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 Tomas Bata University in Zlín  
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**Conference Proceedings**

**DOKBAT**

**17th Annual International Bata Conference  
for Ph.D. Students and Young Researchers**



International Bata Conference

**Tomas Bata University in Zlín  
Faculty of Management and Economics  
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# HOW GREEN HUMAN RESOURCE MANAGEMENT DRIVES CORPORATE SOCIAL RESPONSIBILITY: A LITERATURE REVIEW

*Zuhair Abbas, Roman Zámečník, Ghulam Kalsoom, Muhammad Shoaib,  
Munir Hussain, Mohsin Javed*

## **Abstract**

This green human resource management (GHRM) and corporate social responsibility (CSR) remained under-researched in the management field. In this way, this study attempts to bridge the research gap by conducted a literature review on green human resource management (GHRM) and corporate social responsibility (CSR). Methodologically, this study conducted a literature review to generate an interesting knowledge. This study considered and selected only relevant 9 peer-reviewed articles published during the period from 2014 to 2021 from Web of Science and Scopus databases on GHRM practices and CSR. This study employed Atlas.ti 9 qualitative data analysis software for the analysis of published articles. This review developed a new framework to get better understanding of GHRM and CSR phenomenon after systematically analysis of 9 studies on Atlas.ti software. This review revealed GHRM enables socially responsible behaviour of employees via top management commitment and bring employee volunteering activities at the workplace. Importantly, this review also found employee green behavior and socially responsible HRM is main drivers of business competitiveness and corporate reputation. This study suggested managers, policymaker and leaders to get better understanding by adopting GHRM practices and promote social responsibility initiatives globally and locally.

*Keywords: Green Human Resource Management, Corporate Social Responsibility, Integrative Literature Review*

## **1 INTRODUCTION**

Over the years, the association between corporate social responsibility (CSR) and green human resource management (GHRM) has received a lot of attention from both the practitioner and scholars (Carroll, 1999; Matten & Moon, 2008; Jabbour and Santos 2008; Carroll & Shabana, 2010; Renwick et al., 2013; Yong et al., 2019). GHRM originated as a concept due to the organization's motivation to integrate an aspect of environmental responsibility and corporate social responsibility into their decision-making and internal activities (Marcus & Fremeth, 2009; Howard-Grenville et al., 2014). Moreover, the definition of Green HRM as a phenomenon to help the organizations as to understand the association which exists within the organizational activities that influence the implementation, evolution, design and natural environment of the HRM systems (Jackson et al., 2014). CSR was defined as the legal, economic, discretionary and ethical expectations from the organizations that the society at a certain period (Carroll, 1979).

Research of the present era have demonstrated increased amount of attention to corporate social responsibility and green HRM practices (Al Kerdawy, 2019; Freitas et al., 2020). Subsequently, many scholars working in the field of human resources have made GHRM a research trend in the current era as the practices of green human resource management has the capability to contribute towards and help the organizations achieve their sustainable development goals (Pham et al., 2019). Due to this very reason, GHRM's primary objective is to support

organizations to become compatible and innovative with their sustainable goals (Yong and Mohd-Yusoff, 2016). In this disposition, some fundamental inputs are considered by the HRM practices regarding the adoption and integration of Corporate Social Responsibility practices in organizations. Organizations have diverted the path of HRM practices towards solving the environmental problems; however, some attention been provided to the individual procedure by which the willingness of employees to embrace the green behaviour is triggered by HRM practices (Paillé et al., 2014).

While practitioners and in academia, CSR research is mostly based on the firm level or ‘macro’ approach, there are a number of emerging researches which are based on the role of employees or individuals towards achieving the organization’s sustainable goals. Rodell and Lynch in their research discussed regarding employee’s volunteer acts and whether the organizations encourage or stigmatize such acts. Sonenshein et al., (2014) highlighted in their research discussed the struggle of individuals regarding their support for environmental issues when employers lay a doubt whether these efforts will lead to positive performance results. Subsequently, there is very less information on the green behaviour engagement of employees towards environmental sustainability.

Moreover, the management literature considers the concept of CSR as a an imperative; however, the translation of CSR into actual managerial practices is still challenging for organizations in both under-developed and developing countries (Wang et al., 2015; Jamali et al., 2015). A number of initiatives were raised in the European Union at the end of 20th century with an objective to integrate the extension and practices of CSR as business standards to enable the organizations contribute towards sustainable development. However, it also poses challenge for example; the Slovak companies work with several aspects, which limit the vision of European Union in the area of corporate social responsibility (Antošová and Csikósová, 2015). Subsequently, it was studied that the CSR tool can be used as an effective management technique by organizations to benefit the whole society.

This study attempts to addresses a research gap in several ways. Recently, prior study has called for further research on GHRM and CSR to know the better understanding of responsible businesses for the betterment of employees and society (Mousa and Othman, 2020). More specifically, previous research was silent on emerging issue of environmental and social performance such as GHRM and CSR. In doing so, this study responds to abovementioned call to conduct literature review. This study provides several theoretical contributions for the academic discourse. Firstly, this study attempts to address research gap by examining GHRM and CSR literature review. Secondly, this contributes to the body of knowledge on GHRM and CSR. To date, research on GHRM and CSR are largely separated. In doing so, this review responds to contributes in the existing literature and thus paves the way forward for the scholars in the field of human resource management.

This study has four main sections. The first section is theoretical background, which discusses the background literature on GHRM and CSR. The second area is methodology, which will, discusses the methods used to achieve the results. The third area is results and discussion and the fourth area are conclusion and limitations.

## **2 THEORETICAL BACKGROUND**

### **2.1 Green Human Resource Management and Corporate Social Responsibility**

The concept of green human resource management has been invoked by the regulations and increasing awareness about environmental sustainability, in search for effective practices related to environmental management within organisations (Ren et al., 2017). Different studies

have explored the significance of employees with respect to CSR practices and suggested that the main stakeholders of CSR are the employees of the organisation (Wood & Jones, 1995) and they have greater responsibility of execution of the CSR initiatives as well as bearing most of the related concerns (Aguinis & Glavas, 2012). More significantly, Jamali, El Dirani, & Harwood emphasised that one of the underlying mandates of CSR policies is that the functional departments within an organization must undertake or follow the green initiatives (2015), and without active human participation, it is difficult of the organizations to image the observance of CSR activities. In light of this, several studies have surfaced the interpretation of CSR activities as responsible human resource management practices (McCabe, 2000) and suggest that CSR can aid in achieving responsible HRM. CSR has paved the way for the initiatives of GHRM in a number of organisations (Amrutha & Geetha, 2020).

More importantly, some of the previous studies have also highlighted the shortage of environmental orientation within the human resources and demonstrated that this acts as a major barrier in the effective implementation of corporate social responsibility (Yeh et al., 2014; Odriozola et al., 2015). Moreover, Pizone et al., (2016) have explained in their study that GHRM practices are advantageous for the organizations if human resources perform voluntary behaviours at collective level in order to fulfil the CSR strategies. Nevertheless, organizations still have to face numerous challenges regarding the embedding and implementation of CSR activities within organisations' everyday procedures. One of such challenges is to aware employees regarding the CSR (Bartlett, 2009).

Below defined are the two research questions this study aims to answer:

- What is the relationship between GHRM and CSR?
- What is the role of new framework for the body of knowledge on GHRM and CSR as well as its practical importance for the policymakers and managers?

### **3 METHODOLOGY**

This study employed a literature review method that analyses, summarize, and draw inferences (Tranfield et al., 2003). In order to synthesize the emerging research areas at the association of GHRM and CSR, the literature review methodology seemed appropriate as this review method enables the researchers to generate novel perspectives, frameworks, and knowledge on emerging and new topics (Torraco, 2016). Nine (9) studies have been considered for review under the literature review which was published between the period of 2014 and 2021. The studies were extracted from Web of Science and SCOPUS databases. This study analyzed data through using Atlas.ti Qualitative data analysis software.

#### **3.1 Search Strategy**

Broad search terms i.e., “green human resource management (GHRM), “corporate social responsibility (CSR)” were used to retrieve research articles from 2 databases namely, Web of Science and Scopus Various keywords were used to find relevant articles from the database. Our search considered was limited to peer-reviewed journals.

### **4 RESULTS**

This research found 9 studies which are relevant to the GHRM and CSR aspects as mentioned below Table 1.

Tab.1 - Summary of GHRM and CSR Studies. Source: own research

S.No	Author	Method	Main Findings
1	Úbeda-García et al., 2021	Quantitative	The findings of this study demonstrate a constructive link between the organisation's performance (Hotel Industry) and CSR.
2	De Souza Freitas et al., 2020	Quantitative	The findings of this study demonstrate that CSR practices are positively influenced by the GHRM practices, which also influences customer relationship management positively.
3	Cheema & Javed, 2017	Quantitative	The findings of this study demonstrate that an important role is being played the senior management while being obliged to ensure and support employees who actively participate in meeting ecological, economic, and collective benefits from the green environment.
4	Al Kerday, 2019	Quantitative	The findings of this study demonstrate that CSEV and GHRM play a substantial role in the adoption of CSR activities within organizations.
5	De Souza Freitas et al., 2020	Quantitative	The study findings demonstrate that the practices of CSR are assertively influenced due to the GHRM practices. The study also explored that the practices including performance evaluation, teamwork and recruitment & selection, are as important as the others for better CSR performance are.
6	Yusliza et al., 2019	Quantitative	The findings of this study demonstrate the progressive link between the CSR and top management commitment along with the dimensions of GHRM.
7	Jie et al., 2020	Quantitative	The findings of this study demonstrate the positive performance and behaviour organization's sustainability due to three-way collaborative effects of responsible governance on task performance and employee green behaviour, Green HRM, and the CSR.
8	Chaug & Huang, 2018	Quantitative	The study findings highlight that Environmental CSR pose substantial progressive influences on the green IT structural capital, green IT relational capital, and green IT human capital. Moreover, it was also studied that, green IT relational capital and green IT structural capital pose positive effects on the competitiveness of business and environmental performance.
9	Berber et al., 2014	Quantitative	The findings of this study demonstrate a positive association between the existence of the statements of CSR and the level of environmental matters of different organisations in the Serbia and CEE region. Organisations having the written CSR statements have a higher level of environmental matters than the ones, which do not have these statements.

The below Table.2 demonstrates that GHRM and CSR searched 54 studies in the Web of Science (WoS) and 51 studies in SCOPUS database. While, GHRM independently studies were found 171 in WoS and 214 in SCOPUS respectively. On the other hand, CSR studies were found 13031 in WoS and 13975 in SCOPUS.

Tab. 2 - Results of own literature review in the field. Source: own research

Keywords	SCOPUS	WoS
Green HRM and Corporate social responsibility	51	54
Green HRM	214	171
Corporate Social Responsibility	13975	13031

The below trend analysis (see Figure.1) shows that most of studies (11) conducted in developed country context (United States U.S). On the other hand, 6 studies were conducted in developing country context (Pakistan). Subsequently, 3 studies were conducted in Czech Republic. Finally, 8 studies were conducted in the Peoples Republic China.

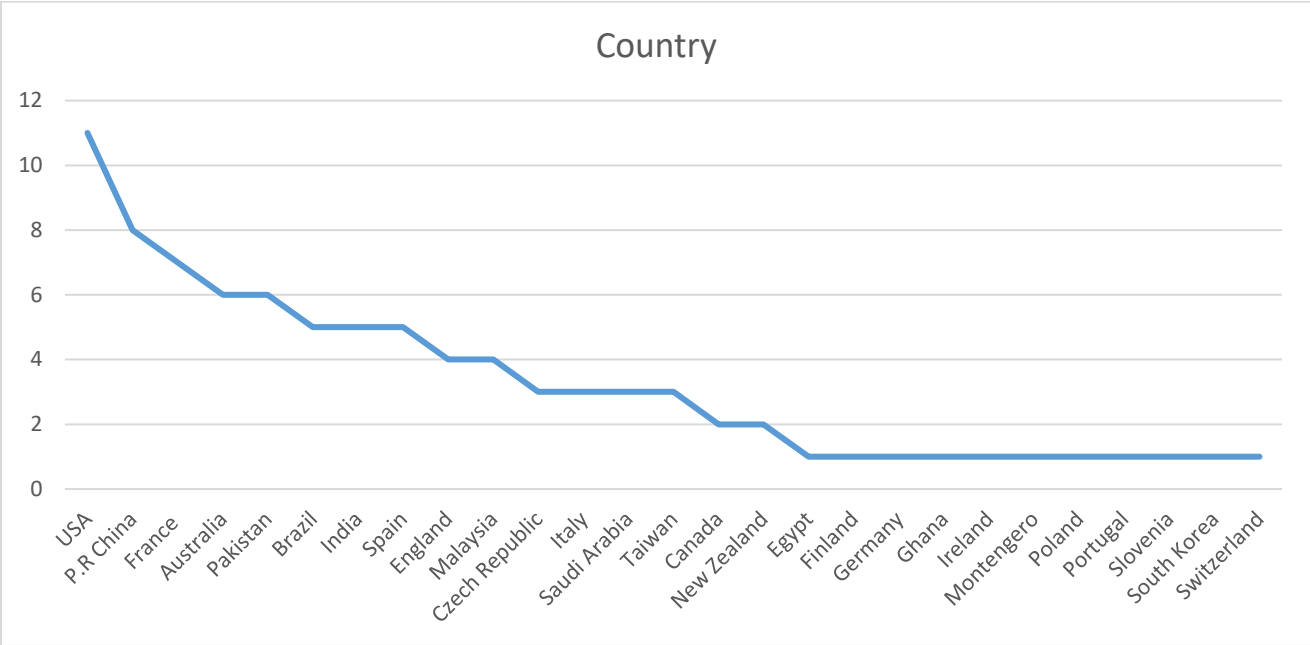


Fig. 2 - Trend Analysis Number of Articles Published in Country-Wise on GHRM and CSR. Source: Own research

Tab. 3 - Top-Cited Scholars in field of CSR. Source: own research

Author	Journal	Citation
McWilliams & Siegel	Academy of Management Review	2706
Sen & Bhattacharya	Journal of Marketing Research	1938
John L Campbell	Academy of Management Review	1750
Matten & Moon	Academy of Management Review	1739

Tab. 4 - Top-Cited Scholars in field of GHRM. Source: own research

Author	Journal	Citation
Douglas W.S Renwick	International Journal of Management Reviews	341
Pascal Paille	Journal of Business Ethics	182
Chiappetta Jabbour Charbel Jose	Journal of Cleaner Production	162
Jenny Dumont	Human Resource Management	114

‘The world cloud shows (see Figure.3) an interesting aspect studied in previous 9 studies. Our study found that ‘environmental’, ‘social’, ‘management’, ‘responsibility’, ‘performance’ and resource sustainable’ are mostly explored areas in the literature. Conversely, ‘sustainability’, stakeholder behavior’, and ethics are under-researched.



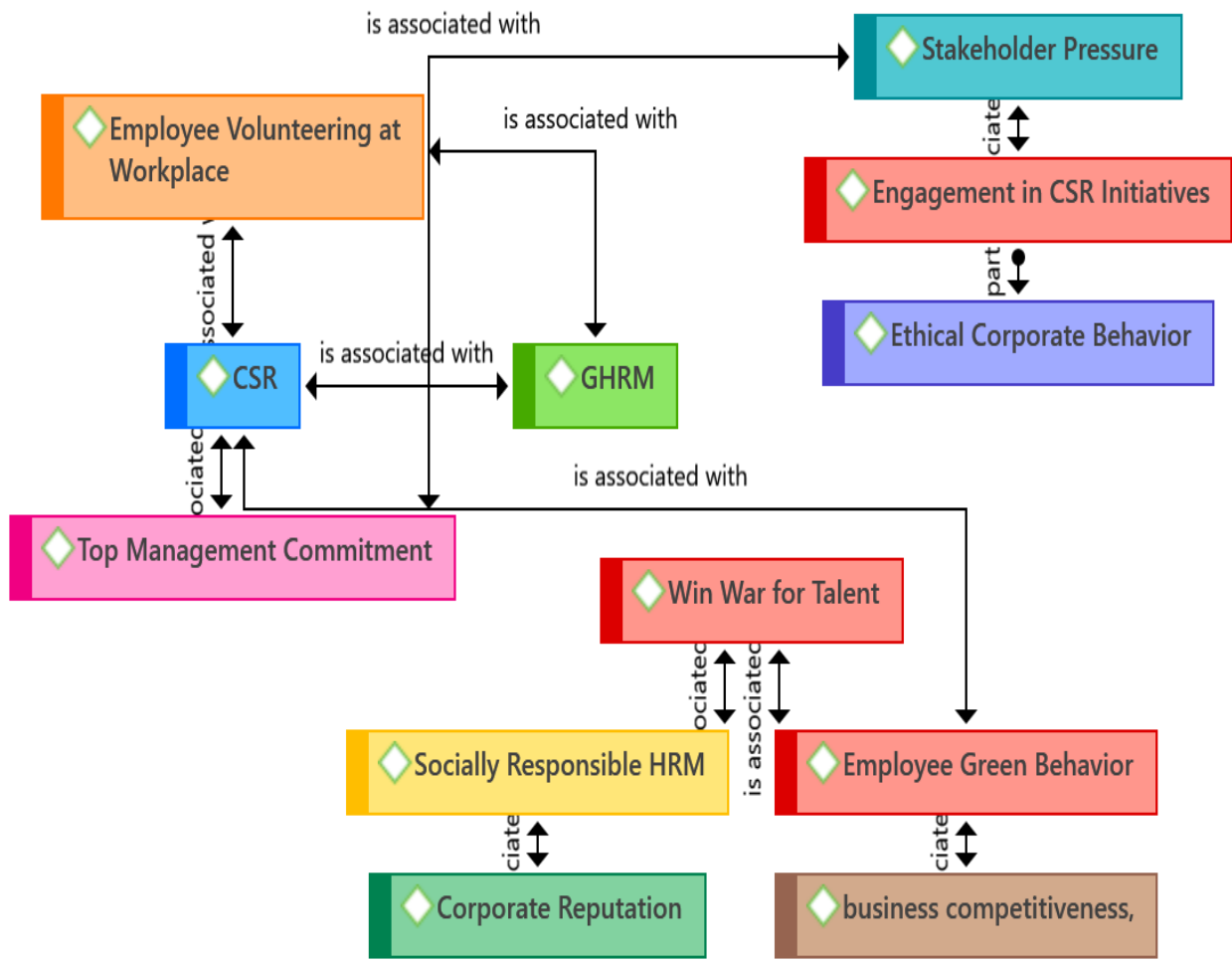


Fig. 4 - Framework of GHRM and CSR. Source: Atlas.ti 9 Version

This study developed an interesting new framework from published studies to contribute significantly towards body of knowledge and practice as well. Firstly, our study revealed that green HRM (GHRM) is positively related with corporate social responsibility (CSR). Importantly, our study found that green HRM practices promotes social responsibility initiatives at the workplace, it also pushes employees to play their role in achieving economic performance along with environmental and social performance. Also, this study demonstrated stakeholder pressure pushes top management commitment to implement CSR initiatives as employees can realize that corporate social responsibility also important as economic performance. Previous research also shows top management commitment is main driver of corporate social change activism at the workplace (den Hond & de Bakker, 2007).

Additionally, our study also found ethical corporate behaviour enables employee engagement in CSR activities. Additionally, regarding the welfare of the society, this study determined the importance of engagement for employees to welcome CSR initiatives and activism at their workplace. Subsequently, more and more organizations are getting involved in CSR, which has attracted calls from researchers to explore and determine the motivations and consequences of organizations that are engaged actively in CSR (Supanti et al., 2015).

Secondly, our study revealed that found employee green behaviour and socially responsible HRM promotes and supports business competitiveness and corporate reputation. This finding suggests to organizations that if they want to “win war for talent” in this competitive era, they must bring the culture of environmentally friendly and CSR activism and play their role in

socially responsible ways to achieve corporate reputation and competitiveness by taking care of employees as well as contributes positive image for the society.

Similarly, this study demonstrates that environmental sustainability in organizations can be promoted using a novel field i.e. employee green behaviour (EGB). One of the factors, which contribute to employee green behaviour as demonstrated in the study is a workplace specific form of pro-environmental behaviour. Moreover, EGB can be defined as a measurable individual behaviour, which in the work context, detracts or contributes towards environmental sustainability goals. In the 21st century, environmental sustainability has emerged as a significant aspect of corporate existence (Starik & Marcus, 2000). Finally, our study found employee volunteering at workplace positively related with GHRM and CSR. This finding is aligned with previous research (Ana and Arminda, 2013), they found that CSR and GHRM practices can be enhances by encouraging volunteering work to employees.

## **5 DISCUSSIONS AND CONCLUSIONS**

This study revealed that GHRM and CSR are important for the organizations to progress and bring stability not only focus on profit maximization but also environmental and social sustainability. Our study suggests that corporate responsibility as a pathway for corporate social responsibility activities in order to promote the wellbeing of underprivileged people, good and healthy workplace, and human rights. Similarly, operations of the organizations can be proactive and work in collaboration with multilateral and government institutions. Lastly, this study also explored that employee volunteering at workplace and socially responsible HRM has become a topic of interest of researchers in the present era, as it not only focuses on the economic aspect but also on social and environmental aspects of the business. Importantly, Gulzar et al., (2020) suggested that to achieve sustainability at workplace, organizations should consider employee wellbeing as an imperative. This nature of the literature review will help the researchers and become valuable in the scientific community (Van Kampen et al., 2012).

### **5.1 Theoretical Contribution**

This study provides theoretical contributions in several ways for the academic discourse on GHRM and CSR. Firstly, this study applied a literature review by developing new framework. Secondly, this study found important drivers which promotes and supports green HRM and corporate social responsibility. In this way, it is an original contribution to the body of knowledge. Thirdly, this study opens new avenues for the scholars to explore the employee green behavior, top management commitment via stakeholder pressure with engagement of CSR activism at the workplace.

### **5.2 Practical Implications**

The present model encourages top management and HR managers to bring the culture of sustainability and responsibility among employees as they become responsible employees to play their role in a better way. Organizations must consider the important role of employees in achievement of environmental and social performance.

### **5.3 Limitations and Future research agenda**

This study has numerous limitations. Firstly, this study reviewed only quantitative studies. Secondly, this study did not shed light on early access articles, proceeding papers, mix-method studies, book chapters, and review papers. Thirdly, this study only considered business and management field. For this reason, this study also opens new avenues for scholars to explore the employee green behavior and corporate social responsibility. In this vein, this study also



suggests to examine the employee green behavior with corporate sustainability by mediation mechanism of CSR engagement. Another essential suggestion is that to explore the antecedents of green HRM to get better understanding for the academic discourse. Subsequently, Future research may conduct further research on GHRM-CSR on addressing methodological gap by employing mix-methods study.

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## Contact information

### Zuhair Abbas

Department of Business Administration at Faculty of Management and Economics,  
Tomas Bata University in Zlín, Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: abbas@utb.cz  
ORCID: 0000-0003-2242-2848

**doc. Ing. Roman Zámečník, Ph.D.**

Department of Business Administration at Faculty of Management and Economics,  
Tomas Bata University in Zlín, Mostní 5139, 76001, Zlín, Czech Republic

E-mail: zamecnik@utb.cz

ORCID: 0000-0003-4564-2317

**Ghulam Kalsoom**

University of Sindh

Jamshoro, Pakistan

E-mail: ghulamkalsoom64@gmail.com

**Muhammad Shoaib**

Department of Business Administration at Faculty of Management and Economics,  
Tomas Bata University in Zlín, Mostní 5139, 76001, Zlín, Czech Republic

E-mail: Shoaib@utb.cz

ORCID: 0000-0003-0970-2343

**Dr. Munir Hussain**

Institute of Business Management, Karachi, Pakistan.

Email: munir.hussain@iobm.edu.pk, munir9876us@yahoo.com

**Dr. Mohsin Javed**

Department of Business Administration at Faculty of Management and Economics,  
Tomas Bata University in Zlín, Mostní 5139, 76001, Zlín, Czech Republic

E-mail: javed@utb.cz

ORCID: 0000-0002-3061-8210

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# KEY BARRIERS TO SMALL AND MEDIUM ENTERPRISES INNOVATION PERFORMANCE ACROSS EUROPE

*Michael Amponsah Odei, John Amoah, Petr Novak*

## **Abstract**

Innovation is worldwide considered as a key instrument for Small and medium enterprises (SMEs) competitiveness. Small firms stand the risk of losing customers when their products and processes do not embrace innovation which makes them uncompetitive. The adoption of information technology has ensured a dynamic and competitive economy across Europe. Most literature reviewed indicates that few empirical studies have been conducted by researchers on barriers to SME innovation performance across Europe. This article aims to identify innovation barriers that limit the innovation performance of small and medium enterprises (SME) across Europe. This study adopts document analysis and a qualitative approach in its methodology to fill the literature gap. Scientific articles in the Scopus, WoS, and Google scholar database was used in the document analysis using keywords concerning the topic. Results from most of the documents analyzed indicated that inadequate funds, inadequate qualified and skilled personnel, low adoption of technology, and keen competition among firms are some key factors hindering SME's innovation performance. The theoretical implication will provide insight into some main barriers to SMEs' innovation performance and its influence on the European economy. The results of the study may also be helpful for SME managers who are attempting to adopt innovation across the European region. This study is limited in the sense that no sample size was used. The sample covers the whole European region which cannot be used to generalized other continents.

*Keywords: Innovation, Performance, SMEs, Barriers*

## **1 INTRODUCTION**

Newly established small and medium enterprises have continuously been under the threat of major transformation from major competitors (Christensen, 2003). The main drivers of change for SME sectors have been attributed to globalization and digitalization. In recent times, SMEs have been facing competition on the market and thus there is a need for firms to embrace the necessity for innovation thus most of these firms have created new processes, procedures or they have well-established research departments (R &D) to explore new ideas and technologies. For instance, most SMEs involved in financial services have immensely improved on their products and services rendered to the general public through digitalization which has improved customer satisfaction and perceptions since the 1990s. More products and services have been made available online and offline as a result of innovation. Nevertheless, new players that mainly offer improved products and services online such as SMEs involved in the manufacturing of shoes have adopted new smart technologies. Smart shoes for instance have distinct features such as insoles that can act as Bluetooth-connected devices that can help track activities through a smartphone application which will allow customers to track their fitness performance (Prescouter, 2018). This current trend used by shoe manufacturers will generate greater output with the same set of input. The newer design of shoes is manufactured with this smart technology to meet customer needs, this will ensure customer satisfaction and enhances business profitability which is relevant for microeconomics. This technology is adopted by

Nike, Xiaomi, and Armour which are of course larger firms. Innovation takes full effect when a new technology is applied in the firm where it has been developed. The full benefit of innovation can be realized when it spreads across the economy and benefits firms at large. Europe has been the birthplace of innovation and there has been a continuous boost of innovative capacity in the European region (Fassio et al., 2019). Many researchers have asserted the barriers, challenges, and obstacles for effective innovation within newly established SME firms that have been reviewed in recent literature (Bhimani et al., 2019; Chege & Wang, 2020). However, the growing literature in the field of innovation barriers mostly focuses on the disruptive innovations within the public service sector (Albury, 2005). Less is known about the barriers that focus strongly on obstacles related to the product of SME firms and R&D in manufacturing firms. This is very relevant since companies are constantly challenged by new laws aimed at stabilizing the market and competitiveness. Besides, enabled by modern technologies and new entrants to the market to offer new and improved services and products. This compels SMEs to employ technology and offer new competitive services. Unlike other financial service sectors, most manufacturing SMEs do not have an R&D and are primarily focused on the improvement of products and services. This implies that SMEs involved in manufacturing need to inject more funds, create structures and build new R&D to enable successful innovation (Geerts et al., 2010). Consequently, successfully implementing changes will require subsystems and is connected with devastating organizational change effects (Tushman and Smith, 2002).

In this paper, I assessed some of the key barriers to the improvement of potentially disruptive and radical innovations within SMEs in the manufacturing sector. The main focus is on both internal and external barriers to innovation for us to have a clear firm dynamic. First, I assess some traditional obstacles to SME innovation based on reviewed literature. Second, I assess some external barriers through empirical studies conducted in recent literature.

## **2 LITERATURE REVIEW**

Recent societal and policy debate on SMEs innovation among manufacturing firms lacks empirical studies on both internal and external barriers to innovation. Most studies focus on consumer adoption barriers (Lee et al., 2003) or the cultural influence that resulted in barriers connected with innovation (Singer et al., 2008). Most of the literature focused on the impact of innovation on the market and customer's perception or the funding of innovation and its impact on the firm's growth. Hence, empirical assessment of both internal and external barriers experienced by SMEs firms to adopt and launch effective innovation is absent.

### **2.1 Types of Innovation**

The Organization for Economic Co-operation and Development (OECD) has grouped innovation into four types namely: process, product, marketing, and organizational innovation. For the sake of this research, the concentration will be on process and product innovation (OECD, 2010). The result of product innovation is the introduction of improved goods or services regarding special components and their importance. Product innovation is a result of consumer demand without also neglecting the supply factor because both factors are the main drivers of this type of innovation. Modern technology, consumer preference, and the short life cycle of the product have ensured keen competition among SMEs to innovate worldwide. The method of producing new products or services improves as a result of process innovation. The process used in creating the product can be new or improved upon the already existing product. According to Schumpeter (1940), the theory of creative destruction suggests that firms involved in innovative activities have a competitive edge to replace non-innovative firms. Innovation is key to economic growth and ensures the development of SMEs. Theoretically, SME innovation

is expected to boost firm economic performance. Nonetheless, empirical study results have always contradicted innovation studies. That is, several studies indicate that innovation does not spring better performance.

Many studies have looked at process innovation compared to product innovation. Hall et al. (2009) discovered that investment in R & D and firm size were the key determinants of product and process innovation for SMEs in Italy. Hall et al. (2009), also concluded on empirical evidence on the link between innovation and productivity.

Product innovation has been discovered to be more superior to process innovation according to many authors. Many authors assert that the introduction of a new product has a strong and positive impact on the income of SME employees and creates employment opportunities whilst process innovation's main goal is to reduce the cost of production. Foster et al. (2008) suggest that firm-specific demand varies in terms of technical efficiency, which is the dominant factor in determining whether a firm will survive and have a positive influence on measured productivity. Product innovation relates to firm-specific demand whilst process innovation affects technical efficiency. Mairesse and Robin (2012) indicated that product innovation seeks to be dominating factor of labor productivity whilst process innovation is statistically insignificant and economically irrelevant. Cassiman et al. (2010) discovered that product innovation affects productivity but not process innovation.

Studying innovation seeks to explain why some SMEs innovate rapidly than others by identifying various factors that help in their innovation. However, there have been major challenges identifying the successful determinants of a firm's innovation worldwide (De Brentani et al, 2010). Although there have been several issues connected with some of the factors contributing to the high performance of firms, many studies fail to provide a more integrated framework in the field of innovation. This is as a result of higher expectations on the part of SMEs to provide good satisfaction to customers and achieve better revenue for firms due to several actors like networking with an external institution which includes academic universities, companies, the general public in the area of operation coupled with organizational policies. Such forms of collaboration provide a clearer picture of SME's innovation activities. According to Cohen & Levinthal, (1990), a research model on innovation was proposed for the comprehensive framework during a constant review and analysis of various studies conducted on innovation. In general, the various factors can be classified as internal and external factors influencing SME's innovation performance. Among the internal factors are size & age of the enterprise, human resources & human resources practices, business networks, occupational health & safety precautions, product, process, organizational, marketing innovation, leadership and planning, family ownership, and intellectual property. Although most of the reviewed articles analyze the different aspects of an organization's internal and external factors to contribute to the performance of SMEs, other authors also consider macroeconomic factors to be critical to the general success of SMEs.

