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PERCEPTION OF E-COMMERCE BY YOUNG ADULTS IN VISEGRAD GROUP COUNTRIES

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ABSTRACT.

Background: The present young adult generation is one of the current drivers of e-commerce. Understanding where this generation finds out in a chosen country in comparison with most progressive countries in the field of e-commerce is the cornerstone for assessing market possibilities in a particular chosen country. **Aims:** This article analyses trends in online shopping behaviour among young adults in the Visegrad Group countries from 2012 to 2022. The research focuses on sociodemographic factors and their influence on online shopping. **Methods:** Primary data collected by Eurostat underwent systematic analysis using general scientific methods of economic analysis, and comparison. **Conclusions:** The results show a significant increase in online shopping among young adults in these countries, with Slovakia achieving the highest share. They also indicate that the impact of gender, age, education, and income on online shopping varies by country. **Implications:** These findings have important business implications and contribute to a better understanding of the online shopping behaviour of this target group.

Keywords: Young adults. Sociodemographic factors. E-commerce. Consumer behaviour.

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Introduction

Shopping preferences are of great importance in the marketing world, because they form consumer behaviour, mostly they stay relatively consistent in time, and are precious for market segmentation. In the last two decades, the economic rise has pushed consumption beyond the margin of simple survival necessities. Income per capita rose worldwide, which translates into stronger buying power. The decision process in buying goods and services includes multiple factors, that impact the final decision. The decision-making process has become much more complicated for consumers and much more crucial in comparison to the past. It can be described as mental processes leading to the choice of action from multiple scenarios. Each decision-making process leads to action or the creation of an opinion.

Analysis of young adult consumers has great importance in the field of consumer behaviour because of multiple reasons. During the transition from adolescence to early adulthood, young individuals search for the creation of their own singular identities, behaviour, attitudes, and values, which form their consumer patterns. They use their shopping to define and create their unique identities. Those patterns can be used as long as throughout their lives. Young people have the ability to impact the shopping behaviour of others, they act as agents of change, and they impact the culture and society. From the marketing standpoint, young adults are a special, standalone, specialized market segment that disposes of great consumer force. They stand as the important and key market for different goods and services. Marketers aim at those because young adults are considered potential long-term and loyal customers, considering their above-average lifelong income and their current state of transition, which is ideal timing for their change of behaviour (Grant and White. 2003).

Theoretical background

Consumer behaviour important for research is the decision-making of consumers. Consumers are exposed to many tasks in the process of decision-making (Abraham and Patro. 2014). The process of decision-making is therefore complicated. Many researchers in the field of social studies and psychology offered explanations of this process (Abraham and Patro. 2014). In current times decision-making for consumers is more complex and more important in comparison to the past (Yasin. 2009). That is caused by the confrontation of consumers with too many product options. Surrounded by overwhelming amounts of information and different options, consumers try to cope with this problem with specific methods of decision-making and by picking up specific buying strategies.

Bordeau et al. (2002) discussed the motivations of young people to use any products. They have hedonic and utilitarian motives to use the internet and mobile phones while considering those as the root of information, communication, fun, and alternative ways to shop. Mobile technologies, namely cellular phones and text messaging were significantly accepted and integrated into their day-to-day life. To this day there does not exist any description of processes leading to acceptance of mobile technology, therefore we do not have a deep overview of reasons leading to high usage, or opportunities to propose new technologies, that would support the lifestyle of young people. Young people are inclined to change and from a young age, they use new technologies.

A deep study of demographic factors impacting consumer behaviour in mobile shopping was made by Bigne et al. (2005) and identified variables impacting consumer behaviour. Young people spend much of their everyday life with their mobile phones in addition to educational, official, or functional purposes. They are knowledgeable about technologies, and innovative, and prefer to shop online using laptops or mobile phones. Their attitude to innovations and these different needs are the ones of main reasons for the rise in the count of laptops and mobile phones in households.

In preceding studies, we can observe limited research on sociodemographic factors on decision-making styles (CDMS) (Bakewell & Mitchell, 2004; Mitchell & Walsh, 2004; Wesley et al., 2006; Yasin, 2009). The emphasis in research on sociodemographic factors has been put on prioritising gender in devotion to age, income, or level of education (Wesley et al., 2006).

Gender. Singh, J., & Goyal, B. B. (2009) referred in the paper „Mobile Handset Buying Behaviour of Different Age and Gender Groups“, that differences between genders were very obvious in essential technical properties and branding. That is supposedly to lower knowledge of essential technical properties by female consumers. Though less important, differences between genders are present in the „value of the added function“ and „physical appearance“. Female customers probably due to their prevailing orientation on the „physical appearance“ of mobile phones do not consider a brand as important as their male counterparts. Some authors argue, that gender, age, and income do not have

much impact on decision-making process style. Anić et al. (2010) claim, that lower perfectionism is observable in the group of young females compared to a male group of similar age, which is in contradiction to other studies with a similar focus, which indicated, that female consumers tend to manifest higher level of perfectionism in comparison to male. In these studies, has been shown that female consumers have a higher interest in fashion, and with an excess of choice they feel more confused, they are also more susceptible to hedonistic preferences than males. Female consumers are more willing to spend more money on branded products and prefer renowned brands more than male consumers (Mitchell & Walsh, 2004; Mukherjee et al., 2012; Yasin, 2009). Walsh and Mitchell (2005) highlighted that females display higher interest in shopping in comparison to males. They spend more time in the process of shopping and are more engaged in detailed advertising materials, which exposes them to more information load, and that makes their shopping decision-making more difficult.

Age. Weiss (2003) found out, that younger customers have a tendency to impulsive decision-making and are less likely to be brand loyal in comparison to older customers. Anić et al. (2010, 2014) argue, that older customers are less impulsive than their younger counterparts because they carefully plan their shopping and are more focused on the budget. They are more precise in determining their needs and, therefore less susceptible to influences in the shop. These studies confirmed that rising age has negative implications on impulsive, carefree customer behaviour (IMP). Another study by Das, B., and Mohanty, S. (2007) indicates, that age plays one of the main roles in the decision about buying a product or service. Intelligent marketers should consider that the best outcomes of a product or service differ by the age of the targeted customer. Marketing work is easier, if analyses the thinking of consumers, and determines what exactly members of the targeted group want.

Education. Consumers with higher degrees of education manifest higher interest in new things, some authors (Kollat and Willett, 1967) however pointed out, that education level does not affect impulsiveness in buying. Vipul (2010) claims that highly educated customers can, in fact, be more impulsive because they have a better understanding of the product and a better ability in information seeking. Therefore, they are more influenced by information in the shop. Contrary to that Shukla et al. (2011) claimed, that lower-educated customers manifest more impulsive buying behaviour.

Income. The next sociodemographic factor, which has an impact is the income of the customer. Author Zeithaml (1985) suggested exactly that income has an impact on consumer behaviour. Involvement in the consumer decision-making process is significantly impacted by the level of disposable income, which has been stated by Prabhavathi et al. (2014). There are more studies, that confirm the statement, that the height of income positively impacts the awareness of consumers about novelty products (Goldsmith et al., 1998; Jordaan & Simpson, 2006).

According to a study by Abdol Razak Kamaruddin (2009) consumers aged 18-24 years are more inclined to shop by impulse. Shim (1996) observed differences between genders and found out, that „teenage“ boys are more utilitarian, while „teenage“ girls are more socially aware.

Group influences, which contain media, branding, and word of mouth have a significant impact on the decision-making process of consumers about shopping. Fatt Sian (2010) suggested that social networks, television, influencing public figures, and books influence the young generation, which leads to cultural changes, changed behaviour, and shifts in buying intentions, in particular when adapting to a different culture.

Young adults represent a recognized part of impulsive buyers. In fact, younger age has been often recognized as a significant factor (Amos et al., 2014; Kacen & Lee, 2002; Liao et al., 2009). This phenomenon finds support in wider behavioural literature. Young adults have a tendency to experience strong biological motors for new activities, while their ability to consider risks is not fully developed yet (Spear, 2000). Besides, their acts are directed by major material orientation or a lower ability to withhold impulses (Duarte et al., 2013; Kasser & Kanner, 2004).

Methodology

The analysis provided in this paper aims to identify shopping trends in e-commerce in the Visegrad group during the period of 2012 to 2022. Specifically, we aim to answer the following questions: (1) Does the e-commerce buying trends in the Visegrad group copy those of the European Union? (2) Are the countries of Visegrad group trendsetters in the European Union in regards to studied parameters? (3) Do countries of the Visegrad group attain their goals in an economic rise within e-commerce buys?

Variable EU 27 is defined as a group of member states of the European Union after the year 2020, namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland,

France, Germany, Greece, Hungary, Ireland, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.

Variable V4 or the Visegrad group formed itself on 15.2.1991 by signing the Visegrad declaration. Member states are the Czech Republic, Slovak Republic, Poland, and Hungary.

We analyse the period of years 2012 to 2022 as the last published decade of data.

For analysis we use data available from Eurostat saved in databases “Internet purchases by individuals (until 2019)” (European Commission, Eurostat, 2023) and “Internet purchases by individuals (2020 onwards)” (European Commission, Eurostat, 2023).

To answer the research questions, in the paper, we use general scientific methods of economic analysis, namely the method of comparison, also methods of generalisation, systemisation, synthesis, analogy, and classification. These methods we used due to their clarity and the informative value they bring to the studied issue.

Results

The first indicator this paper is analysing is the share of individuals, who made their last online shopping in less than twelve months on the whole population.

Table 1. Individuals, who made their last online shopping in the last 12 months according to Eurostat (2023) (% share of all individuals).

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	40.54	43.12	46.20	49.22	51.16	53.90	56.14	59.79	64.74	67.11	67.98
Czechia	32.81	36.39	42.51	45.32	47.38	55.58	58.59	64.00	71.64	75.48	77.00
Hungary	25.21	28.85	32.52	35.79	38.84	38.56	41.16	49.18	60.02	66.01	70.32
Poland	30.33	31.64	34.19	36.90	41.91	44.98	47.78	53.95	60.93	61.17	64.58
Slovakia	44.73	44.48	48.12	49.63	56.34	58.53	59.00	60.18	62.45	75.32	76.72
Max	73.94	77.42	77.69	78.88	81.52	80.88	84.39	84.15	89.31	90.82	88.30
max country	Sweden	Denmark	Denmark	Denmark	Denmark	Sweden	Denmark	Denmark	Denmark	Denmark	Denmark

From the Eurostat data in Table 1, we see, that the share of such individuals in the observed decade rose steadily. On average EU 27 the share rose from 40,54% to 67,98%. Countries of the European Union with the highest share of online shopping are Sweden in 2012 and in the rest of the decade Denmark. In the case of premiant countries, the share of online shopping individuals rose from 73,94% to 90,82% in the year 2021, while in the last year of the observed decade, a slight decrease to 88,30% was recorded.

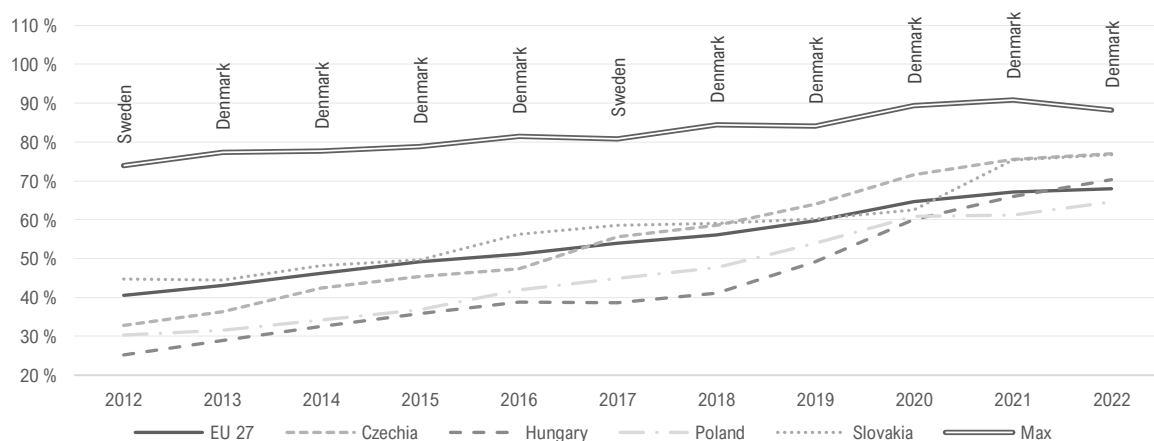


Figure 1. Individuals, who made their last online shopping in the last 12 months according to Eurostat (2023) (% share of all individuals).

Source: Own work according to Eurostat (2023) data

In the countries we observed, we recorded a rising trend in online shopping, as we can see in Figure 1. In the case of the Czech Republic growth starts at 32,81% and finishes at 77% in the year 2022. In Hungary, growth begins at 25,21% and stops at 70,32%. In Poland, the share of online shopping customers has risen from 30,33% to 64,58% and in the Slovak Republic, the share has risen from 44,73% to 76,72%. The steepest incline has been recorded in Hungary at 45,11%, followed by the Czech Republic with incline of 44,19%, next Poland with 34,25%, the Slovak Republic with 32,24%, and an average of the EU with a 27,44% incline. The average of the European Union 27 has been beaten at the end of the decade by the Czech Republic, Slovak Republic, and Hungary.

Table 2. Share of individuals 16 to 24 years old who have been online shopping in last 12 months according to Eurostat (2023) (% of individuals aged 16 - 24 years).

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	50.71	53.86	57.31	62.22	63.15	67.11	68.56	73.32	77.01	79.73	79.94
Czechia	44.35	52.46	62.18	60.55	58.70	68.12	71.02	81.42	85.45	86.51	90.28
Hungary	27.87	38.88	46.72	49.04	54.72	56.53	59.79	61.10	77.54	78.58	81.13
Poland	48.79	49.30	52.01	57.90	56.79	63.59	65.38	74.70	77.82	79.25	79.93
Slovakia	64.22	65.13	65.38	67.15	77.04	79.17	82.18	83.02	78.78	88.39	94.78
Max	87.38	88.36	88.53	88.13	90.46	89.20	91.56	91.16	97.15	96.08	100.00
max country	Denmark	Denmark	Denmark	Denmark	Denmark	Netherlands	Denmark	Netherlands	Denmark	Denmark	Ireland

In the share of individuals 16 to 24 years old, who have been shopping online in the last 12 months, displayed in Table 2, the premiant countries of the European Union are Denmark, Netherlands, and Ireland in the range between 87,38% to 100% in case of Ireland in year 2022. The Visegrad countries recorded a growing trend during the observed period. The leader of growth in the Visegrad group is Hungary with an increase from 27,87% to 80,13%, which is a rise of 53,26%. This is followed by the Czech Republic with a growth of 45,93%, Poland with an increase of 31,14%, and the Slovak Republic closely behind with a growth of 30,56%

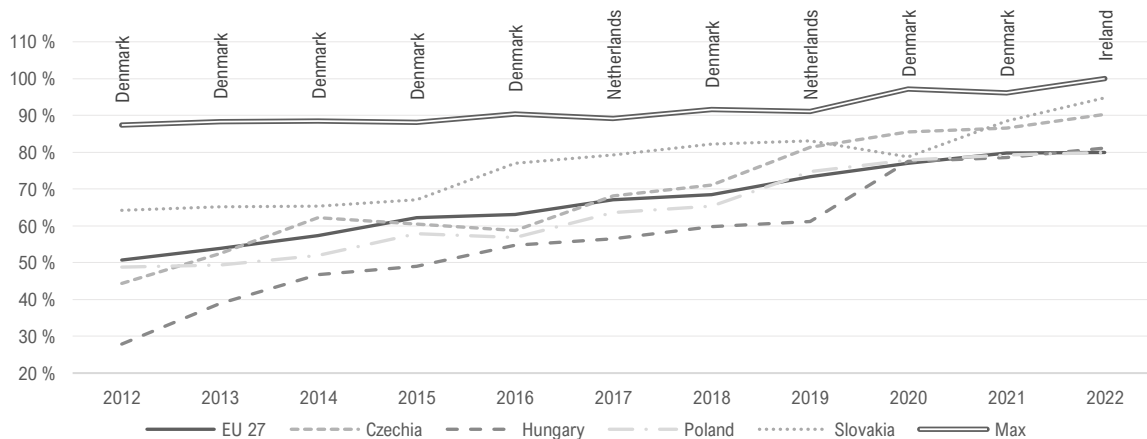


Figure 2. Share of individuals 16 to 24 years old who have been online shopping in last 12 months according to Eurostat (2023) (% of individuals aged 16 - 24 years)

Source: Own work according to Eurostat (2023) data

All of the countries of Visegrad four were able to reach above the average of European Union 27, as seen in Figure 2, and to have more steep growth, than the EU 27 average, which has been 29,23%. Slovak Republic is the leader of V4 in this regard.

Table 3. Share of individuals 25 to 34 years old who have been online shopping in last 12 months according to Eurostat (2023) (% of individuals aged 25 - 34 years).

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	56.48	59.99	64.13	67.56	68.91	72.38	75.11	78.88	83.21	83.74	85.18
Czechia	52.71	56.30	63.19	66.95	71.98	78.14	81.31	86.46	91.17	93.47	96.26
Hungary	40.87	44.96	48.15	53.65	53.94	56.36	64.48	71.23	79.89	84.81	90.08
Poland	55.29	58.29	59.95	64.29	67.78	70.42	73.26	81.25	87.06	86.54	89.41
Slovakia	62.78	66.19	68.24	73.19	79.03	78.94	82.45	81.66	77.73	90.02	95.07
Max	88.79	90.09	92.22	92.95	90.55	92.65	93.74	95.21	96.29	95.85	96.26
max country	Germany	Germany	Germany	Germany	Germany	Germany	Netherlands	Germany	Germany	Denmark	Czechia

In the age range 25 to 34 premiant countries of EU27 are Germany, Netherlands, Denmark, and Czech Republic, as shown in Table 3. Germany has been a premiant country in years 2012 to 2017, 2019, 2020, Netherlands in 2018, Denmark in 2021, and Czech Republic in the end of observed decade, in year 2022. Premiant countries' share has moved in the range between 88,79% and 96,29%.

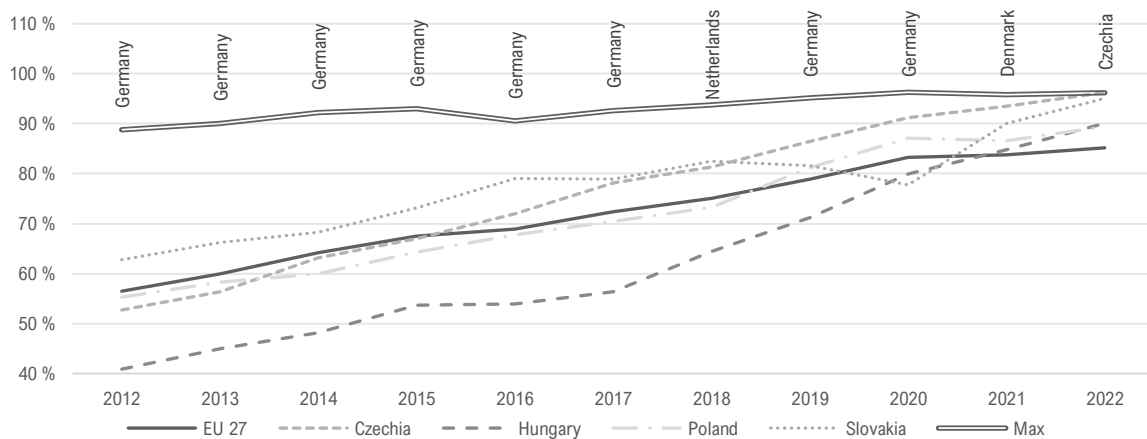


Figure 3. Share of individuals 25 to 34 years old who have been online shopping in last 12 months according to Eurostat (2023) (% of individuals aged 25 - 34 years).

Source: Own work according to Eurostat (2023) data

As we can observe in Figure 3, the steepest rise in the age category 25 – 34 has been recorded in Hungary with a rise from 40,87% to 90,08% with 49,21% growth. The Czech Republic followed with a growth of 43,55% from 52,71% to 96,26%, which made it a premiant country in EU27. With the steepness of growth by 34,12 Poland and the Slovak Republic follow with growth by 32,29% to 95.07% share. Observed countries of the Visegrad group overcome the average of EU27.

We calculated a new indicator, which is the difference in the percentual share of all individuals who have been shopping in the last 12 months and the percentual share of individuals who have been shopping in the last 12 months aged 16 to 24, displayed in the following Table 4.

Table 4. Difference in percentual share of all individuals who have been shopping in last 12 months and percentual share of individuals who have been shopping in last 12 months aged 16 to 24.

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	-10.17	-10.74	-11.11	-13.00	-11.99	-13.21	-12.42	-13.53	-12.27	-12.62	-11.96
Czechia	-11.54	-16.07	-19.67	-15.23	-11.32	-12.54	-12.43	-17.42	-13.81	-11.03	-13.28
Hungary	-2.66	-10.03	-14.20	-13.25	-15.88	-17.97	-18.63	-11.92	-17.52	-12.57	-10.81
Poland	-18.46	-17.66	-17.82	-21.00	-14.88	-18.61	-17.60	-20.75	-16.89	-18.08	-15.35
Slovakia	-19.49	-20.65	-17.26	-17.52	-20.70	-20.64	-23.18	-22.84	-16.33	-13.07	-18.06

All of the values are negative, which means that the share of individuals shopping online aged 16 to 24 is higher than a share of individuals without age limitations.

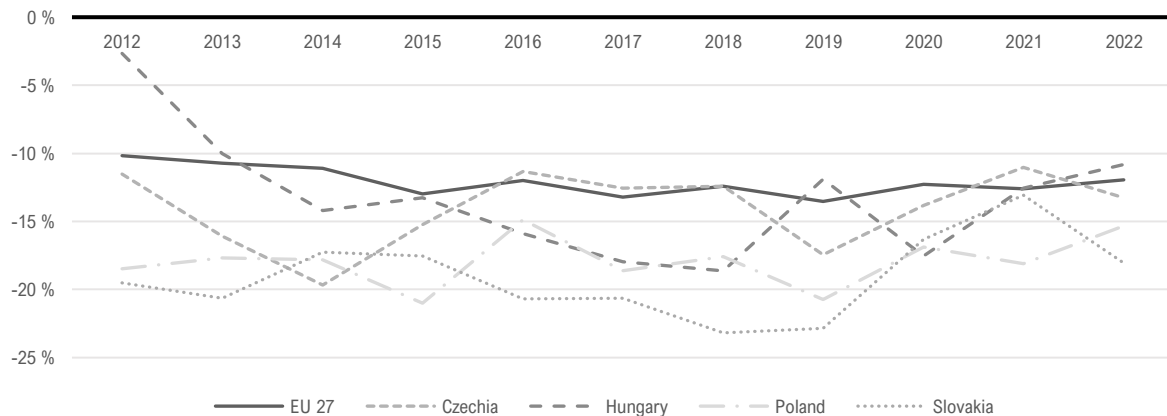


Figure 4. Difference in percentual share of all individuals who have been shopping in last 12 months and percentual share of individuals who have been shopping in last 12 months aged 16 to 24.

