analysis of the State Accountants [59].

In the research, we narrowed down the fields of study as cost calculation regulations were only available for state-run universities, so we have been aware of the limitations of research. In order to accomplish nationwide representativeness, we will expand the research to all universities in the future. The transformation of several state universities has also been taking place, so it has become necessary to investigate the changes in cost accounting.

It can be formulated as a new research direction and question, whether the corporate management approach that appears as a result of the transformation encourages a more conscious cost monitoring system and the use of cost accounting based on more modern principles?

To meet these challenges and improve their financial sustainability, universities need to develop the right tools to identify the full costs of all their activities and training. Knowing the cost price of the training courses, as described above, becomes an essential strategic tool for managing an institution.

The development of an internationally relevant higher education system requires a timely and effective response to societal and market challenges and a focus on performance and quality. In order to mitigate and avoid financial, funding and operational risks, institutions should place greater emphasis on revenue and expenditure planning, transparency of accounting data and financial awareness.

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