Many of these studies have developed different models to access firms' level of innovation performance with the structural equation model, multiple equations, and a decision-based model (Mohnen & Hall, (2013); Rekik & Bergeron, (2017); Voulgaris et al. (2000). Similar studies were conducted on societal & environmental responsibilities which increase business performance through "green practices" (Rekik & Bergeron, 2017).

All the literature reviewed factored SME's performance at the microeconomic level, but a detailed understanding could be explained by studying the firm's performance at the macroeconomic level. Studying at the macroeconomic level has more advantages since it will factor all the determinants of SME innovation into account. SMEs innovation performance can be taken in three dimensions:

the number of SMEs involved the number of employees working for the firms and the added value for firms. Osakwe et al., (2015) analyze the influence of macroeconomic indicators on SMEs growth in the Czech Republic and their results developed a concave relationship between growth and unemployment which was a positive relationship between economic growth and development of firms whiles finance use to support the SMEs sector had no significant influence.

## **2.2 Innovation Barriers**

Many firms have adopted diverse ways in other to facilitate innovation such as the stage-gate model proposed by Cooper and Edgett (2012). These authors grouped the innovation process into several stages which help firms to meet their innovation goals through new products and services with the help of modern technology with minimal errors. Nevertheless, SMEs such as those involved in manufacturing and service who failed to adopt modern technology such as the use of point of sale (POS) devices are considered not be innovative. Several obstacles tend to hamper the process innovation of non-innovative manufacturing and service providers (Galia and Legros, 2004). According to D'Este et al. (2012), several factors hinder innovation and tend to be different throughout the firm's innovation process.

To successfully implement and adopt innovation depends on both internal and external aspects of the firm. For instance, a company may explore and adopt new technologies through research and development which allows for new ideas that lead to product development. Both internal and external barriers to a firm's innovation performance can determine whether the firm will succeed or not. Identifying the barriers to innovation performance will help determine firms that are directly or indirectly influenced by modern technology (Piatier,1984). The most recent internal innovation barriers according to Tushman and Benner, (2015) are the firm's strategy, organizational architecture, leadership, how research is conducted, and incentives given to employees. Conversely, the most mentioned external barriers are the adoption of smart technology, keen competition on the market, and market dynamics (Alexiev et al., 2016)

According to Sandberg and Aarikka-Stenroos, (2014) innovation barriers are grouped into traditional internal barriers such as lack of competent employees, restrictive mindset, and organization not willing to change its structure whilst customer resistance, ecosystem dynamics, and technological troubles are all traditional external barriers.

The identification of obstacles to SME innovation can contribute massively to the innovative culture of SME firms which encourages new ideas. On a national level, it is very relevant to identify and remove some barriers to promote innovation based on competition and to avoid the probability of failing during innovation (Chaminade et al., 2009). Conversely, from an innovation management point of view, it is very vital to identify the barriers to SMEs innovation to promote economic pay-offs innovation-related efforts. (Dougherty, 1992)



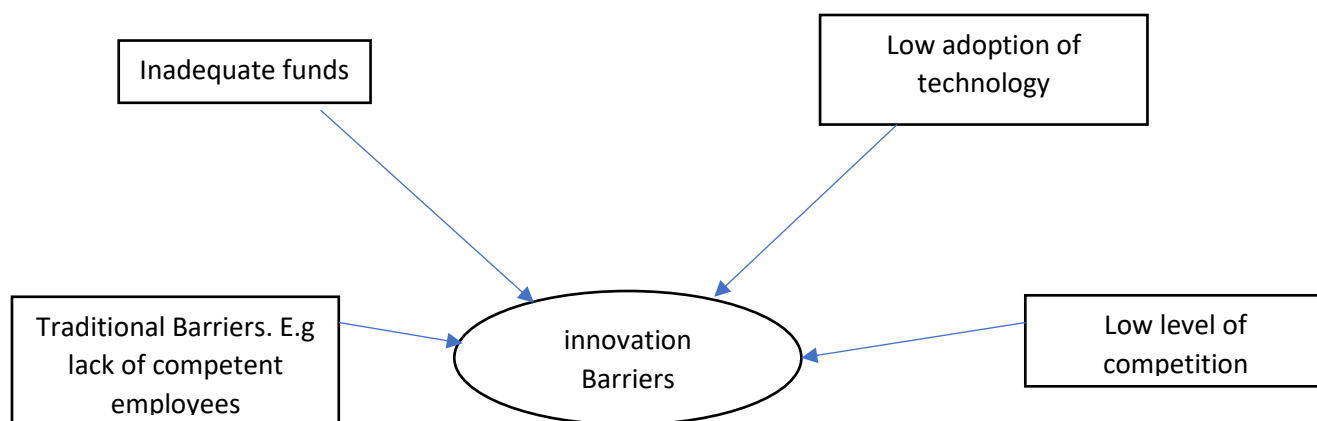


Fig. 1 – Conceptual Framework. Source: own research

### 3 METHODOLOGY

To execute the objective of this study, a qualitative method was adopted by the researchers. The main aim of this paper was achieved through the adoption of document analysis. Document analysis involves the use of printed and online materials for reviewing and evaluate needed documents to conclude (Bowen, 2009). Document analysis which is the scope of the study has advantages such as no interviews with individuals and easy access to many documents. Document analysis has been used recently by researchers and scholars like (Amoah, 2020; Amoah & Jibril, 2020). The main source of information for this paper relied on keywords search from the Scopus, WoS, and Google scholar databases. To achieve the objective of this paper, some articles between 1990 to 2020 connected to the topic were reviewed by Google scholar, WoS, and Scopus using the relevant keywords search associated with the topic such as barriers to SMEs innovation performance in Europe, obstacles to innovation, and hindrance to innovation outcomes. Out of the numerous literature downloaded from the specified databases, thirty-five of the articles were subsequently used to execute the aim of this study. All articles downloaded from the database were published in English.

Some relevant information was accessed from secondary sources as part of the methodology regarding the topic as well as some theories. Also, most literature showed a positive usage of document analysis to provide adequate information for this paper (Battaglia, et al., 2010). Authors are encouraged to review articles conducted by K Szabo et al., (2013).

#### **Limitation of the paper**

Most useful articles were not accessed in some institutional databases and thus were not included in this article. Also results from this paper cannot be generalized in another continent due to different economic conditions.

#### **Theory and practical implication**

Although Innovation in larger firms tend to be rapid than in smaller firms, SMEs are less bureaucratic and are more willing to take risk than larger firms. An attempt to promote innovation comes from the internal decisions of management. First, it contributes to the enrichment of understanding SMEs in Europe. Innovation contributes specific knowledge concerning the financing of SMEs in the selected EU countries. This study will pave way for a more academic and practical inquiry into SME development activities within firms. The research work intends to provide a model for theory and practice for managers of SMEs.

In terms of applied contribution to knowledge, it will help in economic growth by assisting governments and policymakers in establishing an environment that will contribute to

entrepreneurship and regional development. The outcome of the research is going to be used as a guideline to the government which will facilitate technology transfer and helps commercialize research activities. That is, it will give direction for further research as there is more room for improvement.

## **4 CONCLUSION**

From the articles reviewed, SMEs better engaged in technological innovation as this has been the main constraint to their innovation across all sectors. For SMEs firm innovation, governmental policies, and regulation have a positive and negative effect on firm performance. This will either promote or discourage policies by the government and will improve SME's innovation performance. The governmental policy has been a major factor restraining SME technological innovation. However, this is not an important factor for SME's innovation performance.

The flow of information in every organization is keen to overcome competitive restraining factors. However, inadequate market information is an obstacle to the SME industry to adopt technological innovation. SMEs need to collaborate with research and development firms to adopt new technologies and gain a competitive advantage because it will give new designs and help promote innovation of products and services. However, if those firms have adequate involvement in research and development, creating new ideas and adding values to the existing product will be easier. Therefore, inadequate research and development are one of the major problems facing the SME sector as this has contributed to inadequate information for consumers.

SMEs involved in innovation can have necessary resources and capabilities and thus need huge funds to own and manage existing resources. Without funds, SMEs are unable to adapt to technological innovation as a result of the high cost of innovation which has been a major setback for the sector. Finance is the main economic booster for businesses and thus firms without finances cannot adopt new technologies to innovate. This is why the inadequate fund is a significant barrier to the SME sector.

Organizational activities cannot be achieved without the existence of competent employees. However, SMEs have inadequate human resources to achieve its objective as required. For new technologies to be adopted, new competent and qualified resource personnel need to be employed. Therefore, inadequate skilled personnel is considered as the inhabiting factor for SME innovation performance.

### **Suggestion for further research**

It would be interesting to examine the barriers to SME innovation from both organizational or government perspectives to find out why, how and the best solution SME managers need to adapt to ensure innovation performance.

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## Contact information

### Michael Amponsah Odei

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: [Odei@utb.cz](mailto:Odei@utb.cz)  
ORCID: 0000-0001-9449-5750

### John Amoah

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: [amoah@utb.cz](mailto:amoah@utb.cz)  
ORCID: 0000-0002-3558-2077

### doc. Ing. Petr Novak

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: [pnovak@utb.cz](mailto:pnovak@utb.cz)  
ORCID: 0000-0003-4701-5755

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# THE MANAGEMENT OF GREEN TECHNOLOGY INNOVATION: A COMPARATIVE ANALYSIS OF THE GLOBAL WEST AND THE V4 ECONOMIES

*Arif Ibne Asad, Elona Çera, Drahomíra Pavelková, Jana Matošková*

## Abstract

Green innovation management has become an important component of today's world since adopting green technology implies ensuring the survival of the planet. This paper aims to majorly analyze a research gap for green innovation in V4 nations and give recommendations for improvements concerning these elements by comparing the performance of green innovation in the Global West (leading economies) and Eastern Europe (V4 nations), which includes a total of eight countries, and to determine the causes for some countries' underperformance. A case study has been designed through a secondary source, the Environmental Performance Index (EPI) with having two major indicators (environmental health and ecosystem vitality) based on 2020 data set. The leading economies consider high scores as well as progressive change in the wellbeing of the environment. On the other hand, the Czech Republic, Slovakia, Hungary, and Poland performed less effectively during the last decade. Besides, “the Environmental Health Performance” of EPI in V4 did not get sufficient well-being in general; however, “the Ecosystem Vitality” index is not worse for any country. Most of the countries achieved 100 scores in pollution emission. Overall, Denmark is remarkable for achieving success in climate change mitigation, reduction of pollutants, water resource preservation. Finally, the lessons from the leading countries are that V4 economies ought to emphasize on boost up the indicators of the “the Environmental Health Performance”.

**Keywords:** *Green Innovation, Global West Economies, V4 Economies, Environmental Performance Index*

## 1 INTRODUCTION

The significance of green innovation has been discussed for several years because going towards green technology means keeping sustenance of the planet. It encompasses all innovative activities contributing to the benchmark of the production process and, services that involve reducing deterioration impacts to the environment and optimize the use of natural resources at the same (Santamouris & Kolokotsa, 2015). There are several achievements on green innovation in the leading countries, such as Denmark, Luxemburg, Switzerland, and the United Kingdom. The accomplishments of the economies will be observed by 11 environmental health performance issues and compared with the performance of Visegrad Group (V4) countries likewise the Czech Republic, Slovakia, Hungary, and Poland. The investigation will be focused on why the V4 economies are lagging in protecting the environmental quality although these countries belong to Europe with approximately identical features of the top four leading countries while the four leading countries are from Global West and V4 economies are from Eastern Europe. The research work has been conducted by comparative analysis of secondary data with considering a process of content analysis on the environmental health performance of the two regions, such as Global West and Eastern Europe and find out the research gap on the backwardness in V4 economies.

(Atici, 2009) explained that the high per capita energy use caused environmental pollution indicating a tendency of environmentally unclean energy production and trade openness did not associate to emit pollution in that region. It requires green technology innovation to produce clean energy to achieve sustainable development. (Santamouris & Kolokotsa, 2015) study showed that a significant proportion of European people suffer from energy and environmental health problem during recent years due to a deterioration of climate. (Cooke, 2015) focused on the climate change challenges faced by Central and Eastern Europe caused by enormous energy intensity and emission of greenhouse gas (GHG) due to energy production from oil and coal.

(Cassman et al., 2003) focused on sustainable agriculture to attain environmental sustainability by assuring the pivotal components, such as the increase of efficient nitrogen use, avoiding uses of the natural ecosystem for the expansion of cultivation, and improvement of soil quality. Besides, this paper addressed the separation of Eastern European countries from the Soviet Union since 1980 and its impact on agricultural land declination. (Frélichová & Fanta, 2015) studied the environmental impacts of long-term land use in the Czech Republic and intensive agricultural utilization promotes environmental quality.

In Europe, some countries are highly developed in case of environmental quality, but others have poor performance. Therefore, there are always lessons from the same continent, but several countries are lagging. It proposes a new comparative analysis between two parts of Europe which will deepen knowledge in the way what the environmentally less efficient countries can adapt or learn from the leading nations in case of environmental quality.

This paper aims to the major analyze a research gap for green innovation in V4 nations and give recommendations for improvements concerning these elements by comparing the performance of green innovation in the Global West (leading economies) and Eastern Europe (V4 nations), which includes a total of eight countries, and to determine the causes for some countries' underperformance. Also, one of the research questions is that what is the present scenario V4 economies in green innovation as it has not been answered in previous studies. The other two research questions are crucial to extending the first one, such as which issues these V4 economies need to improve and Why leading economies or Global West have desirable performance and what the other region learns from them?

The paper has been structured into six sections, in the first part, the paper provides an overview of green innovation performance, the second part illustrates theoretical background by reviewing previous kinds of literature, the research design and method is described in section three, the fourth part depicts core results, and the discussion of the result has been analyzed in section five and conclusion of the study.

## **2 THEORETICAL BACKGROUND AND LITERATURE REVIEW**

Research conducted in the past four decades has shown that attention towards green innovation has increased considerably among companies operating in the Manufacturing Industry. Green innovations developed by businesses contribute significantly to a more sustainable society. Companies must implement strategies that take into account the activities of their collaborators and reduce the negative environmental impact of their products in order to increase green innovation activities (Meidute-Kavaliauskiene, et al., 2021). According to (Yin et al., 2018) the domain of green innovation is currently in the process of undergoing exponential development. They distinguish between two different phases, a historical one – in which growth rates were characterized by a slower pace of development in technology associated with green innovation propagation: and the current “dramatic increase” phase. According to them, green technology is the leading aspect of green innovation. It has attracted much more investment and gained scientific momentum as researchers pay careful attention to "climate" and

"sustainability". Life-cycle evaluation theory is the most commonly used theory; whereas patents represent a key and widely used explanatory variable to calculate technological performance in econometric models.

Against this backdrop, to meet the Paris climate goal of 1.5°C, more attention should be paid to the role of creative low-carbon early-stage companies and the role of the public sector in resolving finance gaps for longer-term investment needs. Furthermore, successful practices in advanced high-income economies (such as Denmark, Luxemburg, United Kingdom, and Switzerland) have shown that fostering the Knowledge Triangle (Education, Research and Industry) ensures the development of efficient linkages between R&D activities and actual sustainable practices about green innovation. However, such advancements may not be attained without support from a responsible and innovative public sector. The role of public sector support for grant, equity, debt, and new forms of crowd-funding finance in high-income countries, as entrepreneurs need various types of finance as their businesses to expand and move up the “finance escalator”, is deemed essential (Owen et al., 2018, Song et al., 2019).

The most innovative companies in countries such as Denmark, Luxemburg, the United Kingdom, and Switzerland (Schiederig et al., 2012b) have in common the following elements:

1. The object of innovation is a product, a procedure, a service, or a system;
2. Business orientation: The satisfaction of consumer demands while staying competitive in the marketplace;
3. Feature of the environment: The minimization of negative impact (ideal equals zero impact);
4. Phase: The whole life-cycle is taken into consideration (for material flow reduction);
5. Motivation: Reduction may be motivated by economic or environmental considerations;
6. Level: The introduction of new green/innovation norms in the Industry.

Switzerland has been at the forefront of green technology. Several Swiss start-ups have been collaborating with scientific community members to develop technological innovations that enable more sustainable practices (Schiederig et al, 2011). Their winning formula has been the combination of innovative economic growth and environmental protection policies and practices. Furthermore, another key component for their success has been the ability to gather behind them a group of private and public partners. It is therefore essential to ascertain that the government and responsible public institutions are supportive of environmentally friendly policymaking, which further enhances a start-up ecosystem that embraces green technological practices (Hilty & Bieser, 2017; Schiederig et al, 2012, Sun et al, 2019).. Besides, both Switzerland and the United Kingdom have implemented policies that aim at minimizing the negative effects of the wider propagation of ICT technology. (Hilty & Bieser, 2017) have looked at the benefits and threats of digitalization for climate security in Switzerland from 2015 to 2025, taking into consideration both the ICT sector's carbon footprint and its ability to reduce GHG emissions. A consumption-based approach was used to account for greenhouse gas emissions, which includes emissions generated by domestic consumption in other countries.

Information and Communication Technology (ICT) is an important enabler for a low-carbon economy in both Switzerland and the United Kingdom. According to other studies (Hilty & Bieser, 2017; Schiederig et al, 2012; (Hultman & Shapiro, n.d.); Licht & Peters, 2013; (ben Arfi et al., 2018)), ICT has the technological and economic potential to avoid up to three times more GHG emissions than the amount released by the production, operation, and disposal of ICT devices and infrastructures, in 2025. In absolute terms, ICT could enable these economies to save up to 150% more Mt CO<sub>2</sub>-equivalents per year, compared to years in the past two decades.



However, this same advancement in technological infrastructure and support from other important stakeholders (i.e., higher education and R&D institutions, public sector, etc.) have not been fully observed in the V4 countries of Hungary and Poland (Hultman & Shapiro, 2012; Licht & Peters, 2013; Arfi et al, 2017). Companies operating in these countries face similar obstacles with regards to green innovation including a supportive, but as-of-yet relatively unprepared Industry ecosystem; better coordination with policymakers; improved equipment and technology that would reduce the sector’s carbon footprint. Hultman and Shapiro (2012) have described the following challenges:

- An outdated institutional framework that may compromise existing initiatives and could potentially serve as a hindrance for the generation of added value;
- Low attractiveness to international sector leaders, potential investors, policymakers, and other relevant green technology leaders;
- Lack of financial infrastructure to overcome the effects of fiscal austerity, as well as incentives to access public financing from other more developed economies;
- The absence of an interconnecting bridge among innovation spurrers in green technology and actors in the manufacturing industry that is responsible for introducing such innovations into the technology value chain;
- Higher financial risks;
- Larger permeability of low-tech green innovations compared to high-tech green innovations.

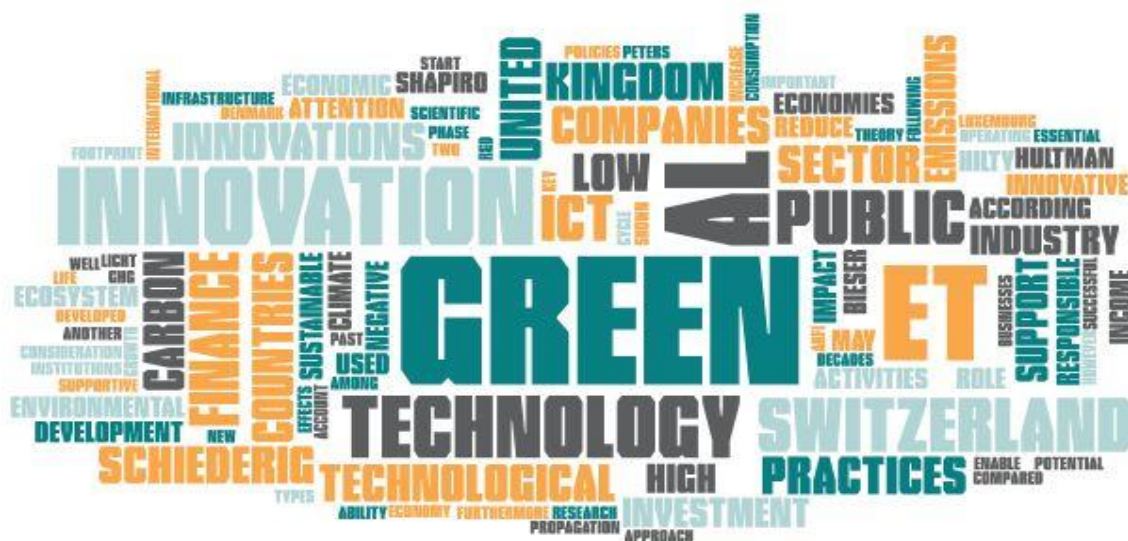


Fig. 1- Word cloud from literature review. Source: Authors (2021)

### 3 METHODOLOGY

#### Data Source

The case study has been designed through a secondary source, the environmental health performance of the two regions, such as Global West and Eastern Europe. Opportunely, the leading four countries (Denmark, Luxemburg, Switzerland, and the United Kingdom) belong to the Global West and V4 countries such as the Czech Republic, Slovakia, Hungary, and Poland are from Eastern Europe. The design of the case study has been conceptualized from (Srinivasa et al., p.5; 2012). Figure 2 illustrates the design more precisely by indicating the background to the structurization of the present study. The Environmental Performance Index (EPI) has two major issues (environmental health and ecosystem vitality) and these are subdivided into 11 issues with scores between 0 to 100. The EPI is composited by these indicators and scores determine the rankings of countries in the world regarding their environmental performance by using available recent year data. The EPI (2020) accommodates a quantitative measure for comparing, analysing, and understanding the environmental performance of 180 countries. It also compares the scores that have changed over the previous decade. The following diagram illustrates the description of the issue categories of the country scorecard.

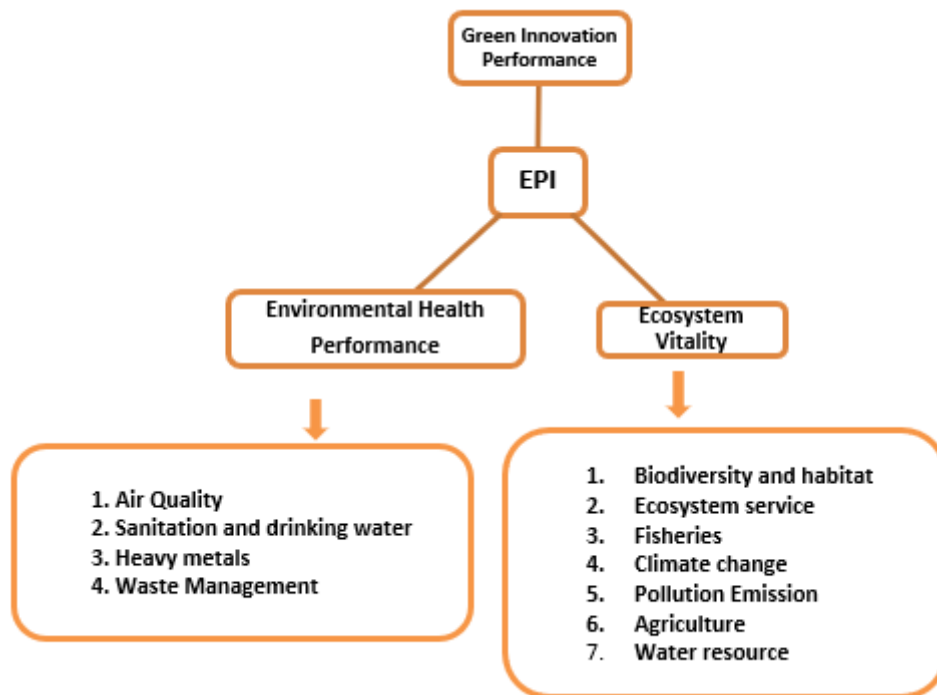


Fig. 2 - Environmental Performance Indicator and the Issue Categories. Source: Authors' (2021)

#### 3.1 Research Method

A case study method from (Srinivasa et al., 2012) has been followed for the secondary data analysis and explained in figure 3. To start the research work, we looked through the background literatures on green innovation with other three connected issues, such as ecological, environmental and sustainable innovation. We measured the performance of green innovation by Environmental Performance Index (EPI), the relevance of the data is that it is available for 180 countries with 11 categorical issues, we came to know that the backwardness of Eastern Europe in green innovation, which was supported from the literature review as well and It was the time to write the content analysis with specifying period, place, key issue and case problem. Finally, we tried to define research problem and research questions. We sorted

and analyse the data set through table, numerical values, index numbers, scores, annual change, and others and finally we started to write the case study.

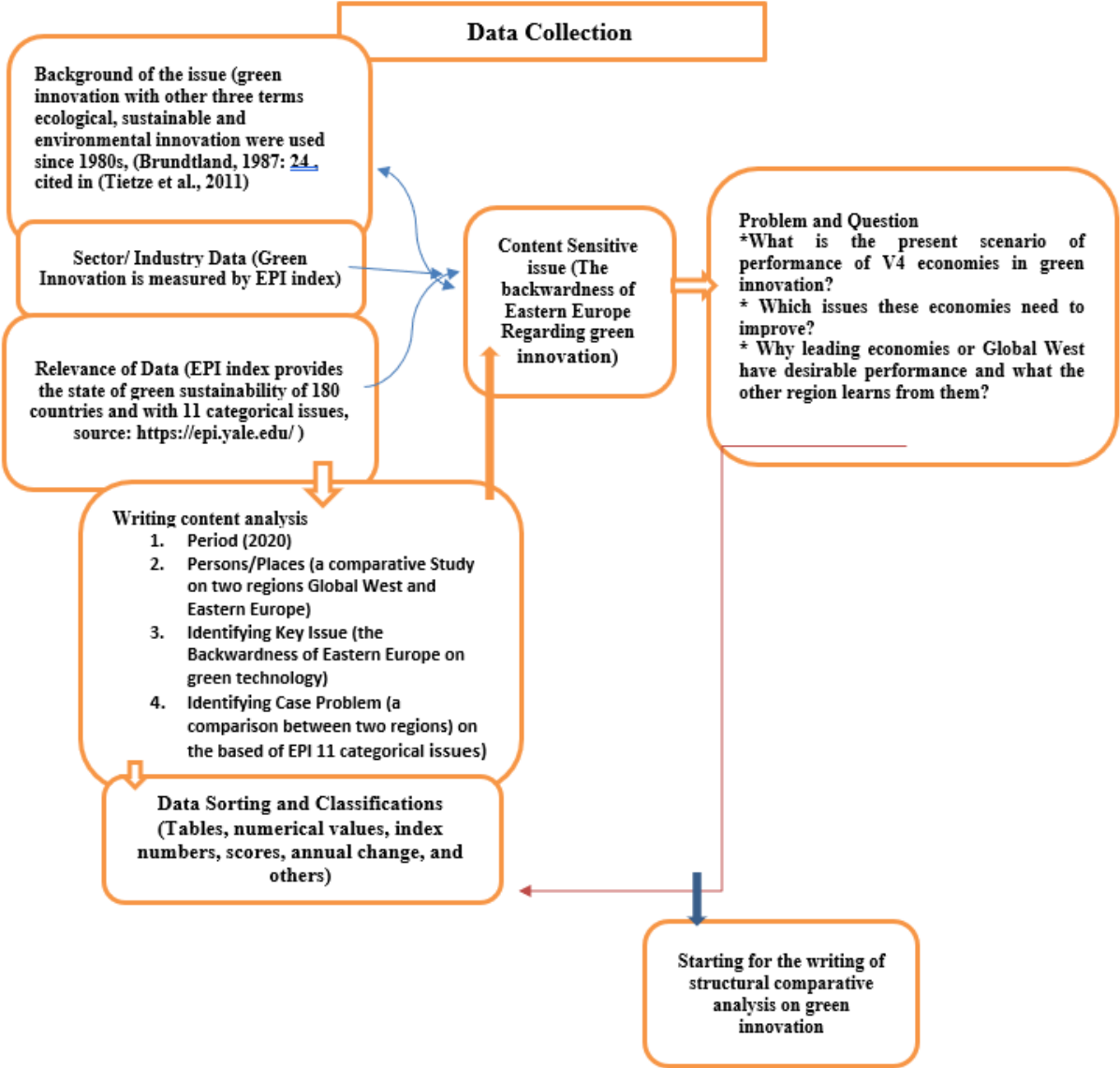


Fig. 3 - Designing case Study from Secondary Source. Source: (Srinivasa et al., 2012)

### 4 RESULTS

In this section, we demonstrate the results of the research questions. The first research question is regarding the present scenario on the performance of V4 countries in green innovation. We also connect the top four economies which will depict an obvious outline. While Czech Republic, Slovakia, Hungary, and Poland are ranked respectively 20<sup>th</sup>, 26<sup>th</sup>, 33<sup>th</sup>, and 37<sup>th</sup> position among the 180 countries in the World for environmental performance with EPI scores 71, 68.3, 63.7, and 60.9 out of a 100 score. The indicator was also performed less efficiently during the last decade; however, the leading economies consider high scores as well as progressive change in the wellbeing of the environment. For instance, the top four nations had

EPI scores 82.5, 82.3, 81.5, 81.3 subsequently and a 10-year change of environment was 7.3, 11.6, 8.6, and 9.

Tab. 1 - Environmental performance index (EPI) scores for four leading and V4 countries. Source: Yale EPI (2020)

Country	Rank	EPI score	10-year change
Denmark	1	82.5	7.3
Luxemburg	2	82.3	11.6
Switzerland	3	81.5	8.6
United Kingdom	4	81.3	9
Czech Republic	20	71	4
Slovakia	26	68.3	3.9
Hungary	33	63.7	3.3
Poland	37	60.9	1.1

The in-depth investigation on country-specific and scorecard on environmental issues are categorized by two different aspects of EPI, such as “Environmental Health Performance” and “Ecosystem Vitality”. The first approach demonstrates that the Czech Republic had moderate scores in air quality, sanitation and drinking water, heavy metals, and waste management withstanding 30<sup>th</sup> position in the world on average. Nevertheless, the other three V4 countries did not get sufficient well-being. For instance, the air quality in Poland, Hungary, and Slovakia is not well at all with having EPI scores, like 47.7, 42.8, and 56.2. Besides, the disposal of heavy metals was worse in these economies with scores 65.3, 68.2, and 69.2.

Tab. 2 - Environmental Health performance of the selected nations. Source: Yale, EPI (2020)

Country	Environmental Health	Air Quality	Sanitation and drinking water	Heavy metals	Waste management
Denmark	91.7 (8)	85.5 (13)	97.4(13)	100 (1)	99.8(3)
Luxemburg	92.6 (7)	87.2(11)	98.6 (9)	96.1 (7)	96.2(15)
Switzerland	95.0 (5)	90.6(9)	100(1)	95(10)	99(6)
United Kingdom	91.7(8)	84.7(14)	100 (1)	94.6 (11)	92.9(17)
Czech Republic	68.3 (32)	58.8 (35)	76.4 (30)	76.4 (30)	89.5(21)
Slovakia	64.3 (34)	56.2 (40)	71.8 (33)	69.2 (43)	80.6(34)
Hungary	54.1 (54)	42.8 (76)	62.2 (48)	68.2 (47)	89.2 (22)
Poland	58.9 (43)	44.7 (70)	71.7(34)	65.3 (52)	91.1(19)

Note: (--) the bracket denotes position among 180 countries.