Source: own data

The average of the European Union is, as we can observe in Figure 4, within the band from -13,53 to -10,17. This indicator has been at its highest in years 2012 and 2013 in Hungary, where it has risen above the difference of EU 27 states in years 2019 and 2022. In the Czech Republic, the value of indicator lowered under the value of EU 27 in the years 2016, 2017, 2018, and 2021. All other values of the indicator were lower than values of EU 27 values. This means that the generation aged 16 – 24 uses online shopping more than the population without age boundaries.

A very similar indicator is the difference in the percentual share of individuals, who were shopping online in less than 12 months without age boundaries and the percentual share of individuals who were online shopping in less than 12 months aged 25 to 34 years, which values follow in Table 5.

Table 5. Difference in percentual share of all individuals who have been shopping in last 12 months and percentual share of individuals who have been shopping in last 12 months aged 25 to 34.

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	-15.94	-16.87	-17.93	-18.34	-17.75	-18.48	-18.97	-19.09	-18.47	-16.63	-17.20
Czechia	-19.90	-19.91	-20.68	-21.63	-24.60	-22.56	-22.72	-22.46	-19.53	-17.99	-19.26
Hungary	-15.66	-16.11	-15.63	-17.86	-15.10	-17.80	-23.32	-22.05	-19.87	-18.80	-19.76
Poland	-24.96	-26.65	-25.76	-27.39	-25.87	-25.44	-25.48	-27.30	-26.13	-25.37	-24.83
Slovakia	-18.05	-21.71	-20.12	-23.56	-22.69	-20.41	-23.45	-21.48	-15.28	-14.70	-18.35

All of the gathered values are negative, which means that the share of individuals who were online shopping in the last 12 months aged 25 to 34 is higher than the share of individuals who were online shopping in the last 12 months without age boundaries.

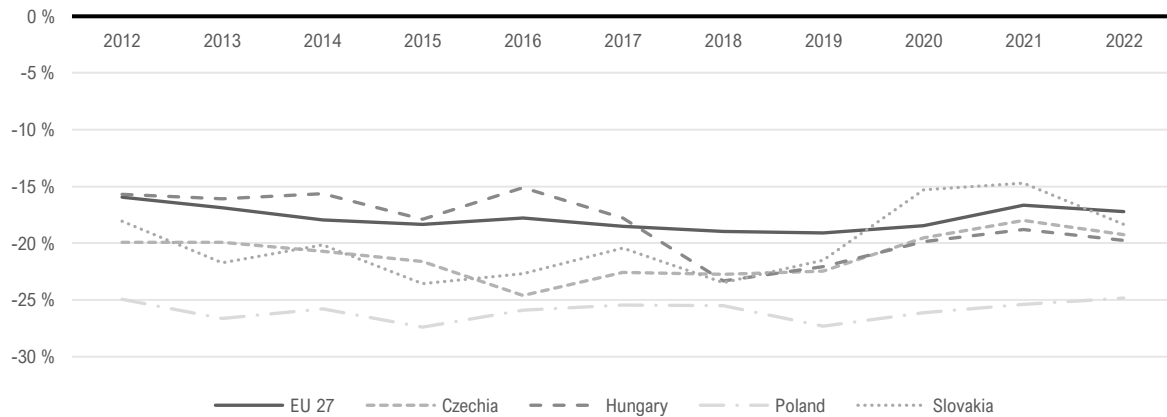


Figure 5. Difference in percentual share of all individuals who have been shopping in last 12 months and percentual share of individuals who have been shopping in last 12 months aged 25 to 34.

Source: own data

The average of the European Union stays in the band from -19,09 to 15,94, as we can observe in Figure 5. An indicator shows, that similarly to the previous indicator, in Hungary it has been higher as EU 27 in years from 2012 to 2017. The value of the indicator has been higher than EU 27 in the Slovak Republic in the years 2020 and 2021. All other values of the indicator are always lower than EU 27. The lowest value of indicator has been during the whole analysed time period in Poland in bad between -27,30 to -24,83, which means, that generation aged 25 to 34 uses internet shopping more often than the population without age boundaries in Poland.

Another calculated indicator is the difference between percentual share of individuals who were online shopping in less than 12 months aged 16 to 24 years and percentual share of individuals who were online shopping in less than 12 months aged 25 to 34 years. Values are depicted in Table 6.

Table 6. Difference in percentual share of individuals who were online shopping in less than 12 months aged 16 to 24 years and percentual share of individuals who were online shopping in less than 12 months aged 25 to 34 years.

Var	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU 27	-5.77	-6.13	-6.82	-5.34	-5.76	-5.27	-6.55	-5.56	-6.20	-4.01	-5.24
Czechia	-8.36	-3.84	-1.01	-6.40	-13.28	-10.02	-10.29	-5.04	-5.72	-6.96	-5.98
Hungary	-13.00	-6.08	-1.43	-4.61	0.78	0.17	-4.69	-10.13	-2.35	-6.23	-8.95
Poland	-6.50	-8.99	-7.94	-6.39	-10.99	-6.83	-7.88	-6.55	-9.24	-7.29	-9.48
Slovakia	1.44	-1.06	-2.86	-6.04	-1.99	0.23	-0.27	1.36	1.05	-1.63	-0.29

From the calculation, there are positive values and negative values. While positive values express more frequent usage of online shopping by the generation aged 16 to 24, negative values express more frequent usage of online shopping by the generation aged 25 to 34. Higher frequency of online shopping by the 16- to 24-year-old generation, can be observed in Hungary in years 2016 and 2017 and in the Slovak Republic in years 2012, 2017, 2019, and 2020. In all other countries and all other years, more frequent usage of online shopping by the generation aged 25 to 34 is observable.

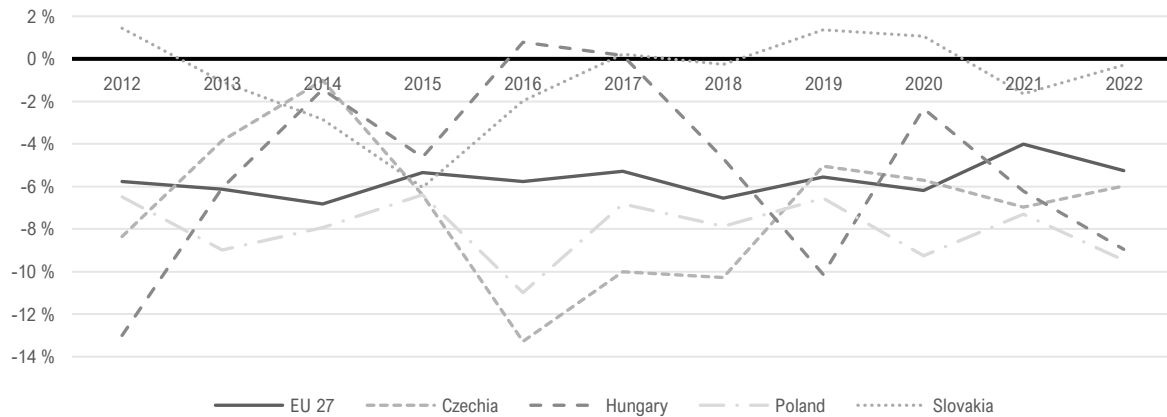


Figure 6. Difference in percentual share of individuals who were online shopping in less than 12 months aged 16 to 24 years and percentual share of individuals who were online shopping in less than 12 months aged 25 to 34 years.

Source: own data

In Poland has the generation gap been in favour of the generation aged 25 to 34 throughout the whole observed period. It also has been deeper than average EU 27. In the Czech Republic, the course of the indicator has been volatile, however in favour of the 25 to 34 generation.

Discussion

In this paper we analysed trends in online shopping behaviour within young adults in Visegrad group countries between years 2012 and 2022 included. Research focused on sociodemographic factors and its impact on online shopping.

Author Diaz-Gutierrez et al. (2023) in their study divided participants into five groups based on their current and in future awaited changes in shopping behaviour, who shown different trends in online and brick-and-mortar store activities of various goods. Outcomes has shown that more participants rose their online shopping activities in contrast with those participants who reduced their activities in brick-and-mortar stores during the COVID-19 pandemic, which induces, that online shopping has shown rising trend just like in our analysis, however it did not replaced shopping in brick-and-mortar shops.

Consumers in online space are influenced by many factors, most frequently mentioned factor is income. Hypothesis, that the higher income consumers achieve, the more they participate in online shopping and vice-versa was confirmed in study by Mehorotra et al. (2020), in which sex does not seem to be main factor influencing online shopping, because in their study men and women shown almost the same rate in using online shopping. Moreover, higher level educated consumers use online shopping more frequently, because authors assume, higher level educated consumers have more knowledge about online shopping.

Edmonds (2010) found out, that collage students within age range 18-30 are more inclined to online shopping then older generations despite they do not have equivalent amount of finance. Likewise, Lester et al. (2006) observed that millennials are more active in relation to online activities i.e. online purchasing and online shopping.

According to Hadler et al. (2021) online shopping is very widely used and positively perceived in between young people. Specifically in this study in connotation with grocery shopping. It has been pointed out by authors, that physical shopping is still mostly widespread form of shopping.

In study by Jindal et al. (2019) has been shown that younger age group age 15 to 30 exhibited positive attitude to online shopping, what has shown in our analysis as well.

Different demographic factors like sex, age, marital status, occupation and income were identified in study by Chincholkar a Sonwaney (2022) as significant factors in product selection by consumers in online shopping.

In work by Hossain et al. (2022) authors discovered that men and mainly married men with higher education level and higher-level work position consumers tend to shop online more. It has been found by authors, that age and income level of consumers did not influence their behaviour while online

shopping, which is in contrast to our outcomes, which show influence of income height and age structure.

Daana et al. (2023) study has pointed out that sex, work specialization and family income does not have significant influence on online shopping behaviour of consumers.

We can conclude that sex, age, education level and income play significant role in online shopping, which is confirmed by Howe and Strauss (2000), that generation differences has become one of significant gaps, because with generational change, the society values changed as well.

Conclusion

The outcome of this paper allows us a deeper understanding of sociodemographic factors impacting online shopping of young adults. Our analysis revealed that the generation aged 16 to 24 and the generation aged 25 to 34 are active users of this modern form of shopping. We found out, that generation aged 25 – 34 participates with higher frequency in the population than the generation aged 16 to 24. This phenomenon can be partially explained by their higher economic activity, however, causes other than this fact shall be a matter of further research.

An interesting finding of this paper is, that the Czech Republic grabbed the leading position of EU27 in online shopping in the category of 25 to 34 years in 2022. This implies the dynamic character of the online market and perhaps induces an impact factor on young customers. Parallel to this, countries of the Visegrad group (Czech Republic, Hungary, Poland, and Slovak Republic) are above average in both age categories, which implies wide support for online shopping in this region.

Partially volatile usage of internet shopping shows the fluid nature of this industry. This fact can be ascribed to multiple factors, including changes in consumer preferences and competition within the market.

The most interesting result is that the generation gap in online shopping is the biggest in Poland. This could serve as a motor for future research in the field of consumer behaviour differences between generations, and our conclusion supports the need for research into such dynamics. Further research is needed to explore the underlying causes behind the generational differences in online shopping, especially to better understand the evolving consumer behaviour dynamics.

While our study offers significant insights, it is limited to the Visegrad group and may not fully represent the broader European context, which is also a motive for further research.

In summary, our findings provide insight into multiple factors impacting the online shopping of young adults and showcase its national and generational differences, which could be of great importance for future marketing strategies and research. This paper contributes to understanding the national and generational differences in online shopping, providing valuable insights for e-commerce strategists and researchers.

As the e-commerce landscape continues to evolve, our findings lay the groundwork for future studies to delve deeper into the dynamic interplay of sociodemographic factors and online shopping trends.

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DEBT TO EQUITY RATIO AND SALES GROWTH OF LISTED OIL AND GAS COMPANIES IN NIGERIA

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ABSTRACT.

Background: The relationship between a company's financial structure is an area of extensive research in corporate finance. **Aims:** The general objective of this study is to investigate the effect of debt to equity ratio on the sales growth of listed oil and gas companies in Nigeria. **Methods:** The study covers a period of ten years from 2013 to 2022 using a population of twelve (12) oil and gas companies and a sample of eight (8) companies. Data for the study were obtained through secondary sources using annual financial reports of the listed companies on the Nigerian stock exchange for the period. Debt to equity ratio was the independent variable while sales growth served as the dependent variable. They were measured using Ordinary Least Squares Regression. **Conclusions:** Findings revealed that debt to equity ratio has a positive and significant effect on sales growth. It was concluded and recommended that companies in the Nigerian oil and gas sector strategically manage their Debt to Equity Ratio (DTER). **Implications:** This involves carefully balancing the benefits of leveraging through debt, such as interest tax shields, against potential financial distress costs.

Keywords: Debt to Equity Ratio, Sales Growth, Oil and Gas, Financial Report

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Introduction

The global oil and gas industry plays a pivotal role in driving economic growth and development across countries, often serving as a key revenue source for both governments and corporations. Within this sector, Nigeria has emerged as a prominent player, possessing substantial oil and natural gas reserves that contribute significantly to its economic landscape (EIA, 2020). As oil and gas companies operate in a capital-intensive environment, their financing decisions, particularly in terms of leveraging debt and equity, hold paramount importance in determining their growth trajectories and overall financial health (Myers, 1977).

One critical metric that sheds light on this balance is the Debt to Equity Ratio (DER), which serves as a barometer of a company's financial structure (Titman & Wessels, 1988). The Debt to Equity Ratio, a fundamental financial indicator, quantifies the relationship between a company's long-term debt and equity financing (Damodaran, 2021). It reflects the proportion of external funds a company relies on for its operations, as opposed to internal equity. A high Debt to Equity Ratio indicates a larger reliance on debt financing, potentially signaling higher financial risk due to increased interest payments and obligations (Harris & Raviv, 1991). On the other hand, a lower Debt to Equity Ratio may suggest a conservative financial approach with limited leveraging, which might constrain growth opportunities (Rajan & Zingales, 1995). In the context of oil and gas companies, these considerations become even more significant due to the capital-intensive nature of their operations, which require substantial investments in exploration, production, infrastructure, and technology (Brealey, Jarrell & Kim, 2017).

Nigeria's oil and gas industry has experienced both moments of robust growth and periods of volatility, often influenced by global oil prices, geopolitical factors, and changing demand patterns (OPEC, 2020). During periods of high oil prices, oil and gas companies may be more inclined to explore expansion opportunities, necessitating capital injection through external financing (Mudida & Barasa, 2019). Conversely, during periods of economic uncertainty or market downturns, the need to balance debt levels with equity becomes crucial to mitigate financial risk (Frank & Goyal, 2008).

The relationship between a company's financial structure, as measured by the Debt to Equity Ratio, and its performance indicators, such as sales growth, is an area of extensive research in corporate finance (Bradley et al., 1984). The Debt to Equity Ratio can influence a company's ability to invest in new projects, research and development, and other growth initiatives (Jensen & Meckling, 1976). An optimal financial structure, achieved through a balanced Debt to Equity Ratio, is considered essential for maximizing shareholder value and sustainable growth (Modigliani & Miller, 1958).

While several studies have explored the relationship between financial leverage and business performance in various industries, there remains a gap in research when it comes to analyzing the impact of Debt to Equity Ratio (DER) on the sales growth of oil and gas companies in Nigeria. Existing studies such as the study of Johnson (2019); "An Empirical Analysis of Capital Structure and Firm Performance: Evidence from Various Industries", have often focused on general corporate finance theories and have not sufficiently captured the unique challenges and dynamics of the Nigerian oil and gas sector. Furthermore, these studies have often overlooked the specific economic, regulatory, and market conditions that characterize the Nigerian context. As a result, a comprehensive investigation that effectively captures the complexities of the Debt to Equity Ratio-sales growth relationship in Nigerian oil and gas companies is lacking. This research aims to fill this gap by providing a targeted analysis that offers insights into how financial leverage influences sales growth in this specific sector, contributing to a more robust understanding of the interactions between financial decisions and business performance in the Nigerian oil and gas industry.

The main objective of the study is to analyze the impact of Debt to Equity Ratio (DER) on the sales growth of oil and gas companies in Nigeria. In line with the objective, research hypothesis was formulated in null form as follows:

Debt to equity ratio has no significant effect on the sales growth of listed oil and gas companies.

The study covers eight (8) out of the twelve (12) oil and gas companies listed on the Nigerian Stock Exchange as at 31st December, 2022. The study covers a period of ten years from 2013 to 2022. The period was appropriate because of the challenges faced by the industry within the period including: Inflation, currency fluctuations, volatile political climate, Covid-19 pandemic and lack of access to affordable capital all of which affected the oil and gas industry.

The findings of this study will be of interest to investors, policymakers, and practitioners, enabling them to make informed decisions regarding capital structure choices and strategies to enhance profitability in the Nigerian oil and gas industry.

Literature Review

The following is the review of related conceptual, empirical and theoretical literature.

Conceptual Review

The following reviews concepts related to the study:

Concept of Sales Growth

Sales growth is a critical performance metric that measures the increase in a company's revenue over a specific period, offering valuable insights into its market presence, customer demand, and overall financial health (Horngren, Datar, Rajan, & Beaubien, 2019). This key indicator serves as a barometer of a company's ability to expand its operations, attract new customers, and capitalize on growth opportunities within its industry.

The calculation of sales growth is relatively straightforward, expressed as a percentage change in revenue between two periods. The formula for calculating sales growth is: $\text{Sales Growth (\%)} = ((\text{Current Period Sales} - \text{Previous Period Sales}) / \text{Previous Period Sales}) * 100$. This calculation quantifies the relative change in sales over time, reflecting the company's ability to generate more revenue compared to a previous period.

Positive sales growth is a coveted outcome for companies, as it signifies a healthy trajectory and often corresponds with increased market share and profitability (Kotler, Keller, Brady, Goodman, & Hansen, 2016). Companies with consistent and positive sales growth are likely successfully appealing to their target audience and effectively responding to changing market dynamics. Factors contributing to positive sales growth include effective marketing strategies, product innovation, expansion into new markets, strong customer relationships, and improvements in operational efficiency.

Conversely, stagnant or negative sales growth can signal potential challenges. A lack of growth might stem from increased competition, changing customer preferences, economic downturns, or operational inefficiencies. It could necessitate a thorough analysis of the company's product offerings, pricing strategies, customer engagement practices, and overall business approach to identify areas for improvement.

The significance of sales growth goes beyond numerical figures; it reflects a company's adaptability to evolving market conditions and consumer preferences. Sustainable sales growth requires a balance between retaining existing customers and attracting new ones. Companies often invest in research and development, marketing initiatives, and customer service enhancements to foster growth and maintain their competitive edge (Kotler et al., 2016).

In industries such as oil and gas, sales growth is influenced by a complex interplay of global energy demand, commodity prices, geopolitical factors, and environmental concerns. The volatile nature of this industry amplifies the importance of understanding and managing sales growth. Companies in the oil and gas sector need to continually evaluate market trends, explore diversification strategies, and ensure operational resilience to navigate the challenges they face (IEA, 2020).

Analyzing the relationship between the Debt to Equity Ratio (DER) and sales growth for oil and gas companies in Nigeria, as proposed in the research topic, is of particular relevance in this context. Understanding how a company's financing decisions impact its ability to achieve and sustain sales growth is crucial, especially in an industry where capital-intensive projects and market volatility play a significant role.

Sales growth serves as a crucial indicator of a company's ability to thrive in a competitive market landscape. Positive sales growth reflects successful strategies and effective adaptation to changing market dynamics, while stagnant or declining growth prompts the need for strategic reassessment. In industries like oil and gas, where external factors significantly influence sales, maintaining a balance between financial decisions and growth aspirations is essential for long-term success.

Concept of Debt to Equity Ratio

The Debt to Equity Ratio (DER) is a fundamental financial metric that evaluates the capital structure and risk profile of a company by comparing its long-term debt to its equity financing. This ratio serves as a key indicator of how a company funds its operations and growth initiatives, offering insights into its financial stability, risk exposure, and ability to meet its debt obligations.

The formula to calculate the Debt to Equity Ratio is straightforward: $\text{DER} = \text{Total Debt} / \text{Total Equity}$. Total Debt refers to all of the company's long-term debt obligations, including bonds, loans, and other forms of borrowing. Total Equity represents the residual interest in the company's assets after deducting liabilities, primarily reflecting shareholder investments.

The Debt to Equity Ratio provides a snapshot of the proportion of external funds (debt) compared to internal funds (equity) that the company uses to finance its operations. A high Debt to Equity Ratio suggests that the company relies heavily on debt financing, which can enhance returns on equity but also exposes the company to higher financial risk due to increased interest payments and debt-related obligations (Harris & Raviv, 1991). Conversely, a lower DER indicates a more conservative approach with a higher reliance on equity financing, potentially limiting growth opportunities but reducing financial risk (Rajan & Zingales, 1995).

This ratio is not universally interpreted in isolation; it gains significance when viewed within the context of the industry, company life cycle, and economic conditions. For instance, capital-intensive industries like oil and gas often carry higher debt loads due to substantial investment requirements. Additionally, companies in their growth phase might take on more debt to fuel expansion.

Understanding the optimal Debt to Equity Ratio involves striking a balance between leveraging for growth and maintaining financial stability. The appropriate ratio varies across industries and is influenced by factors such as interest rates, company risk tolerance, and profitability.

The Debt to Equity Ratio is a pivotal financial metric that informs stakeholders about a company's financial structure and risk appetite. While a high Debt to Equity Ratio can magnify returns, it also amplifies financial risks, making the optimal ratio a complex consideration that needs to be aligned with the company's strategic goals and economic context.

Empirical Review

The following reviews related empirical literature:

Debt to Equity Ratio and Sales Growth

The relationship between financial leverage, represented by the Debt to Equity Ratio (DER), and business performance indicators, such as sales growth, has been a topic of interest in corporate finance research. While there is a substantial body of literature examining this relationship across various industries, the specific context of oil and gas companies in Nigeria remains underexplored.

A study by Myers (1984) laid the foundation for understanding the trade-off between the benefits and costs of debt financing. The Trade-off Theory suggests that companies aim to balance the advantages of tax shields from debt interest payments with the increased financial risk associated with higher debt levels. Applying this theory to oil and gas companies in Nigeria, it is conceivable that an optimal Debt Equity Ratio could influence sales growth by providing access to necessary funds for exploration, production, and expansion projects.

In a different industry context, Bradley, Jarrell, & Kim (1984) empirically examined the relationship between capital structure, including the Debt Equity Ratio, and firm performance. While not specific to the oil and gas sector, their findings contribute to the understanding that a company's financial structure can impact its ability to generate sales growth. Their study indicated that an optimal capital structure leads to improved performance, potentially translating into higher sales growth.

Closer to the Nigerian context, Mudida and Barasa (2019) investigated the impact of capital structure on the financial performance of oil marketing companies in Kenya. Although not focused on sales growth, their study provided insights into how the Debt Equity Ratio might influence financial indicators, which could indirectly affect growth prospects. Similar dynamics might apply to Nigerian oil and gas companies, warranting a direct examination of the Debt Equity Ratio-sales growth relationship.