On the other hand, the leading economies consisted of high ranks in all of the four criteria of “Environmental Health”. Denmark had sustained a 100 percent score for keeping the atmosphere healthy by producing environment-friendly heavy metals. Besides, Switzerland and the UK simultaneously achieved 100 percent success in sustainable sanitation and drinking water systems.

The second approach is “the Ecosystem Vitality” index is not worse for any country, even it is in a good position for V4 economies. Most of the countries achieved 100 scores in pollution emission excepts are Hungary and Poland; however, these two economies do not contain annoying results. Fisheries in these two parts are ultimately low even with no resources in most cases. The reason behind this is that the World West and Eastern Europe had hardly been

occupied by rivers and oceans. Overall, Denmark was remarkable for achieving success in climate change mitigation, reduction of pollutants, water resource preservation.

Tab. 3 - Ecosystem Vitality performance of the selected nations. Source: Yale EPI (2020)

Country	Ecosystem vitality	Bio-diversity and habitat	Ecosystem services	Fisheries	Climate change	Pollution emissions	Agriculture	Water resource
Denmark	76.4(1)	81.7(31)	30.2(108)	13.2(62)	95.0(1)	100.0(1)	73.0(5)	100.0(1)
Luxemburg	75.4(2)	85.5(18)	34.3(90)	0.0(0)	77.5(7)	100.0(1)	42.2(73)	98.5(6)
Switzerland	72.5(8)	63(82)	46.4(47)	0.0(0)	81.6(5)	100(1)	68.8(11)	43.7(42)
United Kingdom	74.3(4)	88(6)	28.3(115)	8.8(109)	90.0(2)	100.0(1)	54.3(37)	98.5(6)
Czech Republic	72.9(7)	85.7(17)	26.7(128)	0.0(0)	76.3(10)	100.0(1)	58.7(29)	60.8(31)
Slovakia	70.9(10)	85(20)	32.1(101)	0.0(0)	71.9(13)	100.0(1)	68.8(11)	43.7(42)
Hungary	70 (11)	82(36)	28.2(117)	0.0(0)	71.3(16)	96.9(25)	73.1(4)	53.8(35)
Poland	62.3(26)	89(3)	27.1(126)	8.0(0)	65.4(40)	89.6(38)	57.4(32)	60.9(30)

Note: (--) the bracket denotes position among 180 countries.

## 5 DISCUSSION

In general, Denmark, Luxemburg, Switzerland, and the United Kingdom are ranked as the four countries most “environmentally-conscious” countries in the world according to the Environmental Performance Index’s list of countries, based on several environmental indicators.

(Schiederig et al, 2011) demonstrated that Switzerland has been at the prominent position in for green technology. For instance, Switzerland ranks first worldwide in two very important indicators, such as “Sanitation and Drinking Water” , and “Pollution Emissions”. Both these indicators are crucial in demonstrating the effectiveness of enforcing environmental regulation by applying green technology. The United Kingdom is also among the best performers on the global stage with regards to the same indicators and typically for ICT sector (Hilty & Bieser, 2017 and (ben Arfi et al., 2018). However, being situated on an archipelago and having a much larger population (as well as population density) have made the country a major contributor to water pollution, in addition to being responsible for the degradation of marine ecosystems surrounding its waters. These indicators have contributed to the country being ranked immediately after Switzerland on the EPI.

On the other hand, V4 countries such as Hungary and Poland rank as the 33rd and 37th most “environmentally-friendly” countries in the world, respectively. Despite fairing relatively better compared to other countries in Central, Eastern, and Southern Europe, they still face numerous obstacles with regards to the following indicators: Air Quality (Czech Republic, 35th, Slovakia 40th, Hungary, 76th and Poland, 70th); Sanitation and Drinking Water (the Czech Republic, 30th, Slovakia 33th Hungary, 48th and Poland, 34th); Heavy Metal Contamination (the Czech Republic, 30th, Slovakia 43th Hungary, 47th and Poland, 52nd); Waste Management (Czech Republic, 21st, Slovakia 24th Hungary, 22nd and Poland, 19th). The countries are also facing problems related to ecosystem services, where all V4 countries are ranked below the first 100 countries. (Hultman & Shapiro, 2012; Licht & Peters, 2013; Arfi et al, 2017) study advised to undertake robust contribution from the stakeholders, such as higher education and R&D institutions, public sector, etc.

However, such an indicator is not necessarily related to ineffective management practices, as much as it is to geography and resources. Despite this, it can be concluded that V4 countries are not performing as efficiently as advanced economies, including Denmark, Luxemburg, United Kingdom, and Switzerland. This is due to many factors, but most importantly, to the lack of green innovativeness in the manufacturing sector of all countries, unenforced environmental protection regulation, lack of financing, as well as outdated technology.

## 6 CONCLUSION

The importance of green innovation has been debated for several years since adopting green technology ensures the planet's survival. The case study was created using secondary data, and it is about the Environmental Performance Index (EPI), which has two primary flaws (environmental health and ecosystem vitality). The leading economies consider high scores as well as progressive changes in environmental well-being; the Czech Republic, Slovakia, Hungary, and Poland scored less well in the previous decade. Furthermore, EPI's "Environmental Health Performance" in V4 did not receive adequate well-being in general. The "Ecosystem Vitality" indicator, on the other hand, is not worse for any country, and it is even better for V4 economies. In terms of pollutant emissions, the majority of countries received a perfect score of 100. Overall, Denmark stood out for its achievements in climate change mitigation, pollution reduction, and water resource protection. Finally, the leading countries' lessons suggest that V4 economies should focus on improving metrics of "environmental health performance."

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## Contact information

### Arif Ibne Asad (Ph.D. student)

FAME, Tomas Bata University in Zlín, The Czech Republic

Mostní 5139, Zlín, Czech Republic

Email: [asad@utb.cz](mailto:asad@utb.cz)

ORCID: 0000-0001-8622-0941

**Elona Čera ( Ph.D. student)**

FAME, Tomas Bata University in Zlín, The Czech Republic  
Mostní 5139, Zlín, Czech Republic

E-mail: elcera@utb.cz

ORCID: 0000-0002-6786-8168

**Drahomíra Pavelková, prof. Dr. Ing.**

FAME, Tomas Bata University in Zlín, The Czech Republic  
Mostní 5139, Zlín, Czech Republic

E-mail: pavelkova@utb.cz

ORCID: 0000-0003-1399-6129

**Ing. Jana Matošková, Ph.D.**

FAME, Tomas Bata University in Zlín, The Czech Republic  
Mostní 5139, Zlín, Czech Republic

E-mail: matoskova@utb.cz

ORCID: 0000-0001-6944-2892

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# THE IMPACT OF FDI ON DOMESTIC INVESTMENT: A LITERATURE REVIEW

*Francis Atiso, Etsub Tekola Jemberu, Lucie Kopřivová, Ali Sufyan, Abdul Quddus*

## Abstract

In recent years there has been substantial theoretical and empirical work on the impact of FDI on the domestic investment of the host countries. This study aims to review selected literature on the impact of FDI on domestic investment published between 2010 to 2020 and provide insights and directions for future studies on the subject. To identify the prevailing results among the empirical literature, the study collects data from Scopus, Web of Science, and Google scholar databases and objectively selects 33 studies with 42 different findings and conducts a review. In addition, it also presents theoretical background on FDI and its relationship with domestic investment. Based on both theoretical and empirical contributions, this review shows that there is no univocal consensus about the direction as well as the effect size of FDI on domestic investment. Therefore, we propose further explorations, sectoral impact assessment, and meta-analytical reviews based on the existing studies to clarify the debate and to establish a consensus about the relationship.

*Keywords: IFDI, Domestic Investment, Crowd-in, Crowd-out*

## 1 INTRODUCTION

An investment where a business owner invests or establishes a new business and operates a business directly in a foreign country is referred to as a foreign investment. Initially, foreign investment was based on the great encouragement to support the European power from the all-regions of the globe until the industrial era started. Following the industrial revolution in the 18th and 19th centuries, foreign investment was made vast in terms of regional development. And during the twentieth century, it took a huge part in infrastructure and developments, such as establishing electricity power generation. Especially in developing countries, it started to be highly encouraged by utilizing natural resources, buildings, railways, and different transportations.

Essentially, foreign investment can be classified into two categories: direct investments and portfolio investments. While portfolio investment refers to capital flows from a foreign entity without operational control of the company receiving the capital (in terms of buying equity and debt securities), direct investment entails a long-lasting investment from a foreign entity with the objective of effective influence in the capital receiving company's management (UNCTAD, 1999). There exist several definitions of foreign direct investment (henceforth, FDI). United Nations, for instance, defines FDI as an investment that includes long-term commitment. It follows that investor significantly influences the leading of the company in another economy by at least 10% shareholding. The acquisition involves the initial transaction between these two subjects and all subsequent transactions (UNCTAD, 2012). Other authors say that FDI is a mechanism by which firms find new opportunities, maintain their production control abroad, maximize their values, utilize firm-specific advantages (Kuemmerle, 2016). It helps to incorporate the country's current account and fiscal deficits (Krkoska, 2002).

Foreign direct investment (FDI) plays an essential and significant role in the world economy. Following its surge around the world in the last few decades, its impact on the host country's economy, in general, and domestic investment, in particular, has been a focus of interest among policymakers, international organizations, and researchers for quite some time. Related to this, a major contestable issue is whether FDI crowds-in (increase) or crowds-out (decrease) domestic investment (Ayyagari & Kosová, 2010, Morrissey & Udomkerdmongkol, 2012). Notwithstanding the debate, nowadays, many policymakers and economists see FDI as one of the crucial advantages of globalization. Especially, developing countries try to attract potential foreign investors by introducing new policies and regulations (Farla et al., 2016).

It is well established that domestic investment (henceforth, DI) is one of, if not the major, engine of the economic growth of any country. It can be defined as investments made by domestic investors using domestic capital in the production process of a country. FDI can have either positive or negative impacts on DI. It mostly depends on its complementarity and substitution attributes. When FDI generates substitutes, it could crowd out domestic firms (incredibly inefficient companies). Crowding-in domestic firms are when FDI produces complementary goods (Göçer et al., 2014). In several studies, authors found the crowding-out effect (see, for example, Diallo et al., 2020; Gungor & Ringim, 2017; Yahia et al., 2018). On the other side, some authors observed a positive relationship between FDI and domestic investment (see Ameer et al., 2017; Shah et al., 2020; Tung, 2019; Tung & Thang, 2020). The relationship between these two variables remains in debate both empirically and theoretically. While some studies find a positive relationship, others realize a negative one and a few studies find that no relation exist.

### **1.1 Global Trends in FDI and Domestic Investment**

In recent times the global inflow of Foreign Direct Investment saw a great decline for developed countries while developing countries remained steady by a 2% increase. Inflows saw a general decline globally by 13% amounting to \$1.3 trillion. Developing economies made steady gains for the first time in many years while developed economies suffered a massive decline of inflows which is attributed to massive repatriation by major US foreign investors due to a policy initiative by their home country government and a significant drop in the United Kingdom. However, the decline was partly caused by about 55 economies taking a hard policy stance that affected foreign investment negatively and M&A investments being abrogated. Despite these blocks and stoppage, greenfield investment was steady (United Nations Conference on Trade and Development, 2019). These economies claimed national security concerns regarding ownership of critical infrastructure, core technologies and other sensitive business assets, as a motivation for these policies they adopted. The question therefore is, could it be that these economies which would be mostly developed, have realized the negative effects on FDI to their economies?

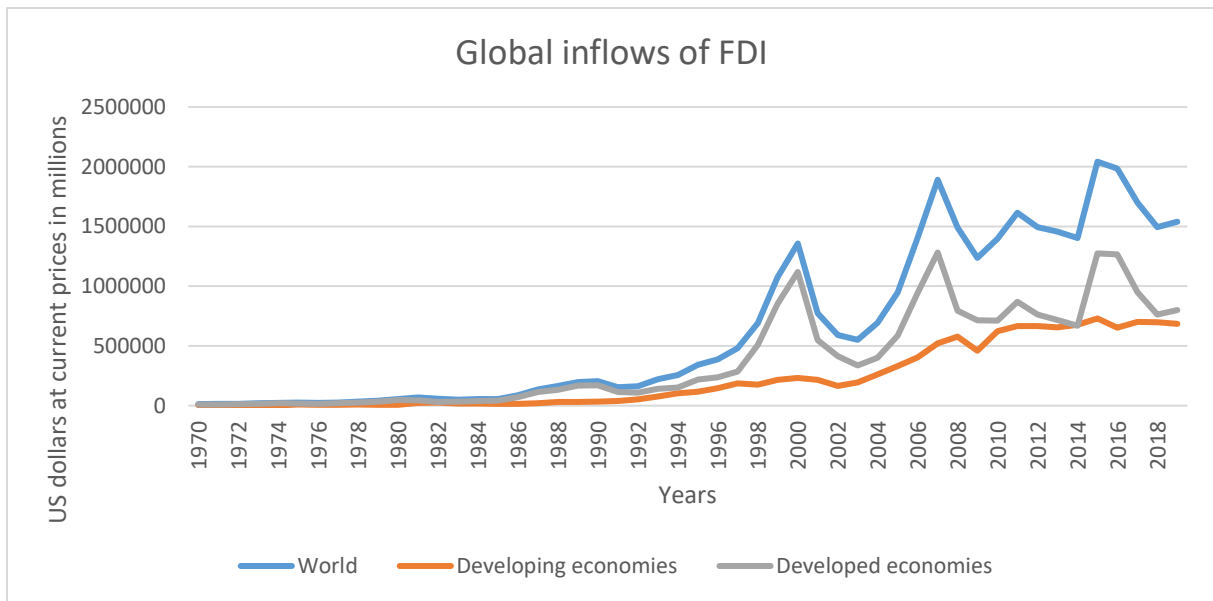


Fig. 1 – Global Inflows of FDI. Source: UNCTAD

Inflows of FDI to developed countries at a peak in the millennium year 2000 has been exhibiting a downward and upward flow in approximately every 8 years interval where the upward flows are seen in 2000, 2007 and 2015 while developing economies have seen a steady rate of increase in inflows over the same period as seen figure 1 below. This decline in inflows is much clearer when viewed from the perspective of income level status categories as shown in Figure 2. Thus, the appreciation of inflows is evident for Middle Income Countries (MIC) and Upper Middle-Income Countries (UMC) in the year 2018 as well as the drop for Higher Income Countries (HIC).

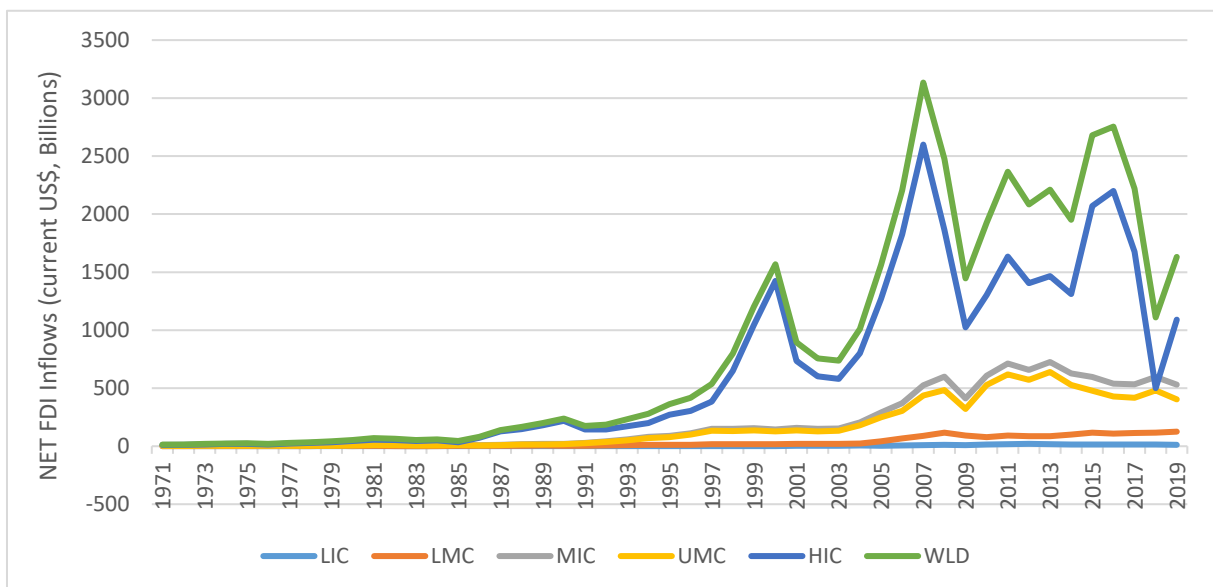


Fig. 2 - Net Inflows of FDI(BoP) according to income level status. Source: World Bank

On the other hand, Figure 3 shows Gross Fixed Capital Formation (GFCF) widely used as a measure domestic investment of countries categorized into income level status. It is seen that upper middle and middle-income countries are gradually moving to attaining a high-income status while the lower-middle countries have much more to do in climbing up the ladder to attaining a higher income level status. For low-income countries, no figure has been reported

since 1970 to date. This is due to the non-availability of data from such countries in terms of GFCF.

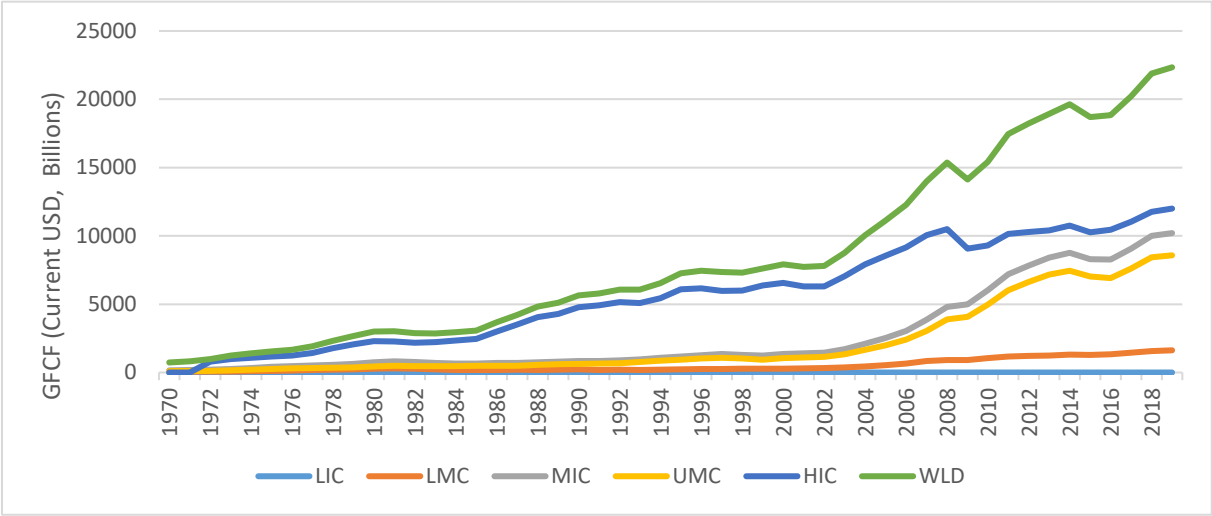


Fig. 3 - Net Inflows of GFCF according to income level status. Source: World Bank

The recent changes in the classification of countries into 4 income status (low, lower-middle, upper-middle, high) according to world bank saw 10 countries changing status. Benin, Indonesia, Mauritius, Nauru, Nepal, Romania, Tanzania out of 10 moved from a lower status to a higher status and otherwise for the remaining 3. Mauritius, Nauru, Romania attained a high-income status, Indonesia moved to upper-middle income whiles Benin, Nepal and Tanzania joined the lower middle income status group. The upward change in status of Benin, Nepal and Tanzania is attributed to the national account revision activity. As some countries rose to higher income status, others like Algeria, Sri Lanka and Sudan all dropped to the next lower income status where Algeria and Sri Lanka dropped from upper middle to lower middle and Sudan from lower middle to low-income statuses. These classifications were done based on the GNI of countries (Serajuddin & Hamedah 2021).

In summary, the global inflow of FDI on the average, remains higher to developed countries as compared to developing economies even though the recent decline significantly affected developed economies. However, for global GFCF developing economies have closed-in on the developed economies in recent time. Thus, Domestic Investment in developing countries have been on the rise and catching up with developed economies after the 2008 global recession as shown in Figure 3.

The paper's objective is to provide literature review of papers focusing on the relationship between FDI and Domestic Investment. We analyse open-access articles from the last decade (2010 to 2020) using Web of Science, Scopus, and Google Scholar databases. This research paper is structured as follows. Section 2 presents the literature review of this topic and draw conclusions in section 3.

## 2 LITERATURE REVIEW

### 2.1 Theoretical review

#### Theories of FDI

International business activity is in no way a recent development. Likewise, neither attempts to explain it. Hence, the concept of FDI can be traced back to decades ago. The works of Adam Smith which gave birth to the theory of absolute advantage and David Ricardo's to the

comparative cost advantage had given the basis for the theories developed later on FDI. Then came the Heckscher-Ohlin model (Ohlin, 1933) and really put the ground for the modern-day idea of FDI. Since then theories have attempted to explain FDI through different lenses. Generally, based on the classification proposed by (Denisia, 2010) we can identify the key underpinnings considered in explaining FDI as (i) Internalization theory, (ii) The eclectic or OLI paradigm, (iii) Product life-cycle (PLC) theory, and (iv) The Theory of Exchange Rates on Imperfect Capital Markets. Most of these theories seek to explain why and when FDI takes place. In this section, we discuss the first three theories of FDI which we found as the most prevalent ones.

**The internalization approach** to the theory of FDI tries to explain the growth of multinational corporations (MNCs) and their motivations to engage in FDI. First conceptualized by (Buckley & Casson, 1976), many scholars have made important contributions to the development of this paradigm, e.g. (Hennart, 1982; Hymer, 1976; A. M. Rugman & Verbeke, 1992; Alan M. Rugman, 1980). Its basic argument is that the efforts of companies to replace market transactions with internal transactions result in FDI. In particular, (Buckley & Casson, 1976) articulated the theory of internalization based on three postulates;

- i. Firms maximize profit in imperfect markets.
- ii. When the external markets are imperfect, there is an incentive to circumvent them by creating internal markets.
- iii. MNCs are created whenever markets are internalized across the world.

According to the authors, the main factor of internalizations is the non-existence or the inefficiency of external markets for intermediate inputs like knowledge which is needed for MNCs. Faced with this challenge, firms are likely to create their own internal market via investment across borders.

Even though the institutionalization theory was properly articulated by Buckley & Casson, (1976), Hymer, (1976) was the pioneer in theorizing the FDI in an imperfect market setting in bringing the focus from nations to firms. In his doctoral dissertation, which was published later in 1976, Hymer emphasized that the decision of an MNC to invest abroad depends on whether it has some firm-specific advantage over the local firms of the host country which are in a favorable position in terms of culture, language, knowledge of the market, etc or not. These firm-specific advantages can be the possession of better technology, cheaper sources of production factors, or better distribution facilities. Furthermore, Rugman, (1980) later, pointed out the importance of country-specific factors (both host and home country) in addition to firm-specific advantage in internalization decisions made by firms.

In line with the aforementioned scholars, Hennart, (1982) also contribute to the development of internalization theory by considering the cost associated with organizing economic activities or transaction cost. He argued that FDI emerges to manage interdependencies between economic actors across borders in a context where doing so by the market is less efficient or doing it through firms has more benefits than its cost.

By introducing the concept of location-bound and non-location-bound firm-specific advantages to the discussion, another important extension was also made by (A. M. Rugman & Verbeke, 1992). They defined the non-location-bound firm-specific advantages as company advantages that are transferable across borders without a substantial loss of value like technology or license and location-bound firm-specific advantages as company advantages that can not be transferred worldwide without losing substantial value like reputation or advantages that are tied to a limited geographical area like market knowledge. Based on this, Rugman & Verbeke, (1992)

argue that firm-specific, specifically the non-location bound one, can be created both in the parent company at home and foreign subsidiaries.

**The eclectic paradigm**, also known as OLI, is a well-known FDI theory that was developed by (Dunning, 1980). According to him, the firm decision to engage in FDI depends upon three sets of factors;

- i. The net-competitive or ownership advantage that it possesses over its competitors from other countries serving a particular market. This ownership advantage includes asset advantages because of sole ownership of a unique asset and transaction advantages resulting from the ability to coordinate these assets located in different countries with a lesser transaction cost than the external markets . – (O from ownership)
- ii. Whether the firm believed internalizing these advantages across-borders is more beneficial or profitable than transferring (selling or leasing) them to foreign firms through the external market. – (I from internalization)
- iii. The degree to which the firms perceived that it is profitable to exploit its ownership advantages by combining it with country-specific advantages of a certain foreign nation rather than the home country. The country-specific advantage, also called location-specific advantage, of the foreign nation can be immobile factor endowment like labor force, natural resource and even the socio-political environment, or other intermediate products. – (L from location)

Therefore, the essential feature in the eclectic paradigm is that only when all these three factors are favorable will FDI take place. Besides, Dunning & Lundan, (2008) further stresses that the importance of these advantages and the dynamic interaction between them may vary across countries (both home and host), industries, and even firms.

The explicit reference to the role of ownership factors and some macroeconomic variables in determining the decision of MNCs to cross national borders is probably the most important distinction between Dunning's eclectic paradigm and internalization theory. Acknowledging the importance of internalization for transactional efficiency as one of the important factors in the decision of firms to expand across borders, he argues that it is not the only factor and explicitly incorporates ownership factors and location characteristics. Hence compared to the internalization theory, the eclectic theory is a more descriptive, holistic, explanation of the motivation of MNCs in engaging in FDI (Alan M. Rugman, 1985).

**Product life-cycle (PLC)** theory is another theory that tries to explain FDI. The theory was first proposed by (Vernon, 1966) in response to the expansion of FDI by US companies after the second world war. The theory attempts to explain this through dynamic changes of location-specific factors or their interaction over time.

Vernon, (1966) assumes that, in general, there are three stages of a product cycle that a typical manufactured product has to go through.

- i. **New product:** The first is a new product stage. In this stage, a firm (in Vernon, (1966) analysis a US firm) that discovers the product starts producing it in the home country, resulting in an innovative-based oligopolist. Because of uncertainties, at this stage, the firm likely produces and presents the product to the local market. Moreover, the demand elasticity of the product at this stage is fairly inelastic given it is highly differentiated.
- ii. **Maturing product:** if the product is found to be successful in the home market then it enters into the maturity stage where its production increases, new markets for it

are explored and its export develops. As the knowledge about the product grows more among the consumers, its demand in both home country and foreign markets (again, Vernon, (1966) believed that these foreign markets are most likely found in the next-highest income countries like European countries) starts to grow more too. Noticing this demand, at first production at home expands from which some get exported to the foreign market. Competitors also emerge. In this stage, the price elasticity of demand for the product in the home market is comparatively low. Once uncertainties surrounding the product are subdued, finding ways of decreasing the cost associated with producing and distributing it takes the manufacturer's attention. Thus, the firm sets up a production unit in the foreign market country (developed country) when it finds doing so is cheaper and profitable than exporting.

- iii. Standardized product: this is the final stage which is characterized by product standardization. By now the product is no more differentiated and the production technique is widely known. Hence, the competition among firms is solely price-based. And less-developed countries become attractive production locations to the firms of the investing country that are looking for locations where they can produce at the lowest possible cost. Eventually, these firms end up setting subsidiaries in these less developed countries. And the products that are produced in these countries are exported to the original home country or other developed countries. Therefore, the exporter becomes an importer.

All in all, from the above review, one can understand that there is no single unified theory that can explain FDI comprehensively.

### **Relationship between FDI and Domestic Investment**

There is a general consensus among economists about the close interconnection of the process of economic growth and investment. Whichever economic model one considers, capital formation has been understood as one of the engines, if not the major, for economic growth among other variables such as labor force growth, imported inputs, and technical progress, etc. Therefore increasing capital accumulation as much as possible has been and continues to be a key policy objective and priority in many countries. The source of this capital formation in a country can either be internal - domestic - or external - from foreign countries. On the ground of the legitimate question about the adequacy of domestic saving in financing investment especially in developing countries, economists stressed the importance of foreign capital inflow. The debt crises due to external borrowing in many countries and the unreliability and prerequisites of foreign aid coupled with development in growth literature have made many developing countries to resort to capital inflows in the form of FDI.

Although the suggestion from empirical studies is far from conclusive (which is discussed in the next section), many theoretical models have been swearing by FDI as an important source of economic development in the recipient countries. And these theories point to a number of distinct channels through which this can be achieved. One of these said channels is through its indirect effect on domestic investment (Nowbutsing, 2009). Many researchers refer to this indirect effect as the spillover effect of FDI.

Blomström & Kokko, (1996) discuss productivity and market access spillovers of FDI on domestic firms. Concerning the productivity spillover effect, for three main reasons, one can expect a positive productivity spillover of FDI. For one, MNCs may bring new technologies and techniques that are not available in the local market or not known by indigenous firms. Two, the use of these new technologies and techniques leads to technology diffusion and allows the local firms to know the ins and outs of it. And finally pushed by the competition in the

market due to the presence of MNCs and fearing being outcompeted, the domestic firms acquire the new technology and become more efficient.

In addition, the export operation of MNCs in the host country can open up markets for the local firms. Since MNCs have a strong competitive advantage of entering the international market over the local firms, they most likely export their product to the international market. This activity of the MNCs influences the local market directly or indirectly. Directly, it expands the output of local firms when they get employed by the exporting companies as suppliers and sub-contractors. Indirectly, the local firms can learn from the MNCs about the foreign markets.

Nowbutsing, (2009), on the other hand, decomposes the impact of FDI into three categories; the direct impact; the indirect impact; and the reverse impact (see Figure 4).

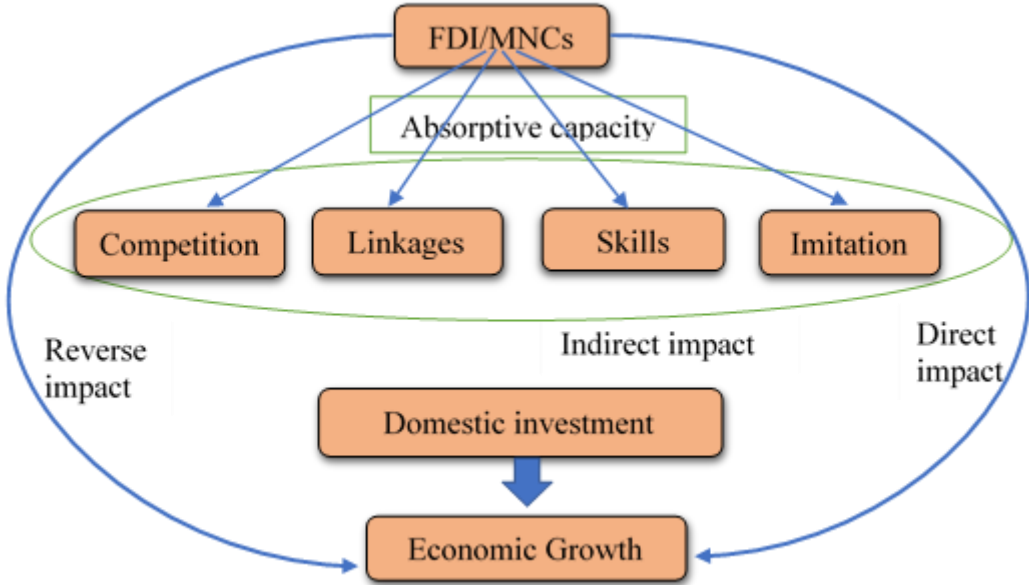


Fig. 4 – Relationship between FDI, DI, and Economic Growth. Source: Nowbutsing (2009)

While the direct impact refers to the direct contribution of FDI on output growth in the host country, the reverse impact refers to the positive influence that economic growth may exert on attracting FDI. Moreover, the indirect effect is the spillover effects of FDI on domestic investment. According to Nowbutsing, (2009), the main channels through which FDI spillovers are competition, linkages, skills, and imitation. The first channel of spillover, competition, represents the increment of competition in the domestic market of the host country due to the presence of MNCs. This ultimately leads the domestic firms to utilize the existing resource efficiently, to adopt better technology, and, in general, to operate more efficiently to stay competitive in the market. This, however, only works for indigenous firms that are already strong enough to compete. Otherwise, especially in most of the developing countries where local firms are weak, this competition will have a negative impact. Linkage channel, on the other hand, refers to the productivity spillover of MNCs on local firms. This productivity spillover can be on indigenous firms that are found in the same industry as the MNC or it could be on firms that are found in other industries. The set of skills and know-how that FDI brings to the host country is another spillover effect of FDI on domestic investment. Through labor mobility, employees of MNCs who have been trained with advanced technical and managerial skills may end up in other indigenous firms or even start their own company. On the flip side, the foreign companies may grab away the well-trained workers from the market and free-ride past training given by local firms. The last channel of the spillover is imitation or learning by watching. Oftentimes, MNCs bring new technologies or new techniques to the host country for their sake.



Watching this, indigenous firms can adopt or imitate these technologies and techniques, which will result in a productivity improvement. Nonetheless, the total spillover, which Nowbutsing, (2009) called “the ring of spillover”, from all the channels mentioned above depends on the absorptive capacity or the host country’s ability to absorb the spillovers.

To sum up, for FDI recipient countries that opened their door to MNCs in the hope of advancing their domestic growth agenda, it is important to ensure that FDI does not crowd-out domestic firms or domestic investment. And regarding this theoretical literature points to several distinct channels through which FDI may affect domestic investment in recipient economies. But most of their analysis is based on very strong assumptions which are equivalent to ignoring the potential costs of MNCs for host countries.

### **3 METHODOLOGY**

To ensure the representativeness and completeness of the research considered for the review, this study followed a systematic process of retrieving data from reliable sources. The methodology followed for selecting the most relevant papers on the subject is composed of two stages: first using “FDI” or “foreign direct investment” and “Domestic investment” as keywords, we conduct a search on well-recognized databases like Scopus, Web of Science and Google Scholar. In the second stage, the search results were reviewed for relevance according to the objective of our study. In this step, papers that were not relevant for explaining the impact of FDI on domestic investment and duplicated articles were eliminated. To ensure that the literature review reflects the most recent results in the area, we decided to restrict the analysis to empirical studies that were published between the years 2010 to 2020. Besides, it is well known that all earlier publications did not use to be available digitally. Hence, excluding empirical research published before 2010 from the study can help us to avoid the selection result associated with that. In addition, to ensure the comparability of the content, the review was restricted to empirical studies available in English and does not include books, chapters in books, conference proceedings, working papers, and other unpublished works. This process yielded 32 empirical research papers in total. A full account of the authors, publishing date, variables employed, main findings is provided in Table 1.

### **4 RESULTS AND DISCUSSION**

Many studies have been conducted to find the relationship between FDI and Domestic Investment. The main aim of this paper was to conduct a contemporary literature regarding the impact of FDI on DI. Table 1 below presents findings on current empirical trends of this relationship between the 2010 to 2020 period after combing Web of Science, Corpus and Google Scholar databases where we captured authors, year of publication, number of data sets used in study, and how the two variables were measured.

We found 33 reports focusing on the impact of FDI on DI globally. These 33 articles had 42 outcomes regarding whether FDI crowds-out or crowds-in domestic investment. Some of the findings were positive, others while a few found no significant impact of FDI on DI. Out of the total findings, 20 (47.6%) of them revealed that FDI has a positive and significant impact on domestic investment, 16 (38.1%) showed the opposing negative while 6 (14.3%) does not find any significant relationship between the two variables. Some author had multiple findings (Elheddad, 2019; Göçer et al., 2014; İpek & Kizigol, 2015; Pilbeam & Oboleveciute, 2012; Shah et al., 2010) while the remaining had single finding. Thus, multiple where adjustment in data gave different results like positive, negative and no relationship at all. Could this mean the impact of FDI is time dependent and conditional? We explain further below where we group findings into positive, negative, and not significant.

The measure of the two variables was also recorded in table 1. It was realized that the most common form of measurement of FDI was the FDI to GDP ratios or FDI as a percentage of GDP, followed by FDI in real terms, then net inflows of FDI and finally a few sectoral measures like the manufacturing, service, agricultural and oil sector not forgetting only one study (Elheddad, 2019) using greenfield investment as a measure of FDI. The measure of DI was in different forms as well ranging from Gross National Investment to GDP ratio, Gross Fixed Capital Formation to GDP, Private Investment to GDP with only a few using Public Investment to GDP and the only sector measurement being the ratio of agricultural inward FDI flow to agricultural GDP. These measurements of variables are mostly focused on aggregate data values and lacks sectoral measures. This means few studies exist that looks at disaggregated sectoral measures of FDI and DI variables with regards to the relationship between the two.

Tab. 1 – Empirical Evidence of the Impact of FDI on DI.

Relationship	Author (Year)	N	Measure of FDI	Measure of Domestic Investment
Positive	İpek & Kizigol, (2015)	51	FDI/GDP ratio	Investment/GDP ratio
	Elheddad, (2019)	66	aggregate Greenfield FDI inflows to GDP	Public Domestic Investment to GDP
	Tung, (2019)	60	Log of FDI inflow	Log of Private Investment
	Shah et al., (2020)	33	FDI/GDP, FDI in Manufacturing/GDP, FDI in Service/GDP	Domestic investment/GDP
	Tan et al., (2016)	208	IFDI in constant USD	GFCF in constant USD
	Tung & Thang, (2020)	1293/1320	FDI in unit billion \$	private investment as % of GDP
	Wang, (2010)	1041	FDI inflow as a % of GDP	GFCF as a % of GDP
	Wu et al., (2010)	20	Inward FDI as a share of GDP	GDI/ GDP
	Goh & Wong, (2014)	47	Inward FDI as a share of GDP	GDI/ GDP
	Al-Sadig, (2013)	1787	Foreign Direct Investment as a percentage of GDP	private domestic investment as a percentage of GDP
	Kim et al., (2012)	85	Net FDI inflows as a share of GDP	GFCF as a share of GDP
	Shah et al., (2010)	21	FDI (percent of GDP)	gross domestic investment (percent of GDP)
	Al Khatib et al., (2012)	36	FDI as a ratio of GDP	Gross Domestic Investment (net of FDI) as a ratio of GDP
	Arazmuradov, (2012)	75	The value of capital of MNEs in host country in real terms	GFCF minus FDI inflows
	Amadou, (2011)	39	FDI as a ratio of GDP	Gross domestic investment in % of GDP
	Rath & Bal, (2014)	32	FDI inflow	Private Domestic Investment

	Djokoto et al., (2014)	31	Ratio of agricultural inward FDI flow to agricultural GDP	Agricultural domestic capital flow to agricultural GDP ratio
	Omri & kahouli, (2014)	273	the stock of foreign direct investment per worker	stock of the domestic capital per worker
	Jing, (2011)	21	FDI inflow	domestic investment in fixed assets
	(Göçer et al., 2014)	570	FDI to GDP ratio	Investment to GDP ratio
Negative	Szkorupová, (2015)	80	FDI as a % of GDP	Domestic investment/GDP ratio
	İpek & Kizigol, (2015)	69/51	FDI/GDP ratio	Investment/GDP ratio
	Gungor & Ringim, (2017)	30	FDI inflows in USD	DI in USD
	Elheddad, (2019)	66	aggregate Greenfield FDI inflows to GDP	Private Domestic Investment to GDP
	Yahia et al., (2018)	40	FDI in unit billion \$	DI in USD
	Ali et al., (2019)	35	net inward FDI to GDP ratio	Gross capital formation to GDP ratio
	Diallo et al., (2020)	1360	FDI flows in % of GDP	Gross fixed capital formation (as a % of GDP)
	Eregha, (2012)	370	FDI inflow as a % of GDP	GFCF as a % of GDP minus FGDP
	Wang, (2010)	1041	FDI inflow as a % of GDP	GFCF as a % of GDP
	Ashraf & Herzer, (2014)	580	Greenfield FDI as % of GDP	GFCF as a % of GDP
	Morrissey & Udomkermongkol, (2012)	552	Net FDI inflow as percentages of GDP	Private investment as percentages of GDP
	Munemo, (2014)	1518	net FDI inflows as a percent of GDP	GFCF as a % of GDP
	Hanif & Jalaluddin, (2013)	40	ratio of FDI to GDP	ratio of GFCF to GDP
	Acar et al., (2012)	370	share of inward FDI flow in GDP	share of gross fixed capital formation in GDP
	Pilbeam & Oboleviciute, (2012)	228	FDI/GDP ratio	total investment/GDP ratio
	(Göçer et al., 2014)	570	FDI to GDP ratio	Investment to GDP ratio
Not Significant	İpek & Kizigol, (2015)	54/69	FDI/GDP ratio	Investment/GDP ratio
	Elheddad, (2019)	66	disaggregate Greenfield FDI inflows to GDP	Public Domestic Investment to GDP
	Elheddad, (2019)	66	disaggregate Greenfield FDI inflows to GDP	Private Domestic Investment to GDP
	Shah et al., (2020)	33	FDI in Primary sector/GDP	Domestic investment/GDP
	Prasanna, (2010)	16	inflow of FDI to GDP ratio	Domestic Investment as a % of Real GDP
	Pilbeam & Oboleviciute, (2012)	228	FDI/GDP ratio	total investment/GDP ratio

## **Positive Relationship**

Majority of findings of the studies observed found FDI to be of a complementary to DI in the short-run, and mostly long-run with these effects being mostly direct while a few were indirect and conditional. Most (11 out of 20) of the studies were country specific focused, 5 out of 20 were focused on regions like the MENA, ASEAN, Asian, African etc, while 3 out of 20 again focused on developing economies, and lastly 1 out of 20 focused on the manufacturing sector.

FDI was realized to significantly stimulate Private, Public and total DI in various countries like Ghana, China, Togo, India, Pakistan, Jordan, Vietnam where majority used aggregated and a few disaggregated data (Al Khatib et al., 2012; Amadou, 2011; Arazmuradov, 2012; Djokoto et al., 2014; Goh & Wong, 2014; İpek & Kizigol, 2015; Jing, 2011; Rath & Bal, 2014; Shah et al., 2010; Tung, 2019). Another study analyses time-series data from 1980-2012 using ARDL cointegration technique, they find that the FDI positively and significantly influence the DI in Pakistan but this effect is strongly felt at manufacturing and services level, to promote DI (Shah et al., 2020).

On a regional scope, Tan et al., (2016) found FDI to create a crowd in effect on domestic investment in 8 ASEAN countries using a panel times series data. Another study by Tung & Thang, (2020), also found FDI to stimulate private domestic investment in all three sub grouped data in to Asian, African and both combined using a panel regression model. Göçer et al., (2014) further confirms crowd-in effect in developing Asian, Latin American, and Caribbean countries. The study of Omri & Kahouli, (2014) revealed a uni-directional crowd-in effect of FDI on DI based on data from 13 MENA countries from 1990 to 2010. Aggregate FDI significantly stimulates public domestic investment in the oil-exporting gulf cooperation council economies (Elheddad, 2019).

Lastly, some studies considered data from different developing economies for analysis. For instance, using data from 50 countries from 1970 to 2004, Wang, (2010) found a cumulative positive crowd in effect of FDI on domestic investment in less developed countries while the cumulative effect in developed countries remain ambiguous. Al-Sadig, (2013) investigates 91 developing host countries over the period 1970-2000 employing panel data, confirmed a significant crowding-in effect of FDI on DI, and concluded that FDI incites DI in developing host countries with mainly middle-income and high-income status. Kim et al., (2012) alludes to these findings of positive impacts of FDI but places focus on regime-specific context using cross-sectional data for 85 countries from 1975-2010. They find that for low-income countries, FDI demonstrate indirect positive and significant effects on DI in countries with low human capital, less financial development, and high corruption and vice versa. This makes the complimentary effect of FDI on domestic investment a conditional one.

## **Negative Relationship**

This review also came across a significant number of studies that found FDI to have a substitution effect on domestic investment on a country-specific, regional, and developmental level. 6 out of 16 of these negative impacts were country-specific focused, 6 out of 16 were regional and 4 out of 16 focused on developing countries.

FDI is was found to impact domestic investment negatively in Czech, Turkey, South Africa, Nigeria, Sudan, China, Malaysia in the long term from six studies (Ali & Wang, 2018; Gungor & Ringim, 2017; Hanif & Jalaluddin, 2013; İpek & Kizigol, 2015; Szkorupová, 2015; Yahia et al., 2018).

Diallo et al., (2020) focused on 40 sub-Saharan countries in 1980-2013. Their results show that FDI inflows have substantial crowding-out effects but the interaction of FDI and higher public investment may improve private DI in the long run. They also find that in secondary and tertiary

sectors, the effect of FDI inflows is more crucial. A study by Eregha, (2012) also found a long-term crowd-out effect of FDI on domestic investment after an analysis of data from countries in the ECOWAS region from 1970 to 2008. In another study, the authors analyse 13 MENA countries in 1980-2008 using panel data. They divide the countries as oil-rich (7 nations) and oil-poor (6 countries). The study results show a negative relationship between FDI and DI. They conclude that FDI shows a crowding-out effect on DI (Acar et al., 2012). On the other hand, Pilbeam & Obolevičiute, (2012) used 26 EU countries (exclude Luxembourg) from 1990 to 2008. They divide the results into two parts and found that FDI crowds out DI in the long run for older countries (EU14). Even though Elheddad, (2019) found FDI to stimulate public domestic investment, there is a significant crowd-out effect in the case of private domestic investment. Göçer et al., (2014), finds an interesting and contrasting crowd-out effect in developing African countries as compared to the positive effect found by Tung & Thang, (2020) in the same region. This means different findings can always be found with change in the data set available to measure the relationship of FDI and DI on a regional or larger territorial base.

Wang, (2010) did find a long-term positive impact of FDI on DI but there exist a significant short-term crowd out effect of FDI on domestic investment using the same data set from less developed countries. Thus, a short-term crowd-out takes place before a long-term crowd-in can occur in this case. The study of Ashraf & Herzer, (2014) found a significant crowd-out effect of greenfield FDI on domestic investment using data from 100 developing countries from 2003 to 2011. Analyses from 46 developing countries from 1996 to 2009 resulted in a negative and statistically significant crowd-out effect of inward FDI on private DI in developing countries (Morrissey & Udomkerdmongkol, 2012). Munemo, (2014) looks at the relationship differently compared to others. He found an indirect growing positive effect of FDI on DI through lowering the cost of entry regulation but a direct crowd-out on DI in mostly poor countries with entry regulation above a certain threshold. Thus, with different conditions and interaction variables a substitution of FDI to DI can be turned to a complementary one.

### **Not Significant Relationship**

Six studies found ambiguous and insignificant relationship between FDI and DI. For instance, İpek & Kizigol, (2015) Finds the effects of FDI on DI to be insignificant and non-existent for Brazil and Mexico. Elheddad, (2019) again found effect of disaggregate FDI on private domestic investment in different sectors aside the oil sector remains ambiguous and insignificantly stimulates public domestic investment. Shah et al., (2020) found primary sector FDI has no significant impact on Domestic investment. Prasanna, (2010) analysed the direct and indirect impact of FDI on DI in India. The author finds an immediate positive effect but a neutral indirect influence in the long run. So, there is no evidence of crowding-in or crowding-out effect. Pilbeam & Obolevičiute, (2012) found no significant impact of FDI on DI for new EU member states.

## **5 CONCLUSION**

The main purpose of this review of literature was to assess the impact of FDI on DI with the aim of summarizing the findings of selected research published during the last decade. To this end, we analysed 33 empirical studies that were published between 2010 and 2020 derived from Web of Science, Scopus, and Google Scholar databases.

To sum up, previous empirical works of literature have been providing conflicting results concerning the direction of causality between FDI and DI. Out of the 33 papers reviewed for this study, majority (47.6%) of them have reported some sort of positive relationship between the two variables indicating the crowding-in effect of FDI. On the other hand, while 38.1% estimation results reported in the papers suggested a negative or a crowding-out effect of FDI

on DI, some, albeit a limited number of them have found insignificant associations. Therefore, the content analysis has revealed that despite the considerable and increasing effort in investigating the effect of FDI on DI, the direction and the magnitude of the effect remain elusive. To understand the reason for this inconclusiveness, we have noted that exploring the influencing factors further through a metadata analysis can go a long way. Furthermore, the effect of FDI on DI among different sectors of the economy could be divergent considering the varying nature of each economic sector. Hence, sector or industry specific FDI impact assessments can be one avenue towards a better understanding of the implication.

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## **Contact information**

### **Francis Atiso**

Univerzita Tomáše Bati Zlín - Fakulta managementu a ekonomiky  
Mostní 5139, 760 01 Zlín  
E-mail: atiso@utb.cz  
ORCID: 0000-0003-0179-3877

### **Etsub Tekola Jemberu**

Univerzita Tomáše Bati Zlín - Fakulta managementu a ekonomiky  
Mostní 5139, 760 01 Zlín  
E-mail: tekola@utb.cz  
ORCID: 0000-0003-2448-7565

### **Lucie Kopřivová**

Univerzita Tomáše Bati Zlín - Fakulta managementu a ekonomiky  
Mostní 5139, 760 01 Zlín  
E-mail: lkoprivova@utb.cz  
ORCID: 0000-0002-9509-1990

### **Ali Sufyan**

Univerzita Tomáše Bati Zlín - Fakulta managementu a ekonomiky  
Mostní 5139, 760 01 Zlín  
E-mail: sufyan@utb.cz  
ORCID: 0000-0002-3250-8090

### **Abdul Quddus**

Univerzita Tomáše Bati Zlín - Fakulta managementu a ekonomiky  
Mostní 5139, 760 01 Zlín  
E-mail: quddus@utb.cz  
ORCID: 0000-0003-3914-6755

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# IDENTIFYING FEATURES OF DIGITAL BUSINESS MODELS

*Stephan Bauriedel*

## **Abstract**

For entrepreneurs, politicians and even experts, digitalisation is just a buzzword they use inflationary. They use it to explain all kinds of progress without knowing or even comprehending the full extent of that word. It is important to take a closer look: What is digitalisation, where does it begin, where does it end, what characterises it? To classify digital business models scientifically, we need characteristics that can be used to define it. These characteristics distinguish a digital from an analogue organisation and make it possible to identify a real digital business model beyond doubt. The systematic derivation involved several steps. First, digital business models were defined as platform businesses. With this approach, analogous organisations could be contrasted with platform-oriented business models. Obvious differences emerged in the areas of work, insights, networks, and volume. The properties were verified using different industries (e.g. music, travel, banking) and well-known business models (e.g. iTunes, Uber, booking.com). An argumentatively underpinned work theory emerged. All four characteristics are independent of company size, business model and industry. From the comparison of analogue and digital business models laws for digitisation were derived. The benefit of the laws established is, that a real digitalisation can be distinguished from a fake digitalisation. If the principles are followed, we speak of real digitalisation of business models. If they are not followed, we are dealing with a so-called pseudo-digitalisation.

*Keywords: digitalisation, digital business model, digital transformation*

## **1 INTRODUCTION**

Every aspect of business is supposed to be digital in the future. But what characterises digitisation? This paper takes a closer look on digital business models to show how thoroughly business processes must be to speak of a digital world.

The business model of Apple's music distribution illustrates the difference of analogue and digital business models very clearly: music used to be sold on phonograms. These were produced, distributed to retailers and sold individually in stationary stores. Today, music is a digital product that is offered for download or via streaming service. Productivity shows a dramatic leap. The output quantity is theoretically unlimited, because the product can be copied as often as required without effort. The production factor material approaches zero, because music is now a digital good (Clement et al., 2019, pp. 33-37). The platform eliminates operational work in sales and production. The capital employed to build the platform is likely to be less than that required to build a recorded music production facility including a stationary distribution channel. The disruptive scenario from the music industry now represents a conflagration. Nearly all industries, retail, banking, tourism, and even the movie theatre at the next corner, are feeling the shifts in the markets.

Current examples of pseudo-digitalisation are schools or universities that claim to teach digitally. Teachers and students meet online, the lecture is recorded by a video camera, transmitted digitally and the signal is displayed on the student's screen. The only difference is that the sender and receiver use the internet as a transmission channel. But both sides remain

analogue protagonists. All the characteristics that make up digitalisation are not present, so it is pseudo-digitalisation. Real digitalisation would mean a university transforms into a platform - without books, teachers, and buildings.

## **2 THEORETICAL BACKGROUND**

This article is based on various theories that deal with digitalisation, but each of them only highlights one facet. The strategy experts explain the business models, the economists see a drastic reduction in transaction costs, and for a technology expert digitalisation consists of web, app and cloud. Only a holistic view of all aspects leads to a comprehensive understanding of digitalisation. Three areas of digitalisation were found: products, production, and business models. The derivation of the laws of business models is based on the following theories.

### **2.1 Digitalisation**

Only a few definitions of digitalisation can be found in the literature. Most experts explain digitalisation using striking examples. Thus, the business models of the internet giants are explained, but no one names the forces at work in the background.

Klaus Schwab (2016), founder of the World Economic Forum in Davos, has dealt with digitalisation in detail and speaks of the fourth industrial revolution. He sees a profound change in human civilisation with a multifaceted interaction between technology and society.

Klaus Macharzina gives a technically oriented and a comprehensive definition of digitalisation. The technical definition is: "Digitalisation is the preparation of information so that it can be processed and stored in a computer system or in computer networks" (Macharzina and Wolf, 2018, p. 1057). The second, comprehensive definition is: "Digitalisation is the worldwide processing and penetration of information and communication technology in virtually all areas of human activity and thus also in companies" (Macharzina and Wolf, 2018, p. 1057).

The author has taken Macharzina's definition and got more precise. His view is that "digitalisation is the technology that connects people, companies, and products and enables the storage, processing, and systemic exchange of information" (Bauriedel, 2020). The emphasis is on the systemic exchange of information.

### **2.2 Digital Business Model**

Christian Hoffmeister sees business models as a development process for standardised trade. "The permanent repetition of processes turns a trial-and-error procedure into a fixed procedure that serves as a binding instruction for all employees." (Hoffmeister, 2013, p. 6). Business models are evolving from individual to dominant to unstable. Traditional business models - in his view - are becoming increasingly unstable because "the internet creates new needs through new service models. At the same time, known needs are being satisfied differently than before. This leads to changes in established industries as well through new providers with new business models." (Hoffmeister, 2013, p. 13).

Patrick Stähler examined digital business models at an early stage. He explains, "By means of business models, information management attempts to map the reality of a company with its processes, tasks and communication relationships onto an IT system in order to support the company in its tasks." He names three components of a business model: the value proposition, the architecture of value creation and the revenue model. In addition, he points out, "Business models on the internet are only new if they also use the possibilities of new media, i.e. ubiquity, the activity of the information carrier, networking and multimedia, although it is not crucial to use all features at the same time." (Stähler, 2002, pp. 38-181)

Alexander Osterwalder has taken Stähler's concept of a business model and developed it further. His definition is: "A business model describes the basic principle by which an organisation creates, conveys and captures value." (Osterwalder and Pigneur, 2011, p. 6) In contrast to a traditional business model, the digital business model focuses on the possibilities of digital technologies. Digital business models satisfy basic needs in a new form (Stähler, 2002) and they are better in the performance characteristics that are important for the customer (Christensen, 2016).

### **2.3 Identifiers**

The four identifiers show a significant difference in digital business models in relation to analogue organizations. Digitization eliminates operational work, information is collected systematically, platforms are networked, and an explosion of transactions is needed.

#### **Work**

In his book "The End of Work" (Rifkin, 2016), futurologist Jeremy Rifkin manifested a theory that is interesting for digitalisation. He describes how every technological innovation (the steam engine, electricity, and the computer) has reduced work. He later recaptured his thought and describes "The Zero Marginal Cost Society" (Rifkin, 2014). He draws a future in which algorithms take over all manual as well as mental labour and marginal costs approach zero.

Taking this idea and comparing a traditional bank with a lending platform, the scope of Rifkin's theory becomes apparent: a bank employee advises on loans. He takes the information, verifies the collateral, calculates the loan rate, waits for approval, and allocates the loan amount. The loan origination process consists of many manual activities. This lending process is both time-consuming and costly, and the banker's working time is limited. A credit platform, on the other hand, processes any number of applications, responds without delay, works around the clock, and does so at the lowest marginal cost. In the long run, the platform eliminates the banker's job.

#### **Information**

Ray Wang, digital business expert, summarises the value of information as follows: "Every touchpoint, every click, every interaction provides us with digital exhaust that's rich in context" (Wang, 2015, p. 163). Analogue companies lose important data, while digital platforms capture data systemically. Wang says that information is part of digitalisation and it significantly changes the shape of decisions, "... moving into the digital business world is moving from a gut-driven to data-driven company". (Wang, 2015, p. 163)

According to Salim Ismail, part of the digital strategy is to converge information into digital goods. He writes in his book Exponential Organizations, "An information-based environment creates fundamental disruptive opportunities" (Ismail et al., 2017, p. 14). Thus, both digital business models and digital goods hold entrepreneurial advantages. The iTunes music platform has converged music into a digital good while creating a digital business model with the platform.

The author has already examined the collection of information using an analogue, a digital and a fitness watch in his article "The Essence of Digitalization" (Bauriedel, 2020). The analogue watch, for example, does not store any information. The digital watch is the same as an analogue watch in the way it works, while the fitness watch really collects and shares far-reaching information. The fitness watch can analyse the collected master and transaction data individually via an app and display them cumulatively (Fitbit, Inc. (2021). In addition, research has shown that the systematic collection of digital data yields both obvious and hidden insights. For example, the company Strava, Inc. visualised the running distances of Fitbit watches in a

heat map (Strava, Inc., 2020) and unexpectedly revealed the locations of U.S. military bases in Afghanistan (Förtsch, 2018).

## **Platform**

Platforms often appear to us as monoliths, but they are highly interconnected (Bauriedel, 2017). They form networks, exchange information, and complement each other. It is a typical feature of digitalisation that systems do not act in isolation, but network with other systems. If a platform has a payment function, a payment provider is integrated for this purpose. This is then connected to a credit card provider, which in turn interacts with the buyer's bank and the seller's bank. If the platform uses a map, the map display is integrated via a provider such as Google Maps. The weather comes from a weather data provider, the news from a newspaper, etc. It may also be that the platform itself offers information to downstream platforms.

## **Volume**

The transaction volume is an underestimated feature of digital business models. The platform is always available and works around the clock. It makes no mistakes and is tireless. However, this also means that a platform must be fed with transactions. The loan officer from our example might manage four to eight loan applications in a day; the platform does not need a second. Platforms are so-called hyperscalers (Manyika and Chuid, 2014). Amazon.de, for example, offers its customers more than 226 million products (Brandt, 2017).

Reiner Clement describes in his book "Internet Economics" how the transaction costs of a digital business model continue to decrease due to unit cost degression (Clement et al., 2019, pp. 67-70). The more transactions executed by the platform, the lower the marginal cost. With a "flywheel", growth is further fuelled. Prof. Goutam Challagalla explains this effect using Uber as an example: a much higher number of deployed drivers bring better geographic coverage, which leads to shorter waiting times. Short waiting times are a significant customer value and in turn increase customer demand. More demand means more trips, less downtime, and lower prices (Challagalla, 2019).

The author has already elaborated that after digitalisation, a second process must be started to make digitalisation a success (Bauriedel, 2021). According to his theory, it is necessary to pass on the cost savings to the customer through a radical price reduction. The price advantage brings new customers and more consumption. Volume increases and leads to a shift in market share. The process can lead to a monopoly position. This phenomenon from digitalisation is called "The winner takes it all" (Clement et al., 2019, p. 239).

## **3 METHODOLOGY**

The idea for this working theory arose from the inflationary use of the term digitalization. However, it is obvious to everyone that headlines can easily change but the old content remains. The research question was therefore: What are the characteristics of digitalization?

Digitalisation seems nebulous to us, while a cube, for example, is easy to identify. It has twelve edges, eight corners, and six faces of equal size. These properties describe its essence and distinguish it from other geometric figures. The cube has properties that describe it. So, what are the properties of digitization? The development of the working theory is based on the following methodology:

### **3.1 Description as an object**

The first step was to turn the nebulous concept into an object or thing. Digitalisation has a physical appearance. It is strictly speaking, an electronic platform - consisting of hardware

(servers), software (application) and, of course, internet connectivity. If you pull the plug it is useless. Viewing digitalisation as a platform already gives the term some grip. Prof. Challagalla (2019) provided this impetus, as Americans refer to their internet giants as platform businesses.

**3.2 Identification of the characteristics**

To understand digitalisation as a platform it allowed for a juxtaposition of analogue organisational structures and platform-oriented business models. The juxtaposition included numerous business models and industries. For example, online banking was compared with a stationary bank, Airbnb or Booking.com with a travel agency, a car rental company with a car sharing company, Wikipedia with an encyclopaedia, etc. The question was: What are the concise differences?

Numerous impulses for possible identification features came from the literature, internet research and discussions with experts. Often it was a single idea that was taken up and developed further. In addition to the extensive research, the author has 30 years of experience in strategy, business, technology, and change. As a management consultant, he has gained deep knowledge of the organisational structure of companies and their IT infrastructures through numerous projects.

For comparison, the author has depicted the analogue as well as the digital business models in the form of process diagrams. Each business process was divided into several process steps.

Each process step was assigned an organisational unit (department), role (workplace/function) and the activities to be carried out. Based on the detailed representation, the characteristics could be evaluated. The following comparison shows the example of music distribution.

Tab. 1 - Comparison of analogue vs. digital business models (music distribution). Source: own research

<b>Laws</b>	<b>Characteristics of stationary music distribution</b>	<b>Characteristics of platform-oriented music distribution</b>
Algorithms replaces employees	Many manual activities (production, logistics, distribution, accounting)	No manual activities
Information brings insight	Physical product – LP, CD  Low transaction data - Product - Price	Digital product – dataset  Full transaction data - Customer (master data, customer history, customer behaviour, preferences, device) - Products (Interest, history, usage) - Price - Evaluations
Platforms form networks	Isolated systems with few internal interfaces (cash register, merchandise management, financial accounting)	Networking with customers, music producers, device providers, payment systems

Acceleration creates dominance	Volume is limited	Infinite Volume
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### 3.3 Survey on laws

The results showed four characteristics that make up the concise features of a digitalisation, regardless of the technology, business model or industry. According to Immanuel Kant, digitalisation can be described as immanent. It has special properties that are inherent in it as a thing and distinguish it. If these properties are universally valid, they can be elevated to laws (Kant, 2011). Laws create order by stating the invariable relationships between things.

### 3.4 Further research steps

This paper describes a working theory supported by observations, arguments and examples. For further empirical evidence, a multi case study is planned for 2022. Companies that claim to have already completed the digital transformation will be closer looked at if they have a real digital business model. It will be measured whether the laws of digitalisation have been fulfilled and what impact this has on the company's results. It is expected that "real" digitalisation will produce better results.