Given the global oil industry's cyclical nature, the Market Timing Theory, as explored by Baker and Wurgler (2002), becomes relevant. This theory suggests that companies time their issuance of equity and debt based on market conditions. Applying this theory to Nigeria's oil and gas sector, it becomes evident that the Debt Equity Ratio's influence on sales growth might vary based on favorable or unfavorable market conditions.

Resource Dependency Theory, highlighted by Pfeffer and Salancik (2003), emphasizes organizations' reliance on external resources. In the context of Nigerian oil and gas companies, these resources could include funds acquired through debt financing. The theory suggests that a higher Debt Equity Ratio might provide these companies with the resources needed for growth initiatives, including expanding exploration and production activities to drive sales growth.

Oseni and Oladipupo (2017) examined the capital structure of Nigerian firms and found that a moderate level of debt positively impacts profitability. While not directly focusing on sales growth, their findings underscore the relevance of studying how financial leverage influences various performance indicators, which could extend to sales growth outcomes.

In an oil and gas context, Akindele and Omoniyi (2017) explored the relationship between financial leverage and corporate performance in Nigerian oil and gas companies. Their findings indicated that financial leverage positively affects performance metrics. Applying this insight to the

current research, it becomes apparent that a comprehensive analysis of the Debt Equity Ratio's impact on sales growth within the Nigerian oil and gas industry is warranted.

Akpan, Isong, and Patrick (2016) examined the determinants of financial leverage among listed companies in Nigeria. Although not specific to the oil and gas sector, their findings highlighted the influence of firm-specific factors on leveraging decisions. This approach offers a lens through which one can assess how industry-specific factors impact the Debt Equity Ratio-sales growth relationship within Nigerian oil and gas companies.

Nigeria's unique economic and regulatory environment influences the dynamics of financial decisions and performance outcomes. Okafor, Nwude, and Ezejiofor (2021) delved into the impact of leverage on financial performance in the Nigerian manufacturing sector. Their insights into the interplay between financial decisions and business outcomes offer valuable implications for oil and gas companies. Considering the sector's distinct challenges, the application of such findings to the Debt Equity Ratio-sales growth relationship becomes critical.

The need for timing and resource optimization in the oil and gas sector is emphasized by Akingunola, Popoola, and Adetunji (2020), who explored the effect of capital structure on firm performance in the Nigerian upstream oil and gas industry. Their study recognized the relevance of capital structure in navigating the industry's complexities. This aligns with the proposed research's objective of understanding how Debt Equity Ratio influences sales growth within the sector.

While these existing studies provide valuable insights into the relationships between financial leverage, firm performance, and capital structure in various contexts, the specific analysis of how the Debt Equity Ratio impacts the sales growth of oil and gas companies in Nigeria remains an underexplored area. The unique economic, regulatory, and market conditions of Nigeria's oil and gas industry make it imperative to conduct a study that directly addresses this gap and provides insights tailored to the challenges and opportunities faced by companies within this sector.

The empirical literature suggests that the Debt to Equity Ratio can influence firm performance, potentially impacting sales growth. However, the direct examination of this relationship within the Nigerian oil and gas industry is limited. The proposed research, focusing on the impact of the Debt Equity Ratio on the sales growth of oil and gas companies in Nigeria, will contribute significantly to filling this gap in the existing literature.

Theoretical background

The study is underpinned by several relevant theories in the field of corporate finance, providing a robust theoretical framework for understanding the relationship between the Debt to Equity Ratio (DER) and sales growth in Nigerian oil and gas companies.

Structurally, the study is organized around these key theories, namely the Trade-off Theory, Pecking Order Theory, Agency Theory, Market Timing Theory, and Resource Dependency Theory. These theories collectively offer insights into the financial decision-making processes of Nigerian oil and gas companies and how their financing choices impact sales growth outcomes.

Trade-off Theory: Franco Modigliani and Merton Miller developed the concepts of the theory in the 1950s and 1960s. Subsequent researchers, such as Myron J. Gordon and Jerome L. Stein, contributed to its refinement and application. The Theory posits that companies face a trade-off between the benefits and costs of debt financing. As the Debt to Equity Ratio increases, companies may experience tax shields from interest payments, which can lead to improved profitability. However, higher leverage also increases financial risk due to the obligation to make interest payments. In the context of the study, the Trade-off Theory helps explain how companies in the Nigerian oil and gas sector make financing decisions to optimize the balance between leveraging for growth and managing financial risk.

Pecking Order Theory: Myers and Majluf introduced the theory in 1984. Stewart C. Myers further developed and popularized the theory in subsequent research. The Pecking Order Theory suggests that companies prefer internal financing (retained earnings) over external financing, and when external financing is required, they prefer debt over equity. This theory is relevant for understanding the behavior of oil and gas companies in Nigeria when considering their financing options for achieving sales growth. It helps explain why companies might resort to debt financing to fund expansion projects when internal funds are insufficient.

Agency Theory: Michael C. Jensen and William H. Meckling pioneered the theory in 1976. Subsequent scholars such as Eugene F. Fama have further expanded and refined the theory. Agency Theory explores the conflicts of interest between company managers (agents) and shareholders (principals). Managers might make decisions that prioritize their interests over those of shareholders.

The Debt to Equity Ratio can impact managerial behavior, as excessive leverage might encourage managers to engage in risky projects to meet debt obligations. This theory is important for understanding how the Debt to Equity Ratio influences decision-making within oil and gas companies, particularly concerning sales growth initiatives.

Market Timing Theory: Donald B. Keim and Timothy C. Johnson introduced the theory in 1998. The Market Timing Theory suggests that companies time their issuance of equity and debt based on market conditions. Companies tend to issue equity when their stock is overvalued and debt when it's undervalued. In the context of oil and gas companies, this theory helps explain how companies might time their financing decisions based on favorable market conditions to support sales growth initiatives.

Resource Dependency Theory: Jeffrey Pfeffer and Gerald R. Salancik formulated the theory in 1978. The theory posits that organizations rely on external resources to survive and grow. In the context of the study, oil and gas companies may use external financing (debt) to acquire necessary resources for sales growth. The theory helps explain how the Debt to Equity Ratio is connected to the companies' resource acquisition strategies.

Embedded within this theoretical framework are specific research inquiries guiding the study:

How do Nigerian oil and gas companies navigate financing decisions in light of the principles outlined in the Trade-off Theory?

To what extent do these firms adhere to the Pecking Order Theory, particularly concerning their preference for internal financing over external financing, and the prioritization of debt over equity when external funds are required?

How does the Debt to Equity Ratio influence managerial behavior within these companies, as posited by the Agency Theory?

Do Nigerian oil and gas companies adjust their financing decisions based on market conditions, as suggested by the Market Timing Theory?

In what ways do these firms rely on external financing, particularly debt, to support their sales growth initiatives, in line with Resource Dependency Theory?

These research inquiries will guide the empirical analysis of data, aiming to ascertain the validity and applicability of these theories within the specific context of the Nigerian oil and gas industry.

Methodology

The research employed an ex-post facto research design due to the availability of variables obtained from the financial statements of listed oil and gas companies. This design allowed for the examination of relationships between variables based on historical data. The population of the study consisted of twelve (12) oil and gas companies listed as of December 31, 2022.

A purposive sampling technique was utilized, selecting a sample of eight (8) listed oil and gas companies. These companies were chosen based on their complete financial statements throughout the years under review, ensuring comprehensive data for analysis.

The model used to test the hypothesis of the study is specified as follows:

$$SG_{it} = \beta_0 + \beta_1 DER_{it} + \varepsilon_{it} \quad (1)$$

Where:

SG= Sales Growth

DTER = Debt to Equity Ratio

β_0 = Constant/Intercept

β_1 = Coefficient of Independent Variable

i = Firm

T = Period

ε = Error Term

This model allows for the examination of how changes in the Debt to Equity Ratio influence Sales Growth across the selected oil and gas companies over the specified period. The analysis aims to provide insights into the relationship between financial leverage and sales performance within the sector.

Table 1

S/ N	Variables	Measurement	Source
1	SG	$S1 - S0 / S0 \times 100$	Pardanawati, 2021
2	DTER	Total Debt/Shareholder's Equity	Brigham & Houston, 2016

Source: Developed by the Researcher, 2023

Results

Result and Discussion of Findings

Data collected in the course of the study were presented and discussed in this section.

The descriptive statistics of the variables under study were analyzed. The description of mean, standard deviation, minimum, and maximum of dependent and independent variables were computed using STATA 13:

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
SG	80	0.710	0.323	-0.600	1.341
DTER	80	0.865	1.40	0.218	8.765

Source: STATA 13

Table 2 shows eighty (80) observations; that is, the number of the sampled companies which is eight (8) multiplied by the number of periods reviewed from 2013 to 2022 which is ten (10) years.

The mean 0.710 implies, on average, positive sales growth. The standard deviation of 0.323 suggests some variability around this mean, indicating fluctuations in sales growth among the observations. The minimum value of -0.600 and maximum value of 1.341 show the range of sales growth in the data set.

As for the Debt to Equity Ratio, the mean of 0.865 suggests an average level of debt compared to equity. The higher standard deviation of 1.40 indicates greater variability in debt to equity ratios. The range, represented by the minimum of 0.218 and maximum of 8.765, illustrates the diversity of debt to equity ratios among the observations.

Table 3: Correlation Matrix

	SG	DTER
SG	1.0000	
DTER	0.0412	1.0000

Source: STATA 13

Table 3 reveals that the variables are positively correlated with Sales Growth.

Regression Diagnostic and Robustness Tests

There exists a prerequisite which is conducting a diagnostic test or reliability and validity test (Okoth, 2017). The first pre-diagnostic test was the normality test. This was to find out whether the data were normally distributed or not, then multicollinearity test which tested the presence or absence of multicollinearity in the independent variable and heteroskedasticity.

The result reveals that the variables are not normally distributed and that the P-values of the variables are less than 0.05. Ruben (2020) states that it is only when the P-value is higher than 0.05 that we can conclude that data are normally distributed; that is when they are insignificant. In this case, the data are not normally distributed because the independent variable is significant and derailed from the rule. Therefore, the study used robust standard error in the subsequent regression tests in order to take care of normality problems as was used by Yahaya, Tanko, and Muhammad (2017) in their study (Lawal, 2023).

Table 4: Multicollinearity Test Result

Variable	VIF	1/VIF
SG	1.71	0.546
DTER	1.83	0.634
MEAN VIF		1.80

Source: STATA 13

Table 4 shows that there is the absence of multicollinearity because the variable has a variance inflation Factor (VIF) that is higher than ten and none of the tolerance values indicated by 1/VIF has a value that is less than 0.1. Field (2009) states that VIF values that are higher than ten or tolerance values that are less than 0.1 indicate the presence of multicollinearity. In this case, the study does not have any problem of multicollinearity.

Table 5: Heteroscedasticity Test Result

chi2(1)	0.060
Prob > chi2	0.871

Source: STATA 13

Table 5 of Heteroscedasticity indicates that the data does not suffer from the heteroscedasticity problem because the P-value which is 0.871 is insignificant and the Chi2 value is 0.060. Zach (2020) states that if the P-value is greater than 0.05, we fail to reject the null hypothesis and infer that there is an absence of heteroscedasticity. In this case, there is an absence of heteroscedasticity in the study.

Table 6: Breusch and Pagan Lagrangian Multiplier Test Result

Chi2(1)	0.00
Prob>Chi2	0.06

Source: STATA 13

In Table 6, Syabihah, Yahya and Chua (2021) report that if the Breusch and Pagan Lagrangian Multiplier Test result is significant then the null hypothesis is rejected and the Random Effect is selected but if the P-value is insignificant then the null hypothesis is accepted and Ordinary Least Squares is the most appropriate. In this case, the test result is insignificant. Ordinary Least Squares are the most appropriate.

Table 7: Presentation and Interpretation of Regression Result

Variables	Coefficient	Z-Value	P- Value
DTER	0.0032432	0.17	0.001
_cons	0.0744816	4.12	0.002
Prob > F			0.213
R-squared			0.24
F Stat			2.1

Source: STATA 13 (2023)

The general objective of the study was to investigate the effect of debt to equity ratio on the sale growth of listed oil and gas companies in Nigeria.

The R² of the model has a value of 0.24. This implies that 24% of the total variation in sales growth companies in Nigeria was caused by debt to equity ratio while 76% was caused by other factors not included in the model. Furthermore, the F-statistic in the first model has a coefficient of 2.1 with a p-value of 0.213.

Hypothesis Testing

H₀₁: Debt to equity ratio has no significant effect on the sales growth of listed oil and gas companies in Nigeria.

The coefficient value of 0.0032432 represents the estimated effect of changes in the Debt to Equity Ratio on sales growth while holding other factors constant. The positive coefficient suggests that as the debt to equity ratio increases, sales growth is expected to rise. The low p-value of 0.001 (< 0.05) indicates sufficient evidence to conclude that the debt to equity ratio significantly affects sales growth.

This finding aligns with the Trade-off Theory, which suggests that firms balance the benefits of debt, such as interest tax shields, against the costs of financial distress. As sales grow, firms may leverage more debt to optimize their operations and capitalize on tax advantages.

Consequently, the null hypothesis, which posits that debt to equity ratio has no significant effect on the sales growth of listed oil and gas companies in Nigeria, is rejected. This outcome is consistent with previous research by Akingunola, Popoola, and Adetunji (2020).

Conclusion

The study aimed to investigate the impact of the Debt to Equity Ratio (DTER) on the sales growth (SG) of listed oil and gas companies in Nigeria. The descriptive statistics revealed that, on average, there was positive sales growth with some variability. The Debt to Equity Ratio showed an average level of debt compared to equity, with greater variability in ratios among the observations.

The correlation matrix indicated a positive correlation between Debt to Equity Ratio and Sales Growth. Moving on to regression diagnostics and robustness tests, the normality test suggested non-normal distribution, leading to the use of robust standard error in subsequent regression tests. Multicollinearity, heteroskedasticity, and Breusch and Pagan Lagrangian Multiplier tests showed no significant issues, confirming the reliability of the regression model.

The regression results demonstrated an R^2 of 0.24, signifying that 24% of the variation in sales growth was explained by the Debt to Equity Ratio. The F-statistic with a coefficient of 2.1 and a p-value of 0.213 suggested overall model adequacy. The hypothesis testing, focused on whether DTER significantly affects sales growth, yielded a positive coefficient of 0.0032432. The low p-value ($0.001 < 0.05$) provided evidence to reject the null hypothesis, indicating a significant effect of Debt to Equity Ratio on sales growth.

The findings align with the Trade-off Theory, suggesting that as firms seek to balance the benefits of debt, such as interest tax shields, against the costs of financial distress, an increase in Debt to Equity Ratio is associated with increased sales growth. This conclusion is consistent with the results of Akingunola, Popoola, and Adetunji (2020).

The study contributes valuable insights into the relationship between Debt to Equity Ratio and sales growth in the context of Nigerian oil and gas companies. The positive and significant effect of the Debt to Equity Ratio on sales growth implies strategic considerations regarding debt management for firms in this industry. Further research could explore additional factors influencing this relationship and its implications for financial decision-making in the sector.

Based on the study's findings, it is recommended that companies in the Nigerian oil and gas sector strategically manage their Debt to Equity Ratio (DTER). This involves carefully balancing the benefits of leveraging through debt, such as interest tax shields, against potential financial distress costs. Continuous monitoring and adjustment of Debt to Equity Ratio are essential to adapt to changing market conditions and ensure an optimal financial structure. Proactive risk mitigation strategies should be implemented, considering the positive correlation between Debt to Equity Ratio and sales growth.

Financial education and awareness initiatives are crucial for stakeholders to understand the implications of Debt to Equity Ratio on business outcomes. Industry benchmarking against peers can provide valuable insights, aiding companies in aligning their financial structures with industry norms. Further research exploring specific factors influencing the Debt to Equity Ratio -sales growth relationship, as well as scenario analysis, can contribute to a nuanced understanding and more informed financial strategies. Engagement with financial advisors, transparent investor communication, and fostering a culture of continuous learning are integral for navigating the dynamic financial landscape in the oil and gas sector.

The study is limited as follows:

Descriptive statistics provide a snapshot of sales growth with variability among observations, yet they may not fully capture long-term trends or fluctuations in sales performance.

While the Debt to Equity Ratio showed an average level of debt compared to equity, variability across observations was noted. Individual company dynamics may differ, potentially affecting the generalizability of the findings.

The positive correlation between Debt to Equity Ratio and Sales Growth does not imply causation, as other unobserved factors could influence this relationship.

The normality test indicated a non-normal distribution, which may impact the validity of statistical inferences drawn from the regression results.

The R^2 of 0.24 suggests that only 24% of the variation in sales growth was explained by the Debt to Equity Ratio, indicating the potential influence of unobserved variables not included in the model.

The study's scope was limited to listed companies, and factors such as industry-specific regulations, market dynamics, and company-specific strategies were not fully explored.

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Facebook vs. Instagram: Which Social Network Can Help One Become President?

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ABSTRACT. Background: The influence of social media on the effectiveness of political campaigns has grown substantially over the past few years. The candidates exhibit differences in performance, a factor that has a direct impact on their ultimate outcome. **Aims:** The purpose of this research is to provide a comparative analysis of the social media campaigns carried out by Ivan Korčok and Peter Pellegrini, both of whom were candidates for the president of Slovakia. **Methods:** Primarily employing quantitative approaches, the study assesses advertising expenditure, follower growth, post frequency, and interaction rates. The study examines the official Facebook and Instagram accounts of both candidates, along with data extracted from the Meta Ads Library. **Results:** The outcomes demonstrate differences in the effectiveness of social media strategies, in which Ivan Korčok showed notable growth in both follower count and engagement rates. **Conclusions:** As a result of the importance of consistent publishing and advertising in contemporary political campaigns, the need for an efficient social media strategy is emphasized in the conclusion. **Implications:** Additional research could be conducted to determine the optimal publishing frequency and content strategies for increasing campaign effectiveness and voter engagement.

Keywords: Political marketing, Social media, Facebook, Instagram, Presidential elections, Campaign

JEL Classification: example D02, O17, P31

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Introduction

Political campaigns in Slovakia, like in the rest of the globe, have experienced a transformation. Politicians and their strategists are seeking to exploit this potential to sway voters in their favor, and they are prepared to commit substantial amounts to social media platforms.

Despite the Act on Election Campaigns (2014) setting the financial cap for the presidential election in Slovakia at 500,000 euros, campaign teams are enthusiastic about allocating a major portion of their money to social media advertising, as explained in this article. The allocation of funds to the social media teams is not within the scope of this study.

According to the official election control authority in Slovakia, Štatistický úrad (2024), the candidates Peter Pellegrini and Ivan Korčok received the majority of votes in the first round. Ivan Korčok received 42.51% of the votes, which is equivalent to 958,393 votes, while Peter Pellegrini received 37.05% of the votes, totaling 834,718 votes. Peter Pellegrini became victorious in the second round, garnering 53.12% of the votes, which amounted to 1,409,255 votes. In contrast, Ivan Korčok received 46.87% of the votes, totaling 1,243,709 votes. As stated in the methodology chapter, this research centers on the social media presence of these two candidates.

Theoretical background

In political marketing, marketing principles are applied to the promotion of candidates and parties to the voters. It involves understanding voter behavior, voter segmentation, targeting voter groups, and crafting messages with the potential to get voter attention, effectively utilizing various communication channels (Johnson et al., 2023).

Political marketing can change public opinion and voter behavior using tools and strategies like those used in commercial marketing (Woolley and Howard, 2016). The goal is to persuade voters and make them feel like part of the political process, creating a connection and commitment to the political candidate or party (Kreiss, 2016).

The topic of political marketing in Slovakia was elaborated by Štarchoň and Smolková (2019), where the study found that results from research agencies often failed to accurately predict election outcomes, highlighting the need to improve marketing communication strategies to deeply understand voter behaviour and preferences. Jánošová and Bundzíková (2020) conducted a study comparing the use of marketing communication tools by conservative and liberal parties during election campaigns. They found that the effectiveness of these campaigns is largely dependent on the communication style of the parties and their continued outreach to the electorate after the election. Other researchers who have addressed this topic include Krivý and Mesežnikov (2020), Fico and Kohut (2019), Vrabec (2018), and Havlík (2017).

Choi and Thoeni (2023) suggest that it is essential that voters subjected to political marketing have trust in the politician or influencer supporting them. However, Jánošová, D., and Bundzíková, R. (2020) postulate that during the election cycle, the pressure on voters is too strong, and less can be more, meaning political marketers must be careful not to overdo it.

When analysing the 2019 presidential elections, it is remarkable that Zuzana Čaputová, despite her almost complete lack of political experience, achieved a triumph in the second round over the experienced diplomat Maroš Šefčovič. A study by Svidroňová, Kaščáková, and Bambuseková (2019) finds that Zuzana Čaputová's high Facebook activity contributed significantly to her voter engagement, which likely played a key role in her success in the second round of the election. Although Zuzana Čaputová posted only 7 posts more than Maroš Šefčovič, she achieved a significantly higher number of shares and comments. Zuzana Čaputová's posts received 118,792 shares and 869,462 comments, while Maroš Šefčovič received 19,851 shares and 45,874 comments.

Social media strategies use platforms like Facebook and Instagram to communicate with voters, share political messages, and mobilize supporters. Strategic planning in social media marketing is essential for maximizing engagement and reach (Dwivedi et al., 2023). Tailored content and targeted advertising resonate more with specific voter demographics, leading to higher engagement rates (Kizgin et al., 2023).

In Slovakia, the topic of social media was the focus of Jenčová, S., and Miškuřová, M. (2023) and Vozár M., Kajanová, J., and Barteková, N. (2023). Smolková, E., and Smolka, S. (2021) suggest that the role of digital marketing will be increasingly important in future political campaigns.

The frequency of posting has a significant impact on voter engagement, which is crucial for gaining the vote in elections. Consistent posting on social media helps maintain interest and engagement, with 5 – 7 posts per week being the ideal frequency (Lee, Hosanagar, and Nair, 2018).

In the **methodological part** of this research, we will focus on the strategies of Ivan Korčok and Petr Pellegrini on the social networks Facebook and Instagram. It describes the process of collecting data from official social media accounts and the Meta Ads Library and analyses the increase in followers, frequency of posts, interactions, and ad spending.

In the **results section**, we will examine two selected social networks: Facebook and Instagram. The first part of our analysis focuses on Facebook, covering several key aspects: trends in Facebook fans, an overview of candidates' activities on Facebook, the frequency of posts on Facebook, and interactions on Facebook. The same methodological approach was applied to Instagram. The chapter concludes with an overview of advertising on both Facebook and Instagram.

The **conclusion and discussion** section summarizes the role of social media in the Slovak presidential elections and compares the success of Ivan Korčok and Petr Pellegrini on social media platforms. It discusses implications for future political campaigns and offers recommendations for further research. It also considers external factors and other social media platforms for future analysis.