## 4 RESULTS

The result of the working theory are the following four laws that constitute true digitalisation if focussing on business models. The characteristics reveal significant differences between digital and analogue organisations and are redundant in themselves. They make it possible to identify digitalisation regardless of the technology, industry, or business model.

Algorithms replace employees - The example of the iTunes music platform shows that music distribution via a platform does not require manual labour. One feature of digitalisation is the systematic elimination of all manual and intellectual activities in operational processes.

Information brings insights -The systematic collection of information along the operational processes forms a component of digitalisation. It enables automated decisions to be made and new insights to be gained. The goal is to evolve into a data-driven company.

Platforms form networks - Platforms are not monoliths. They exchange information, provide digital services, and build networks over the internet. Only if a company networks digitally with customers, suppliers, partners, banks and logistics providers is the systemic exchange of information possible.

Volume creates dominance - Digital platforms can carry out any number of transactions. Therefore, it is necessary to drastically increase the volume. Every digital business model demands an explosion of transactions to use the full potential.

## 5 DISCUSSION

Digitalisation is difficult. You have to part with the old economic theories and accept the new success factors. Furthermore digitalisation is only explained superficially. Nevertheless it is not possible to ignore digitalisation, because it is changing the markets.

Digitalisation is presented as a positive development that simplifies our society, our work, and our life. However, it carries major social implications. There are numerous articles on "the digital employee," which only adds to the conflict. If we talk about digital, it is an algorithm; if we talk about a human being, it is always analogue. The digital employee is a paradox, because analogue and digital represent opposites. "Algorithms replace employees" is the distinguishing



feature of any digital business model. Conversely, this means that whenever an employee intervenes in a process through a manual activity or decision, there is no digitalisation. It would be the partial automation of an analogue process. With this recognition - triggered by Jeremy Rifkin's theories - the search for further characteristics began for the author.

The term pseudo-digitalisation emerged too. That is, companies invest in digitalisation but will never realise the benefits of a digital business model. Pseudo-digitalisation is dangerous because it leaves the entrepreneur believing they are doing the "right thing" and it blocks the resources for further steps to "real" digitalisation. The four established characteristics can be used to identify "real" digitalisation. Perhaps there are additional identifying features that have not yet been found. Therefore, further research is essential.

## 6 CONCLUSION

True digital business models exhibit certain characteristics that distinguish them from those of an analogue organisation. The author has identified four characteristics that constitute "real" digitalisation and distinguish it from pseudo-digitalisation.

The laws reveal guidelines for developing digital strategies. They describe the immutable interrelationships of a true digitalised organisation and are applicable to any platform-based business model. They do not lay out technical details, but instead target business benefits. Entrepreneurs can test their digital strategy against the laws. If the laws are fulfilled, the change will lead to true digitalisation.

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## Contact information

### Stephan Bauriedel (M.B.A)

Unternehmensberatung Stephan Bauriedel  
 Eschenallee 20, 14050 Berlin, Germany  
 E-Mail: [bauriedel@digital-action.de](mailto:bauriedel@digital-action.de)  
 ORCID: 0000-0002-6060-5285

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# DIGITIZATION POTENTIAL IN THE CONTAINER SHIPPING INDUSTRY

*Benjamin Bendel, Milan Fekete*

## **Abstract**

The so-called digitization and its effects on the economy, logistics and business models are currently being intensively discussed. The aim of this publication is to provide an overview of the digitization potential in maritime container shipping. Maritime container shipping is a capital-intensive, competitive business field that is also subject to global business cycles. A thorough desk research was applied by screening relevant maritime shipping documents and statistics as well as publications in adjacent topics. The results of our research are twofold: Firstly, digitalization could help to streamline current complex logistics processes between stakeholders towards process automation and overall cost reduction and secondly, digitalization could help the maritime container industry to gain a better competition position in the future by means of improved services and cost position.

***Keywords:** digitization, digital business models, network economy, maritime container shipping, container terminal operators, multi-modal cooperation, supply chain management, data analysis, business analytics*

## **1 INTRODUCTION**

The potential of digitization to improve supply chain management is widely discussed across various industry sectors. Digitization is an important discussion topic also in the maritime container shipping industry for two reasons. Firstly, maritime container transport shows growing future container trade volumes. Market insight shows that between 2019 and 2027, the global container shipping market is forecast to grow at a compound annual growth rate (CAGR) of over four percent (Statista, 2019). The competition for market shares might challenge container shipping companies and container terminal owners in terms of improving their service level e.g. by digitization of current chiefly paper based administration processes.

Secondly, market leading ecommerce giants such as Amazon to transform into into a 3rd party logistics provider in eurotransport.de, Alibaba or JD.com which put pressure on global supply chains in terms of demanding enhanced reliability and shorter delivery times from the goods producer to the customer. (Fortune, 2016)

This publication aims at giving an overview of the digitization potential in maritime container shipping and its likely impact on the various stakeholders. A thorough analysis of the literature showed that digitization in the maritime container industry can be reduced to 4 main topics namely digital business models and platforms, data analysis and prediction as well as process innovations such as the blockchain to safeguard secure business transactions.

Becker et al. (2019) and Schallmö (2018) provide insights into the economic and organizational issues of digital business models. A recent global ports survey of the International Ports and Harbours Association IAPH (2021) discusses the status quo of the implementation of software solutions in ports at a broader scale.

Robinson (2016) explains the potentials and pitfalls of modelling the port as an operations system for applying quantitative research methodology.

Hofman and Osterwalder (2017) discusses the transformation of third party logistics providers and the business transformation against the requirements of the digitalization. Schramm, et al (2019) discusses the digital business model transformation for fourth-party logistics providers.

Tradelens is an example for a scalable global trade platform developed by shipping company Maersk and software company IBM. Tradelens is both an open and neutral blockchain-powered platform that is digitizing the global supply chain and incubator for the streamlining of complex trade. Presentation of Tradelens provides deep insights into the ecosystem and today's complexity of maritime supply chains as well as the current situation of implementation projects Tradelens (2019) An overview about the blockchain technology and its use cases e.g. for cybersecurity are discussed by Clott et al (2020).

Alvarez et al (2021) presents a detailed overview about data sources, use cases and the fusion of various data silos with the aim to generate sophisticated data e.g. for vessel tracking and vessel traffic prediction on a global scale. A further reading of data analysis with a focus on data-driven decision models for ports and container terminal is published by Heilig, Stahlbock and Voss (2019). Pigni (2016) et al demonstrate based on theoretical discussions and use cases how data can be exploit to create value.

Ihle (2018) analysis in his doctoral dissertation the optimisation of power consumption for the case of short-term load forecasting in container terminals based on various ship arriving patterns and applying methods of time series analysis and artificial intelligence. Pigni et al (2020) evaluate the benefits of so-called digital twins which emulates üprt operations and allow a deeper understanding of port operations.

The prerequisites for the building of use case for predictive analytics are discussed in terms of selecting appropriate data, the linkage of different data sources and the use of hardware such as video surveillance and IoT (Internet of Things) sensors in an overview article in Port Technology (2019).

There is one thing which is of special interest in maritime digitization: cooperation between the various stakeholders at container terminal waterside operations in order to improve vessel planning and flexing container terminal operations. We focus in our discussion on this topic later on discussing a real-world example.

In a nutshell, today's state of digitization can be understood as a toolbox of technical solutions coupled with superordinated digital business models which connect various stakeholders. In order to speed up logistics processes by streamlining process steps.

The future challenges for the maritime container industry are manifold and demanding in many aspects. The following section will intensify the scientific discussion and shed light on specific topics of digitization by providing the link to real use cases with different stake-holders.

## **2 RESEARCH METHODOLOGY**

The research applied in this study is descriptive and exploratory. A thorough desk research was also applied focusing on maritime economics and technical studies. The reviewed literature was taken through retrieving data bases, mainly ProQuest, Ebrary, and Springer together with internet pages of different sources. Desk research took place mainly in November and December 2020 covering the literature base in the time span from 2015-2020.

### 3 INTRODUCTION TO MARITIME CONTAINER LOGISTIC

In order to understand the potential impact of digitization on maritime container logistics, it is necessary to explain and classify the stakeholders, their functions and the relevant processes. The value-added business activity in maritime container logistics is the transport and logistics management of sea containers coupled with adjacent services.

The term **maritime container shipping** refers to all container transports with ocean-going container ships. In this way, maritime container shipping (deep sea) is properly distinguished from short sea shipping near the coast and transport by inland waterway vessel.

Ships with a carrying capacity of up to 24,000 TEU are used today, The MSC Gülsun of the shipping company MSC is currently the largest container vessel with a carrying capacity of 23,756 TEU. Container ships with 25,000 TEU are discussed in the design draft. However, these ship sizes are not considered further at this point. The term TEU (Twenty Foot Equivalent) describes the standard measurement of 20' for a container. The most important stakeholders in container shipping are the shipping company, the port, the container terminal and the logistics service providers.

The **port**, represented by the port authority, provides the infrastructure (e.g. port access, berths, power supply) and in the case of so-called PPP models (Private Public Partnership) also the terminal infrastructure (terminal area, earthworks, access roads, etc.). In order to use the infrastructure, shipping companies and container terminal operators must pay user fees such as concession fees to the port authority. The superstructure (terminal equipment, software) is procured and operated by the users themselves.

The **shipping company** operates a fleet of container ships and assumes the payment of a transport tariff of the container transport for the shipper. Some shipping companies have financial interests or their own subsidiary in container terminals. One example is the Danish group A.P. Moeller-Maersk with its subsidiary APMT.

For a fee, the **container terminal operator** takes over container handling at the container terminal. The handling service includes loading/unloading the container ship, storage of the container at the terminal, customs clearance and other services. Container terminal operators and shipping companies close contracts on handling charges and the planned container handling volumes.

The **logistics service provider** in the port carries out services such as the seaworthy stowing and packing of the sea container (Stuffing & Stripping) as well as container transport from/to the shipper/end customer. Depending on the contract, various means of transport such as truck, rail or inland waterway vessel are integrated into the supply chain. The contract models are divided into the types **Merchant Haulage** and **Carrier's Haulage**.

Preferring Merchant Haulage, individual services in container logistics are carried out by various independent contract partners, such as container transport from/to the port, whereas in Carrier's Haulage a single contract partner (shipping company or logistics service provider) is fully responsible to carry out services along the supply chain from the dispatch of the container to its arrival at the recipient. The potential advantage of Carrier's Haulage is the full contract liability given to one logistics provider and the pressure to fulfill all liabilities but at higher cost.

### 4 CHALLENGES IN MARITIME CONTAINER LOGISTIC

Investments in maritime container logistics are long-term over periods of 20-40 years and require large investment volumes. On the other hand, there are volatile markets for freight rates and changes in the global economy. There is an investment risk, as many capital goods such as

container ships or terminal equipment find only a few buyers and are generally classified as non-liquid assets. In addition, these investments tie up considerable financial resources (working capital, liquidity), which, for example, has a direct impact on the free cash flow available for dividend payments to shareholders.

Investment theory offers various criteria for assessing the benefits of investments, which are essentially decided on the basis of the capital value criterion, the internal rate of return and the annuity criterion. The basis of all investment decisions is a business plan that maps the expected cash flows over a selected time period of 5-15 years. With the help of the investment criteria, the company can decide whether investments in e.g. digitization offer an economically advantageous capital allocation compared to other investments against a given investment budget. In this respect, proven methods of investment calculus can be used to evaluate digitization projects (Terstege, et al., 2018).

#### **4.1 Shipping Companies**

Shipping companies face 4 basic challenges:

- Intense competition
- High investment costs in new ships building
- Dependence on the dynamics of the global economy
- Volatile operating ship operating costs

Container transport is a so-called homogeneous good which is subject to intensive competition between shipping companies. The decisive competitive factors are the price for the transport as well as different service levels such as the punctuality of the container ship. The price of container transport tends to fall as the size of the container ship increases, since fixed costs and operating costs fall disproportionately less up to a certain size of container ship, given full utilization of container storing positions.

For reasons of profit maximization, the shipping companies aim to expand their market share by building larger new ships and to squeeze out competitors by means of the price of transported container. This praxis can only be successful as long as full utilization of container storing positions on the ships is guaranteed, which is determined exogenously by the dynamics of the global economy and the volume and direction of the transported goods flows. The "timing" of market dynamics thus becomes an essential factor in the shipping company's business decisions. As soon as the financing and operating costs for new ships can no longer be amortized, shipping companies have to exit the market.

The ship operating costs (apart from debt service and personnel costs) are significantly influenced by fuel prices (so-called bunker price) and environmental regulations for so-called low-sulphur marine diesel. Rising bunker prices have the direct effect that container transport tends to become unprofitable on certain routes and transport routes are shifted to other ports.

The following illustration in Fig. 1 shows the market cycle in container shipping, starting with a decline in prices for ships and ending with an excessive number of new buildings with overcapacity of container storing positions and a subsequent decline in prices.



Fig. 1 – The market cycle of container shipping. Source: KPMG (2018) Navigating the future – changing business models-shipping in-side, p. 1

## 4.2 Container terminals

Container terminal operators face 4 basic challenges:

- High investment costs in immobile assets
- Dependence on Loco volume and contracted shipping companies
- Peak Load capacity problems
- Dependence on local port infrastructure

Investments for container terminal operators focus on the one hand on hardware in terms of terminal vehicles, container bridges and landside terminal cranes and on the other hand on software, e.g. for the Terminal Operating System (TOS), as well as various systems for controlling terminal equipment and financial administration.

Due to their location, container terminals can only control the geographical focus for container handling to a limited extent. From the **land side**, the container volume is controlled by the shippers. The local volume of goods (loco volume) for containerized cargo is an essential basis for the shipping companies' decision to call at the container terminal and it also determines the frequency of calls. From the **water side**, the shipping companies determine the container volume by the ship arrivals and the size of the ships used. The productivity of the container terminal, the services offered, and the transshipment prices determine not only the loco volume of container ship departures but also the attractiveness as a regional transshipment point for shippers.

The timing of unloading and loading of the container ship leads to the so-called **peak load problem**, because a container ship wants to minimize its dwell time at the berth in the port. During this time the container terminal operator has to use a corresponding capacity of terminal equipment, which is not needed on all weekdays, because there is no continuous occupancy of the berths at the container terminal. Depending on the size of the ship and the container handling volume, the berthing time at the container terminal is on average 24-36 hours. In the so-called

**off-peak load times**, this equipment is not needed and causes opportunity costs in the form of empty costs due to under-utilization. As a result, high investments are required to cope with peak load times, which tie up the corresponding capital for the handling or transshipment equipment without the corresponding income adjusted to the scarcity conditions. As a basis for the demand for container terminal services, the THC Terminal Handling Charge ('container handling charge'), which is negotiated with the ship owner, can be used as a proxy.

The dependence of container terminal operators on local port infrastructure is evident. If there are corresponding ship flows in/flows out at the port, necessary water depths and maintenance measures for water depth are required. The decision and responsibility for the described measures is not the direct responsibility of the container terminal operator but of the port authority. If the required water depth is not maintained, certain ship sizes can only flow in or out at the port partially loaded, which is not very attractive for shipping companies.

## 5 DIGITIZATION

The previous parts have laid the foundation for a general understanding of maritime container shipping. In this part, the term digitization will be applied to potential fields of application in maritime container logistics.

The Gabler Wirtschaftslexikon (2018) defines the term digitization as follows:

*"The term digitization has several meanings. It can mean the digital conversion and representation or implementation of information and communication or the digital modification of instruments, devices and vehicles as well as the digital revolution, also known as the third revolution, or the digital turnaround. In the latter context, the "information age" and "computerization" are not least mentioned. Whereas in the 20th century information technology (IT) was primarily used for automation and optimization, private households and workplaces were modernized, computer networks were created and software products such as office programs and enterprise resource planning systems were introduced, since the beginning of the 21st century disruptive technologies and innovative business models as well as automation, flexibilization and individualization have been at the forefront of digitization. This has taken a new direction and has led to the fourth industrial revolution, which in turn is associated with the term Industry 4.0 (also "Enterprise 4.0")."*

So, what does digitalization mean for maritime container logistics? In principle, digitization in maritime container logistics also follows the definition given above with the key words – **disruptive technologies, innovative business models, automation and flexibilization** (A.T. Kearney, 2015).

From the authors' point of view, digitization can be classified as follows relating to the maritime container logistics:

1. Who carries out the digitization?
2. Which processes and organizational models are digitized?
3. Which data sources are used?
4. Which software is used?
5. How is the performance of the digitized processes measured?

Figure 2 below shows the classification of digitization in the maritime transport chain.

Deloitte understands digitization in the "Smart Port" approach as an interdependent ecosystem starting with the Port Authority, continuing with terminal integration and ending with cross-



port supply chains. Port digitization is understood as a step-by-step transformation process across different evolutionary stages and stakeholders (Deloitte, 2018).

This defines the main actors and drivers of digitization in container logistics.

The decisive factor now is the consideration of potential fields of action, process changes and target systems for the success of the company.

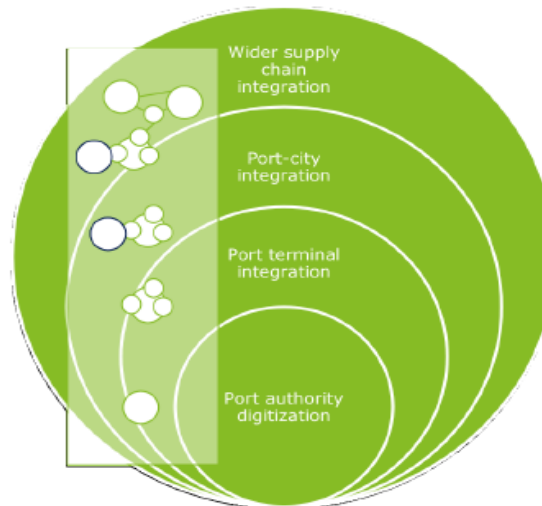


Fig. 2 – Classification of the digital transformation in the maritime transport chain. Source: Deloitte (2018) p. 4

### 5.1 Focus of Digitization in Maritime Container

BCG names 3 fields of action (BCG, 2019), (Deloitte, 2018): "Develop New Business Models and Offerings", "Digitalize the Core Business" and "Build a Robust Internal Digital Foundation". If one follows this proposal, it becomes clear that the goal of digitization is to open up new sources of income ("Develop New Business Models and Offerings"), to raise optimization potentials in the core business ("Digitalize the Core Business") and to support the organizational requirements for a digital transformation of business processes in a goal-oriented manner ("Build a Robust Internal Digital Foundation").

#### Field of action 1: Develop new business models and offerings

- **Easy online booking platform.** One-click online booking has become a must. Besides it, it allows shipping companies to strengthen the direct relationship with their customers and to win new ones, attracted by the simplicity of booking online.
- **High-Margin Services.** E-commerce platforms and advanced cargo management systems allow liners to expand their offerings into higher-margin areas of the supply chain, like intermodal and warehousing solutions.
- **Next-Generation Solutions.** Real-time cargo tracking and on-board sensors that monitor cargo conditions cater to customer demands for greater visibility throughout the shipping journey.

#### Field of action 2: Digitalize the core business

- **Revenue Management.** Robust analytics unlock dynamic pricing and contract portfolio optimization with significant revenue-enhancement opportunities.
- **Advanced Analytics on System Costs.** Advanced modeling allow optimization in network design, vessel deployment, cargo routing, and empty repositioning to minimize costs.

- **Blockchain Technology.** Opportunity for the industry to streamline and secure the documentation process.
- **Digital Lead Management.** Connected market intelligence and lead management allows liners to leverage the broad network of agencies and significantly increase customer bases.
- **Enterprise Resource Planning (ERP) Interfacing.** Linking ERP functionality between liners and customers affords advanced capacity planning, and bolsters customer lock-in by providing an automated booking system directly from customers' own ERP systems.
- **Control Tower Fleet Monitoring.** Tracking fleet activity, by leveraging millions of data and on-board sensors, allows continuous routing and vessel performance optimization along with predictive maintenance.
- **Multi-Modal Collaboration Platform.** Exchanging information between liners, terminals, and intermodal companies can improve efficiency of port call and connection with intermodal.

#### Field of action 3: Build a robust internal foundation

- **Talent.** Implementing—and publicizing—a strong digital foundation across the organization serves to attract the right digital talent in shipping to help keep the business growing and running more effectively.
- **Systems.** Modernizing systems to take advantage of advanced data and predictive analytics enables growth-minded intelligence and decision-making capabilities.
- **Agility.** Instilling a way of working throughout the shipping enterprise that enables shorter innovation cycles to more quickly develop solutions.

From the multitude of possibilities listed above, one potential approach will be discussed more explicitly: The Multi-Modal Collaboration Platform. This selection is made with the aim of simultaneously demonstrating a digitalization approach and a process-improving solution at the interface between shipping company, container terminal and hinterland logistics for the core business. This interface is of outstanding importance because the mentioned stakeholders currently make their decisions independently of each other in bilateral agreements (shipping company-ship; ship-container terminal, container terminal-logistician in the hinterland) and a cooperation requires a more centralized planning of the stakeholders.

## **6 MULTI-MODAL COOPERATION FOR CONTAINER STOWAGE PLANNING AS AN APPLICATION EXAMPLE**

The US company NAVIS (2019) is the leading provider of Terminal Operating Software (TOS) for container terminals worldwide. The TOS is a central element in controlling the container flows from the water side of the container terminal via the landside container yard to the transport of the container on the land side by truck, rail or inland water vessel. With the help of the TOS, the container terminal operator plans, controls and monitors all processes with the core functions: ship stowage planning, equipment control, accounting modalities, resource planning and customs processes (Turloch, 2019).

It should be emphasized that optimization potentials can be exploited if the central planning of the TOS is coordinated with the planning of the shipping company and the hinterland transports.

In order to understand this, the core processes and individual goals of the shipping company, terminal and hinterland operators are analyzed in a more detail.

The **shipping company** plans the container loading of a ship for liner services on a route with fixed port calls based on the container bookings notified by customers. The aim of the shipping company is to achieve full utilization of the container storing positions and short dwell times at the container terminal in order to minimize the costs of the ship over the route.

The shipping company's task is to plan container unloading/loading along the route in such a way that container restacking during port calls on the ship is minimized. Any restacking of containers on the ship takes time by occupying the crane capacity on the waterside of the container terminal. This process is called **optimal ship stowage planning**.

The **container terminal operator** aims to make optimum use of the maximum handling capacity for a given area by minimizing the time the container remains at the terminal. The planning process aims at positioning containers at the terminal promptly before loading/unloading the vessel at the terminal, mirroring the stowage plan of the vessel, in order to minimize container transport movements (Zhen, et al., 2013), (Hamedi, 2010). The result is an optimal stowage plan from the planning of the container terminal operator.

With this approach, the terminal operator maximizes his revenues at given costs of terminal operation and the investment costs incurred.

Each container occupies limited space. Various restrictions prevent the container storage capacity on the terminal area from exceeding certain stacking heights.

These restrictions include the load-bearing capacity of the yard, the technical performance of the terminal equipment, working time regulations and natural influences such as wind.

In addition, it should be noted that changes in the planning basis, e.g. due to delayed ship calls or unplanned container deliveries on the land side, result in an increase in restacking processes of containers at the terminal. This restacking takes time and consumes equipment resources.

In the **transfer zone** of the terminal, the containers are handed over/received in hinterland transport by truck, rail or inland water vessel from/to the container's consignee/consignor. The transfer zone is also called interchange or transfer area. It represents the point of intersection between the container terminal and the logistics service providers in hinterland transport. The logistics service providers in hinterland transport determine their departure/arrival times according to individual schedules or, in the case of truck transports, according to the route optimization of the forwarders.

The container terminal operator has only limited influence on these individual processes, for example, by using so-called cut-off time windows, which determine the time of the latest delivery of the container by the forwarding agents.

As an interim conclusion, it should be noted that the different planning bases of the stakeholders lead to endogenous volatilities in planning for the container terminal operator and exogenous factors such as congestion in the roadside access to the terminal, delayed trains and ships bring a high degree of complexity to the planning process and are hardly plannable. The operator must therefore include the probabilities of occurrence of endogenous and exogenous factors in his planning process and build in sufficient buffers for flexibility. Due to the complexity of the process, decision-support software would be of great benefit to the container terminal operator. This software is offered by the company NAVIS under the name XVELA.

NAVIS XVELA is a software solution that is designed to enable synchronized stowage planning between shipping company and container terminal in real time according to the provider's statements (Bhardwaj & Miller, 2018).

In NAVIS XVELA, information on stowage planning on the part of the shipping company and the terminal is compared in real time with current status information of all stakeholders involved. This saves time and avoids communication errors compared to sequential and decentralized planning, in which the status quo information can be compared bilaterally on different communication channels. NAVIS calls this procedure "shared performance analysis".

NAVIS XVELA also offers the function of statistically evaluating large amounts of data, so-called big data, via stakeholder data exchange, calculating scenarios and generating predictive forecasts to support decision-making.

## **7 SUMMARY AND OUTLOOK**

The digitalization of maritime container logistics seems to be very promising. It comes also clear that digitization could change the future the maritime supply chain. On the one hand, there is the opportunity that Digitization could increase value creation along the maritime supply chain by streamlining mainly paper based processes, overall cost saving and new schemes of cooperation based on new digital business models and electronic platforms. Global consumers could both gain from better services and lower transport prices.

On the other hand, there are clear risks for maritime stakeholders when entering the digitization stage. Apart from investments in software, consulting and the set up of new logistics processes, streamlined processes and services tend to result in higher market transparency over maritime services and lower profit margins when customer loyalty decreases. We recall the fact, that container transport is a homogenous service business because operators will fail to apply price differentiation for the same service level in different markets.

On the other hand, there are clear opportunities for maritime companies which are able to implement digitization successfully. Highly-standardised logistics processes save money and can be 24/7 automatically supervised with a minimum of physical manpower. Digital platforms offer the opportunity to involve more stakeholders and to expand the market footprint. At the end of the day, conventional shipping companies of today could potentially transform in to a new Amazon by expanding their services into new customer segments and safeguard a larger market footprint. Furthermore, digitization allows companies to make use of economies-by-scale by connecting to several digital platforms simultaneously and to increase their market share which could be important in order to defy decreasing profit margins in boom-and-bust cycles. The overall result of this said market dynamics could be further market concentration and the market exit of many smaller companies which are not in the position to work profitable in the new environment.

Further research is needed to evaluate the overall impacts of digitization. Cost-benefit studies of particular digitization projects for maritime companies are essential to answer this question with regard to customers, companies and the global economy as a whole.

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## **Contact information**

### **Benjamin Bendel**

Comenius University in Bratislava, Faculty of Management  
Šafárikovo námestie 6, Bratislava, Slovensko  
E-mail: benjamin.bendel@outlook.com  
ORCID: 0000-0003-0806-0473

### **doc. Ing. Milan Fekete PhD**

Comenius University in Bratislava, Faculty of Management  
Šafárikovo námestie 6, Bratislava, Slovensko  
E-mail: Milan.Fekete@fm.uniba.sk

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# THE GLOBALISATION, SPILLOVER AND SUSTAINABILITY PROFILE OF FRANCE AND THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

*Patricia Bokorová, Denisa Čiderová, Tímea Fusatá*

## Abstract

Historically, both the UK and France have developed their global Anglophone and Francophone communities, respectively. While France was at the origin of the European Coal and Steel Community implemented in 1951 on the basis of the 1950 Schuman Plan, the UK moved from negotiating establishment of the European Economic Community (EEC) towards negotiating alternative European Free Trade Association, and vice versa. Over the years, integration in the sui generis European Union (EU) upgraded from a customs union at the time of the UK's entry to the economic and monetary union with explicit legal personality at the time of Brexit. While the UK's focus at the time of its entry (vetoed twice by the French President Charles de Gaulle), was on some of the overseas countries and territories, the spillover effect brought about by its membership in the EEC/EU resulted in the UK's focus on its borders vis-à-vis Ireland and France upon Brexit. Thus, bearing the "3E's of sustainability" in mind, in our paper we explore the globalisation, spillover and sustainability profile of the UK and France through the (updated) indexes: the KOF Globalisation Index; the SDG Index (and related "Leave no one behind" Index) as well as the Spillover Index.

**Keywords:** *globalisation, indexes, European Union, France, United Kingdom of Great Britain and Ireland*

## 1 INTRODUCTION

*"The Union shall have legal personality." (Article 47 of the Treaty on European Union)*

While the European Union (EU) celebrates 60 years of economic integration theory (Balassa, 1961) and 70 years of European integration in practice (the European Coal and Steel Community implemented in 1951 on the basis of the 1950 French Schuman Plan), the European External Action Service (alias the EU's diplomatic service) marks its first decade in 2021.

Looking at the context of:

- the ratification of the Lisbon Treaty (2009) explicitly recognising the EU's legal personality of an independent entity in its own right with the ability to become a member of international organisations, to join international conventions, and to negotiate as well as to conclude international agreements in accordance with its external commitments; and
- the withdrawal of the United Kingdom of Great Britain and Ireland (UK) from the EU (alias Brexit) originally planned for 2019,

we can see a major progress in economic integration of the EU (i.e. from a customs union at the time of the UK's entry to the sui generis economic and monetary union with explicit legal personality at the time of Brexit). Within the geographical coverage pursued by Minárik & Čiderová (2021) we now focus on France as a member of the European Union, and the UK,



which has – as a result of Brexit and the recently expired transitional period – become the so-called third country vis-à-vis the EU.

Historically, the UK and France have developed their global Anglophone and Francophone communities, respectively. For illustration, “[i]n its Victorian heyday, when Britannia ruled the waves, it consisted of 58 countries with a population of 400 million. Covering fourteen million square miles, or about a quarter of the earth’s surface, it was seven times larger than the territories of Rome at their greatest extent.” (Brendon, 2018, p. 5). In this respect it is not to be abstracted from the fact that the course of time witnessed developments in terminology and composition of: the British Empire; the British Commonwealth of Nations; the Commonwealth of Nations (Čiderová, 2016). With Brexit, the following ceased to be EU overseas countries and territories (OCTs): Anguilla; Bermuda; British Antarctic Territory; British Indian Ocean Territory; British Virgin Islands; Cayman Islands; Falkland Islands; Montserrat; Pitcairn; South Georgia and South Sandwich Islands; Saint Helena, Ascension Island, Tristan da Cunha; Turks and Caicos Islands (European Commission, 2019). While the UK’s focus at the time of its entry, which was vetoed twice by the French President Charles de Gaulle, to the European Economic Community (EEC) was precisely on some of the EU OCTs, the spillover effect brought about by its membership in the EEC/EU resulted in the UK’s focus on its borders vis-à-vis Ireland (and France) at the time of Brexit; as Holden (2020) puts it: “proposal to keep Northern Ireland aligned with the EU customs union and single market was politically controversial. It stressed that this was not a national territorial claim but if anything a transnational territorial claim (‘claiming’ Northern Ireland as a part of the integrated pan-European space)”.

France continues to be represented in the list of EU OCTs by: French Polynesia; French Southern and Antarctic Territories; New Caledonia and Dependencies; Saint Barthélemy; St. Pierre and Miquelon; Wallis and Futuna Islands. OCTs are located across the globe and while they maintain special links with the respective EU member states, they are not part of the EU territory and are not bound by the EU *acquis communautaire* (European Commission, 2019).

Furthermore, parts of some EU member states located across the globe represent the EU outermost regions (ORs); unlike the EU OCTs, the EU ORs form an integral part of the EU, with the *acquis communautaire* being fully applicable in their territory (European Parliament, 2020). Among the EU ORs, there are five French overseas departments (Martinique; Mayotte; Guadeloupe; French Guiana; Réunion). Additionally, Saint-Martin as the French overseas community is qualified as an EU OR, while Sint Maarten qualifies as the Dutch EU OCT.

The aim of our paper is to explore the globalisation, spillover and sustainability profile through the (updated) KOF Globalisation Index; the SDG Index (plus related “Leave no one behind” Index) just like the Spillover Index, and in Part 2 Theoretical background of our paper we focus on the context of globalisation. Then, in Part 3 Methodology we identify data collection and data analysis on the background of the respective indexes before data are presented in Part 4 Results. Next, Part 5 Discussion addresses the issue of within-country equity as well as equity across EU member states that is to be considered before a summary of findings is presented in Conclusion.

## **2 THEORETICAL BACKGROUND**

Held et al. (1999) categorised globalisation as: “thick globalisation”; “diffused globalisation”; “expansive globalisation”; and, “thin globalisation” based on spatio-temporal dimensions vis-à-vis globalising processes (extensity; intensity; velocity; reciprocity between local and global events); in Braudel’s belief crucial historical changes are to be explored also in terms of “social orders” (1980). K. Ivanička (2006) points out that countries facing challenges implied by the globalisation processes seek opportunities resulting from European integration processes so that

the latter would help them cope with the first. Analysis shows, Ivanička (2006, p. 191) continues, “a nation-state is amidst a triangularity of challenges: *globalisation*, *integration*, and *regionalism*” (Fig. 1) and these respective vectors are characterised by reciprocal interaction with the nation-state.

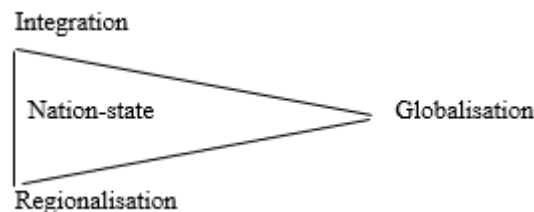


Fig. 1 – Nation-state in the globalisation era. Source: Ivanička (2006), p. 189.

In his work published five years before the Brexit referendum Rodrik (2011) differentiates between “hyperglobalisation” and “moderate” globalisation, depending on how much the capacity of countries to shape effects of globalisation in their respective economies and societies is limited. This brings us briefly to the line of thought pursued by Acemoglu & Robinson (2008). Ascertaining that over the last half millennium different societies have moved onto distinct paths of political and economic development, Acemoglu & Robinson (2008, pp. 673-679) explain their argumentation as follows: “[B]eginning in the seventeenth century, Britain experienced a series of changes in political institutions which led to the emergence of a constitutional monarchy and a much greater stability of property rights. In consequence, the British economy began to develop rapidly and was at the forefront of the industrial revolution in the 19th century. [...] While political institutions determine the distribution of de jure political power in society, the distribution of resources influences the distribution of de facto political power at time  $t$ . These two sources of political power, in turn, affect the choice of economic institutions and influence the future evolution of political institutions. Economic institutions determine economic outcomes, including the aggregate growth rate of the economy and the distribution of resources at time  $t + 1$ .”.

In practice, the author of the *Wealth of Nations* Adam Smith witnessed the beginning of the Industrial Revolution, which turned Great Britain into the first industrialised country in the late 18th and 19th centuries, followed by Germany and the USA. His view of prosperity was associated with agriculture, manufacturing, and foreign trade: “When Britain specialised in manufacturing as the earliest industrial power, it imported agricultural goods. Smith certainly saw the interconnections between trade and the structure of the British economy. In fact, Smith’s beliefs about a circumscribed role for the state were influenced by his deep-seated opposition to the mercantilist policies of that time. He strongly objected to mercantilists distorting international trade by seeking to run a surplus.” (Yueh, 2019, pp. 26-28). Regulation and taxation of trade by the British government in the course of the 18th and early 19th centuries (mercantilist trade policy during the Industrial Revolution, tariffs imposed on agricultural goods under the Corn Laws, and English vessels to be used in trade in terms of the Navigation Acts) were succeeded by declining trade barriers in the 1830s. Roughly since the repeal of the Corn Laws, globalisation has experienced its “ups” (the 1850-1913 & the 1950-2007 periods) and “downs” (the Great Depression & the Great Recession periods). Individual post-war decades have witnessed tendencies towards multilateralism or plurilateralism. In the case of the UK the 1950s symbolised its direction away from negotiating establishment of the EEC towards negotiating alternative European Free Trade Association (EFTA); and, the 1960s marked the UK’s redirection from EFTA membership towards the EEC. The 1970s were dynamic for the UK, too, when shortly after its 1973 EEC accession the UK held a referendum in 1975 whether to sustain its EEC-oriented direction, or to redirect it again (Čiderová et al., 2019).

For the purpose of compatibility with the KOF Globalisation Index introduced in the following Part 3 Methodology, let us conclude with the definition of globalisation by Gygli et al. (2019): “*Globalisation describes the process of creating networks of connections among actors at intra- or multi-continental distances, mediated through a variety of flows including people, information and ideas, capital, and goods. Globalisation is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produces complex relations of mutual interdependence.*”.

### **3 METHODOLOGY**

The aim of our paper is to explore the globalisation, spillover and sustainability profile of France and the UK through the (updated) KOF Globalisation Index; the SDG Index (plus related “Leave no one behind” Index) just like the Spillover Index.

In terms of the 2017 edition of the International Comparison Program used for reference, the category “world” is represented by 176 participating entities that jointly account for 96% of the total world population. The 2017 World Bank International Comparison Program data correspond with the 2017 KOF Globalisation Index data used for illustration of the “Globalisation dimensions” of both entities (UK; France) considered.

Číderová et al. (2019) summarise the KOF Globalisation Index as follows: a composite index measuring globalisation along its economic (alias long-distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges), social (alias spread of ideas, information, images and people) and political (alias diffusion of government policies) dimension with almost global territorial coverage since 1970, which contrary to the Globalisation Index (Robertson & Scholte et al., 2007, pp. 1514-1515) by the Centre for the Study of Globalisation and Regionalisation (CSGR, University of Warwick) and the first revision of the KOF Globalisation Index (KOF, Swiss Federal Institute of Technology Zürich), respectively, in its recent second revision launches a distinction between de facto and de jure globalisation indexes.

In the words of Gygli et al. (2019), “[s]ingle indicators, often reflecting openness, such as trade as a percentage of GDP, are frequently used as a proxy for globalisation. Globalisation is, however, a multifaceted concept that encompasses much more than openness to trade and capital flows.” (Tab. 1). In this respect, whilst the de facto Globalisation Index measures actual international flows and activities, the de jure Globalisation Index maps policies and conditions facilitating and fostering (such) flows and activities. Following the initial version of the KOF Globalisation Index (2006) and its update (2008), the most recent revision combining de facto and de jure globalisation stretched from 23 into the current 43 variables. Besides a split between trade globalisation and financial globalisation as well as time-varying weights of the underlying variables, variables especially measuring de jure characteristics of globalisation are a new feature (for detailed definitions and sources of variables see in detail: <http://www.kof.ethz.ch/globalisation/>).

Tab. 1 – Structure of the KOF Globalisation Index. Source: Gygli et al. (2019).

<b>Globalisation Index, de facto</b>	<b>Weights</b>	<b>Globalisation Index, de jure</b>	<b>Weights</b>
<b><i>Economic Globalisation, de facto</i></b>	<b>33.3</b>	<b><i>Economic Globalisation, de jure</i></b>	<b>33.3</b>
<i>Trade Globalisation, de facto</i>	50.0	<i>Trade Globalisation, de jure</i>	50.0
Trade in goods	38.8	Trade regulations	26.8
Trade in services	44.7	Trade taxes	24.4
Trade partner diversity	16.5	Tariffs	25.6
		Trade agreements	23.2
<i>Financial Globalisation, de facto</i>	50.0	<i>Financial Globalisation, de jure</i>	50.0
Foreign direct investment	26.7	Investment restrictions	33.3
Portfolio investment	16.5	Capital account openness	38.5
International debt	27.6	International Investment Agreements	28.2
International reserves	2.1		
International income payments	27.1		
<b><i>Social Globalisation, de facto</i></b>	<b>33.3</b>	<b><i>Social Globalisation, de jure</i></b>	<b>33.3</b>
<i>Interpersonal Globalisation, de facto</i>	33.3	<i>Interpersonal Globalisation, de jure</i>	33.3
International voice traffic	20.8	Telephone subscriptions	39.9
Transfers	21.9	Freedom to visit	32.7
International tourism	21.0	International airports	27.4
International students	19.1		
Migration	17.2		
<i>Informational Globalisation, de facto</i>	33.3	<i>Informational Globalisation, de jure</i>	33.3
Used internet bandwidth	37.2	Television access	36.8
International patents	28.3	Internet access	42.6
High technology exports	34.5	Press freedom	20.6
<i>Cultural Globalisation, de facto</i>	33.3	<i>Cultural Globalisation, de jure</i>	33.3
Trade in cultural goods	28.1	Gender parity	24.7
Trade in personal services	24.6	Human capital	41.4
International trademarks	9.7	Civil liberties	33.9
McDonald's restaurant	21.6		
IKEA stores	16.0		
<b><i>Political Globalisation, de facto</i></b>	<b>33.3</b>	<b><i>Political Globalisation, de jure</i></b>	<b>33.3</b>
Embassies	36.5	International organisations	36.2
UN peace keeping missions	25.7	International treaties	33.4
International NGOs	37.8	Treaty partner diversity	30.4

According to the *The 2020 Europe Sustainable Development Report*, the “Leave no one behind (LNOB) Index measures inequalities within countries” (SDSN & IEEP, 2020, p. 7) through 29 indicators, tracking:

- unequal access to public services and infrastructure;
- gender inequalities, and inequalities in access to food, health, education and other human-development-oriented measures;
- gaps in income and wealth across population groups.

The *Sustainable Development Report 2020* identifies the “SDG dashboards” and the “SDG Index”: while the first is “a visual representation of each country’s performance on the 17 SDGs”, the latter represents “a percentage of optimal performance”. The 2020 version of the SDG Index has a coverage of 166 countries (cf. 162 countries in the 2019 edition) and besides modifications of some indicators, additional new indicators were included. The 2020 SDG Index is presented in our paper in the form of ranks and scores as:

- the 2020 SDG Index (*Sustainable Development Report 2020*), and
- the 2020 SDG Index for Europe (*The 2020 Europe Sustainable Development Report*).

And, “[f]or the first time, the 2020 edition of the [Sustainable Development] report features time series data for several spillovers.” (Sachs, 2020, p. 63); according to the *Sustainable Development Report 2020* alike, the “Spillover Index” was designed to measure “transboundary impacts generated by one country on others, which may in turn undermine the other countries’ capacities to achieve the SDGs” (Sachs, 2020, p. 90). Thus, the Spillover Index relates to:

- environmental and social impacts embodied into trade and consumption;
- financial spillovers;
- development cooperation.

The Spillover Index is presented in our paper in the form of ranks and scores as:

- the Spillover Index (*Sustainable Development Report 2020*), and
- the International Spillover Index for Europe (*The 2020 Europe Sustainable Development Report*).

Both data collection and data analysis required application of quantitative and qualitative methods.

## 4 RESULTS

Data of the 2017 World Bank International Comparison Program (Tab. 2) released in 2020 document that output in terms of GDP in bln. PPP is roughly the same in the case of the European Union as in the case of the USA; thus, they have a share of 16.0% and 16.3% in world total GDP (in PPP), respectively. But because the EU population of 446.4 mil. stands for 6.2% of the world’s population, the USA with 325.4 mil. of inhabitants representing 4.5% in world population outnumber the EU in terms of GDP per capita (in PPP) correspondingly.

Tab. 2 – The EU, France and the UK in an international comparative perspective. Source: own calculations based on the 2017 World Bank International Comparison Program (2020) data.

	GDP		GDP		USD; EUR	Share in World total			
	bln.		p.c.			GDP		Population %	Population mil.
	PPP	USD; EUR	PPP	USD; EUR		PPP %	currency %		
<b>World</b>	<b>119,547.5</b>	<b>79,715.0</b>	<b>16,596</b>	<b>11,066</b>	<b>USD</b>	<b>100.0</b>	<b>100.0</b>	<b>100</b>	<b>7,203.6</b>
World	81,696	70,563	11,341	9,796	EUR	100.0	100.0	100	7,203.6
<b>USA</b>	<b>19,519.4</b>	<b>19,519.4</b>	<b>59,984</b>	<b>59,984</b>	<b>USD</b>	<b>16.3</b>	<b>24.5</b>	<b>4.5</b>	<b>325.4</b>
USA	13,339	17,278	40,992	53,097	EUR	16.3	24.5	4.5	325.4
<b>EU</b>	<b>19,092.1</b>	<b>14,739.5</b>	<b>42,768.2</b>	<b>33,017.9</b>	<b>USD</b>	<b>16.0</b>	<b>18.5</b>	<b>6.2</b>	<b>446.4</b>
EU	13,047	13,047	29,227	29,227	EUR	16.0	18.5	6.2	446.4
<b>FR</b>	<b>2,994.5</b>	<b>2,592.7</b>	<b>44,651</b>	<b>38,661</b>	<b>USD</b>	<b>2.5</b>	<b>3.3</b>	<b>0.9</b>	<b>67.06</b>
FR	2,046.4	2,295	30,513.2	34,222	EUR	2.5	3.3	0.9	67.06
<b>UK</b>	<b>3,037.0</b>	<b>2,669.6</b>	<b>45,988</b>	<b>40,424</b>	<b>USD</b>	<b>2.5</b>	<b>3.3</b>	<b>0.9</b>	<b>66.04</b>
UK	2,075	2,363	31,427	35,783	EUR	2.5	3.3	0.9	66.0

Similarly, output in terms of GDP in bln. PPP is roughly the same in the case of France as in the case of the UK. Moreover, both of them have a share of 2.5% in world total GDP (in PPP) and of 0.9% in the world’s population though the UK with 66 mil. of inhabitants outnumbers France with its population of 67 mil. in terms of GDP per capita (in PPP). Overall, the USA (outnumbering the EU) and the UK (outnumbering France) are both illustrated in Fig. 2 through the KOF Globalisation Index up to the year 2016, which marked the “Make America great again” Trump era in the USA, and the “Make Great Britain great again” Brexit referendum in the UK.

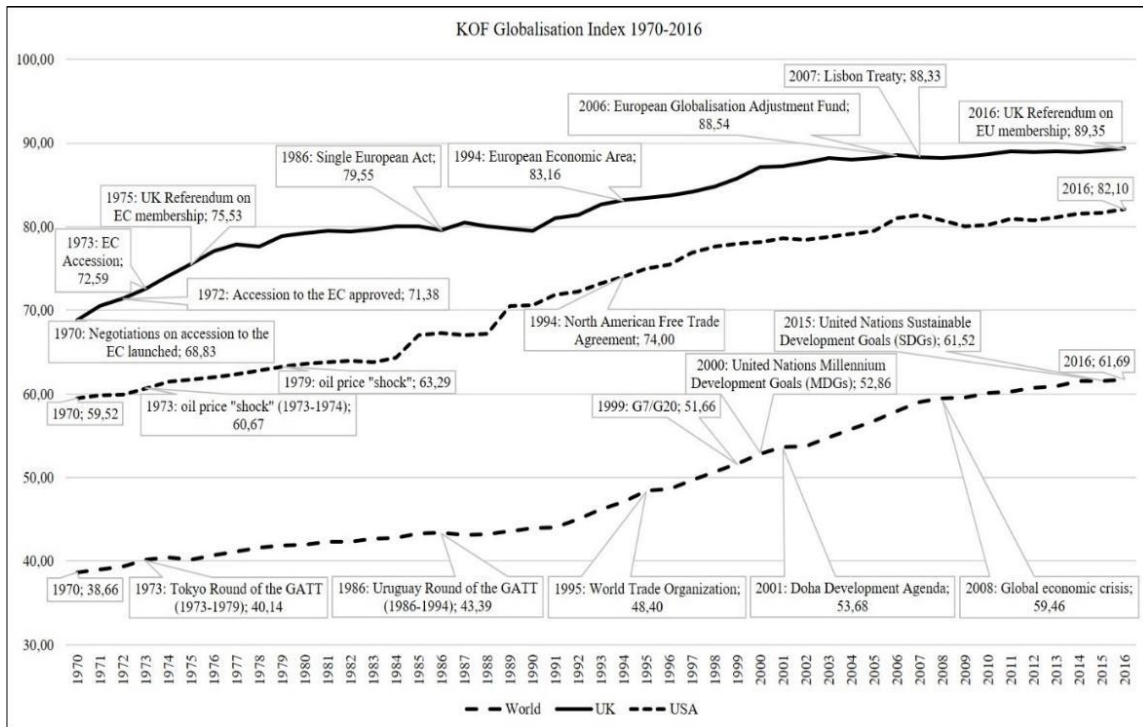


Fig. 2 – KOF Globalisation Index (1970-2016): the UK and the USA in an international comparative perspective. Source: Čiderová et al. (2019), p. 157.

A question if the “America First” and the “Britain First” policies would have shaped the globalisation profile of the USA and the UK, respectively, without their respective participation in the regional economic integration forms (i.e. NAFTA in the case of the USA, and the EU in the case of the UK) remains hypothetical. What Fig. 2 reveals is that their globalisation profile measured through the KOF Globalisation Index had a rising trend – parallel to the one registered in the KOF Globalisation Index for the world total.

Let us now proceed to the results of the overall KOF Globalisation Index in its de facto (Fig. 3) and de jure (Fig. 4) version for the UK and France in order to illustrate their globalisation profile during the era of their membership in the EEC/EU (subject to the 1970 – 2017 data coverage).

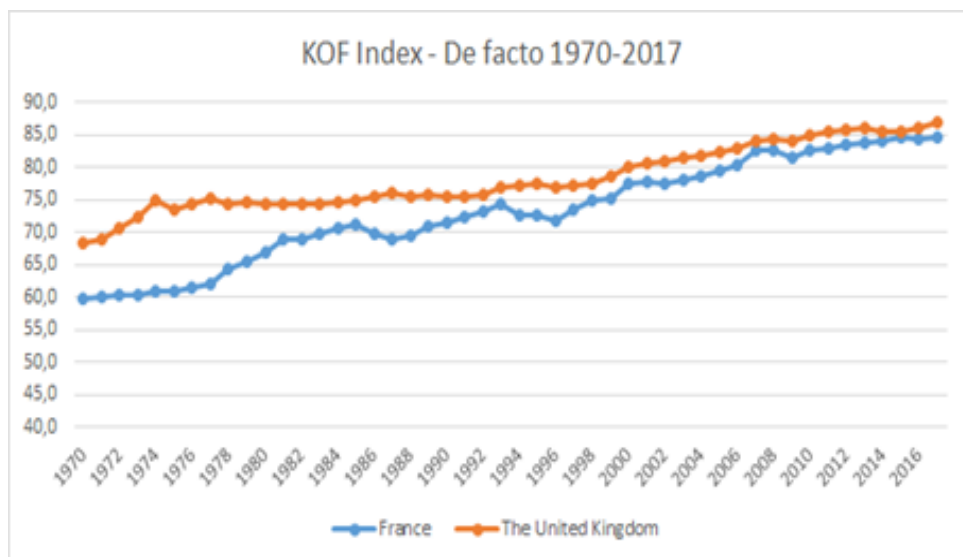


Fig. 3 – The UK and France in an international comparative perspective: De facto KOF Globalisation Index. Source: KOF Globalisation Index (1970 – 2017).

Fig. 3 documents an initial gap between the de facto KOF Globalisation Index values for the UK and France, followed by gradual convergence and an increasing trend that parallels the de jure KOF Globalisation Index values (Fig. 4) with a slight upward shift of the de jure KOF Globalisation Index value interval in comparison with the de facto KOF Globalisation Index value interval. Although certain convergence may be attributed to simultaneous membership of the UK and of France in the EEC/EU, there was a number of UK opt-outs in some policy areas.

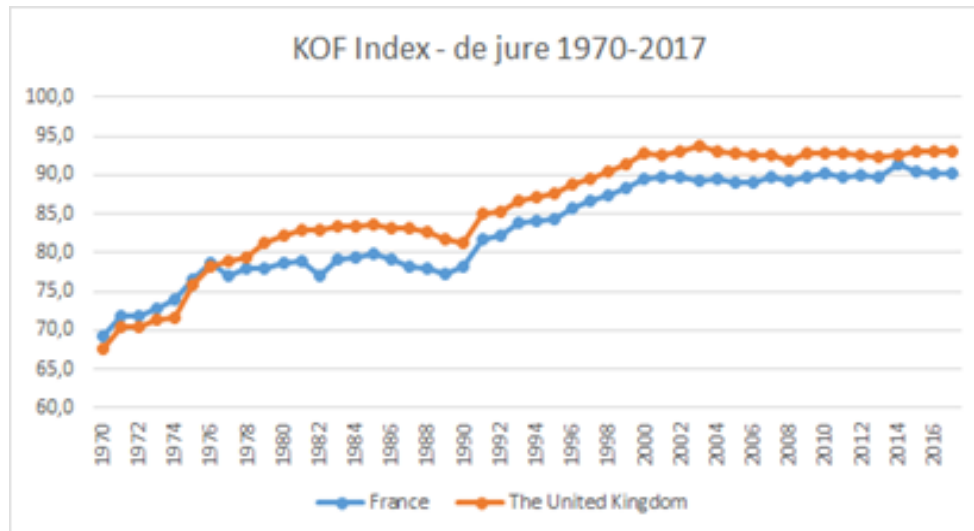


Fig. 4 – The UK and France in an international comparative perspective: De jure KOF Globalisation Index.

Source: KOF Globalisation Index (1970 – 2017).

Still, EU membership entitled both the UK and France to apply for support from the European Globalisation adjustment Fund (EGF) designed to provide “support to people losing their jobs as a result of major structural changes in world trade patterns due to globalisation, e.g. when a large company shuts down or production is moved outside the EU, or as a result of the global economic and financial crisis” (European Commission, 2021). By early April 2021 (i.e. with data coverage for 2020), there were 187 applications for funding from the EGF registered, out of which 149 were completed (with no participation of the UK, and participation of France in 9 cases amounting cumulatively to approx.. 100 mil. EUR and ordered alphabetically as follows: Air France; GAD; Mory-Ducros SAS; MoryGlobal; Peugeot; Peugeot suppliers; PSA; Renault).

With economy, equity, and environment as the “3E’s of sustainability” on mind, we would like to call attention to the fact pointed out by Minárik & Čiderová (2021) that top ranks of countries in the 2017-18 edition of the Global Competitiveness Index ranking were not necessarily mirrored in the ranks of the respective countries in the corresponding 2017 edition of the SDG Index ranking. This is why we will next consider the standing of the UK and of France vis-à-vis the progress made towards meeting the SDGs, i.e. in terms of the SDG Index and the Spillover Index (Tab. 3, Fig. 5 & 6).

Tab. 3 – The UK and France in an international comparative perspective: SDG Index. Source: Sachs et al. (2020); SDSN & IEEP. (2020).

Entity	Indicator			
	2020 SDG Index Rank	2020 SDG Index Score	2020 SDG Index for Europe Rank	2020 SDG Index for Europe Score
UK	13/166	79.8	15/31	70.2
France	4/166	81.1	9/31	73.0

For illustration, the 2020 SDG Index for Europe score stands at 70.7 within the 81.1 (Finland) – 55.8 (Bulgaria) interval, and an alternative perspective is the 84.7 (Sweden) – 74.3 (Luxembourg) interval of the (global) 2020 SDG Index Score. So, the position of the EU can be interpreted either within 31 ranks (rank 1 for Finland; rank 31 for Bulgaria) in the European 2020 edition, or up to 44 ranks out of 166 (rank 1 for Sweden; rank 44 for Luxembourg) in the global 2020 edition. In both (the global and the European 2020) editions France (4/166; 9/31) outperforms the UK (13/166; 15/31). The associated EU LNOB Index for Europe Score of 71.8 is inbetween the 86.7 (Finland) – 47.7 (Romania) interval, with 13 EU member states (incl. France) scoring above and 14 EU member states below the average. The “Leave no one behind Index for Europe” is not matched with an alternative in the global edition, which leaves us with France and the UK ranking 10th and 12th, respectively, out of 31 countries.

As a point of reference, the International Spillover Index for Europe Score of 67.0 on a scale from 84.8 (Poland) to 38.6 (Luxembourg) divides EU member states roughly into two-thirds, which are above the average, and the remaining one-third below the average. Again, an alternative perspective is the 91.6 (Romania with rank 101/166) – 33.5 (Luxembourg with rank 164/166) interval of the Spillover Index Score. Outcomes of France (with the score of 51.1) and the UK (with the score of 52.1) nearly match in the Spillover Index Score, placing them on rank 158 out of 166 and rank 157 out of 166, respectively. A slight difference can be observed between France (ranking 25th out of 31) and the UK (ranking 28th out of 31) in the International Spillover Index for Europe Score.



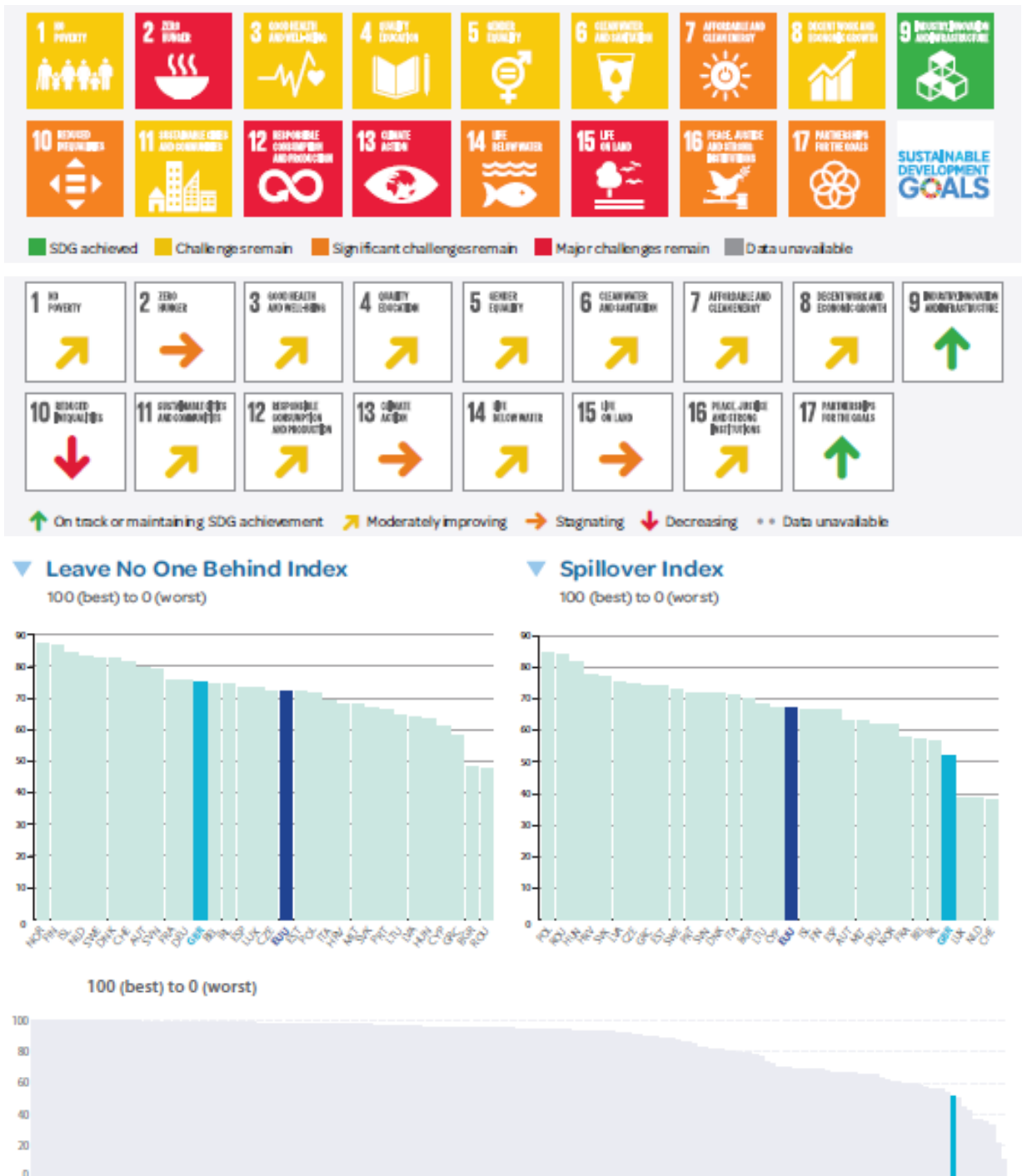
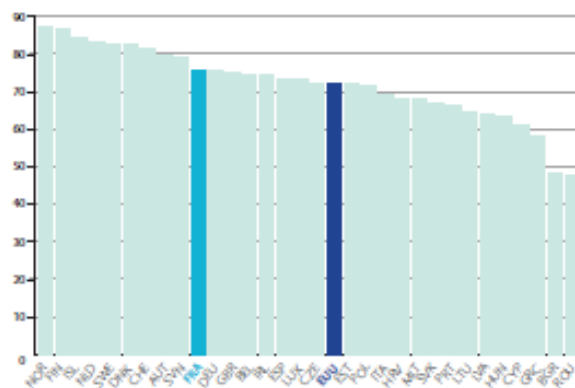


Fig. 5 – UK in an international comparative perspective: SDG Dashboard & trends, the LNOB Index, the International Spillover Index for Europe and the Spillover Index. Source: The 2020 Europe Sustainable Development Report, p. 148; Sustainable Development Report 2020, p. 468.



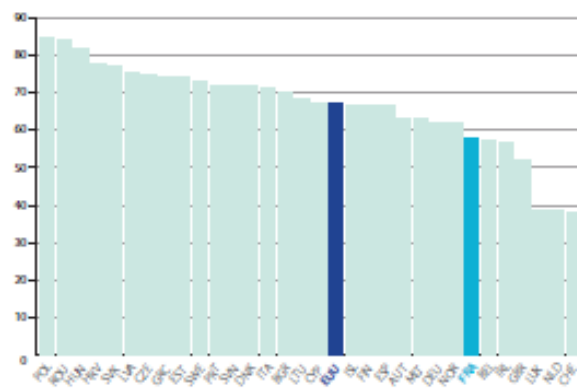
### ▼ Leave No One Behind Index

100 (best) to 0 (worst)



### ▼ Spillover Index

100 (best) to 0 (worst)



100 (best) to 0 (worst)



Fig. 6 – France in an international comparative perspective: SDG Dashboard & trends, the LNOB Index, the International Spillover Index for Europe and the Spillover Index. Source: The 2020 Europe Sustainable Development Report, p. 104; Sustainable Development Report 2020, p. 222.