Methodology

The aim of this study is to analyze the social media strategies used by Slovak presidential candidates Ivan Korčok and Peter Pellegrini on Facebook and Instagram in the observation period from January 2024 to April 2024. The methodology involves tools for collecting, processing, and analyzing data to assess the growth of followers, the frequency of posts, interactions, and spending on advertisements.

The growth in followers represents an increase in the number of followers on the candidates' social networks. This indicator is measured by recording the number of followers at the beginning and at the end of the reporting period (January 2024 to April 2024). The growth in the number of followers indicates the reach and popularity of the candidates' social media presence.

The frequency of posts represents the number of posts that candidates posted on their social networks during the reporting period. The frequency of posts helps to understand the candidates' engagement strategy and their consistency in keeping voters interested.

Interactions represent the total number of engagements (likes, comments, shares) on candidates' posts. Interactions reflect the level of engagement and interaction that candidates receive from their followers.

Ad spend represents the amount of money spent on Facebook and Instagram ads. This metric is measured using data from the Meta Ads Library. Ad spend indicates a candidate's investment in social media advertising and its potential impact on reach and engagement with followers.

The candidates Ivan Korčok and Peter Pellegrini were selected for this research based on the official election results provided by the Štatistický úrad (2024), which showed that only three candidates received more than 5 percent of the votes in the first round. Štefan Harabin, the third candidate, was excluded from our research due to not having an official Facebook account during the campaign.

The data were obtained from the official Facebook and Instagram accounts of both candidates, as well as from the Meta Ads Library for advertisement data. The follower numbers were monitored schedule, and the number of postings, classified by their respective types (status updates, photographs, videos, carousels, and reels), were documented. The overall interaction was measured by aggregating engagement data, such as likes, comments, and shares. Data pertaining to advertisements, such as the quantity of advertising, overall expenditure, and impressions, were retrieved from the Meta advertising Library.

The collection of time series data began on January 9, 2024, representing the official initiation of the presidential campaign as documented in the Collection of Laws (2024).

Descriptive statistics provided an overview of the overall counts and changes over time, whereas growth rates for followers and interactions were calculated as percentages. Time-series graphs illustrate the trends in the growth of followers, frequency of posts, and interactions, highlighting patterns and sudden increases that align with important campaign events. The comparison tables provided an overview of the data for both candidates, while the correlation analysis investigated the connection

between advertisement spending and interaction rates. The study included qualitative content analysis to interpret the influence of various types of posts on user engagement.

The data were obtained from publicly accessible sources, with strict adherence to privacy regulations, and in accordance with ethical norms for online research.

The study's dependence on data that is accessible to the public restricts the level of detail in the findings, especially when it comes to information about the characteristics of the followers. Moreover, the accuracy of metrics could be influenced by platform-specific algorithms and data reporting procedures.

The study presents a thorough assessment of the social media tactics employed by Ivan Korčok and Peter Pellegrini, combining quantitative and qualitative analysis to provide in-depth insights into the efficacy of their campaigns during the Slovak presidential election.

Results

On Facebook, Peter Pellegrini was at a large advantage as the starting position of fans was significantly higher compared to Ivan Korčok. Pellegrini began the campaign with 326,755 followers, whereas Korčok started with 41,699 followers. This substantial initial gap provided Pellegrini with a strong boost from the start.

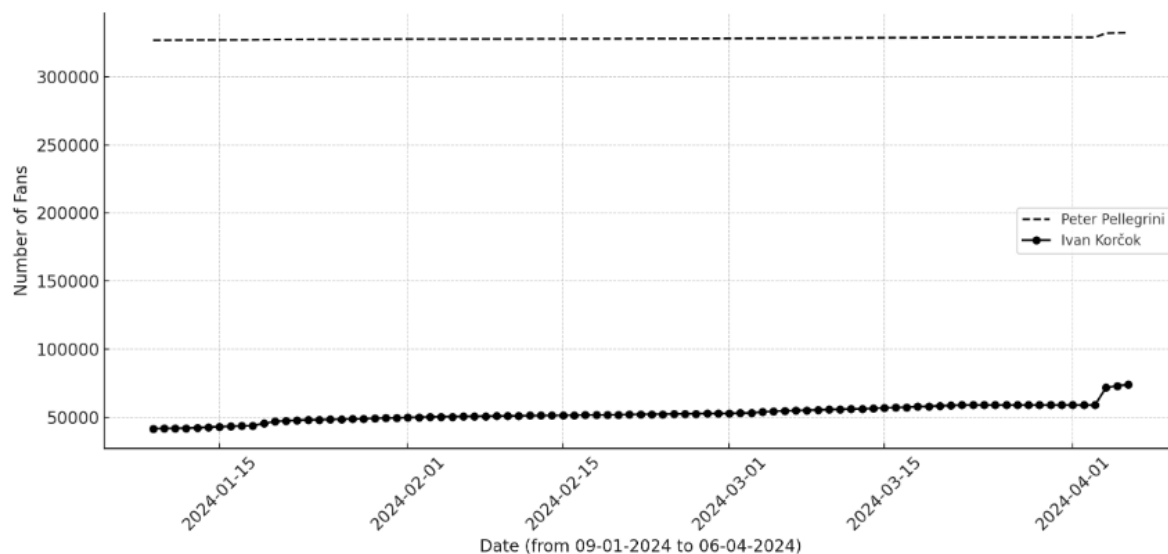


Figure 1. Fans Trend on Facebook

Source: Facebook

Peter Pellegrini maintained a consistently high number of followers throughout the campaign period, with his initial follower count of 326,755 increasing only slightly by 1.68% to reach 332,246 by April 2024. In contrast, Ivan Korčok experienced a significant increase in followers, starting with 41,699 and growing by 77.28% to reach 73,975 by the end of the campaign (see Table 1 and Figure 1). The rapid growth of Korčok's followers, while notable, resulted in a follower count that is still only slightly over one-fifth of Pellegrini's total due to Pellegrini's already high baseline from his previous political engagements.

Table 1. Summary of candidates' activity on Facebook

	Ivan Korčok	Peter Pellegrini
Initial Fans	41699	326755
Fan's change	32,276 (77.28%)	5,491 (1.68%)
Total Interactions	1,655,506	1,338,794
Admin Posts	Total: 445 (statuses: 21, videos: 164, photos: 259, carousels: 1)	Total: 285 (statuses: 5, links: 1, videos: 145, photos: 124, reels: 10)

Source: Own processing from Facebook

Both candidates heavily focused on photos and videos. Ivan Korčok posted 259 photos and 164 videos, while Peter Pellegrini posted 124 photos and 145 videos (Table 1). Additionally, Pellegrini experimented with reels, posting 10 of them, whereas Korčok did not utilize this new format on Facebook. The posting trend graph shows periods of heightened activity corresponding to crucial campaign milestones (see Figure 2).

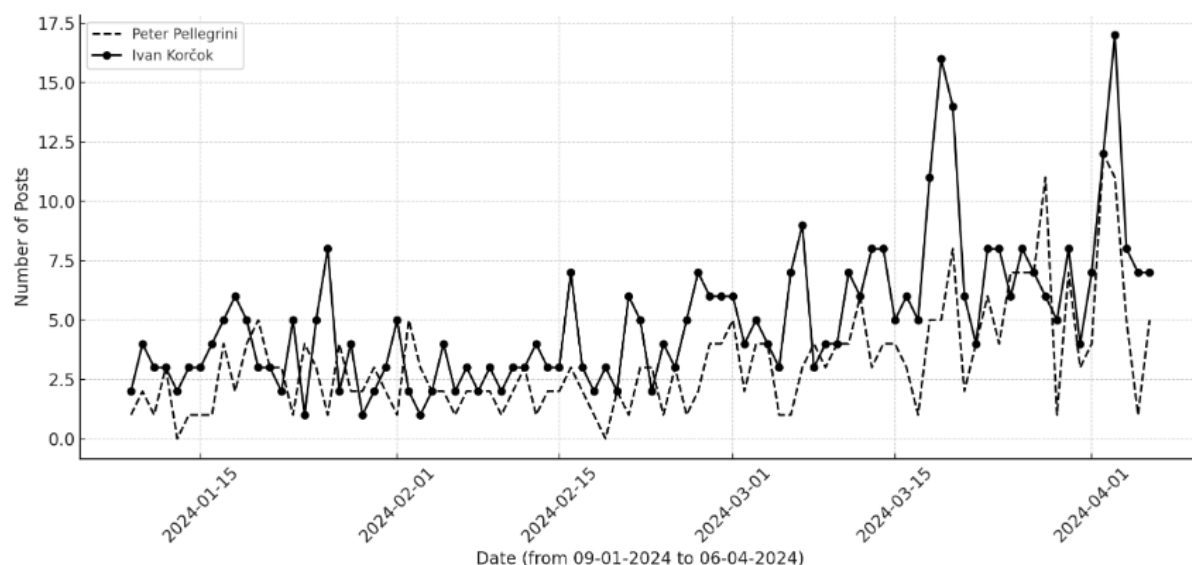


Figure 2. Frequency of Posts on Facebook

Source: Facebook

In terms of interactions, Ivan Korčok outperformed Peter Pellegrini with a total of 1,655,506 interactions compared to Pellegrini's 1,338,794 (Table 1). This higher engagement rate for Korčok indicates a more active and possibly more engaged follower base. The interaction spikes for both candidates demonstrate the dynamic nature of social media engagement during the campaign period. Notably, interactions increased significantly towards the end of the campaign, likely due to heightened voter attention and increased ad spending (see Figure 3 and Figure 7)

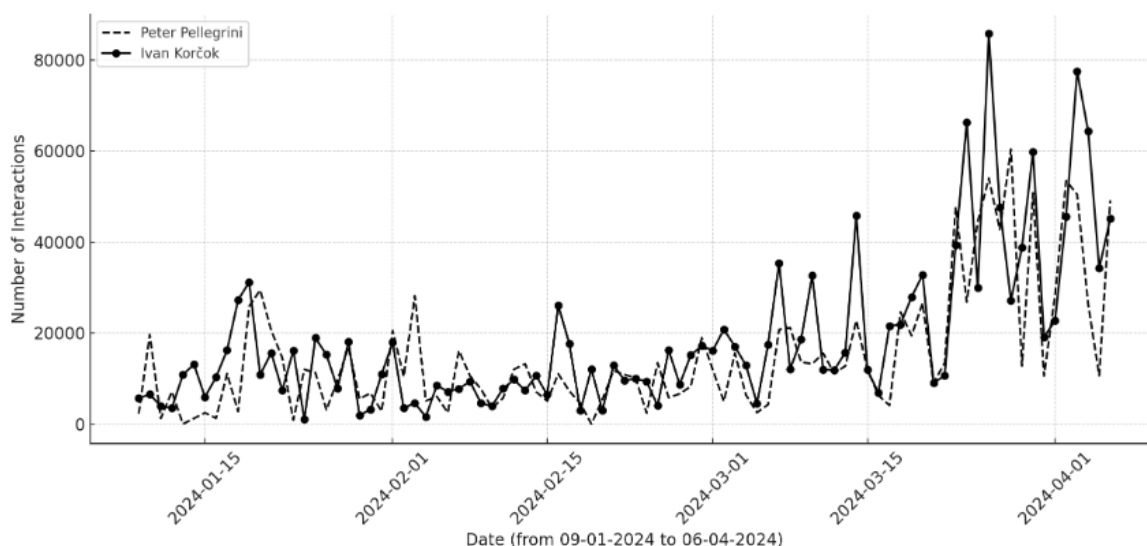


Figure 3. Interactions on Facebook

Source: Facebook

On Instagram, both candidates demonstrated significant efforts to increase their follower base and engagement, albeit starting from different initial positions.

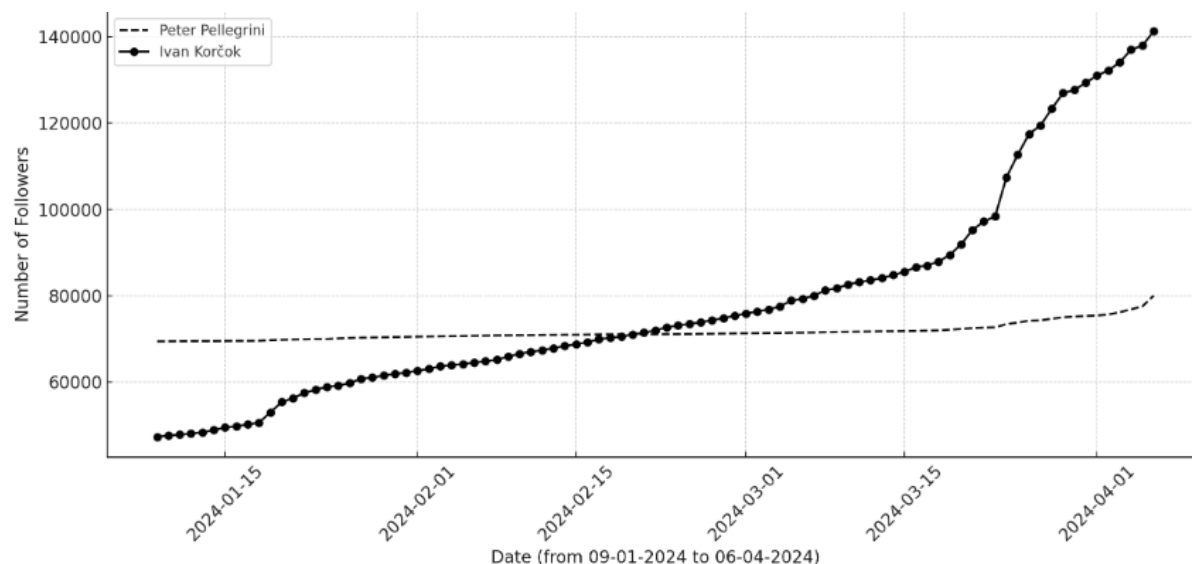


Figure 4. Followers Trend on Instagram

Source: *Instagram*

Ivan Korčok started with 47,268 followers and experienced substantial growth, increasing his follower count by 199.04% to reach 141,288 by the end of the campaign. Peter Pellegrini began with 69,400 followers and saw a growth of 15.29%, reaching 80,014 followers (see Figure 4 and Table 2). This notable growth for Korčok on Instagram mirrors his success on Facebook, and on Instagram, he rapidly overcame Pellegrini in terms of total followers.

Table 2. Summary of candidate's activity on Instagram

	Ivan Korčok	Peter Pellegrini
Initial Followers	47,268	69,400
Follower Change	+94,020 (199.04%)	+10,614 (15.29%)
Total Interactions	1,655,506	372,220
Total Posts	445 (statuses: 21, videos: 164, photos: 259, carousels: 1)	217 (carousel: 37, photos: 63, reels: 117)

Source: Own processing from Instagram

Both candidates were active in posting content on Instagram. Ivan Korčok posted a total of 445 times compared to Peter Pellegrini's 217 posts (Table 2). Korčok's posts were a mix of carousels, photos, and videos, whereas Pellegrini also utilized the reel format extensively, posting 117 reels. The heightened activity in posts, particularly close to critical campaign milestones, contributed to the increased engagement observed (see Figure 5).

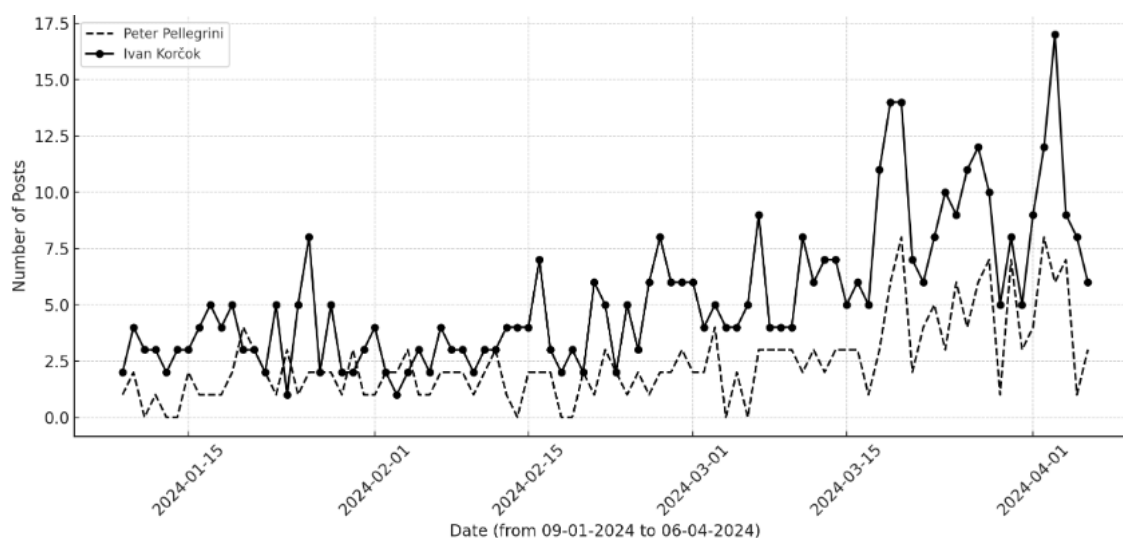


Figure 5. Frequency of Posts on Instagram

Source: *Instagram*

Interactions on Instagram also highlighted a strong performance by Ivan Korčok, who accumulated a total of 1,655,506 interactions compared to Peter Pellegrini's 372,220 interactions (Table 2). The engagement rates for both candidates increased significantly as the campaign progressed, with notable spikes towards the end, especially for Korčok. This suggests increased voter attention and strategic ad spending, even though the spending was similar for both candidates (see Figure 6 and Figure 7).

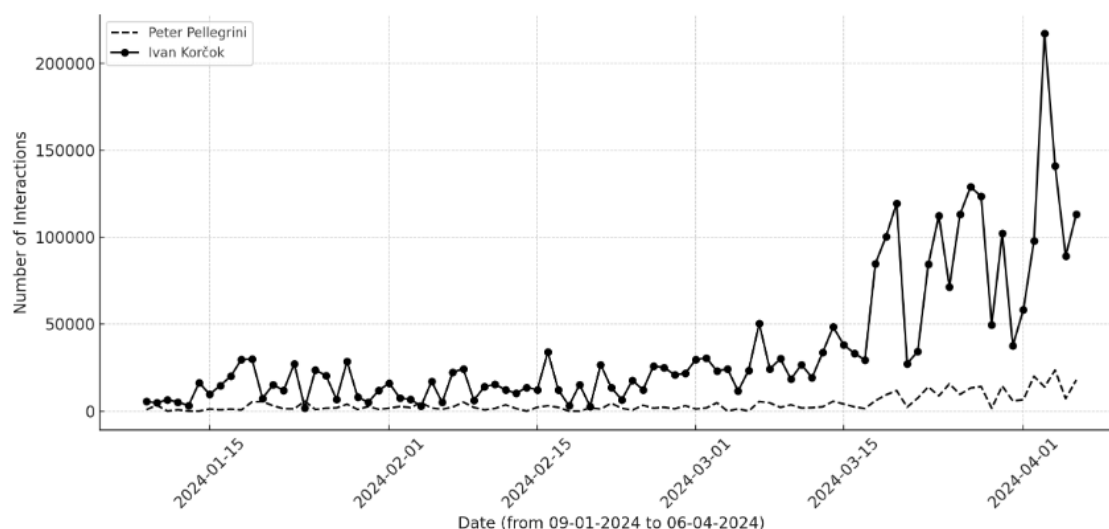


Figure 6. Interactions on Instagram

Source: *Instagram*

The advertisement data indicates that both candidates invested significantly in Facebook and Instagram ads.

Table 3. Advertisement on Facebook

	Ivan Korčok	Peter Pellegrini
Number of ads (total)	183	277
Total spend (as a range)	€39,800 - €61,517	€18,700 - €46,923
Total impressions	15,252,000 - 17,999,817	14,194,000 - 15,762,724

Source: Own processing from Meta Ads Library

Ivan Korčok ran fewer ads on Facebook but spent significantly more overall, resulting in a higher number of impressions. Conversely, Peter Pellegrini ran more ads but with a lower total spend, achieving fewer impressions in comparison (Table 3).

Table 4. Advertisement on Instagram

	Ivan Korčok	Peter Pellegrini
Number of ads (total)	117	232
Total spend (as a range)	€23,900 - €37,083	€14,400 - €38,168
Total impressions	6,886,000 - 8,191,883	6,238,000 - 6,294,769

Source: Own processing from Meta Ads Library

On Instagram, Ivan Korčok ran fewer ads but spent more overall, resulting in a higher number of impressions. Peter Pellegrini ran more ads but with a lower total spend, achieving fewer impressions in comparison (Table 4).

Conclusion and discussion

Social media played a crucial role in the outcome of the Slovak presidential election in 2024. Given the substantial number of impressions totaling in tens of millions, it is logical to assume that the majority of the public was impacted by diverse social media campaigns. Both Peter Pellegrini and Ivan Korčok dedicated substantial portions of their campaign budgets to social media advertising, while simultaneously continuing to put money in traditional political marketing techniques.

Despite initially being a somewhat unknown contender (compared to ex-prime minister Pellegrini) with a far smaller following, Ivan Korčok managed to surpass Peter Pellegrini on Facebook and particularly on Instagram, where he outperformed him by almost an order of magnitude. These findings indicate that Ivan Korčok's voter base consists primarily of a younger demographic who are more active on Instagram, aligning with general expectations.

Ivan Korčok exceeded the predictions indicated by the poll figures and emerged victorious in the first round with a substantial margin. This can be due to a substantial advantage on Instagram, however, additional research is necessary to validate the causality.

The findings indicate that upcoming political efforts will increasingly utilize both Facebook and Instagram. However, there is still potential to extend our analysis to other social media platforms such as X (formerly known as Twitter), Threads, TikTok, and others. We should also note that indicators such as follower growth and interaction rates can be influenced by specific social networking algorithms and the number of influencers who have endorsed individual candidates in campaigns. The reach of influencers and their engagement with their own followers can affect the visibility and perceived popularity of candidates, thus introducing variability that is beyond the direct control of the campaign strategies themselves.

Our research does not account for the influence of external factors that could affect social media interaction and campaign effectiveness, such as current political events, media coverage, or the mood of the community. It is recommended that future research should investigate the optimal number of daily posts that candidates should produce. This is because the highest number of posts published per day was more than 10, which is significantly different from the indicated average of roughly 1 post per day by Lee, Hosanagar, and Nair (2018), this being a specific aspect of political marketing.

Moreover, numerous significant research questions arise. Future studies might prioritize conducting keyword analysis on the most successful posts and ads, targeting voter demographics that are segmented based on certain criteria, and completing comparison analysis to determine the effectiveness of online campaign spending compared to traditional methods.

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CHANGE DRIVERS AS KEY SUCCESS FACTORS IN EUROPEAN RESEARCH AND INNOVATION PROJECTS

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ABSTRACT.