## 5 DISCUSSION

In terms of the LNOB Index let us now look into the inequalities within countries as measured by the regional GDP per capita. While Eurostat (2018) reported the 2016 regional GDP per

capita figures for 276 EU regions in 2013 NUTS (Nomenclature of Territorial Units for Statistics) level 2 terms, the 2019 update (Eurostat, 2019) covered the 2017 regional GDP per capita figures for 281 EU regions in 2016 NUTS 2 terms, subject to amendments. While both the UK and Ireland were represented in top 5, France featured in top 10 in 2016 as well as 2017. Inner London – West (UK) led the EU-wide regional GDP per capita “league table” with the EU28 average “bar” set at 100 in PPS, having shifted its “only-sky-is-the-limit” performance from 611% in 2016 to 626% in 2017. Contrary to the case of Inner London – West (UK) and Île-de-France (FR) in both 2016 and 2017, representation of Ireland in top 5 transformed from the “top-3-ranking” Southern & Eastern region (217% in 2016) to the Southern region (220% ranking third in 2017) and the Eastern & Midland region (189% ranking sixth in 2017) [NB both the Hamburg region and the Bruxelles-Cap./Brussel Hfdst. region marking double of the EU average in 2016 continued to do so at 202 and 196, respectively, in 2017].

In 2017, country-wide regional differences ranged on a scale:

- from 65% (Southern Scotland) to 626% (Inner London – West) in the UK (with country average at 106);
- from 84% (Northern & Western region) to 220% (Southern region) in Ireland (with country average at 181);
- from 34% (EU OR Mayotte) to 177% (Île-de-France) in France (with country average at 104).

What is not to be overlooked, “[i]n all Member States where there are more than one region at NUTS2 level, the highest GDP per capita is in the capital region, except Berlin in Germany, Eastern & Midland in Ireland and Lazio in Italy” as Eurostat informed. On the EU member state level, the UK average of 106 corresponded with the country average of France (104) as indicated above, or Finland (109). Moreover, if judged on the level of the UK’s constituent parts, figures associated with England in an interval from 77 to 113 might resemble either those of 77 (Centro in Spain) and 112 (Noreste in Spain) on the regional level, or Portugal (77) and Belgium (116), respectively, on the country level. Next, Scotland’s average of 98 was on a par either with 98 for Este (Spain) on the regional level, or the country average of Italy (96) and Malta (97), respectively. Then, comparable with the regional average of 82 for Noroeste (Spain), figures of 81 (Northern Ireland in the UK), and 84 (Northern & Western region in Ireland), respectively, draw attention to the issue of the so-called Irish border in the Brexit context. Furthermore, the average of Wales (76) matched the one of 75 for the EU OR Canarias (Spain) on the regional level, or the country average of Slovakia (76).

Lately, with Brexit in place since 1 February 2020, Eurostat has adapted its methodology in two ways: firstly, to apply the post-Brexit EU27 in its calculations (EU27 = 100); and, secondly, to consider GDP p.c. (PPS, EU27 = 100) just like the GDP per person employed (PPS, EU27 = 100); in our paper we refer just to the first aspect for the purpose of comparability. So, according to recently available Eurostat data (Eurostat, 2020), country average in terms of GDP p.c. (PPS, EU27 = 100) in the UK stood at 106 (with a nationwide spread from 63% for Southern Scotland to 620% for Inner London – West) and in France at 104 (with a nationwide spread from 30% for EU OR Mayotte to 178% for Île-de-France), respectively.

## 6 CONCLUSION

In this paper we focused primary on France as a member of the European Union, and the UK, which after Brexit in 2020 became so-called third country to EU and vice versa. We chose these countries because of their similarities whether it applies to the population or other economic indicators such as GDP, GDP p.c. and so on (we examined more indicators in the paper). As

we have already mentioned in the paper, France and the UK are big rivals, which was also shown during the UK's accession to the EU, when France vetoed this accession and the UK joined the Union not until 1973. In our paper we explored the globalisation, spillover and sustainability profile of the UK and France through the indexes: the KOF Globalisation Index; the SDG Index and the Spillover Index. SDG Index for Europe score stands at 70.7 within the 81.1 (Finland) – 55.8 (Bulgaria) interval. In both editions France outperforms the UK. The associated EU LNOB Index for Europe Score of 71.8 is inbetween the 86.7 (Finland) – 47.7 (Romania) interval, with 13 EU member states (incl. France) scoring above and 14 EU member states below the average. The “Leave no one behind Index for Europe” is not matched with an alternative in the global edition, which leaves us with France and the UK ranking 10th and 12th, respectively, out of 31 countries. The International Spillover Index for Europe Score of 67.0 on a scale from 84.8 (Poland) to 38.6 (Luxembourg). Outcomes of France (with the score of 51.1) and the UK (with the score of 52.1) nearly match in the Spillover Index Score, placing them on rank 158 out of 166 and rank 157 out of 166, respectively. A slight difference can be observed between France (ranking 25th out of 31) and the UK (ranking 28th out of 31) in the International Spillover Index for Europe Score. Anyhow, “the UK was one of the few member states never to develop a compelling story about its achievements within the Community. For the Six, membership was associated with the extraordinary growth rates of the post-war decades, known variously as the “trentes glorieuses”, the “Wirtschaftswunder” and the “miracolo economico”. For states like Spain, Greece and Portugal, membership was associated with the transition from military rule and fascism. For the former Eastern bloc, the EU had eased the transition to democracy and a market economy after the collapse of the Soviet Union. Had the UK developed such a story, it would presumably have centred on the economic transformation of the late twentieth century, as the struggling economy of the 1970s reinvented itself as one of the most dynamic participants in the global market.” (Saunders, 2018, pp. 380-381).

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### **Contact information**

#### **Bc. Patrícia Bokorová**

University of Economics in Bratislava, Faculty of Commerce

Dolnozemska cesta 1, 852 35 Bratislava

E-mail: pbokorova1@student.euba.sk

ORCID: 0000-0002-1947-6055

#### **Assoc. Prof. Dr. Denisa Čiderová**

University of Economics in Bratislava, Faculty of Commerce

Dolnozemska cesta 1, 852 35 Bratislava

E-mail: denisa.ciderova@euba.sk

ORCID: 0000-0002-0046-1451

#### **Bc. Tímea Fusatá**

University of Economics in Bratislava, Faculty of Commerce

Dolnozemska cesta 1, 852 35 Bratislava

E-mail: tfusata1@student.euba.sk

ORCID: 0000-0001-7628-8520

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# **ELECTRO MOBILITY – ONE-SIDED STRATEGY FOR ALTERNATIVE DRIVES OR IS IT BETTER TO FOCUS ON FUEL CELLS NOW?**

*Andreas Britsche, Milan Fekete*

## **Abstract**

In this article, the advantages and disadvantages of electric cars are examined and an outlook for the fuel cell is given. On the positive side of the utilization of electric cars are the subsidies from government and industry, tax benefits, lower maintenance costs e.g. costs for oil, filter or spark plug changes or the reduction of wear parts, no fear of driving bans, current parking privileges and lower noise emissions. On the currently critical side are the low range, long charging times, expandable charging infrastructures, high costs in case of battery defects and the production of the batteries and the mining of the raw materials. Fuel cells are a good alternative to electric batteries because they only release water as a by-product, which is not harmful at all.

*Keywords: Electro mobility, electrification, fuel cells, combustion, alternative transportation*

## **1 INTRODUCTION – ELECTRO MOBILITY AS A CORE PRODUCT IN ALTERNATIVE DRIVES**

Road transport technologies are ever-changing because the conventional combustion engine is incompatible with the world's aim of decarbonizing it. There are numerous factors that attribute and motivate consumers, carmakers, and government to shift to electrification of mobility. Electrification is an opportunity for countries to upgrade the so-called indigenous automobile sector amid the knowledgeable period. Electric cars do not emit fumes with nitrogen oxide or greenhouse gases, but they need a combination of resources of rarer raw materials and the disposal and recycling still pose significant problems. So, the sustainability of electric cars is therefore still being scrutinized.

The use of electric vehicles is defined as electro mobility and this term applies to an array of vehicles ranging from bicycles to trains. With the advent of automotive back in 1900, the people in the U.S. preferred electric cars over combustion engines. The basic problem of the early electric vehicles, in addition to the range (average 30 km), was the weight of the lead-acid batteries. The development was continued, but it was not until the end of the 20th century that it gained increased attention due to the new technical possibilities of the more compact design of the batteries (Karle, 2017, pp. 19). In the following decades, people started using combustion engines because electric motors had a low capacity and were unable to cope up with people's demands.

Road transport technologies are ever-changing because the conventional combustion engine is incompatible with the world's aim of decarbonizing it. Therefore, carbon-efficient technologies are emerging, and nothing sounds innovative other than electrification (The process of changing to electric vehicles rather than conventional combustion engines). Unlike before, this electrification does not only involve changing the combustion engine with an electric motor, but a lot of components are being changed while an electric car is manufactured. Moreover, road transport electrification aids in innovative interfaces (connection, paradigm) and infrastructure between energy systems and transportation systems because it favors unique

concepts and attitudes of mobility and people respectively. Due to these systematic changes (occurs when change reaches all or most parts of a system, thus affecting the general behavior of the entire system), car manufacturers are emerging and this is referred to as the “paradigm change” (Donada & Fournier, 2014).

Vulnerable climate change is not the sole factor that attributes and motivates consumers, carmakers, and government to shift to electrification of mobility. Electric Vehicles (EV) offer a promising solution to polluted metropolitan cities since they are emission-free. Similarly, if electric energy is used to drive cars then there will be no need for fossil-based sources to run the combustible engine. As of yet, the trade of fossil fuels disrupts the foreign trade cycle in several countries. To combat the trade deficit and pollution, some countries are shifting to electro mobility to make their automotive industry more competitive. Hence, different factors motivate industries and governments to shift to electro mobility differently. Furthermore, preparatory conditions such as energy system characteristics, technological capabilities, and demand conditions are parallel to each other. Thus, consumers and carmakers opt for different national policies and technological options to support the mission.

Technological (related to technology) pathways for electro mobility vary from country to country. The early tenure of EV dominance is referred to as the “era of ferment” as it was characterized by both tough competition and experimentation (Anderson & Tushman, 1990). The later stage after tough competition is easier for countries with economies of scale and grand network effects. (Boschma & Martin, 2010) This suppresses alternative options that lead to dominant design (Utterback & Abernathy, 1975).

There are innumerable differences and similarities in technological pathways taken by both international and national determinants (a factor which decisively affects the nature or outcome of something). For example, the fermentation phase is different in Asia and Europe because of different global forces. In both continents, the technology choice is determined by the automotive firms operating there, alongside their production network around the globe. Thus, there is a dialectic relationship between conditions and strategies prevailing in a country and it is unaligned with the statement that there are uniform technologies among countries.

There are two main supporting factors behind electro mobility. First of all, electrification is an opportunity for countries to upgrade the so-called indigenous automobile sector amid the knowledgeable period. The automotive industry is simple but has a complex paradigm that might upgrade the countries power industry. Some countries like China have ample experience in manufacturing electric batteries since it has 13% of the world’s lithium reserves. Secondly, increasing urban population is another factor that contributes to electrification. In some countries, the concentration of polluted air is far beyond the benchmark of the World Health Organization (WHO) (Cheng, Jiang, Fajardo, Wang & Hao, 2013). It is worth noting that in China shifting to electrification has increased carbon-based emissions (Wilson, 2013). Not very long ago, France adopted electro mobility but hasn’t encountered long-standing benefits despite government investment, public procurement programs, and high subsidies (a sum of money granted by the state or a public body to help an industry or business keep the price of a commodity or service low). Grand-scale carmakers such as PSA and Renault have different production strategies because of more international exposure; however, for a local subsidy, all that matters is domestic sales. Moreover, the nature of national subsidy is temporary such as France’s fiscal (relating to government revenue, especially taxes) disruption did not result in more sales pick up. In the light of this issue, the fiscal policy is brittle due to weak industrial structure and competitiveness.

The nascency (the event of being born) specificities of the automotive industry are undermined by political frameworks in Germany. Germany initially missed the rapid development in the



field of electric car mobility and other manufactures occupied the segment before. Thus, Germany focused on manufacturing PHEV (acronym for plug-in hybrid electric vehicles) and HEV (acronym for hybrid electric vehicles) car models soon after France. This lag is oftentimes overlooked as a matter of concern, but Germany well-recognizes Toyota's early bird entry into the hybrid car zone. This means that grand-scale production requires a changeover, but with low investment and fewer components, the efforts for electrification are quite low.

The purpose of this paper is to contrast the current strategies for mobility. In particular, it compares electromobility with combustion-based mobility. Alternatively, fuel cells technology is referenced. Possible research questions are thus the further development of the different technologies and the supply chains integrated with them.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

There are innumerable benefits of electro mobility as compared to diesel-run and internal combustion engine vehicles. Taking few examples, the first Renault Twizy, Nissan Leaf or BMWi3, exhibit utmost performance with minimal carbon emissions, but as the focus is diverted to the electrification of cars, buses, and trucks investors and carmakers have hawk-eyes over manufacturing and infrastructure processes that surround the electrification process. The negative presumption of battery production is a major problem for EVs. People assume that the wastewater of the battery industry is spilled into the water canal. However, there are no exhaust emissions of the battery industry, but some batteries produce carbon while the minerals are sourced. Another problem is the carbon footprint that comes along with all types of batteries, even Li-ion batteries. If the world shifts to electrification there would probably be zero exhaust emission, but then the other issue would be the availability of electric sources. Ideally, using solar, wind, or hydropower is one of the best solutions. The charging infrastructure to keep the vehicles running requires global charging standards against which there is a lack of construction. Adding remote and changeable charging points is complex. Some of the cars use regular household sockets for charging. Conventional mindsets agree that combustion engines are dangerous for climate, but they also show anxiety over electric vehicles because for them it is seen as an increasing rate of adoption. At this point, the capital expenditure of electrification is higher than the cost of regular fuel. Electro mobility has stepped up to the infancy stage, but still, the Total Cost of Ownership (TCO) is unguaranteed. Electric Vehicles require less maintenance and repair than combustion vehicles, but in the years to come electric vehicles will offer a much better Total Cost of Ownership (TCO).

Undoubtedly, EVs have minimal climate impact as opposed to vehicles that run on combustion engines (Knobloch et al., 2020). Along with governmental subsidies and technological progress, this has resulted in the massive production of electric cars (Deng, Bae, Denlinger & Miller, 2020). The pace of electrification can be judged by the fact that at the start of the previous decade there were a couple of thousands of electric cars, but by the time the decade was about to end, the total number of electric vehicles was more than 7.5 million. Unfortunately, the global market penetration for electro mobility is only 1.5% but future analysts have predicted an absolute rise in the digits ("Global EV Outlook 2020 – Analysis - IEA", 2021).

Lithium-Ion Batteries (LIB) are an emerging technology for Electric Vehicles. A typical LIB consists of graphite as an anode, Nickel (Ni), Cobalt (Co), and Lithium (Li) as anode. Also, it contains copper and aluminum as pack components. Most commonly, the cathode is made up of lithium iron phosphate (LFP), lithium nickel cobalt aluminum oxide (NCA), and lithium nickel cobalt manganese oxide (NCM). Due to the rampant emergence of the EV industry, many risks have also emerged such as geopolitical cobalt concentration, environmental, and social impact (Olivetti, Ceder, Gaustad & Fu, 2017).

Interpreting the future demand of raw material used for Electric Vehicles is important to manipulate the strategic, social, environmental, and political impact. Several studies have quantified and predicted the future demand such as China, United States, and Europe (Ziemann, Müller, Schebek & Weil, 2018). Upon a wise assessment of EV batteries, a shortage of Co and Li at the global level can be expected (Pistoia & Liaw, 2018). Nevertheless, it is hard to investigate the impact of battery development such as improving Lithium-Air (Li-Air) and Lithium-Sulfur (Li-S) recycling. The global condition of EV development and everchanging battery technology demand for light-duty batteries that make use of Silicon (Si), Graphite (C), Copper (Cu), Aluminum (Al), and Manganese (Mn). The raw material demand interferes with the current production unit because of reduced material.

Upon scrutiny inside the EV supply chain, it can be observed that apart from limited raw materials there are various underappreciated (not valued or appreciated highly enough) costs. These costs rule out the future of the batteries as either reliable or clean enough to fulfill people's expectations or the possibility of it containing any unprecedented human rights infringement (to deny individuals their fundamental moral entitlements). The undermining risk is that these electrical sources are manufactured at upstream origin with different Lithium-ion variants. Typically, the anode is made of inert graphite, while the cathode is a mix of elements like manganese, nickel, or cobalt. As of yet, Manganese-Cobalt-Nickel batteries supervise the market; for instance, Tesla electric cars use Lithium-Nickel-Cobalt-Aluminum so it is proof that batteries do not need to rely only on Nickel.

Lithium sources are widespread in Argentina, Chile, and Bolivia, while the Democratic Republic of Congo (DRC) is rich in Cobalt. Mineral extraction of Nickel and Cobalt occurs after few compromises to human rights and the environment. In DRC more than 40,000 children are working for Cobalt extraction. On the other hand, lithium extraction in Chile is a water-demanding business and results in wastewater disposal into the agricultural land. Still, human rights and environmental concerns come after the lack of raw materials due to the scarcity of lithium. The raw materials needed for battery production are present in small sets in markets. Worse than this is the fact that the raw materials for batteries are controlled by a single actor (one that takes part in any political affair) and that is China. The Chinese industrial policy dominates both national and international raw material production. The state subsidies are present in Beijing and it is the main factor that controls the global EV industry and supply chain. The concentrated upstream consumption (refers to the material inputs needed for production) and supply of raw materials impose several security risks in the EV supply chain.

As discussed above, DRC controls the global supply chain of Cobalt because it produces 60% of the world's Cobalt. Another fact is that the cobalt mines in DRC are owned and invested by Chinese firms under the Chinese Communist Party (CCP). The supremacy of the Chinese over DRC's reserve can be judged by the fact that in 2018, more than 85% of Cobalt reserves in DRC were used by Chinese companies. Also, Chinese companies control at least 12 Cobalt reserves in DRC. Moreover, the state-owned enterprises of China control the supply chain of DRC Cobalt reserves.

One of the Chinese state-owned enterprises have a rich network in DRC with several smelters (an installation or factory for smelting a metal from its ore) and leach plants for mineral research. The supply chain and strategic management leverages between different Chinese players. The vertical integration of the raw material market is non-stop since China enjoys a mastery over the automotive industry. One of the Chinese companies by the name of Contemporary Amperex Technology Co. (CATL) supplies to Honda, Toyota, Volkswagen, and BMW. Furthermore, China carries out strategic partnerships and investments to integrate itself in foreign competitors. Chinese corporate and state actors have control over every EV start-up.

The concentrated raw material supply from only one state introduces a failure factor that disrupts the supply chain due to the generation and magnification of ripple effects. Amid the COVID-19 pandemic, the raw material firms have encountered major risks of unilateral dependency and low resiliency. Due to these reasons, China has become a global master and has dominated the supply chain at both coercive ends. This supports anti-competitive and non-market behavior; for example, Ford and Nio are competitors but both are being supplied by China.

Human rights and environmental concerns have motivated to reduce the use of standard EV batteries. Any technological advances may upgrade the tainted materials used for EV battery production. For instance, the use of silicon is equivalent to using graphite anode in Lithium-Ion batteries. Another approach used by Tesla is reducing the cobalt cathode in batteries to protect the environment. These kinds of moves are unlikely to alter Chinese control because Beijing also controls the global polysilicon (polycrystalline silicon is used as a raw material by the solar photovoltaic and electronics industry) economy. Hence, it is premature to anticipate exceptional technology in the supply chain of either cobalt or silicon. Chinese omnipresence in the technological niche also allows it to have a stronger control; for instance, CATL is the largest EV battery manufacturer in China and supplies Lithium-Ion phosphate to Tesla's plant.

Why the advantage gained by the battery is cancelled out by the combustion engine?

Undoubtedly, there are an array of benefits of battery-run cars such as the cars are:

- Environmentally friendly
- Renewable source, unlike gasoline
- Require minimal maintenance
- Less noisy than combustion engine cars
- Beneficial because of the availability of tax credits

Despite numerous advantages of battery over combustion ignition, there are a few demerits of the electric cars such as:

- Battery-run cars have a shorter range as compared to normal cars
- Charging of battery is time-consuming than refueling
- The cars are quite expensive
- There are few charging stations only

Hence, a car is meant for a person's ease so people prefer combustion engines over batteries because they cannot wait for the charging of the battery and have low budget. Therefore, as far as the current pace of electric cars is concerned there needs to be a lot done before people could actually choose electric cars.

## **2.1 Is sustainability questionable?**

Indeed, electric cars do not emit dangerous fumes, but the batteries they use emit toxic fumes. The electricity used to power EVs is generated by numerous non-renewable sources and that leaves an impact on both environment and health. Also, EVs may take up to 12 hours for full charging so the total cost saved by fuels is covered by the electricity bills. Nevertheless, the amount will be quite lower than the fuel cost. EV batteries contain flammable and toxic materials that require an ample amount of manufactured energy, which releases as a greenhouse gas. Metallic minerals like nickel and cobalt are used in the battery industry and their extraction

leaves toxic wastes in the ground. While extracting nickel from its ore a high amount of sulfur oxide is released which is an environmental pollution. Rechargeable batteries in EV can unload, but all of the energy is not converted for use. Some of the portion of the energy is lost; for example, a standard acid battery loses 20-30% of its energy.

Electric cars do not emit fumes with nitrogen oxide or greenhouse gases, but the process of making batteries and disposing of them can lead to a loss of sustainability if new battery technology is not developed.

The carbon footprint (the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community) of an electric vehicle is the same as that of a conventional combustion engine. Electric vehicles emit no carbon dioxide; however, the plan that charges electric vehicles emit carbon dioxide. Battery disposal and recycling is a cost-inefficient way since huge investments are needed. Also, recycling of batteries is not guaranteed because the breakdown of battery components releases harmful toxins that may pollute the environment. Improper disposal of batteries can emit harmful metallic compounds such as Lithium, Cadmium, and Nickel that may seep into streams, groundwater, and local soils. The incineration of batteries releases heavy metals directly into the atmosphere. Moreover, battery disposal contributes to air and water pollution. When batteries are thrown in trash, they end up damaging the landfills due to leaks and decay. The corrosion of the battery can release harmful chemicals into the groundwater and may contaminate the surface water with heavy metals. The full charging of Tesla requires about 40 minutes as compared to 1-2 minutes fuel refill. Also, there are very few charging stations in the world as compared to petrol stations. Therefore, it is clear that the recycling procedure of batteries is very immature and thus proper waste disposal might be needed to cause less damage to the environment.

### **3 METHODOLOGY**

An extensive literature on the current market situation exists in the field of electro mobility. The authors focused on the literature on market orientation and its consequences published in German and English. Several specific papers have focused on the consequence for the environment, renewable sources and sustainability. A survey of the literature was carried out and compiled from search engines like Google scholar using keywords such as electro mobility, electrification, fuel cells, combustion and other related terms. All the papers used for this review were published in reputable scholarly journals or publishing companies.

This paper is a literature review whether it is interpretive or aggregative synthesis of literature and the databases were used for literature review.

### **4 SCIENTIFIC RESULTS**

An alternative to electric batteries is the use of fuel cells in electric vehicles. Fuel Cell Electric Vehicle (FCEV) generates energy using hydrogen only. It is more efficient than combustion engines and standard electric batteries since it produces minimal tailpipe emissions. Fuel cells only emit warm air and water. Currently, hydrogen infrastructure (infrastructure of hydrogen pipeline transport, points of hydrogen production and hydrogen stations for distribution as well as the sale of hydrogen fuel) and FCEV are in their introductory stage of implementation. FCEV is based upon a propulsion system similar to that of electric batteries in which hydrogen is used to drive electric. Unlike traditional combustion engines, FCEV requires pure hydrogen gas as a fuel and it only takes about 4 minutes to refill the tank full of hydrogen gas. Fuel cells are referred to as the “no-emission vehicle” because it only emits water vapor. The main source of

hydrogen is important for a vehicle's environmental performance. The best way is to use the hydrogen emitted in renewable energy production in fuel cells. Internal Combustion Engines (ICE) - an engine which generates motive power by the burning of petrol, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand - and Electric Batteries cause carbonization; hence, it is important to develop sustainable technology for driving electric vehicles.

Fuel cells are still in the demonstration and development phase because all carmakers are progressing towards sustainable development programs. With increasing environmental concern, more and more attention is diverted towards fuel cells as alternatives in running electric vehicles. The current units of fuel cells are used only for portable items, but in the transportation niche, only 15% of vehicles use fuel cells. Electrical vehicles that use fuel cells are powered by both fuel cells and batteries. There are various configurations in fuel cell vehicles that depend upon battery rules, type of fuel cell, and hybridization level. In traditional combustion engine, batteries provide electrical energy, but in fuel cell vehicles the battery and fuel cell are connected in parallel to provide power. A conventional electric car with a standard battery has an intrinsic (upper limit to the possible intensity of every. positive property which is capable of degrees) limit, recharge time, and range. On the other hand, fuel cell batteries have more range and can cover greater distances due to stored hydrogen. Another factor is that hydrogen refueling is less time consuming than the total recharging time of an electric vehicle.

The Fuel Cell and Hydrogen Joint Undertaking (FCH JU) have allocated €1.33 billion as of 2020 to support fuel cell projects as an alternative to electric batteries. The two main fuel cells funded projects are JIVE 1 and JIVE 2. Another fuel cell funding source is the European Union (EU) Connecting Europe Facility (CEF) with a multi-million budget for developing hydrogen infrastructures. Another project by the name of MEHRLIN will deploy (move (troops or equipment) into position for military action) seven hydrogen stations in Europe. The Europe Investment Bank provides interest-free loans for large-scale hydrogen infrastructure, along with a cleaner transport facility. Riga was one of the first cities to get the loan for the execution of fuel cell programs with a total of 10 fuel cell buses. Other than that, some EU-based funding programs take help from structural funds such as European Regional Development Fund (ERDF).

On a national level, different support levels vary from country to country, but most of the countries have other funding programmers that can support the fuel cells; for example, getting funds from Office for Low Emission Vehicles (OLEV) and Nationale Organisation Wasserstoff und Brennstoffzellentechnologie (NOW) program. On a local level, some authorities work in collaboration with European regions to assist in finding programs. These co-support local funding projects are, for example, in the Westphalia region.

Sustainability is a major factor in long-standing energy infrastructure viability in some regions. Global fuel cell development is challenging because it reduced the carbon footprint effect. Put simply, fuel cells only use hydrogen which reacts with oxygen to produce water. So, there are no carbon by-products that can cause a carbon footprint. The raw material for fuel cells is hydrogen, but there is no clear-cut manufacturing process of hydrogen except for the electrolysis (a technique that uses direct electric current to drive an otherwise non-spontaneous chemical reaction) of water or distillation of air. These two processes are very expensive so fuel cell experts are trying to find a good resource of hydrogen gas that can be used in fuel cells. The dual-track (the aim is to validate ideas for products as quickly and cost-effectively as a team possibly can) production of fuel cells in the medium term is the benchmark for sustainability and competitiveness.

## 5 DISCUSSION

With regard to the next stage of automotive transport technologies, interesting questions arise about the use of electromobility and hydrogen technology or fuel cells.

Especially the influences of power generation, power transport, and the production of batteries affect the further development in the market. As explained in this article, the raw materials currently used for battery production are a decisive parameter for sustainability. However, we will certainly see strong innovations here in the coming years.

Furthermore, the expansion of the infrastructure and the convenient usability for customers will ensure innovations in the automotive and technology development. The usability of different technologies will be adapted to the conditions of different markets and the demands of customers.

## 6 CONCLUSION

The electric vehicle industry and its growth are not only welcomed by carmakers, but it is a dire need because of alarming pollution and greenhouse gas emissions. As demonstrated within the environmental, social, and economic analysis, the long-term benefits of electric vehicles overcome the total costs. One of the great obstacles is the widespread use of electric vehicles which renders the process inefficient due to the lack of recharging stations (an electric vehicle charging station, also called EV charging station, electric recharging point, charging point, charge point, electronic charging station (ECS), and electric vehicle supply equipment (EVSE), is a machine that supplies electric energy for the recharging of plug-in electric vehicles). In this decade, carmakers have anticipated policy changes and technological advancements that may transform the traditional vehicle industry. Moreover, the success and realization of electric vehicles depend upon the global population. With environmental education and mass marketing (a market strategy in which a firm decides to ignore market segment differences and appeal the whole market with one offer or one strategy, which supports the idea of broadcasting a message that will reach the largest number of people possible), people may feel empowered and incentivized to drive an electric vehicle. Due to the lack of resources to use electric cars, many people have not switched to electrification because no one would find as many recharging stations as petrol pumps. Also, electric batteries cause minor pollution of heavy metals that are toxic to human health, the environment, and crops. In the light of all the above issues, fuel cells are a good alternative to electric batteries because it only releases water as a by-product, which is not harmful at all.

The current advantages and disadvantages of using electric cars or fuel cells will change in the coming years. Not only big cities and their infrastructure but also landscapes with a lower population density will use new or adapted mobility concepts and adapt them to the respective needs that the market demands and the technology provides.

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## Contact information

### Dipl.-Kfm. Andreas Britsche

Comenius University in Bratislava, Department of Strategy and Entrepreneurship, Faculty of Management

Odbojárov 10, 820 05 BRATISLAVA, Slovak Republic

E-mail: [britsche1@uniba.sk](mailto:britsche1@uniba.sk)

ORCID: 0000-0001-8726-8146

### Assoc. Prof. Ing. Milan Fekete, PhD.

Comenius University in Bratislava, Department of Strategy and Entrepreneurship, Faculty of Management

Odbojárov 10, 820 05 BRATISLAVA, Slovak Republic

E-mail: milan.fekete@fm.uniba.sk  
ORCID: 0000-0001-8834-4470

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# EMPLOYMENT OF GRADUATES WITH ENVIRONMENTAL KNOWLEDGE

*Roman Buchtele*

## **Abstract**

The presented paper deals with the employment of graduates, the university students, with environmental knowledge.

The aim is to describe how students with an environmental focus imagine their future position in the labour market. Furthermore, the aim is to answer the question of what role the environmental knowledge acquired at university plays in their future job decisions.

The subject of the analytical part constitute the data obtained by a pilot qualitative survey in the spring of 2020 in the form of interviews and data obtained by a pilot questionnaire survey in the spring of 2021. The methodology was based on the triangulation of methods – the qualitative and the quantitative approach.

The main findings from the results show that students combine their future activities with companies in the field of green economy or circular economy. It has been confirmed that their environmental knowledge influences their future job decisions. Students' future decisions about their employment in the context of environmental knowledge are not influenced by the inclination towards a New Ecological Paradigm. Graduates are also aware of the mismatch in the labour market.

*Keywords:* graduates, environmental knowledge, green economy, labour market, qualitative approach, quantitative approach

## **1 INTRODUCTION**

One of the basic tasks of universities is to supply the labour market with experts with knowledge in their chosen field of study. This is due to the growth of environmental awareness, which was most pronounced in the second half of the 20th century. The second reason is the application of new alternative concepts of economic development, which stand against the current prevailing development paradigm. This current development paradigm can be characterized as linear.

Capasso et al. (2019) state that environmental knowledge is a necessary driver of green growth in regions or states. Universities thus play an important role in supplying the labour market with experts who are equipped with this knowledge. Šlaus & Jacobs (2011) have previously confirmed this general starting point. They consider the development of human capital to be a critical factor in long-term sustainability. According to Chekima & Chekima (2019), environmental knowledge can be understood as the amount of information individuals have concerning environmental issues and their ability to understand and evaluate its impact on society and the environment.