Background: Change management involves the communication and implementation of organizational changes, focusing on managing both people and processes to ensure smooth transitions. **Aims:** This study aims to identify key change drivers within European research and innovation projects under Horizon Europe and to evaluate the level of project commitment to change and transformation. **Methodology:** We analysed project data from the Community Research and Development Information Service (CORDIS), covering projects from 2021 to 2024. Our analysis included keyword density calculations for terms such as "change" and "transformation" in project objectives. **Results:** Our findings indicate that the European Research Council; Digital, Industry and Space; and Health sectors are the top recipients of funding, highlighting research as a significant change motivator. Notably, European Research Council projects have yielded substantial intellectual property, start-ups, and publications. The Marie Skłodowska-Curie Actions programme, with the highest number of projects and partners, accentuates its role in enhancing the European Research Area's visibility. Approximately 23.4% of the 8,800 analysed projects explicitly mention "change" or "transformation" in their objectives. The highest commitment ratios were found in "Careers and universities" and "Promote and co-fund innovation programmes," while some priorities, like "Promoting Public Outreach," showed no such commitment. This variation suggests differing focal points across thematic priorities, warranting further investigation into the factors influencing these disparities.

Keywords: leadership, change management, project management, transformation, Horizon Europe, organizational behavior, Cordis

JEL Classification: D23, O20, O30

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Introduction

In today's fast-paced global environment, both individuals and organizations face changes of high complexity and impact, often happening simultaneously and faster than in the past. The need to react immediately, make decisions, and address problems has become more urgent than in previous eras. Organizational leaders who anticipate and invent the future are even more successful because those who invent the game are the leaders in the industry. (Pryor et al., 2008). Recent events such as the war in Ukraine, the COVID-19 pandemic, and the global financial crisis in 2008 considerably transformed the world. COVID-19 for example changed the way society communicates, works, or educates our children, but also caused a dramatic loss of employment all over the globe. Managing planned change has become essential to achieve resilience since it brings a systematic approach to deal with the transition or transformation of an organization's goals, processes, or technologies. Change management (CM) helps organizations adapt and achieve business objectives while minimizing resistance from employees and reducing the costs associated with unsuccessful change. It applies a structured process and set of tools for leading the people's side of change to achieve a desired outcome, it also involves the application of behavioral science knowledge and practices to help bring about successful change. In essence, CM enables the transformation of strategy, processes, technology, and people to enhance performance and ensure continuous improvement in an ever-changing environment. A robust change management process fosters employee engagement, and higher productivity, and ultimately leads to the achievement of organizational goals in a cost-effective manner. From a technical-process point of view, CM is a well-established term in the field of engineering too (e.g., configuration management - a system engineering process for establishing consistency of a product's attributes throughout its life). The aviation industry, for example, delivers complex products, services, and solutions to customers on a worldwide scale, with lifecycles spreading over several decades. Every aircraft is constantly evolving and undergoing continuous change during its lifetime - as a matter of fact, there exist no two equal jets in the world, as well no airplane remains unchanged after it leaves the final assembly line. Each product adaptation, whether requested by a customer or regulation must be carefully managed to ensure safety, and airworthiness to name a few. European manufacturer Airbus, who has built more than 13,500 commercial aircraft during the company's 50-plus year history, is undertaking a major transformation called Digital Design Manufacturing & Services (DDMS). The mission of DDMS is also to respond to major global changes such as the increasingly competitive marketplace. While preparing for the next generation of aircraft Airbus particularly tries to meet the company's goal of being the first major manufacturer to offer climate-neutral commercial aircraft by 2035. The company's major change projects are the development of the A321XLR (A320 family plane with 30% less fuel burn) and Future Combat Air System (FCAS) - a key instrument in ensuring future European autonomy and sovereignty in defense & security. Source: <https://www.airbus.com>

The main motivation of this work is to extend the change management perspective on research and innovation projects by analyzing change drivers. Here we identify a gap, as most of the research on change management is written from the industry perspective resp. very little is known in the research & innovation project management context. For the purpose of this analysis, change drivers will be considered equal to project success criteria. The main objective will be to provide a summary of key change drivers in the context of European research and innovation. Furthermore, this work summarizes the breakdown of the most important EU programmes, their main goals, and achievements. Finally, insights on the level of commitment to change through the optics of project objectives have been analyzed. This paper is organized into the following chapters: introduction, literature review, data and methods, findings, discussion, and conclusions.

Horizon Europe as the European Commission's largest framework programme for research and innovation holds a total budget of around 95.5 billion euros with a duration from 2021-2027. It follows up on the previous era of Horizon 2020, FP7 to FP1. Its main goals are tackling changes in climate, the UN's Sustainable Development Goals, and also EU's competitiveness and growth through facilitating collaboration and strengthening the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges. Furthermore, it supports the creation and better dispersing of excellent knowledge and technologies, creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness, and optimizes investment impact within a strengthened European Research Area. Legal entities from the EU and associated countries can participate. One of the goals of Horizon Europe is to foster open science, and set new standards for the dissemination of knowledge and new skills across European societies. Source: <https://research-and-innovation.ec.europa.eu/>

Theoretical background

In terms of the type of change, the key difference is between a planned one and a change that happens to organizations. Organization development is directed at bringing about planned change to increase an organization's effectiveness and capability to change itself. It is generally initiated and implemented by managers, often with the help of an OD practitioner from either inside or outside of the organization (Cummings & Worley, 2005). Major frameworks dealing with organization change, that received considerable attention in the field, describe activities that must take place to initiate and carry on successful organizational change (Wanner, 2013). Kurt Lewin's model (1951) was pivotal in developing the concept of planned change and represents a simple framework. Sometimes called also *3-Step Model of Planned Change* divided the process of change into three major steps:

1. Unfreezing: reducing forces maintaining organizational behavior at the present level.
2. Restructuring: moving the organizational behavior to a new level.
3. Refreezing i.e., stabilizing the organization at a new state of equilibrium such as new organizational structure, culture, rewards, benefits, etc.)

Several variations of Levin's model have evolved over time such as Havelock's model, Kotter's model, Lippitt, Watson, and Westley's model, etc. From the mentioned, Kotter's model has gained substantial attention in the industry. He defined Change Management as a systematic approach to dealing with change, both from the perspective of an organization and on the individual level. (Kotter, 1996) His study focused on understanding lessons learned by analyzing the success of 100 companies trying to remake themselves into better competitors. In every case, the basic goal was to make fundamental changes in business where the general lesson learned from the successful companies was the presence of a change process consisting of several phases usually requiring a considerable length of time. Another significant finding was that critical mistakes in every project phase can have a devastating impact. The model involves the following eight steps to transforming organizations:

1. Establishing a sense of urgency
2. Forming a powerful guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering others to act on the vision
6. Planning for and creating short-term wins
7. Consolidating improvements and producing still more change
8. Institutionalizing new approaches

The Action Research model represents another planned change method which is based on an iterative cycle of research and action with a high level of data gathering and collaboration among organizational members and organizational development practitioners involved. This model uses multiple cycles of research and implementation and usually also consists of eight steps:

1. Problem identification
2. Consultation with behavioral science expert
3. Data gathering and preliminary diagnosis
4. Feedback to a key client or group
5. Joint diagnosis of the problem
6. Joint action planning
7. Action
8. Data gathering after action

The positive model of planned change focuses on understanding and reinforcing the organization's strengths, while the previous models can be described as deficit-based. This method also emphasizes creating excitement about the future and a shared vision in an organization. It typically involves the following five steps:

1. Initiation of inquiry
2. Inquire into best practices
3. Discover the themes

4. Envision a preferred future
5. Design and deliver ways to create the future

In every planned change model, effective change depends on a careful diagnosis of how the organization is functioning. Diagnosis identifies the underlying causes of organizational problems, such as poor product quality and employee dissatisfaction, or determines the positive opportunities that need to be promoted. (Cummings, Worley, 2005) The idea of Integrated Change Management is to achieve the desired target state by integration of the organizational and individual change processes on the one hand and by the integration of project and change management on the other hand. A systematic application of the knowledge, tools, and resources of change that provides organizations with a key process to achieve their business strategy. Change projects take place on an organizational and an individual level. Both levels are considered within the model of Integrated Change Management (Wanner, 2013).

Pryor et al. conducted valuable research that has been dedicated to the study of major differences in changes today and those of previous eras. The following can be named conclusions:

- the simultaneous nature of the changes
- the speed at which the different types of change occur
- the complexity of changes
- the immediate communication and impact of the changes throughout the world; and
- the need for individuals as well as leaders of organizations and nations to step up and immediately make decisions and address problems, issues, and resolutions. (Pryor et al., 2008)

The concept of Change Management has evolved over time, but one of the early definitions comes from research work led by IBM corporation. IBM's definition of change management describes it as a method that an organization uses to communicate and implement change, including the management of people and processes. A change management process helps ensure that employees are equipped and supported for the entirety of the transition. Several reasons constitute a need for change management. Mergers and acquisitions, leadership adjustments and implementation of new technology are common change management drivers. The organizational development needed to compete with rapid digital transformation across the industry leads companies to implement new products and new processes. However, these innovations often disrupt workflows, presenting a need for effective change management. Successful transformational change goes beyond a communication plan; it involves implementing change throughout the company culture. A change management strategy can help stakeholders to adopt proposed changes more readily than in situations where such a strategy is not employed. By activating employees as change agents by involving them in the workflow, business milestones can be achieved. Leaders can and should establish the benefits of change through developing a comprehensive change management plan. Source: <https://www.ibm.com/> McKinsey company has also left a footprint in this field. They emphasize the strategic role of communication and influencing, by suggesting that leaders develop a change story that helps all stakeholders understand where the company is headed, why it is changing, and why this change is important. Building a feedback loop to sense how the story is being received is also useful. These change stories not only help get out the message but also, recent research finds, serve as an effective influencing tool. Stories are particularly effective in selling brands. Source: <https://www.mckinsey.com/> Other popular models dealing with change are McKinsey 7-S, Bridges Transition Model, IT Infrastructure Library (ITIL), or Prosci methodology.

Methodology

The primary objective of this work is to understand change drivers in the context of European research & innovation projects. For this purpose, Horizon Europe's thematic priorities will be used to approximate change drivers. The secondary objective was to conclude the level of project commitment towards "change" and "transformation". This has been achieved by calculating the density of keywords like change, transformation, etc. in project objective statements. Our data contains results of empirical research conducted on project databases retrieved from The Community Research and Development Information Service. CORDIS is the European Commission's primary source of results from the projects funded by the EU's framework programmes for research and innovation, from FP1 to Horizon Europe.

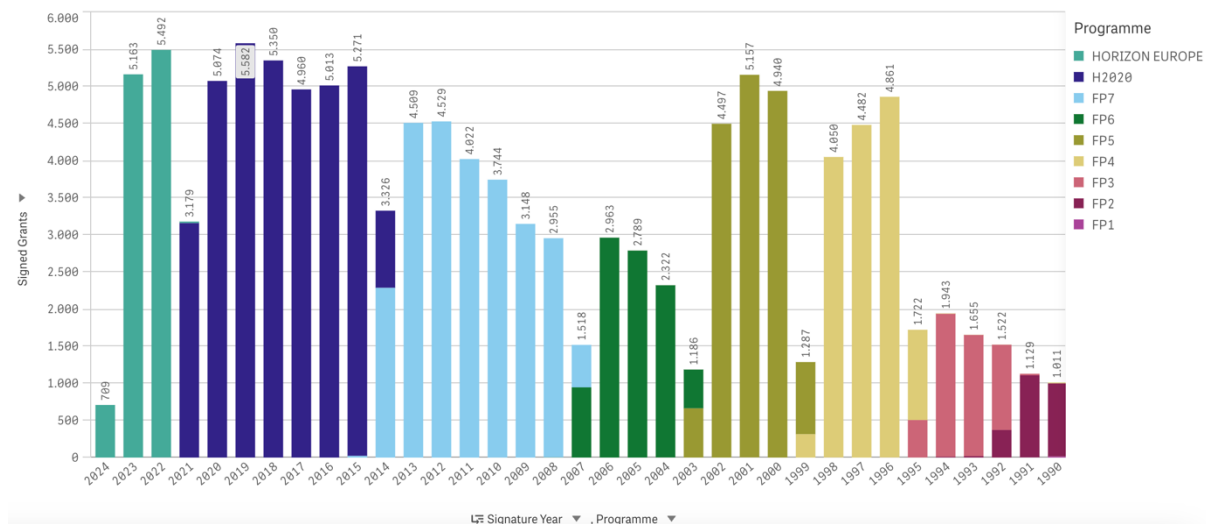


Figure 1. EU Funding programs evolution over time

Source: <https://cordis.europa.eu/about>

Horizon Europe as the European Union's key funding programme for research and innovation runs from 2021 to 2027. The main goals of Horizon Europe are: Promoting Open Strategic Autonomy:

1. Leading the development of key digital, enabling, and emerging technologies, sectors, and value chains.
2. Restoring Europe's Ecosystems and Biodiversity: Managing natural resources sustainably.
3. Making Europe a Digitally Enabled Circular, Climate-Neutral, and Sustainable Economy: This involves tackling climate change and helping to achieve the UN's Sustainable Development Goals.
4. Creating a More Resilient, Inclusive, and Democratic European Society: This includes creating jobs, fully engaging the EU's talent pool, boosting economic growth, promoting industrial competitiveness, and optimizing investment impact within a strengthened European Research Area.

Horizon Europe's changes priorities exist in the following areas:

1. Innovation and Collaboration: The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges.
2. Geographical Expansion: Horizon Europe has introduced a groundbreaking change, offering the opportunity for association to countries with robust science, innovation, and technology profiles, regardless of their geographic location.
3. Economic Impact: According to the impact assessment, Horizon Europe has the potential to deliver up to €11 in Gross Domestic Product (GDP) gains for every euro invested, create up to 320,000 new highly skilled jobs by 2040, and consolidate Europe's leadership in research and innovation.

The dataset used in this research consists of finished and ongoing EU-funded projects. For the time period, years 2021 – 2024 have been selected to focus on the current Horizon Europe framework programme. The following dimensions have been considered:

- projects: legal basis, project name, project ID, start date, end date, project status, EU contribution, objective, thematic priority, number of partners, etc. (76.593 projects)
- project participants: organization name and ID, homepage, address, type of organization, project role, EU contribution amount, etc. (22.452 total organizations, 12.165 distinct organizations)

Results

Table 1 and Figure 2 provide a detailed overview of key change drivers represented as various European funding programs, their contribution amounts, the count of projects they support, and the count of partners involved in consortia. Some key takeaways are:

- The European Research Council (ERC) has the highest contribution at over 5.5 billion EUR making research the main change motivator for Horizon Europe.
- The Marie Skłodowska-Curie Actions (MSCA) have the highest count of projects at 3,675 and partners at 12,250.
- The programme with the lowest contribution is Promoting Public Outreach with 150,000 EUR.
- The total contribution across all programs is 31.4 billion EUR, supporting 11,484 projects and 71,255 partners.

Table 1. Horizon Europe: Top 10 change drivers

Thematic Priority	Sum of EC Contribution (EUR)	Count of Projects	Count of Partners
European Research Council (ERC)	5.580.793.809	3.236	3.918
Digital, Industry and Space	3.278.729.456	565	8.161
Health	3.170.786.138	428	6.287
Climate, Energy and Mobility	2.367.681.547	356	5.986
Clean, Safe and Accessible Transport, Mobility	1.947.489.410	210	3.654
The European Innovation Council (EIC)	1.782.074.949	686	2.188
Marie Skłodowska-Curie Actions (MSCA)	1.667.142.134	3.675	12.250
Culture, creativity and inclusive society	1.552.016.157	328	5.093
Food, Bioeconomy Natural Resources, Agriculture, Environment	1.478.423.587	285	4.500
Energy Supply	1.126.086.422	185	2.406

Table 1 provides a general overview of the top 10 Horizon thematic priorities, their grant contributions, and a number of funded projects and is organized into three columns:

1. Thematic Priority: This column lists our change drivers i.e., different sectors or initiatives that are receiving funding. These range from research councils, health, climate, and energy to education and training programs.
2. Sum of EC Contribution (EUR): This column shows the total amount of EUR funding that each sector or initiative has received from the EC.
3. Count of Projects: This column indicates the number of projects that have been funded in each sector or initiative.
4. Count of Partners: This column represents the total amount of partners involved in consortia

Thematic priorities that scored lower than the top 10 are displayed in Figure 2.

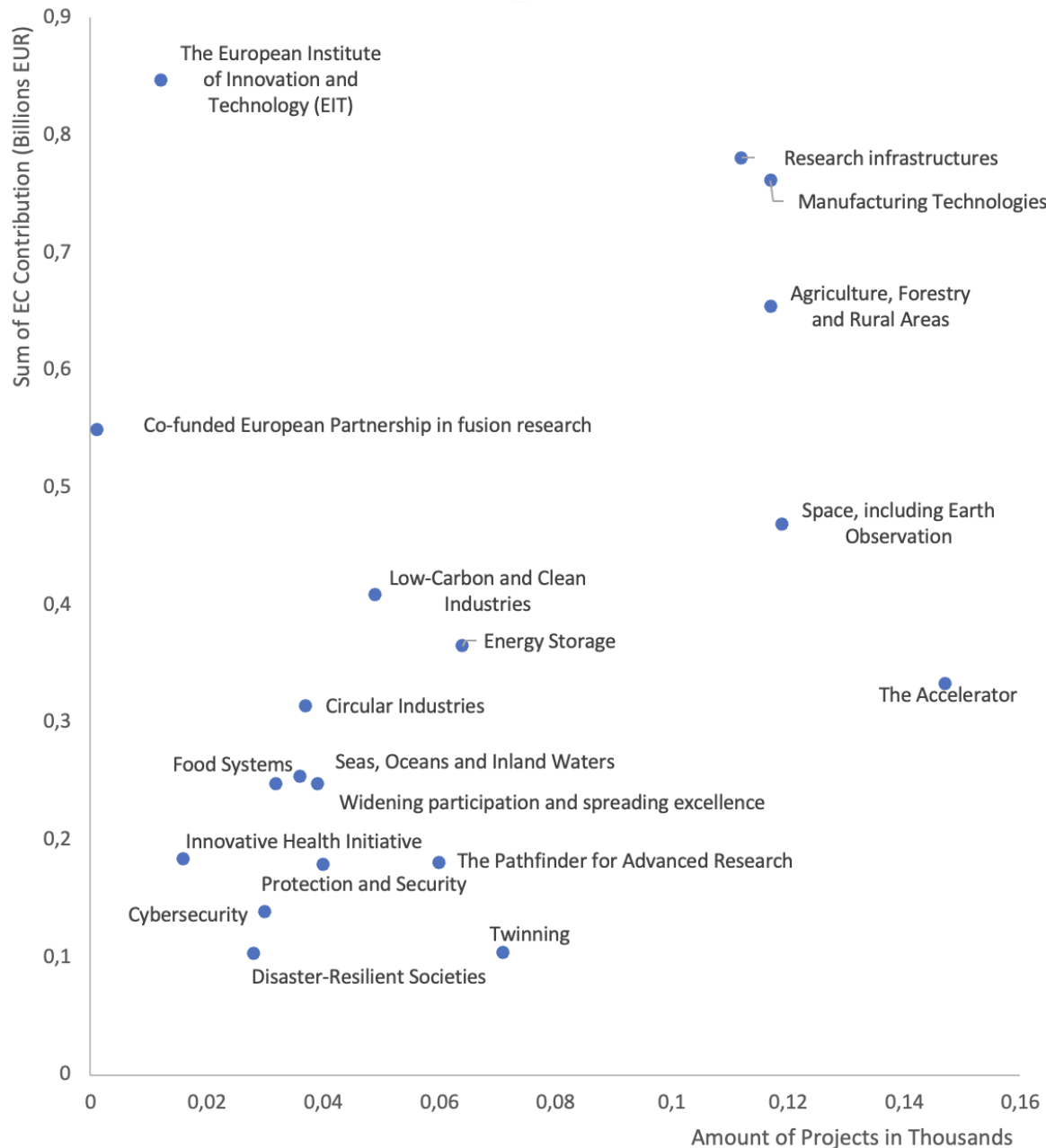


Figure 2. Horizon Europe: Key change drivers (rest)

Source: <https://cordis.europa.eu/>

As per the secondary objective, the goal was to understand the project's level of commitment to change based on project objective analysis. Table 2 shows the thematic priorities of various projects and the prevalence of the keywords "change" and/or "transformation" in their objectives. Here are some key findings:

1. Highest Ratio: The thematic priorities "Careers and universities" and "Promote and co-fund innovation programmes" have the highest ratio (100%) of projects with the keywords "change" and/or "transformation" in their objectives.
2. Most Projects: The "Marie Skłodowska-Curie Actions (MSCA)" has the greatest number of projects (2,636 without keywords and 1,039 with keywords). However, the ratio of projects with keywords to all projects is only 28.3%.
3. Lowest Ratio: Several thematic priorities such as "Promoting Public Outreach", "Euratom Research and Training Programme (EURATOM)", "Co-funded European Partnership in fusion research", "Civil Security for Society", "Education, training and mobility, including education and training schemes such as Marie Skłodowska-Curie Actions (MSCA)", and "Foster the development of fusion

- energy and contribute to the implementation of the European fusion roadmap” have no projects with the keywords “change” and/or “transformation” in their objectives, resulting in a ratio of 0%.
4. Overall: Looking at the grand total, out of 8,800 projects, 2,684 projects have the keywords “change” and/or “transformation” in their objectives, which is a ratio of 23.4%.

This data provides a useful overview of how themes related to change and transformation are prioritized within different project objectives. It’s interesting to see the variation across different thematic priorities. It could be beneficial to further investigate why certain themes have higher ratios than others and what this implies about the focus of these projects.

Table 2. Commitment level to change in Horizon

Thematic Priority	Projects without commitment	Committed projects	Commitment score
Careers and Universities	0	2	100,0%
Promote and co-fund innovation programmes	0	1	100,0%
The European Institute of Innovation and Technology (EIT)	4	8	66,7%
Safe spent fuel and radioactive waste management	1	1	50,0%
Widening participation and spreading excellence	21	18	46,2%
Seas, Oceans and Inland Waters	20	16	44,4%
Food, Bioeconomy Natural Resources, Agriculture and Environment	160	125	43,9%
Agriculture, Forestry and Rural Areas	67	50	42,7%
Circular Industries	23	14	37,8%
Culture, creativity and inclusive society	210	118	36,0%
Disaster-Resilient Societies	18	10	35,7%

Note: Listed are thematic priorities with a commitment score of 35% and higher.

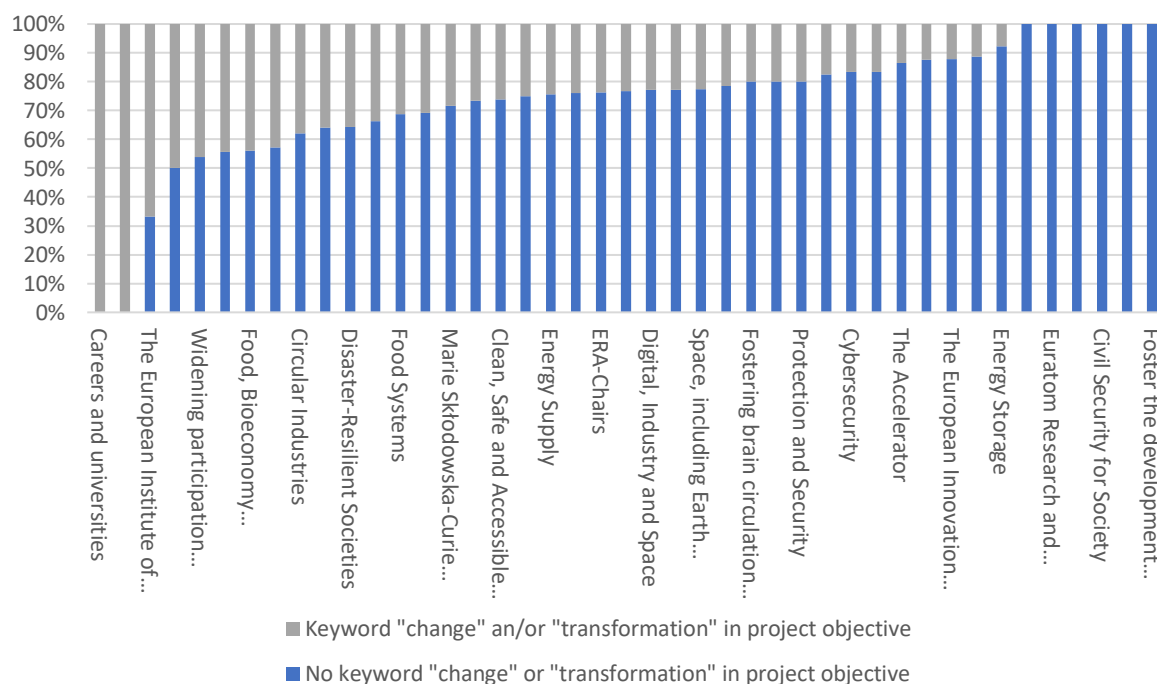


Figure 3. Horizon Europe: Commitment ratio for all thematic priorities

Discussion

Change management is fundamentally centered on the human aspect of change, recognizing that the success of any project or initiative hinges on effectively managing the impact on people. This emphasis on the human element aligns with the broader academic discourse on change management, which underscores the importance of resilience and leadership in navigating organizational transformations (Hiatt, 2006; Kotter, 2007). Various models have been proposed in the literature to provide structured approaches to managing change, with Kotter's 8-step model being particularly prominent. Kotter's model emphasizes the need for a clear vision, strong leadership, and consistent communication, which are critical in ensuring that change initiatives are not only implemented but also sustained over time (Kotter, 1996).

In our study, we explored the most prevalent drivers of change within the context of Horizon Europe and assessed the level of commitment to "change" or "transformation" through a text analysis of project objectives. This method aligns with recent academic efforts to quantify and analyse the thematic focus of large-scale research initiatives (Bryson, Ackermann, & Eden, 2007). Our analysis of 8,800 projects revealed that 2,684 projects (23.4%) explicitly mentioned "change" or "transformation" in their objectives, highlighting a significant focus on these themes.

The achievements of the European Research Council (ERC), Marie Skłodowska-Curie Actions (MSCA), and European Innovation Council (EIC) provide concrete examples of how strategic funding and support can drive significant advancements in research, innovation, and societal impact. ERC-funded projects, for instance, have not only contributed to scientific knowledge but have also led to numerous patents, start-ups, and prestigious awards, reflecting the high impact of targeted research funding (European Research Council, 2021).

Similarly, the MSCA has played a crucial role in enhancing researcher mobility, skills, and career development, fostering excellence across the European Research Area (ERA) (European Commission, 2021). The focus on international, inter-sectoral, and interdisciplinary mobility aligns with academic findings that highlight the benefits of diverse research experiences and collaboration in driving innovation and research quality (Scerri & James, 2010).

The EIC's support for startups and SMEs, promotion of gender equality, and contributions to addressing global challenges further underscore the importance of targeted innovation support in fostering a vibrant and inclusive innovation ecosystem (European Commission, 2021). The significant follow-on investments and valuations of EIC-supported companies illustrate the potential for public funding to catalyse private-sector investment and economic growth, a theme well-documented in innovation literature (Mazzucato, 2013).

As for the most funded thematic priorities (ERC, MSCA, and EIC), our findings are summarized as follows.

1. The European Research Council (ERC) has funded numerous notable projects across various fields, below listed are some achievements that have resulted from ERC-funded projects:

- ERC projects have led to over 2,200 patents and other Intellectual Property Rights (IPR) applications
- ERC grantees have founded or co-founded over 400 start-ups.
- More than 200,000 articles have been published in scientific journals as a result of these projects.
- ERC grantees have been awarded 14 Nobel Prizes, 6 Fields Medals, 11 Wolf Prizes, and dozens of other important prizes. Source: <https://erc.europa.eu/>

2. The Marie Skłodowska-Curie Actions (MSCA) is a flagship program of the European Union for doctoral and postdoctoral training. It is considered to have enhanced the visibility and attractiveness of these organizations across the European Research Area (ERA), but also worldwide Marie Skłodowska-Curie Actions - European Commission. Source: <https://research-and-innovation.ec.europa.eu/>
Following are considered key achievements in Horizon Europe:

- Promoting Researcher Mobility and Skills: The MSCA aims to equip researchers with new knowledge and skills through mobility across the European Research Area and exposure to different

sectors and disciplines. They have strengthened researchers' skills and international mobility, and the circulation of talent and knowledge across the European Research Area.

- Enhancing Research Quality: The MSCA is funding the development of excellent doctoral and postdoctoral training programs and collaborative research projects while fostering excellence through the implementation of research projects
- Boosting Career Development: The MSCA have enhanced the creative and innovative potential of researchers holding a PhD, providing training on transferable skills and career development
- Increasing International, Inter-sectoral, and Interdisciplinary Mobility: The MSCA is focusing on international, inter-sectoral, and interdisciplinary mobility, and building bridges and exposure to the non-academic sector.
- Structuring Impact on Institutions: The MSCA have achieved a structuring impact on higher education institutions, research centers, and other organizations way beyond academia by widely spreading excellence and setting standards for high-quality researcher education and training
- Contributing to Horizon Europe's Strategic Plan: The MSCA is also contributing to the orientations identified in the Horizon Europe strategic plan.

3. The European Innovation Council (EIC) on the other hand has considerably contributed to fostering innovation and supporting startups and SMEs. European Innovation Council Impact Report 2021 lists some key achievements that demonstrate the EIC's commitment to fostering innovation, promoting gender equality, and addressing global challenges. Source: <https://eic.ec.europa.eu/>

- Support of Startups and SMEs: The European Innovation Council (EIC) has supported 5500 startups and SMEs, which have accumulated €9.6 billion in follow-on investments. These companies have reached a valuation of around €50 billion, including 91 "centaurs" (company valuation over €100m) and 2 "unicorns" (company valuation over €1 billion)
- Promoting Gender Equality: The EIC has seen an increasing number of women-led startups. Of those awarded funding in 2020, over 20 percent have a female CEO, a doubling of the previous level
- EIC Fund Investments: The EIC Fund, established in 2020, took investment decisions on 137 companies worth €600 million in the first six months of 2021. The first 24 direct equity investments by the EIC Fund attracted co-investments by VC funds and others of €395 million (2.7 times the EIC Fund investment).
- Generating Scientific Breakthroughs: EIC-supported research projects have generated over 800 innovations. The EIC is also generating scientific breakthroughs as a basis for future innovations.
- Addressing Global Challenges: As of 2020, 90.5% of the portfolio of EIC Accelerator companies are developing innovations that address at least one Sustainable Development Goal (SDG). The 218 startups awarded EIC funding in 2020, including 72 developing innovative solutions for COVID, at least 64 for Green Deal, and at least 40 for digital technologies. Source: <https://commission.europa.eu>

Conclusion

Our analysis of Horizon Europe projects demonstrates a significant commitment to change and transformation, with a notable proportion of projects explicitly focusing on these themes. The achievements of the European Research Council, Marie Skłodowska-Curie Actions, and European Innovation Council highlight the impact of strategic funding and support in driving research excellence, innovation, and societal impact. These findings point to the importance of continued investment in structured change management approaches and support mechanisms to foster resilience, leadership, and sustainable innovation in the face of ongoing challenges. Future research should continue to explore the relationship between funding mechanisms, researcher mobility, and innovation outcomes to inform policy and practice in the context of large-scale research and innovation programs.

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REASONS FOR STUDYING MANAGEMENT: EXPLORING DIFFERENCES BETWEEN GROUPS

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ABSTRACT. Background: Comprehending the reasons driving students' choices of study programs is crucial for academic institutions in customizing their offerings and for the broader education sector to synchronize with industry needs and student ambitions. The pursuit of management studies enjoys global popularity and is recognized for its ability to confer a competitive edge across diverse professional domains. **Aims:** This paper aims to identify differences in the reasons to study the study program Management at the Faculty of Management and Business (FMB) at the University of Presov (UP) considering the different characteristics of the students. **Methods:** We use the Mann-Whitney U test to test four hypotheses. We consider gender, nationality, form of the study, and level of the study as group characteristics. **Sample:** The research sample consists of 416 students of the study program Management at the FMB at the UP. **Results:** Results showed the most differences considering the form of study and nationality. **Conclusions:** The differences between the analyzed groups were predominantly confirmed through the rationale considering low travel expenses, the recommendation from family, the recommendation from teachers (counselors) from high school, and the modern teaching methods. **Implications:** Understanding these differences can also help educational institutions in designing targeted recruitment strategies and support services for students.

Keywords: management, business, reasons for studying, study choice, university

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Introduction

Understanding the factors that motivate students to choose specific study programs is essential for academic institutions when tailoring their offerings and for the broader education sector to align with industry demands and student aspirations.

Motivation is a central concern in all sectors of human functioning, including education and career choices. Theoretical constructs explaining human motivation vary significantly across different cultural and contextual backgrounds, affecting students' choices in education and career paths (Sahoo, Sahoo, & Jena, 2019).

According to Kucharcikova et al. (2019), the students themselves are an essential component of the educational process. While many aspects impact students during their academic journey, the most critical one is their drive to learn and develop into competent experts within particular practical demands (Jenčová & Petruška, 2023). To accomplish the desired outcomes during the educational process and to ensure the process's sustainability, students must be motivated to study.

This paper aims to identify differences in the reasons to study the study program Management at the Faculty of Management and Business (FMB) at the University of Presov (UP), considering the different characteristics of the students.

The remainder of this paper is organized as follows. In the next section, we provide a theoretical background. Next, we present methodology, i.e., research intent, methods and material. The presentation of the results and a discussion follows. The final section summarizes our findings, the limitations of our research, and possibilities for future research.

Theoretical background

There is a wealth of research dedicated to understanding the myriad factors influencing students' choices when selecting a university, shedding light on the complex interplay of personal, academic, and socio-economic considerations. In this theoretical background, we primarily focus on the decision-making processes of management students, while also extending our analysis to include students from various other academic programs.

According to research by Kucharcikova et al. (2019), the desire to improve their chances in the labor market and the potential to earn more money in the future are the two main reasons why people start university studies. The desire only to obtain a university degree, in contrast to the effort to improve one's qualifications, indicates only a cursory interest in the study itself, which means less attention is paid to the taught subject matter and less interest is paid to active participation in the educational process.

Price et al. (2003) carried out quantitative research in England in which they tried to find out what most influences students when choosing a university. The results showed six main factors that influence their choice of university. The first two were the study program and the university's teaching reputation. Other four factors related to infrastructure are computer classrooms, the quality of library infrastructure (books, academic journals, CDs, IT), "quiet learning zones" and "common learning zones" (for group work).

In similar research by Maringe (2006) in collaboration with the Southampton University Partnership Scheme, the highest importance was given to the factors such as study programs, tuition fees, distance from home, transport, living costs, and the ability to combine work with study.

Brown, Varley, and Pal (2009) found that the admission requirement (minimum grades and subject tests) is also a determining factor for students when choosing a university. Participation in well-organized open days and communication with the university are also important.

Al-Rfou (2013) investigated what factors influenced the students of the Technical University of Tafilah when choosing a study program. The study found that parents have a significant influence on their choice, siblings, and friends are also considered to be important, while the teachers and media are the least important among the analyzed factors. The respondents give more importance to future job factors. They agreed that future earnings, career options, occupational prestige, and type of work are the most important factors affecting the decision process.

Studying management is popular worldwide and is known to provide a competitive advantage in a variety of fields. Sahoo, Sahoo, and Jena (2019) examined the motivations associated with management students. They suggest that, in addition to a competitive advantage, studying management may also encourage career switching due to having gained knowledge in this field. The Graduate Management Admission Council (GMAC) in India surveyed to learn more about the motivation of recent

management graduates. The study was focused on both barriers and motivators. There were 1,078 males and 219 females. There were no significant differences across gender groups. Results showed the important motivational factors were challenging (interesting) content, a personal sense of satisfaction and achievement, planned career development, professional credentials, confidence, occupational transition, international employment opportunity, the prospect of a good job, remaining marketable, financial stability (Sahoo, Sahoo, & Jena, 2019).

A Master of Business Administration (MBA) is an internationally recognized business degree that provides practical preparation for individuals in business and management. An MBA can complement the professional experience. Also, an MBA graduate can earn a better income than his (her) colleague without a degree. The motivators driving students to pursue an MBA are professional development and career and employment opportunities (Turgumbayeva et al., 2023). Currently, there are a variety of professional and personal motivations that drive students to pursue an MBA. When discussing personal motivations for pursuing an MBA degree, common reasons include personal growth and the desire to reach a higher level of achievement. Additionally, reasons like wanting to step outside one's comfort zone and seeking increased self-esteem were also frequently mentioned.

AL-Mutairi and Saeid (2016) investigated the motives and reasons of students who enrolled in an MBA program offered by universities operating in Kuwait. According to the study, students choose the MBA program primarily to address their own needs and advance their knowledge and abilities. In addition, the student's primary information sources were university websites, recommendations from friends, and program alumni and campus visits. The students considered international accreditation as their most important criterion for assessing the MBA programs, followed by faculty reputation, institution reputation, and admission requirements.

Thompson and Gui (2000) argue that the need for advanced skills, knowledge, and career development are among the key factors of students to choose an MBA study. In addition, personal and social benefits, such as the desire to improve social status or to develop personally, may also be considered as motivating factors.

Marks and Edgington (2006) found no difference between men and women related to their motives that are the same, specifically career improvement, career change, and personal development. However, they found that women are more motivated by the desire to improve their careers. Men are more motivated by the desire to change careers and start their businesses. Ng, Burke, and Fiksenbaum (2008) also found that males and females had similar motivators affecting their career choices and both groups placed emphasis on self-development. Most students aspire to careers reflecting a desire for career benefits and becoming wealthy.

Blackburn (2011) indicates literature gives reputation as an important motivating factor. Moreover, job prospects and salary after graduation are given high weightage in MBA evaluation systems. On the contrary, graduate salary is not key for bachelor's degree graduates. Flexible modes of study were ranked as unimportant by bachelor students, but MBA students ranked them among the three most important factors. Another factor is sources of information. Future graduate students were more likely to get advice from faculty members, the Internet, and newspapers. Family or friends did not seem to influence the decision-making process of bachelor students. Researchers have agreed that not all students make fully informed choices when selecting a bachelor's or master's degree.

Ronnie and Wakeling (2015) surveyed 312 students in both full-time and part-time MBA programs to explore their motivation in pursuing an MBA. Findings show that common reasons for undertaking an MBA are business skills acquisition and enhancement, career progression and change, personal development, networking potential, and the prospect of academic stimulation.

Research by Kurmanov, Zhumanova, and Kirichok (2013) suggests that students in Kazakhstan are more interested in pursuing an MBA. According to Kirichok (2013), most students in Kazakhstan choose an MBA because they want to advance in their careers. According to Rydzewski, Eastman, and Bocchi (2010), when students are choosing an MBA program, availability, quality, program length, cost, and courses are the main factors. Results of the study among students at business schools in Pakistan realized by Saeed and Ehsan (2010) show that the university name is the most valued factor.

Table 1 presents a synthesized overview of the main factors influencing students' decisions to pursue studies related to management and business, derived from multiple research studies.

Table 1. Factors affecting students' decision-making for studying management and business field of studies

Authors	Research sample	Country	Field of study	Factors	Short summary
Blackburn (2011)	76 current MBA students	Australia	MBA Program	Repute, syllabus, quality, facilities, career	The reputation of the university is a key factor. Other important aspects include syllabus, quality of education, facilities, and career prospects.
Alonderiene & Klimaviciene (2013)	224 first-year students	Lithuania	Management and Economics	Personal characteristics, study-related factors, university reputation, city infrastructure, social life, costs	Personal characteristics and study-related factors like career possibilities and study prestige have the biggest influence.
Sabir et al. (2013)	226 undergraduate students	Pakistan	Engineering and Business	University ranking, institutional reputation, employment, career prospects	The career-focused approach leads students to prioritize prominence, price, and program factors.
Abdullah & Saeid (2016)	137 MBA students	Kuwait	MBA Program	Personal satisfaction, improving knowledge and skills, career opportunities, income prospects, enhancing promotional opportunities	Personal satisfaction and skill improvement are the main reasons for selecting an MBA.
Fuller & Delorey (2016)	456 first-year millennial undergraduate students	Canada	Business Programs	Various selection factors including support, sport & recreation, advice, reputation, residence, financial feasibility, student recreation, academic resources	Differences in selection factors between female and male students, and between in-province and out-of-province students.
Kucharcikova et al. (2019)	306 students	Slovakia	Informatics and Management	Better chances in labor market, higher salary, higher qualification	Motivation stems from future job expectations; gender differences in motivation are observed.
Sahoo, Sahoo, & Jena (2019)	273 students	India	Management and Engineering	Need saliency; study motivation; indigenous model	Indian management students are motivated by the prospect of better chances in the labor market, higher salaries, and higher qualifications.

Source: own processing.

Methodology

Research Intent

This paper aims to identify differences in the reasons to study the study program Management at the Faculty of Management and Business (FMB) at the University of Presov (UP), considering the different characteristics of the students.

Based on the aim, we formulate four research hypotheses:

- Hypothesis 1: There is a statistically significant difference between men and women in at least one reason for studying the study program Management at the FMB UP.
- Hypothesis 2: There is a statistically significant difference between Slovak students and Ukrainian students in at least one reason for studying the study program Management at the FMB UP.
- Hypothesis 3: There is a statistically significant difference between full-time students and part-time students in at least one reason for studying the study program Management at the FMB UP.

- Hypothesis 4: There is a statistically significant difference between students of the first level of the study and students of the second level of the study in at least one reason for studying the study program Management at the FMB UP.

Method

We test the hypotheses using the Mann-Whitney U test. The statistical software Statistica 14 is used to perform the mentioned test and other calculations.

The data were obtained by the questionnaire method of data collection from November 2023 to April 2024. The questionnaire was distributed in printed and electronic form to students of the study program Management at the FMB UP. In addition to the items related to the social and demographic characteristics of the respondents (gender, age, nationality, form of the study, level of the study), the main task of the questionnaire was to obtain answers related to the selected statements, while the item in the questionnaire was "For the following items, please indicate your level of agreement with the statement "I decided to study at FMB UP because...". Specifically, we asked about 22 different items (see Table 3) to which students could answer with the options 1 – I completely disagree, 2 – I rather disagree, 3 – I don't know, 4 – I rather agree, and 5 – I completely agree.

Material

The research sample consists of 416 students. The distribution of respondents according to the investigated characteristics is in Table 2. Their mean and median age is 22, the standard deviation is 4.719, the youngest student is 17 and the oldest student is 50 years old.

Table 2. Distribution of research sample

Characteristic	Values	Absolute count	Relative count (%)
Gender	Men	134	32.21
	Women	282	67.79
Nationality	Slovak	316	75.96
	Ukrainian	100	24.04
Form of the study	Full time	372	89.42
	Part time	44	10.58
Level of the study	First (Bachelor)	249	59.86
	Second (Master)	167	40.14

Source: *own calculations*.

Results

First, we present descriptive statistics for each item from the questionnaire related to the reasons for studying at FMB UP (see Table 3). According to the mean value of the answers, results show that the most important reasons why students decided to study at FMB UP are that they "want to have a better application on the labor market" (mean = 4.20), "FMB is in Presov" (mean = 4.16), they "wanted to gain new theoretical knowledge" (mean = 4.06). On the other hand, the least important reasons why students decided to study at FMB UP are that they "received a recommendation from teachers (counselors) from high school", they "received a recommendation from FMB graduates", and they "received a recommendation from the family". Considering the variability of the answers, the items "I have low travel expenses", "I received a recommendation from friends", and "I received a recommendation from FMB graduates" have the highest variability. On the contrary, items "FMB teachers are highly qualified", "I want to have a better application in the labor market", and "FMB has the designation of an excellent research workplace" have the lowest standard deviation.

Table 3. Descriptive statistics of reasons to study at FMB

ID	Item "I decided to study at FMB UP because ..."	Mean	Median	S.D.
1	FMB has a good reputation.	3.50	4	1.062
2	FMB teachers are highly qualified.	3.78	4	0.974
3	FMB teachers have practical experience.	3.68	4	1.025
4	Modern teaching methods are used at FMB.	3.36	4	1.149
5	FMB has modern study spaces.	3.72	4	1.087
6	FMB has engaging promotional materials.	3.35	3	1.056
7	FMB has an interesting presence on social networks.	3.57	4	1.119
8	FMB has the appropriate information on the faculty website.	3.59	4	1.103
9	FMB has the designation of an excellent research workplace.	3.22	3	1.009
10	I wanted to develop my communication skills.	3.71	4	1.152
11	I wanted to develop my critical thinking.	3.83	4	1.109
12	I wanted to get an overview.	3.93	4	1.071
13	I wanted to gain new theoretical knowledge.	4.06	4	1.058
14	I wanted to get new contacts.	3.87	4	1.176
15	I want to have a better application in the labor market.	4.20	4	0.991
16	FMB is located in the city center.	3.93	4	1.164
17	FMB is in Presov.	4.16	5	1.235
18	I have low travel expenses.	2.97	3	1.454
19	I received a recommendation from the family.	2.39	2	1.374
20	I received a recommendation from friends.	2.54	2	1.414
21	I received a recommendation from teachers (counselors) from high school.	2.04	2	1.237
22	I received a recommendation from FMB graduates.	2.31	2	1.403

Source: own calculations.

Note: S.D. denotes standard deviation.

Next, tables 4, 6, 8, and 10 present the results of testing formulated hypotheses conducted through the Mann-Whitney U test.

Results in Table 4 show that differences between men and women were found for five items of the questionnaire (p-values lower than 0.05 are highlighted in bold). We can assess the specific differences considering the mean in Table 5. It follows that the significant items are:

- FMB has an interesting presence on social networks (women agreed more).
- I have low travel expenses (men agreed more).
- I received a recommendation from the family (men agreed more).
- I received a recommendation from teachers (counselors) from high school (men agreed more).
- I received a recommendation from FMB graduates (men agreed more).

We confirm hypothesis 1.

Results in Table 6 show that differences between Slovak and Ukrainian students were found for ten items of the questionnaire (p-values lower than 0.05 are highlighted in bold). We can assess the specific differences considering the mean in Table 7. Ukrainian students agreed more considering all of the following significant items:

- FMB has a good reputation.
- FMB teachers are highly qualified.
- Modern teaching methods are used at FMB.
- FMB has modern study spaces.
- FMB has an interesting presence on social networks.
- FMB has the appropriate information on the faculty website.
- FMB has the designation of an excellent research workplace.
- I wanted to develop my communication skills.
- I have low travel expenses.
- I received a recommendation from the family.

We confirm hypothesis 2.

Table 4. Hypothesis 1 testing (Gender)

ID	Rank Sum Women	Rank Sum Men	U	Z-adjusted	p-value
1	28730.0	58006.0	18103.0	0.7173	0.4732
2	27895.5	58840.5	18850.5	-0.0398	0.9682
3	26474.5	60261.5	17429.5	-1.3479	0.1777
4	27516.5	59219.5	18471.5	-0.3834	0.7014
5	27058.5	59677.5	18013.5	-0.8068	0.4198
6	27538.0	59198.0	18493.0	-0.3649	0.7152
7	24572.0	62164.0	15527.0	-3.0543	0.0023
8	27355.0	59381.0	18310.0	-0.5348	0.5928
9	28683.5	58052.5	18149.5	0.6856	0.4930
10	27058.5	59677.5	18013.5	-0.8018	0.4226
11	28463.5	58272.5	18369.5	0.4779	0.6327
12	27849.5	58886.5	18804.5	-0.0819	0.9347
13	27622.0	59114.0	18577.0	-0.2953	0.7678
14	29412.0	57324.0	17421.0	1.3482	0.1776
15	27075.5	59660.5	18030.5	-0.8165	0.4142
16	27622.0	59114.0	18577.0	-0.2910	0.7710
17	28761.0	57975.0	18072.0	0.8057	0.4204
18	30454.5	56281.5	16378.5	2.2426	0.0249
19	31447.5	55288.5	15385.5	3.1827	0.0015
20	28478.0	58258.0	18355.0	0.4851	0.6276
21	31089.0	55647.0	15744.0	2.9369	0.0033
22	30991.0	55745.0	15842.0	2.7891	0.0053

Source: own calculations.

Table 5. Significant differences related to gender

Gender	ID 7		ID 18		ID 19		ID 21		ID 22	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Mean	3.36	3.67	3.20	2.86	2.71	2.24	2.29	1.92	2.57	2.19
Median	3	4	3	3	3	2	2	1	2	2

Source: own calculations.

Table 6. Hypothesis 2 testing (Nationality)

ID	Rank Sum Slovak	Rank Sum Ukrainian	U	Z-adjusted	p-value
1	60329.0	26407.0	10243.0	-5.5134	0.0000
2	62573.5	24162.5	12487.5	-3.3563	0.0008
3	64133.0	22603.0	14047.0	-1.7645	0.0777
4	62529.0	24207.0	12443.0	-3.3346	0.0009
5	62580.0	24156.0	12494.0	-3.3140	0.0009
6	64549.0	22187.0	14463.0	-1.3317	0.1830
7	63035.0	23701.0	12949.0	-2.8281	0.0047
8	63750.0	22986.0	13664.0	-2.1402	0.0323
9	63229.5	23506.5	13143.5	-2.6764	0.0074
10	63428.5	23307.5	13342.5	-2.4482	0.0144
11	63988.5	22747.5	13902.5	-1.8921	0.0585
12	67488.0	19248.0	14198.0	1.6114	0.1071
13	65817.0	20919.0	15731.0	-0.0699	0.9443
14	64214.0	22522.0	14128.0	-1.6735	0.0942
15	67108.0	19628.0	14578.0	1.2637	0.2063
16	65935.5	20800.5	15750.5	0.0493	0.9607
17	66264.0	20472.0	15422.0	0.4049	0.6856
18	62651.5	24084.5	12565.5	-3.1535	0.0016
19	63020.0	23716.0	12934.0	-2.8430	0.0045
20	66084.5	20651.5	15601.5	0.1951	0.8453
21	66376.0	20360.0	15310.0	0.4991	0.6177
22	65560.0	21176.0	15474.0	-0.3253	0.7449

Source: own calculations.

Table 7. Significant differences related to nationality

Nationality	ID 1		ID 2		ID 4		ID 5		ID 7	
	SVK	UKR	SVK	UKR	SVK	UKR	SVK	UKR	SVK	UKR
Mean	3.34	3.99	3.69	4.05	3.26	3.69	3.62	4.03	3.48	3.85
Median	3	4	4	4	3	4	4	4	4	4

Nationality	ID 8		ID 9		ID 10		ID 18		ID 19	
	SVK	UKR	SVK	UKR	SVK	UKR	SVK	UKR	SVK	UKR
Mean	3.52	3.80	3.15	3.45	3.64	3.95	2.84	3.38	2.28	2.73
Median	4	4	3	3	4	4	3	4	2	2

Source: own calculations.

Note: SVK denotes Slovak nationality, UKR denotes Ukrainian nationality.

Results in Table 8 show that differences between full-time students and part-time students were found for fourteen items of the questionnaire (p-values lower than 0.05 are highlighted in bold). We can assess the specific differences considering the mean in Table 9. Full-time students agreed more considering all the following significant items (except for the last one):

- FMB has a good reputation.
- FMB teachers are highly qualified.
- FMB teachers have practical experience.
- Modern teaching methods are used at FMB.
- FMB has modern study spaces.
- FMB has the appropriate information on the faculty website.
- FMB has the designation of an excellent research workplace.
- I wanted to develop my critical thinking.
- I wanted to get an overview.
- I wanted to gain new theoretical knowledge.
- I want to have a better application in the labor market.
- I have low travel expenses.
- I received a recommendation from the family.
- I received a recommendation from teachers (counselors) from high school.

We confirm hypothesis 3.

Table 8. Hypothesis 3 testing (Form of the study)

ID	Rank Sum Full-time	Rank Sum Part-time	U	Z-adjusted	p-value
1	75050.5	11685.5	5672.5	-3.4619	0.0005
2	75358.5	11377.5	5980.5	-3.1019	0.0019
3	75376.5	11359.5	5998.5	-3.0567	0.0022
4	74706.0	12030.0	5328.0	-3.9417	0.0001
5	76067.0	10669.0	6689.0	-2.0819	0.0374
6	76234.5	10501.5	6856.5	-1.8372	0.0662
7	77253.5	9482.5	7875.5	-0.4246	0.6711
8	75343.0	11393.0	5965.0	-3.0892	0.0020
9	75698.5	11037.5	6320.5	-2.6084	0.0091
10	76193.0	10543.0	6815.0	-1.8947	0.0581
11	75927.0	10809.0	6549.0	-2.2652	0.0235
12	75146.0	11590.0	5768.0	-3.3769	0.0007
13	74394.0	12342.0	5016.0	-4.4901	0.0000
14	77172.5	9563.5	7794.5	-0.5412	0.5884
15	75847.0	10889.0	6469.0	-2.4646	0.0137
16	77295.5	9440.5	7917.5	-0.3716	0.7102
17	77587.5	9148.5	8158.5	0.0373	0.9703
18	79807.0	6929.0	5939.0	3.0410	0.0024
19	80542.0	6194.0	5204.0	4.1074	0.0000
20	78968.5	7767.5	6777.5	1.9245	0.0543
21	80049.5	6686.5	5696.5	3.5237	0.0004
22	78660.0	8076.0	7086.0	1.5242	0.1275

Source: own calculations.

Table 9. Significant differences related to form of the study

Form	ID 1		ID 2		ID 3		ID 4		ID 5	
	Full	Part	Full	Part	Full	Part	Full	Part	Full	Part
Mean	3.56	3.40	3.83	3.70	3.76	3.56	3.47	3.20	3.78	3.63
Median	4	4	4	4	4	4	4	3	4	4
Form	ID 8		ID 9		ID 11		ID 12		ID 13	
	Full	Part	Full	Part	Full	Part	Full	Part	Full	Part
Mean	3.64	3.52	3.26	3.17	3.88	3.74	3.96	3.90	4.08	4.04
Median	4	4	3	3	4	4	4	4	4	4
Form	ID 15		ID 18		ID 19		ID 21			
	Full	Part	Full	Part	Full	Part	Full	Part		
Mean	4.26	4.10	3.02	2.90	2.45	2.31	1.95	2.17		
Median	4	4	3	3	2	2	1	2		

Source: own calculations.

Note: Full denotes full-time study, Part denotes part-time study.

Results in Table 10 show that differences between students of the first level of the study and students of the second level was found only for two items of the questionnaire (p-values lower than 0.05 are highlighted in bold). We can assess the specific differences considering the mean in Table 11. It follows that the significant items are:

- Modern teaching methods are used at FMB (students of the first level agreed more).
- I received a recommendation from teachers (counselors) from high school (students of the second level agreed more).

We confirm hypothesis 4.

Table 10. Hypothesis 4 testing (Level of the study)

ID	Rank Sum First	Rank Sum Second	U	Z-adjusted	p-value
1	53443.5	33292.5	19264.5	1.3204	0.1867
2	53606.0	33130.0	19102.0	1.4920	0.1357
3	54032.0	32704.0	18676.0	1.8563	0.0634
4	54592.5	32143.5	18115.5	2.3171	0.0205
5	53567.0	33169.0	19141.0	1.4421	0.1493
6	51028.0	35708.0	19903.0	-0.7713	0.4405
7	50515.0	36221.0	19390.0	-1.2117	0.2256
8	53142.5	33593.5	19565.5	1.0706	0.2843
9	52614.5	34121.5	20093.5	0.6127	0.5401
10	52280.0	34456.0	20428.0	0.3153	0.7525
11	53440.5	33295.5	19267.5	1.3247	0.1853
12	52516.5	34219.5	20191.5	0.5258	0.5990
13	52356.5	34379.5	20351.5	0.3909	0.6959
14	54037.5	32698.5	18670.5	1.8508	0.0642
15	53259.0	33477.0	19449.0	1.2103	0.2262
16	52665.0	34071.0	20043.0	0.6557	0.5120
17	53000.0	33736.0	19708.0	1.0126	0.3113
18	52806.5	33929.5	19901.5	0.7561	0.4496
19	52917.0	33819.0	19791.0	0.8649	0.3871
20	52136.5	34599.5	20571.5	0.1885	0.8505
21	49689.0	37047.0	18564.0	-1.9796	0.0477
22	50872.5	35863.5	19747.5	-0.9092	0.3632

Source: own calculations.

Table 11. Significant differences related to level of the study

Level	ID 4		ID 21	
	First	Second	First	Second
Mean	3.47	3.20	1.95	2.17
Median	4	3	1	2

Source: *own calculations.*

Discussion

The differences between the analyzed groups were predominantly confirmed through the rationale considering low travel expenses (gender, nationality, field of study), the recommendation from family (gender, nationality, field of study), the recommendation from teachers (counselors) from high school (gender, field of study, level of study), modern teaching methods used at FMB (nationality, field of study, level of study). The differences between groups were occasionally validated by considering other rationales as well, i.e., good reputation (nationality, field of study), highly qualified teachers (nationality, field of study), modern study spaces (nationality, field of study), interesting presence on social networks (gender, nationality).

On the other hand, differences were not confirmed within reasons related to engaging promotional materials, getting new contacts, location of the faculty in the city center, location of the faculty in Prešov, and recommendation from friends. According to descriptive statistics in Table 3, the most important reasons are connected to having a better application on the labor market (mean = 4.20) or the location of FMB, i.e., in Prešov (mean = 4.16) and in the city center (mean = 3.93). The reason for getting new contacts is in sixth place (mean = 3.87). In addition, the key aspects are related to new theoretical knowledge (mean = 4.06), getting the overview (mean = 3.93), and developing critical thinking (mean = 3.83). The reason related to eye-catching promotional materials was considered as a moderate level (mean = 3.35, median = 3). Among the unimportant reasons is the recommendation from friends, family, FMB graduates, and teachers from high school (mean = from 2.04 to 2.54).

Our findings related to career options and good jobs in the future agree with those of Turgumbayeva et al. (2023), Sahoo, Sahoo and Jena (2019), Al-Rfou (2013), Kirchok (2013), and Thompson and Gui (2000). This reason may be important because many professions require a university degree as a basic qualification. In addition, employers often prefer or require candidates (managers) with higher education qualifications. Our results differ from AL-Mutairi and Saeid (2016), as students did not consider recommendations from friends or family as essential when deciding on the choice of study. In this respect, our results agree with the research by Blackburn (2011). The study by AL-Mutairi and Saeid (2016) was more about the sources of information than recommendations. Ultimately, while recommendations from family and friends can be valuable, the decision of which university to attend is highly personal and influenced by many factors specific to the individual. Individuals have unique interests, career goals, and preferences that may not align with the recommendations of family and friends. They might choose a university that better matches their personal aspirations and academic interests.

Consistent with the results of Thompson and Gui (2000) and Abdullah and Saeid (2016), our study shows that gaining new theoretical knowledge and overview are among the key factors of students choosing management study. University education promotes critical thinking, problem-solving, communication, and other soft skills essential in the workplace. It also fosters personal growth and intellectual development. Our results align with the research conducted by Ronnie and Wakeling (2015), demonstrating that getting new contacts (networking potential) is relevant. These networks can be invaluable for career advice, job opportunities, and professional growth.

Conclusion

Comprehending the factors driving students' choices of specific study programs holds paramount importance for academic institutions in tailoring their offerings and for the wider education sector to align with industry demands and student aspirations.

In this study, we identified differences in the reasons to study the study program Management at the FMB at the UP, considering the different characteristics of the students. Results showed the most differences between groups concerning two aspects, i.e., their form of study (14 reasons) and nationality (10 reasons).

Differences between full-time and part-time students in their decision to study management may arise due to a variety of aspects. Full-time students might prioritize a more immersive and structured educational experience, to complete their studies more quickly and enter the job market sooner. On the other hand, part-time students might be balancing their studies with work or other responsibilities, leading them to prioritize flexibility in their educational pursuits. Moreover, motivations and career goals might differ between full-time and part-time students, impacting their preferences for specific study programs like management.

Differences between Ukrainian and Slovak students in their choice to study management could stem from various aspects. These might include cultural influences, economic conditions in their respective countries, perceived opportunities in the field of management, access to quality education, language preferences, career aspirations, and personal interests. Additionally, societal expectations, educational systems, and employment prospects could also play significant roles in shaping their decisions.

Future research endeavors could delve deeper into this subject by employing factor analysis to offer a more nuanced understanding of the underlying factors shaping students' decisions in selecting management-related fields of study. In addition, in future research focused on the FMB, it would be valuable to compare the resulting factors influencing students' decisions among all offered study programs (i.e., Management; Business Management and Marketing; Tourism, Hotel and Spa Industry), providing insights into the unique considerations of different academic disciplines within the same institutional context. To enhance the generalizability and applicability of the outcomes, future research should aim to involve multiple universities. Additionally, it would be beneficial to conduct comparative studies involving at least one other Slovak university. Such comparisons would allow for an analysis of potential differences and similarities in student experiences and outcomes across different educational environments within Slovakia.

One of the limitations of this study is that the student sample was drawn exclusively from a single institution. This may limit the generalizability of the results to other contexts and populations. A limitation of the study is also the relatively low representation of part-time students, which may constrain the breadth of insights gathered and potentially overlook the distinctive perspectives and decision-making criteria of this demographic.

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IS LOGISTIC REGRESSION RELIABLE IN BANKRUPTCY PREDICTION?

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ABSTRACT. Background: The fundamental foundation of financial and economic analysis is the implementation of financial and statistical models in business entities. Financial indicators help assess the company's financial situation and, at the same time, represent the most used tool in the detection of bankruptcy. A still significant method is the logistic regression, which ranks among classic statistical methods. **Aims:** The aim of the paper is to propose a scoring model for non-financial corporations in the electrotechnical industry and to estimate the probability of bankruptcy of enterprises in the electrotechnical industry of the Slovak Republic. **Sample:** The research sample consists of 1,241 companies operating in the electrotechnical industry of the Slovak Republic, according to SK NACE 26, 27 in the year 2020. **Methods:** We used logistic regression and designed a logistic model. Financial data were sourced from The Register of Financial Statements of the Slovak Republic. **Results:** In the bankruptcy model for the electrotechnical industry, the estimated odds ratios showed that the chances of bankruptcy significantly reduce the financial indicators *EBITDA/T*, *ROA*, *L2*, and *NWC/A*. When these indicators increase, the company's probability (or chance) of bankruptcy decreases. **Conclusions:** The estimate of a risky company or the probability of its bankruptcy is always very important. Therefore, it seems appropriate to look for applicable models. Assessing the financial health of business entities using various models is an important area not only in scientific research but also in the practice of business entities. **Implications:** The benefit of the paper is the construction of an early warning model for the Slovak electrotechnical industry. We constructed an appropriate model and evaluated the financial situation in the selected branch of industry.

Keywords: bankruptcy prediction, financial analysis, logistic regression, electrotechnical industry

JEL Classification: C53, G33

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Introduction

The state of the overall economy determines the ability of business entities to achieve the required profitability. A business entity is a symbiosis of a broad economic environment, be it regional, national, or global, which generates the conditions for its existence. However, the mentioned entity itself determines and creates this environment. The fundamental foundation of financial and economic analysis is the implementation of financial and statistical models in business entities. The issue of technical financial analysis is significantly reflected in decision-making processes in the field of business management.

Financial indicators help assess the company's financial situation and, at the same time, represent the most used tool in the detection of bankruptcy. Among the oldest and most popular models is the Altman model. A still significant method is the logistic regression, which ranks among classic statistical methods. Recently, new techniques based on artificial intelligence have emerged, and these have become promising hits.

The aim of the paper is to propose a scoring model for non-financial corporations in the electrotechnical industry and to estimate the probability of bankruptcy of enterprises in the electrotechnical industry of the Slovak Republic. The research sample consists of 1,241 companies operating in the electrotechnical industry of the Slovak Republic, according to SK NACE 26, 27 in the year 2020. We used the logistic regression and designed a logistic model.

Theoretical background

Logistic regression (LR) is used in cases where the dependent variable is not continuous but binary. It is characterised as a prediction of the probability of an event occurring or not. It eliminates the disadvantage of discriminant analysis in that it does not assume normal distribution and homogeneity of covariance matrices. Probit is an alternative that assumes a normal distribution of independent variables (Klieštík et al., 2015).

These statistical-mathematical methods were first used by Ohlson (1980) and Zmijewski (1984). Works by Bernhardsen (2001), Ogachi et al. (2020), Zultilisa et al. (2023), and Calabrese (2023) analysed these methods. Also, these methods have been compared with the latest techniques in the works by Sen et al. (2004), Du Jardin (2008, 2018), Lee (2015), Ptak-Chmielewska (2019), Jenčová et al. (2018, 2020), Korol (2020, 2021), Chen et al. (2021) and Kitowski (2022).

The improved PLS-LR ("partial least squares logistic regression") technique used in the prediction of Jauber (2017) achieved a slight increase in the accuracy of this method. Brygala (2022) used the Logit method to analyse the influence of the ratio of bankrupt and non-bankrupt samples (using the reduction of non-bankrupt ones - "downsizing"). Ohlson (1980) used 105 bankrupt and 2,058 non-bankrupt firms with a 9-indicators analysis that achieved 96% accuracy (one and two years before bankruptcy) using the Logit. Zavgren (1983) used 7 indicators with 69% accuracy (1-5 years before failure). Jenčová et al. (2020) proposed an LR model for the electrotechnical industry of the Slovak Republic, which had an accuracy of 94% (99% for non-bankrupt enterprises and 60% for bankrupt ones). Mučko and Adamczyk (2023) used LR to examine the accuracy of Altman's model and conclude that its unreliability is not caused by shutter manipulation. LR is a nonlinear model, although it is represented by a linear combination of parameters and values of explanatory variables. This function is bounded by 0 and 1 (Becerra-Vicario et al., 2020).

Logit analysis assumes a logarithmic probability distribution and Probit analysis a cumulative probability distribution. These methods can be considered as a kind of general version of the linear model of the estimation of the dependent variable. They allow the use of a continuous, categorical or discrete dependent variable. According to Jenčová et al. (2020), the main disadvantage of the logit model is its high sensitivity to the problem of multiple regression, which requires the exclusion of correlation between dependent variables.

We performed a bibliometric analysis to map the use of logistic regression in bankruptcy prediction. The input to the bibliometric analysis was the publications exported from the scientific database Web of Science. A query command was entered into the search line for the Topic option using the Boolean operator OR (or) in such a structure ("logistic regression" OR "ex-ante" OR "prediction bankruptcy"). Only the latest scientific outputs from 2023 to 2024 were used, which belonged to the category of Economics, Management, Business and Business Finance. After the mentioned restrictions, 1,246 articles were included in the bibliometric analysis. Bibliometric maps were created using the VOSviewer program.

First, the occurrence of countries dealing with the given issue was analysed. A country was included in the analysis only if at least 10 publications on the issue were associated with its affiliation. Figure 1 contains the created bibliometric map that classified 5 color-coded clusters of 33 cooperating countries. A larger point on the map represents a larger contribution of the country to the issue. The countries with the greatest influence are China and the USA. Thicker connections between countries represent more frequent cooperation. Classification of countries into individual clusters:

- red cluster (9 countries) – Austria, Belgium, Brazil, France, India, the Netherlands, Portugal, Romania, South Africa,
- green cluster (7 countries) – Australia, Canada, Indonesia, Japan, China, Singapore, the USA,
- blue cluster (6 countries) - Denmark, Germany, Sweden, Switzerland, Taiwan, Turkey,
- yellow cluster (6 countries) – Chile, England, Italy, Saudi Arabia, Scotland, Spain,
- purple cluster (5 countries) – Czech Republic, Poland, Slovakia, South Korea, Vietnam.

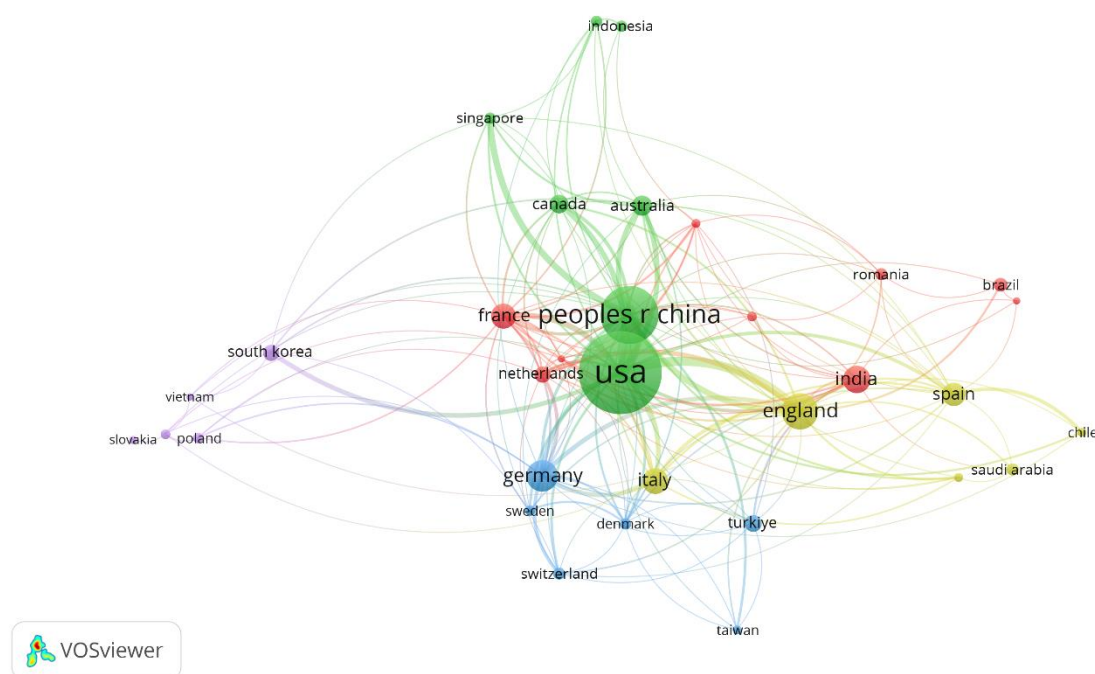


Figure 1 Bibliometric map of occurrence of countries

Source: own processing in VOSviewer program

Another part of the bibliometric analysis is the occurrence of keywords within the given issue. A keyword was included if it appeared at least 30 times in the underlying articles. Figure 2 offers the created bibliometric map that classified 3 color-coded clusters. A larger point on the map represents a more frequent occurrence of a keyword, and a thicker link between keywords means their more frequent occurrence together in publications.

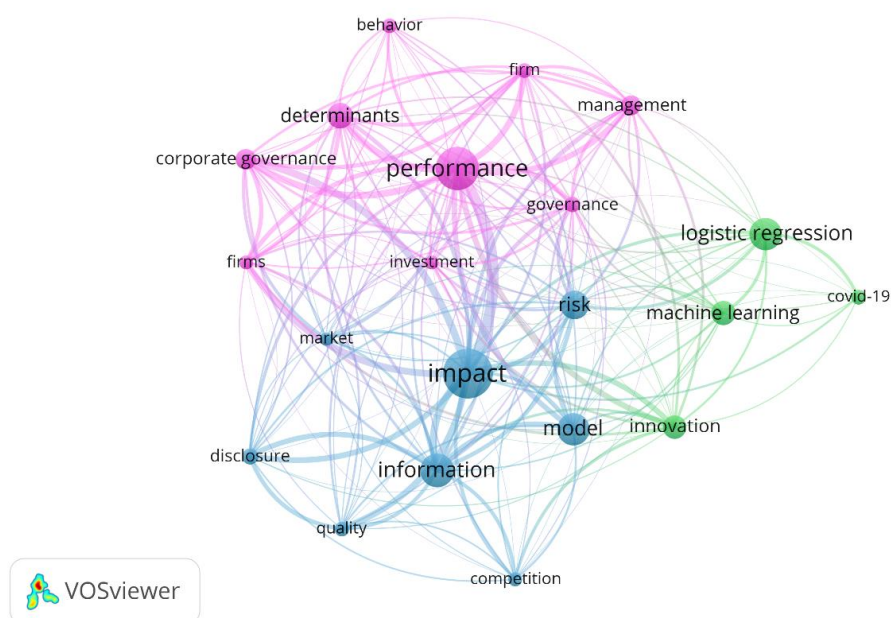


Figure 2 Bibliometric map of occurrence of keywords

Source: own processing in VOSviewer program

The classification of 21 keywords was carried out as follows:

- pink cluster (9 words) – behaviour, corporate governance, determinants, firm(s), governance, investment, management, performance,
- blue cluster (8 words) – competition, disclosure, impact, information, market, model, quality, risk,
- green cluster (4 words) – covid-19, innovation, logistic regression, machine learning.

Figure 3 detects the most discussed keywords from the underlying articles, specifically using Density Visualization. The greater the reach of the keyword, the larger the content of the coloured area around the specific word. We can see from the picture that the most discussed keywords include impact, performance, and information.

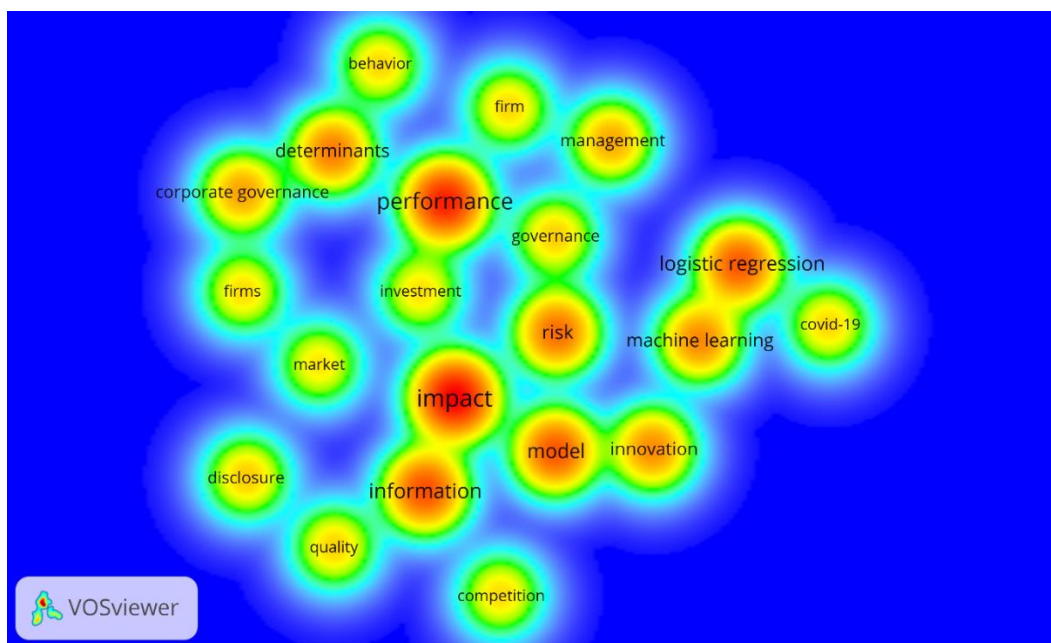


Figure 3 Bibliometric map of the most discussed keywords

Source: own processing in VOSviewer program

Methodology

Research Aim and Methods

The paper aims to propose a scoring model for non-financial corporations in the electrotechnical industry and to estimate the probability of bankruptcy for enterprises in the electrotechnical industry of the Slovak Republic.

Logistic regression (LR) is similar to linear regression, but unlike a continuous output variable, logit has a binary dependent variable. The model uses the probability density function in the large data to classify the explanatory variables and transform the numerical value into a probability distributed in the range 0-1. This simple model has flexible characteristics and is easy to understand, which is the reason for its frequent use in bankruptcy prediction. However, it has several strict assumptions (Chen et al., 2021). Unlike MDA, it does not require a normal distribution.

The conditional probability of the occurrence of the desired event under the condition of occurrence of the vector of independent variables x can be written as $p=P(Y=1|X)$, where Y is a binary variable that takes on two values. The logistic function expressing the relationship between the probability and the vector of explanatory variables has a nonlinear character and thus has the form of an exponential function:

$$p = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}} = \frac{e^z}{1 + e^z} = \frac{1}{1 + e^{-z}} \quad (1)$$

Using nonlinear maximum likelihood estimation in logistic regression, parameter estimates of the logit model were obtained according to (2). In order to use regression, the dependent variable is transformed to a continuous value by calculating the log of the odds (values from the interval $(-\infty; \infty)$), with odds and probability expressing the same information in a different form.

Through the logit transformation, we get a linear one from a nonlinear dependence, the relationship between the logarithm of the chances and the vector of explanatory variables takes on a linear character, and the equation of the logarithmic model has the form according to (2).

$$\log it(p) = \ln\left(\frac{p}{1-p}\right) = \ln\left[e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}\right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \quad (2)$$

Coefficients are estimated using the max-likelihood method. LR is suitable for predicting bankruptcy because its output is a value of 0-1. The cut-off point must ensure the most optimal distribution. The most commonly used split value is 0.5.

When using logistic regression, there is no equivalent statistic as for linear models, and pseudo- R^2 statistics are used. The Cox-Snell R^2 indicator is an alternative expression of the R^2 fit measure for linear models, which represents the proportion of variance explained by the model. It compares the model's credibility with a model without the use of regressors, i.e. with only an absolute term. It can be expressed as:

$$Cox \& Snell = 1 - \left(\frac{L_0}{L_m}\right)^{\frac{2}{n}} \quad (3)$$

L_0 is the likelihood of the model without regressors (use only with a constant), L_m is the maximum likelihood of the model with the use of regressors. A higher value indicates a better explanatory power of a specific model than a model without the use of regressors. The specific model fits the data better than the null model. The limit of the index is one minus the probability multiplied by $2/n$, which, under ideal conditions, reaches a maximum of 0.75. This bound is modified by the Nagelkerke correction, which is bounded to 1. Values approaching unity indicate that the specific model outperforms the model without regressors. This index simply normalizes Cox-Snell R^2 to the interval $(0,1)$:

$$Nagelkerke = \frac{CoxSnell}{(1 - L_0)^{\frac{2}{n}}} \quad (4)$$

Tjur, unlike the other indices, is not relative to the model without regressors. Index values close to one indicate a clear separation of the prediction of bankrupt and non-bankrupt samples. The calculation is made up of the absolute value of the difference of the mean average forecast of the individual models.

$$T_{jur} = |(\bar{L}_0 - \bar{L}_1)| \quad (5)$$

The basic criterion for assessing the classification model is its accuracy. It expresses the part of the prediction that was made correctly. The advantage is simple implementation and interpretability. The disadvantage is small robustness in case of an imbalance of data classes. In binary classification, it can be mathematically expressed as the ratio of correct estimates to the number of all samples. The ratio of positive prediction to positive samples expresses the sensitivity. The opposite is specificity, expressing the ratio of negative predictions to negative samples. Precision expresses the ratio of true positives to all positives.

The ROC curve is used to measure the goodness of fit to evaluate the LR model with a binary classifier. The curve is constructed based on the true positive rate on the vertical axis and the false positive rate on the horizontal axis for the various cut-off points of the model. The true positive rate is the rate of events that are predicted correctly and is usually referred to as sensitivity. The false positive rate is the rate of non-positive events, usually referred to as specificity. The AUC is the area under the ROC curve, which summarises the model's predictive power. The goal is to achieve the value of this metric as high as possible, approaching 1. The higher the value, the better the performance of the model for correct classification. A value of 1 would mean that the model estimated all values correctly (achieving a full 100%), whereas a value of 0 would mean an absolute failure and the inability to estimate a single value correctly. It can be calculated using a non-parametric approach known as the trapezoidal rule. The curve delimits the region and divides it into several trapezoidal intervals by sensitivity and 1-specificity. The sum of the area of the intervals creates the area under the ROC curve. This index is scale-invariant because it does not measure the absolute values of the prediction but how well they are evaluated, which is its great advantage. Other advantages include threshold invariance, which measures the quality of predictions regardless of the classification threshold.

The F1-score is a metric of predictive performance. It is an expression of the harmonic mean of precision and sensitivity. It is suitable for a higher imbalance of classification classes. The interpretation is relatively simple and reliable.

Modelling was done using the JASP program.

Research Sample

The research sample consists of 1,241 companies operating in the electrotechnical industry of the Slovak Republic, according to SK NACE 26, 27 in the year 2020. Financial data were sourced from The Register of Financial Statements of the Slovak Republic. We conducted outlier detection using the interquartile range method, where values outside the interval calculated as three times the interquartile range were flagged as outliers. After removing inconsistent samples and outliers, the research sample consists of 706 enterprises (667 healthy enterprises and 39 bankrupt enterprises). As part of the bankruptcy assessment in the analysed period, the ratio of equity to liabilities is set at 8%. Enterprises where the ratio of equity to liabilities is less than the defined ratio were considered bankrupt. The research sample was randomly split into two parts for training and testing, maintaining a ratio of 70:30. Financial indicators that were input to the analysis:

- x_1 - Total Indebtedness (TI) = Total Debt / Total Assets
- x_2 - Financial Leverage (FL) = Assets / Equity
- x_3 - Equity ratio (ER) = Equity / Assets
- x_4 - Short-term Indebtedness (STI) = Current Liabilities / Assets
- x_5 - Return on Sales (ROS) = EBITDA / Sales
- x_6 - Return on Equity (ROE) = Earnings after taxes (EAT) / Equity
- x_7 - Return on Assets (ROA) = Earnings after taxes (EAT) / Total Assets
- x_8 - Share of Value Added in Sales (SVA / S)
- x_9 - Turnover of Assets (TA) = Sales / Assets
- x_{10} - Net Working Capital to Assets ratio (NWC / A)
- x_{11} - Current Liquidity (L_2) = (Current Assets - Inventory) / Current Liabilities
- x_{12} - Cash to Assets ratio (C/A)

Results

To create prediction models for the electrotechnical industry, ratio indicators were selected from the group of liquidity ($L2$, C/A), indebtedness (TI , FL , ER , STI), activity (TA), profitability (ROE , ROA , ROS) and others (SVA/S , NWC/A), which, according to the analysed literature, significantly contribute to the estimation of the model. According to the literature, these 12 indicators show a high degree of causality to the explained variable (bankruptcy). Descriptive statistics of the data are presented in Table 1.

Table 1. Descriptive statistics

	SVA/S	TI	ER	STI	FL	$L2$	C/A	ROE	ROA (EAT)	TA	NWC/A
Mean	0.3229	0.4657	0.5343	0.3372	2.2018	3.5164	0.3695	0.172	0.0885	1.618	0.4292
Med.	0.3004	0.4453	0.5547	0.2721	1.7324	2.0082	0.291	0.1327	0.0555	1.3699	0.4683
1Q	0.1612	0.2216	0.3304	0.1424	1.2577	1.2342	0.077	0.0109	0.0041	0.809	0.219
3Q	0.4649	0.6696	0.7784	0.4888	2.7715	4.4268	0.6309	0.3465	0.1651	2.1216	0.711
Var.	0.0693	0.0983	0.0983	0.0709	2.5447	13.6103	0.1086	0.1023	0.0285	1.3912	0.1309
Stand. dev.	0.2633	0.3135	0.3135	0.2663	1.5952	3.6892	0.3296	0.3198	0.1688	1.1795	0.3618
Kurto.	1.665	4.9559	4.9559	5.1871	2.5782	2.9997	-0.5838	1.8613	1.3992	3.1227	1.5744
Skew.	-0.0296	1.1468	-1.1468	1.2342	0.6307	1.8462	0.6225	-0.1168	0.3919	1.535	-0.6585
Min	-0.9176	-1.089	-1.4097	-1.1142	-3.8027	-4.7192	-0.3787	-1.0982	-0.4655	-0.6939	-1.0262
Max	1.0512	2.4097	2.089	1.8945	7.6719	17.9996	1.7908	1.3081	0.582	6.8881	2.1142

Source: own processing

Subsequently, the file was divided into two parts. The first part was used to create the model, and the second was used to validate it. The chosen ratio of 70:30 means that 70% (493) of the samples are involved in creating the model and 30% (213) in the validation.

The null model contained all the selected indicators, and using the stepwise method, those that were strongly correlated were gradually discarded. Covariates, in this case, are continuous variables that influence the dependent variable without experimental manipulation. The Wald statistic has an asymptotically χ^2 distribution with one degree of freedom under the null hypothesis. The test compares the original model with a sub-model without the given regression coefficient. The parameters in the model reached the significance of the Wald statistic. The probability of a company's bankruptcy is expressed by a model that consists of four predictors ($EBITDA/T$, $L2$, ROA , NWC/A) and an absolute term (Table 2).

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right) = -0,698 - 2,103 \cdot EBITDA/T - 0,908 \cdot L_2 - 2,592 \cdot ROA - 1,912 \cdot NWC/A$$

Table 2. Model for electrotechnical industry

						Wald Test			95% Confidence interval	
	Estimate	Stand. dev.	Standardised dev.	Odds ratio	z	Wald Statistics	df	p	Lower limit	Upper limit
Constant	-0.698	0.188	-3.842	0.498	-3.716	13.807	1	<0.001	-1.066	-0.330
EBITDA/T	-2.103	1.020	-0.357	0.122	-2.062	4.253	1	0.039	-4.102	-0.104
L2	-0.908	0.194	-2.722	0.403	-4.691	22.006	1	<0.001	-1.287	-0.529
ROA (EAT)	-2.592	1.236	-0.403	0.075	-2.098	4.400	1	0.036	-5.014	-0.170
NWC/A	-1.912	0.340	-0.808	0.148	-5.620	31.589	1	<0.001	-2.579	-1.246

Source: own processing

A condition for logistic regression is that the samples are uncorrelated, so its modelling includes multicollinearity diagnosis. Multicollinearity diagnostics are calculated using VIF. For all financial indicators, the VIF was less than 5. All values meet the non-collinearity criteria (Table 3).

Table 3. Diagnosis of multicollinearity

Financial indicator	Tolerance	VIF
EBITDA/T	0.658	1.521
L2	0.948	1.054
ROA (EAT)	0.661	1.513
NWC/A	0.907	1.103

Source: own processing

The cut-off value is set to 0.5. Model quality is determined using *AIC* and *BIC*, chi-square. The R^2 value is a proportional expression of the total variance explained by the regression model. In this case, the chi-square alone is not a reliable indicator, so additional tests are also calculated - three pseudo-squares R^2 . The value of the Cox-Snell, Nagelkerke statistics, and Tjur test were calculated in the model (Table 4).

Table 4. Statistical validation of a model

Model	Deviation	AIC	BIC	df	X^2	p	McFadden R^2	Nagelkerke R^2	Tjur R^2	Cox & Snell R^2
H ₀	574.771	576.771	581.454	798						
H ₁	398.879	408.879	432.296	794	175.891	<0.001	0.306	0.385	0.289	0.198

Source: own processing

The odds ratio expresses the increase in the odds ratio of bankruptcy when the predictor value is increased by 1. In the bankruptcy model for the electrotechnical industry, the estimated odds ratios showed that the chances of bankruptcy significantly reduce the financial indicators *EBITDA/T*, *ROA*, *L2*, *NWC/A*. When these indicators increase, the company's probability (or chance) of bankruptcy decreases. The return on sales, when it increases by one unit at the values of other fixed predictors, the chance of bankruptcy decreases by 8.19 times. Current liquidity will reduce bankruptcy by 2.48 times, and the share of net working capital in assets will reduce the chance of bankruptcy by 6.75 times.

By modelling a binary variable ($Y=1$, i.e. bankruptcy yes) depending on four predictors for the electrotechnical industry of Slovakia, the proposed logistic model was statistically significant as a whole. The overall success rate of the model for companies in the electrotechnical industry reached 91% (Table 5).

Table 5. Classification table for a model

Real	Predicted		% accuracy
	0	1	
0	700	6	99.150
1	64	29	31.183
Overall accuracy			91.239

Source: own processing

For comparison with other models, a more objective comparison is made using more advanced AUC and F-score metrics (Table 6). Figure 4 shows the ROC curve for the model. The ROC curve for the model defines an area under the curve equal to 0.865.

Table 6. AUC and F-score

	Value
Accuracy	0.912
AUC	0.865
Sensitivity	0.312
Specificity	0.992
Precision	0.829
F-score	0.453

Source: own processing

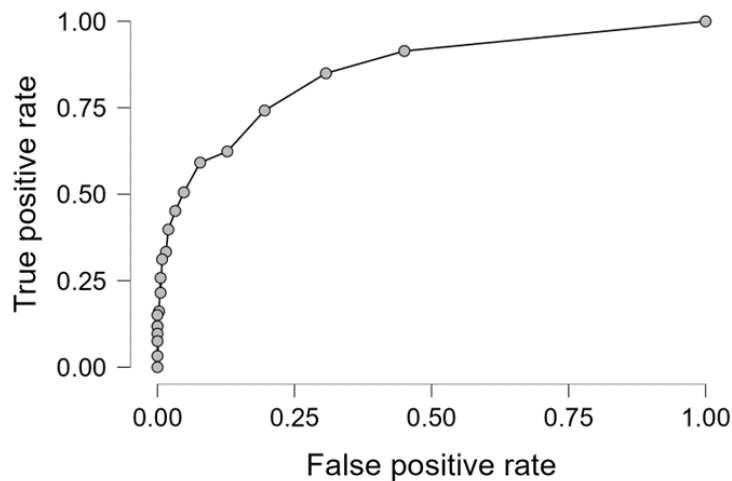


Figure 4 ROC curve

Source: own processing

We can compare our model with several existing logistic regression models. In our proposed logistic model, the liquidity indicators were represented by current liquidity (Mihalovic, 2016; Nyitrou & Virag, 2019; Rahman et al., 2021) and the share of net working capital in assets (Wrzosek & Ziemba, 2009; Jabeur, 2017; Valášková et al., 2018; Becerra-Vicario et al., 2020; Lohman et al., 2022). Profitability indicators were represented in our model by the return on sales indicator (Wrzosek & Ziemba, 2009; Jakubik & Teply, 2011; Harumova & Janisova, 2014; Lee & Su, 2015; Jabeur, 2017; Ptak-Chmielewska, 2019; Nyitrou & Virag, 2019) and return on assets (Režňáková et al., 2014; Lee & Su, 2015; Du Jardin, 2018; Ptak-Chmielewska, 2019; Becerra-Vicario et al., 2020; Korol, 2020; Yousaf & Bris, 2021).

Conclusion

Due to the impact of globalisation and worldwide problems, the need to monitor the business environment is inevitable. According to Samarin et al. (2022), bankruptcy is an important part of the market system, which aims to protect socio-economic processes from inefficient activities of such an

entity. As a result, the entity is removed from the market, redistributing resources from inefficient owners to more efficient ones. Similarly, according to Kitowski et al. (2022), from a theoretical point of view, bankruptcy is part of the market's self-regulating mechanism and can be considered a condition for its development. According to Tsai and Jhen (2008), bankruptcy prediction has long been considered a critical topic and studied in financial literature.

We aimed to propose a scoring model for non-financial corporations in the electrotechnical industry and to estimate the probability of bankruptcy for enterprises in the electrotechnical industry of the Slovak Republic. The research sample consisted of 1,241 companies operating in the electrotechnical industry of the Slovak Republic, according to SK NACE 26, 27 in the year 2020. We used the logistic regression and designed a logistic model. In the bankruptcy model for the electrotechnical industry, the estimated odds ratios showed that the chances of bankruptcy significantly reduce the financial indicators *EBITDA/T*, *ROA*, *L2*, *NWC/A*. When these indicators increase, the company's probability (or chance) of bankruptcy decreases. The return of sales, when it increases by one unit at the values of other fixed predictors, the chance of bankruptcy decreases by 8.19 times. Current liquidity will reduce bankruptcy by 2.48 times, and the share of net working capital in assets will reduce the chance of bankruptcy by 6.75 times.

This paper has several limitations because we analysed it in only one year. Therefore, repeating the analysis for a different year would be interesting. In further analysis, we could use the regional segmentation of companies and other qualitative data. We could also consider the size of firms.

It is important for corporations to identify and prevent instability in time. For this reason, it is necessary to evaluate the company's financial health using appropriate models. To predict the future development of the financial situation, expanding the spectrum of mathematical and statistical methods is necessary.

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