This undoubtedly underlines the importance of university graduates who are equipped with environmental knowledge. These experts should be required by companies that have elements of the green economy or circular economy incorporated in their strategies. The aim of this paper is to describe how students with an environmental focus imagine their future position in the

labour market. Furthermore, the aim is to answer the question of what role the environmental knowledge acquired at university plays in their future job decisions.

## 2 THEORETICAL BACKGROUND

The growth of environmental awareness across societies can be dated to the second half of the 20th century. It is necessary to characterize that period as follows. The human population has grown rapidly, which is associated with the growing consumption of natural resources, as the quality of life has increased with the population, especially in the Western world. In the late 1940s, Leopold (1989) criticized the current development paradigm, which is based on the fact that the industrial development of economies can grow indefinitely and the Earth's resources are unlimited commodities that serve only to humans. His book containing these conclusions was not published until the end of the millennium. In the 1960s, other important publications were added to the discourse. Carson (1964) opposed the increasing use of pesticides in agriculture. The general concern has led government officials to address the negative effects of using these substances. The direct impact was that a Scientific Advisory Committee was set up in the United States to further address this issue. Meadows & Club of Rome (1972) began their activities in the late 1960s and created a model of the Earth's development, demonstrating the mismatch between resource consumption, population growth, and industrial production. All this resulted in the definition of sustainable development by the World Commission on Environment and Development (1987), which represents a long-term goal for all alternative paradigms of economic development.

Concepts such as the green economy or the circular economy are beginning to be widely implemented in the world's economies. According to Loiseau *et al.* (2016), the circular economy is based on the concept of a green economy. D'Amato *et al.* (2017) even add the concept of bioeconomy. The authors state that the concepts of green economy, circular economy and bioeconomy together form three basic mainstream concepts of how to achieve sustainability. Cato (2009) defines the green economy in general as an alternative to the current economic paradigm. UNEP (2021) further specifies the green economy as low-carbon, resource-efficient and focused on social inclusion. Public and private investments are the source of employment and income growth. These investments go to infrastructure or assets that aim to reduce carbon and pollution emissions, improve energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. Loiseau *et al.* (2016) further add that the attractiveness of the concept of green economy has been growing in recent years. According to these authors, the green economy intersects a number of different concepts and the link to sustainability is not always clear.

The green economy was explicitly suggested as a possible solution to the financial crisis, because according to Dahl (2011), it represented a combined solution for the economy, human well-being and, last but not least, for the environment. Cudlínová (2014) describes the green economy in the context of the financial crisis as capable of creating green growth, which will be significantly more environmentally friendly than the previous "brown" economy based on oil and coal. The solutions used will be green investments and green jobs. The purpose of these instruments is to postpone growth limits. However, the problem occurs in the long run. These tools will not be able to solve global environmental and social challenges in the long term.

The second important concept, with which a number of companies in the current market are identified, is the circular economy. One of the most cited definitions comes from the Ellen MacArthur Foundation (2013): "*A circular economy is an industrial system that is restorative or regenerative by intention and design*". Geissdoerfer *et al.* (2017) define circular economy as a "*regenerative system in which resource input and waste, emission, and energy leakage are*

*minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling”.*

If we move to the application of the principles of circular economy across companies, based on the results of the model from Ungerman & Dědková (2019), it can be said that the involvement of companies in the circular economy is beneficial. The biggest obstacle represents the initial investment in technology. Of course, in addition to the increased economic prosperity of companies, an important result is a positive impact on the environment.

As mentioned above according to D'Amato *et al.* (2017), the concept of bioeconomics is often mentioned in the context of modern approaches across companies. According to the European Commission (2020), bioeconomy means: “*using renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy.*” According to Stegmann *et al.* (2020), the concept of circular bioeconomy plays a role in companies that work with biomass and their business thus contributes to the achievement of global climate goals. It is a combination of two partial concepts: bioeconomy and circular economy.

Sulich *et al.* (2020) describe that green jobs can represent a solution to the difficulty of young people or graduates in finding their first job. However, according to the results, the share of young people finding their first job in the field of green economy in the Czech Republic is relatively small. It is around 1,83 %. For example, in Belgium or Poland it is around 15 %. The authors state that the Czech Republic is leaving high-waste and high-pollution technologies. This may mean that there will be more graduates in the future who will move towards a green economy.

The importance of environmental knowledge for green jobs is described by many authors. Strietska-Ilina *et al.* (2011) describe that the transformation of industry towards activities with lower carbon emissions and less impact on the environment causes structural changes in the economy and especially in employment. The authors call this process green restructuring. In practice, this means that there is a demand for employees with different knowledge on the labour market than there has been in the past. In this case, it is environmental knowledge. In addition to generating new professionals, this also means retraining existing staff. Environmental knowledge related to green jobs will be required, both for the existing occupations and for the completely new ones that are being created. This is followed by research by Consoli *et al.* (2016). Their empirical analysis focused on the knowledge characteristics of employees in the context of the green economy and sustainability. The results show that green jobs require high-level of cognitive and interpersonal skills. Furthermore, these green jobs are also associated with a greater demand for education. The authors confirmed that environmental knowledge and other skills represent an important factor when transitioning to the green economy.

A number of factors can influence students' decisions about their future profession. These may be, for example, pro-environmental attitudes that are common among students, as research has shown (e.g. Erdogan, 2009; Vikan *et al.*, 2007). As part of the application of the principles of the green economy across companies, corporate social responsibility (CSR) is an important factor, as stated by Ryszawska (2018). Brekke & Nyborg (2008) addressed the positive impact of CSR on the ability of companies to employ employees whose motivation to perform their profession is based on their moral motivation in the context of pro-environmental attitudes. It seems advantageous for companies to employ such employees. One of the consequences may be that if employees choose "green" companies, the equilibrium wage will be lower in such companies. The savings can be used to green the business in terms of investing in more

environmentally friendly technologies. The second important factor may be the higher productivity of these employees. Heyes (2005) reached similar conclusions in his research in another economic sector. He confirmed that employees who choose future jobs based on their values and moral principles are more productive.

It is also important to answer the question, what is the current situation on the European labour market? As mentioned above, Sulich et al. (2020) point to inequalities between EU countries. In the Czech Republic, only 1,83 % of graduates find their first job in the field of green economy. In other countries, such as Belgium or Poland, this number is much higher. This inequality is also underlined by Colijn (2014), who states that countries such as Denmark, Norway, Switzerland have a large number of green economy jobs compared to Central Europe and Eastern Europe. The reason is the different pace of green transformation across the regions of the European Union.

This might mean that in some countries may be a mismatch in the labour market between the supply of labour and demand for labour in the context of graduates with environmental knowledge.

### 3 METHODOLOGY

The basis of the pilot survey was the triangulation of methods. In the first phase, qualitative research was conducted in the form of a series of semi-structured interviews. A total of eight respondents participated. All respondents were students of the Faculty of Economics of the University of South Bohemia. The basic characteristic of this group of students represents the fact that their economic disciplines are focused on environmental topics. They were students of bachelor's and master's degree programs. The gender distribution was as follows: two men, six women. This phase of the pilot survey took place in spring 2020.

A quantitative approach was chosen for the second phase of the pilot survey. Forty-nine respondents were addressed via a questionnaire. Most of them were students of the Faculty of Economics of the University of South Bohemia. The others were from: University of Hradec Králové, Jan Evangelista Purkyně University in Ústí nad Labem. The basic characteristic of this group of students was, as in the previous case, that their fields of study were focused on environmental topics or contained subjects that deal with environmental issues. They were students of bachelor's and master's degree programs. The gender distribution is as follows: five men, thirty-four women. This phase of the pilot survey took place in the spring of 2021.

Some questions in the questionnaire include the term sustainable development. In case of this research, the primary focus is set on the environmental pillar of sustainability.

Based on the results of the pilot survey using a qualitative approach, hypotheses were compiled for the second pilot survey using a quantitative approach.

H1: *"Graduates' environmental knowledge does not influence decisions about their future profession."*

H2: *"The supply and demand for graduates with environmental knowledge is in balance in the labour market according to students."*

Hypotheses are set as null.

The questionnaire included the tool of environmental sociology NEP & HEP analysis according to Dunlap *et al.* (2000). It is a tool that measures the transition from the paradigm of human exclusivity to the New Ecological Paradigm. The principle is that the respondent agrees or disagrees with the partial statements that are assigned to one of the two paradigms.

Tab. 1 – NEP & HEP item used during research, Source: Dunlap *et al.*, 2000

#	Paradigm	
1	NEP	We are approaching the limit of the number of people the earth can support.
2	HEP	Humans have the right to modify the natural environment to suit their needs.
3	NEP	When humans interfere with nature it often produces disastrous consequences.
4	HEP	Human ingenuity will ensure that we do not make the earth unliveable.
5	NEP	Humans are severely abusing the environment.
6	HEP	The earth has plenty of natural resources if we just learn how to develop them.
7	NEP	Plants and animals have as much right as humans to exist.
8	HEP	The balance of nature is strong enough to cope with the impacts of modern industries.
9	NEP	Despite our special abilities, humans are still subject to the laws of nature.
10	HEP	The so-called "ecological crisis" facing humankind has been greatly exaggerated.
11	NEP	The earth is like a spaceship with very limited room and resources.
12	HEP	Humans were meant to rule over the rest of nature.
13	NEP	The balance of nature is very delicate and easily upset.
14	HEP	Humans will eventually learn enough about how nature works to be able to control it.

## 4 RESULTS

As mentioned above, data collection in the pilot surveys took place in two phases.

### 4.1 Pilot survey – qualitative approach, spring 2020

Within the qualitative pilot survey, two areas were important for this contribution. The first area concerned environmental knowledge as perceived by students as future graduates.

All respondents believe that their environmental knowledge can influence future economic development. They further specified this statement and, in addition to human values or attitudes, the key to them is mainly the future job position. In such job position, they can apply their environmental knowledge.

It is important to look at the knowledge according to the respondents in two ways – environmental knowledge acquired at university and environmental knowledge acquired outside university.

Six respondents confirmed the need to combine this knowledge in this way, and at the same time underlined the role of the university and environmental education, which helps them to understand this knowledge in a broader context and to apply it in the future.

The second area dealt with the demand of companies for graduates with environmental knowledge. Students combine their future jobs with companies that they have defined as: new, modern or “green” companies that often operate in new areas of the economy such as the bioeconomy or apply the principles of the circular economy. According to the respondents, these companies are those that require experts with environmental knowledge. All the addressed students agreed.

In conclusion, three respondents pointed to the mismatch in the current labour market, which is caused by the fact that the supply of employees with environmental knowledge represents an

offer for the future. According to them, today's companies are not looking for such employees. In their view, this mismatch should change over time.

The following statements can be deduced from the interviews:

- Students are aware of the importance of their environmental knowledge. It is important for them to combine several sources where they acquire this environmental knowledge.
- Students combine their environmental knowledge with companies that are associated with concepts such as: green economy, circular economy or bioeconomy.

#### 4.2 Pilot survey – quantitative approach, spring 2021

The NEP & HEP tool of environmental sociology was used to obtain the basic characteristics of the researched sample. The results in Fig. 1 graphically show that pro-environmental attitudes prevail among students and their attitudes can be assigned to a New Ecological Paradigm.

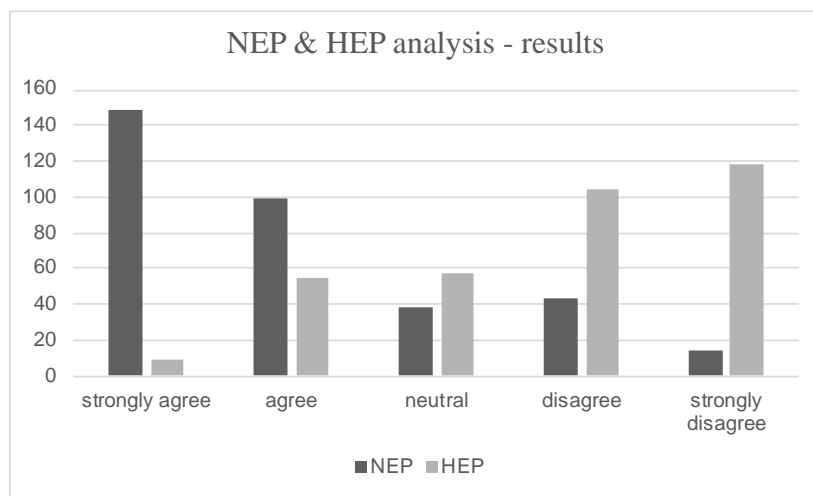


Fig. 1 – NEP & HEP analysis, n = 49. Source: own research

Another monitored characteristic was the importance of teaching environmental topics and sustainable development for the future development of the economy according to students. The degree of importance was measured on a scale of 1-10, where 10 = most important. The results show that students attach a high degree of importance to the teaching of environmental topics and sustainable development.

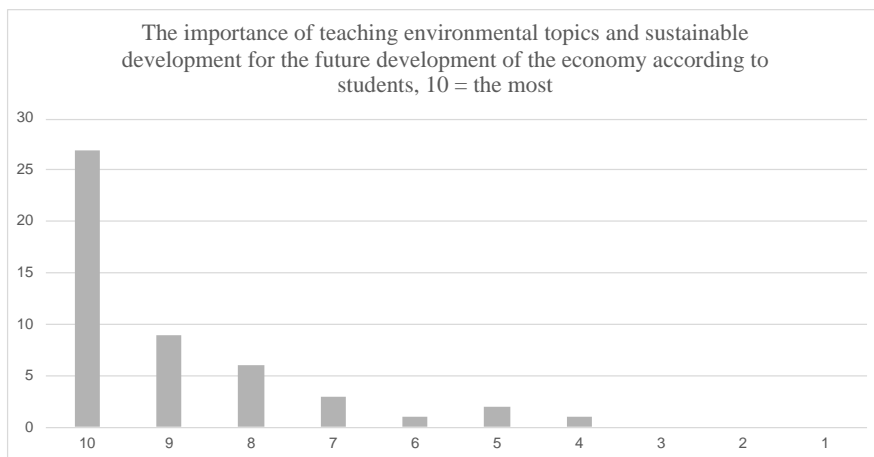


Fig. 2 – The importance of teaching environmental topics and SD, n = 49. Source: own research

However, environmental knowledge can have different sources. From the next Fig. 3 it is evident that students acquire the most of this knowledge at university. This is in line with the previous Fig. 2, where students emphasized the importance of teaching environmental issues and sustainable development. Furthermore, the graph also shows that they gain the least environmental knowledge within the family.

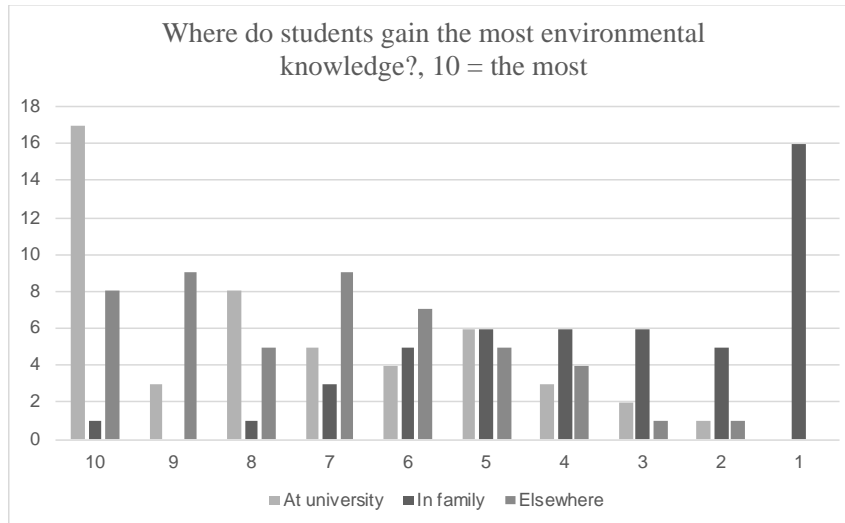


Fig. 3 – Where do students gain the most environmental knowledge?, n = 49. Source: own research

The question "Do you think you can use your environmental knowledge to influence future economic development?" was set to demonstrate the link between environmental knowledge and future economic development. It was determined with regard to how the students themselves perceive it. Based on the frequency of answers, it was determined that it is not possible to confirm the fact that students consider their environmental knowledge as an instrument to change the development of the economy.

Tab. 2 – Environmental knowledge – future economic development, n = 49. Source: own research

<i>Do you think that you can use your environmental knowledge to influence future economic development?</i>					
Yes	Rather yes	I do not know	Rather no	No	Mean
4 %	41 %	18 %	29 %	8 %	3,04

Next question "Do you agree with the statement that your environmental knowledge has or has had an impact on your decisions about future employment?" already shows a greater tendency of environmental knowledge to have influenced or will influence their future career choices. However, the degree of agreement with the assumption is not particularly significant. The mean in this case is greatly affected by the number of neutral answers.

Tab. 3 – Environmental knowledge – impact on decisions about future employment. n = 49. Source: own research

<i>Do you agree with the statement that your environmental knowledge has or has had an impact on your decisions about future employment?</i>					
Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean
18 %	31 %	23 %	20 %	8 %	3,31

These two questions, which are part of Tab. 2 and Tab. 3, were the subject of the correlation analysis. First, a correlation was performed with an inclination towards a New Ecological Paradigm. From Tab 4. it can be seen that there is no dependence between the selected variables. Environmental knowledge and its influence on future economic development is referred to as

variable # 1 and the environmental knowledge and its impact on decisions about future employment is referred to as variable # 2.

Tab. 4 – Correlation: variable # 1 and # 2– NEP. n = 49. Source: own research

<i>variable # 1– NEP</i>			
	Pearson`s r	p-value	n
variable # 1– NEP1	0,003	0,985	49
variable # 1– NEP2	-0,185	0,204	49
variable # 1– NEP3	0,060	0,682	49
variable # 1– NEP4	-0,078	0,596	49
variable # 1– NEP5	-0,100	0,495	49
variable # 1– NEP6	-0,015	0,920	49
variable # 1– NEP7	0,050	0,731	49
variable # 2– NEP1	0,034	0,817	49
variable # 2– NEP2	0,028	0,849	49
variable # 2– NEP3	0,218	0,132	49
variable # 2– NEP4	0,252	0,081	49
variable # 2– NEP5	0,054	0,715	49
variable # 2– NEP6	0,105	0,472	49
variable # 2– NEP7	0,070	0,633	49

The next step was to correlate variables # 1 and # 2 with the degree of importance that students gave to the teaching of environmental topics and sustainable development. A dependence was found between the high importance that students gave to the teaching of environmental topics and sustainable development and their future job decisions. Then, variables # 1 and # 2 with the amount of environmental knowledge that students acquired at university were the subject of the correlation analysis. There has been a dependence between the belief that through environmental knowledge, students can influence future economic development and the amount of environmental knowledge they have acquired at university.

Tab. 5 – Correlation: variables # 1 and # 2– importance of teaching environmental topics and SD; amount of environmental knowledge from university. n = 49. Source: own research

	Pearson`s r	p-value	n
variable # 1 – importance of teaching environmental topics and SD	-0,087	0,553	49
variable # 2 – importance of teaching environmental topics and SD	0,338	<b>0,018</b>	49
variable # 1 – amount of environmental knowledge from university	0,415	<b>0,003</b>	49
variable # 2 – amount of environmental knowledge from university	0,077	0,600	49

Finally, a question was asked based on the findings of the qualitative pilot survey. From the students' answers, it is evident that they again confirm the mismatch in the labour market, where the supply of labour from employees with environmental knowledge is greater than the demand for that labour according to students.

Tab. 6 – Situation on the labour market with employees with environmental knowledge according to students. n = 49. Source: own research

<i>Situation on the labour market with employees with environmental knowledge according to students</i>		
Supply of labour = demand for labour	Supply of labour > demand for labour	Supply of labour < demand for labour
12 %	51 %	37 %



## 5 DISCUSSION AND CONCLUSION

As mentioned above in the theoretical background section of this paper, green jobs in the context of green economy or circular economy are often presented as a tool for environmentally friendly economic growth and at the same time as a tool for solving the employment of young graduates (e.g. Sulich *et al.*, 2020). From the pilot survey through a qualitative approach, it is clear that students are aware of the importance of their environmental knowledge. They also realize and state that it is important for them to combine several sources where they acquire this environmental knowledge. Furthermore, students combine their environmental knowledge with companies that are associated with concepts such as: green economy, circular economy or bioeconomy. This is in line with the claims of the authors (e.g. Strietska-Ilina *et al.*, 2011; Consoli *et al.*, 2016) who describe the importance of environmental knowledge within the jobs in these companies, which operate in these "green" areas of the economy.

Pilot survey through a quantitative approach was based on a previous pilot survey. Authors (e.g. Erdogan, 2009; Vikan *et al.*, 2007) often work with a New Ecological Paradigm. As in their work, the pro-environmental attitudes of students towards the New Ecological Paradigm were confirmed in this research. However, the correlation analysis did not show that these attitudes of students would have a significant impact on their future choice of profession or belief that their environmental knowledge can influence future economic development.

It is clear from the results that according to students, the teaching of environmental topics and sustainable development is very important for them. Likewise, the amount of environmental knowledge acquired within the university is dominant. During the survey, students were directly asked whether they thought that their environmental knowledge could influence future economic development. Based on the frequency of answers, it was clear that the fact that students consider their environmental knowledge as an instrument to change the development of the economy was not possible to confirm. This can be interpreted as follows. Students do not have the faith and hope that they can change current economic developments through their environmental knowledge. The next question was whether their environmental knowledge has or has had an impact on their decisions concerning future employment. From the frequency of responses, it is possible to confirm this statement with the knowledge of the limitations of the research, however, the degree of agreement with the assumption is not particularly significant. Correlation analysis also showed that student, for whom the teaching of environmental topics and sustainable development is of great importance decide on their future profession on the basis of their environmental knowledge. Likewise, students who state that they have the most environmental knowledge from university believe that their environmental knowledge can influence future economic development. This may be related, for example, to the motivation of these future employees (e.g. Brekke & Nyborg, 2008; Heyes, 2005). Finally, students confirmed their belief in the situation on the labour market in the context of employees with environmental knowledge. The null hypotheses that were set for a quantitative pilot survey in the form of questionnaires can be rejected with the knowledge of the limited sample examined. The alternative hypothesis applies.

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## **Contact information**

### **Ing. Roman Buchtele**

University of South Bohemia, Faculty of Economics

Studentská 13, 37005 České Budějovice

E-mail: Buchtr01@ef.jcu.cz

ORCID: 0000-0003-0851-1318

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# DIRECT IMPACTS OF INDUSTRY 4.0 TO PURCHASING 4.0 AND QUALITY 4.0

*Sebastian Bunzendahl, Oliver Schneider*

## **Abstract**

Science has been studying industrial development for many years. With the 4<sup>th</sup>. Industrial Revolution, many theories have been studied and some of them are being used in practice. Keywords like "Digitalization - Networking - Connectivity - Smart Factory - BigData - Cyber-Physical Systems" are mentioned frequently in connection with Industry 4.0. Further scientific research on the impact of Industry 4.0 for quality management and purchasing has only been ongoing since 2017. Definitions for purchasing 4.0 and quality 4.0 are not given as a clear statement. Readiness model 4.0 is a first way to work with 5 levels to identify the implementation level. The aim of this paper is to review the current scientific discussion in the automotive industry and to develop further theories. The transformation in the automotive industry, away from the classic engine to electromobility, is forcing car manufacturers (OEM) to a rethinking. To be faster, cheaper with increasing quality and decreasing costs. GoogleTrends was used to get the first time frame of the internet queries. It can be seen that interest in Purchasing 4.0 and Quality 4.0 is only increasing significantly in 2017. The literature search includes the literature from 2017 beginning. This was analyzed qualitatively and quantitatively by using MAXQDA and key aspects were identified. It can be seen that the effects of Industrie 4.0 are being researched more intensively in German-speaking countries than in English-speaking countries. The results will be used to formulate new theses and to investigate them in a survey in the future. This survey is not the subject of this work.

*Keywords: Automotive Industry, Industry 4.0, Purchasing 4.0, Quality 4.0*

## **1 INTRODUCTION**

The evolution of purchasing and quality goes ahead with the development of industrialization. Already in antiquity, knowledge about purchasing was taught at commercial schools. (Hillberg K. 2017). The 1<sup>st</sup> Industrial Revolution started in 1784 by increasing productivity through the use of steam and water power. The implementation of assembly line production is associated with the 2<sup>nd</sup> Industrial Revolution in the 19th century. In the 20<sup>th</sup> century, programmable logic controllers (PLCs) initiated the 3<sup>rd</sup> Industrial Revolution. Industry 4.0 represents the 4<sup>th</sup> Industrial Revolution, which includes different elements (Lengnink 2018). Keywords such as cyber-digital systems, Internet of Things, Internet of Services, digitalization, networking, Big Data, Smart Factory and sustainability are currently discussed in the literature (e.g. David, 2020; Lengnink, 2018; Zafari & Teuteberg, 2018; Fraunhofer IML und BME e.V., 2016).

Reflecting industrialization, purchasing and quality is assigned a strategic function in the newer science. In the automotive industry, networking, Big Data and digitization are important factors for future success. By using the different views (organization, supplier-customer relationship, information system), the orientation of purchasing | quality should help to achieve the strategic goals of the company (Hamm V. 1997).

## 2 THEORETICAL BACKGROUND AND LITERATURE REVIEW

### 2.1 Theoretical Background

How can the necessary cost down programs be implemented to achieve the strategic goals? The former Board Member for Purchasing at Volkswagen AG José Ignacio López showed in the 1990s how to increase the transparencies (Meißner H.-R., 2012). The vertical range of manufacture was reduced by outsourcing and forward, global and single sourcing were integrated. In pre-meetings and sourcing committees, the procurement costs are decided in detail by the committee. This ensures internal transparency. However, the good supplier-customer relationship and quality suffered (Meissener H.-R., 2012). In 2013, the Verband der Automobilindustrie (VDA) together with Oliver Wyman conducted the FAST 2025 study "Future Automotive Industry Structure" with the result that the value chain of automobile manufacturers (OEMs) and suppliers is changing significantly. It is expected that the value-added share of OEMs will decline to 29 % by 2025. Supplier integration will be focused, so that development and production (trend towards modules) will increase strongly (VDA 2012). The technology trends in the automotive industry is still ongoing. Since 2015, Daimler has been researching and using quantumcomputing together with IBM and Google in order to globally unite scientific research and development as well as the knowledge of the specialist departments. Quantumcomputing is being used to look at issues that may not become reality for another 10 to 15 years. With the help of quantumcomputing, tasks are to be solved for which today's technology would need hundreds or thousands of years (Mohn, 2020). For OEMs and suppliers, the change means that significant investments will have to be made to implement the restructuring of their business models in the context of increasing cost pressure. The first game changer is the trend towards electromobility (E-Mobility), which is already in the implementation phase. The VDA expects the share of electric mobility to change from 3% in 2020 to over 25% as early as 2030 (VDA 2018).

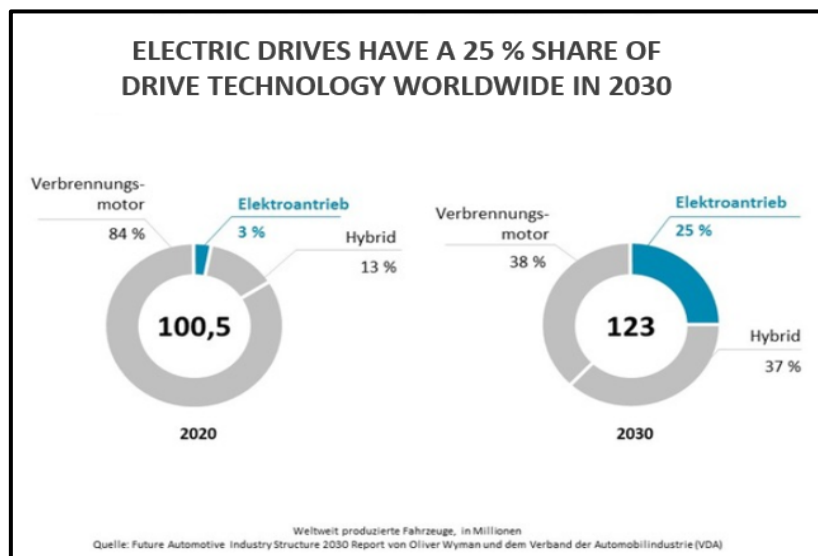


Fig. 1 – Electrical Drives Share in 2030. Source: VDA (2018).

In this context, the VDA has highlighted seven fundamental trends in its Fast Study 2030, which presents the automobile, its production and its use. Next to the E-Mobility the study named connected vehicles, autonomous vehicles, human – machine interfaces, changing customer structures, new distributions channels (pay per use) and the digital industrie.

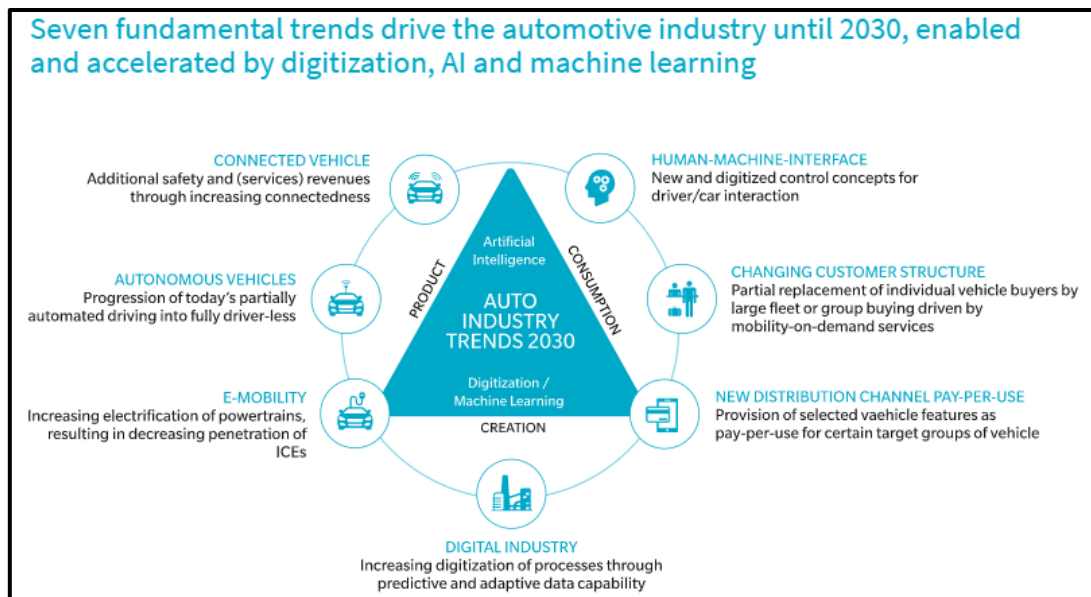


Fig. 2 – Seven fundamental trends drive in the automotive industry until 2030. Source: VDA (2018)

The horizontal and vertical shift in the supply chain are significant changes for suppliers. The effects will not be further investigated in this paper. The question of the impact of Industry 4.0 on the implementation of this change will be further analyzed. The impact on Quality 4.0 and Purchasing 4.0 will be methodologically analyzed in this thesis. A key to realize the transformation is digitalization, which is directly attributed to Industry 4.0. The idea of Industry 4.0 was first presented by the German government at the Hannover Messe 2011 under the "High - Strategy 2020" (Deutscher Bundestag 2016). The idea of Prof. Wolfgang Wahlster, Prof. Henning Kagermann and Prof. Wolf-Dieter Lukas was to combine the Internet of Things (IoT) and industrialization (Wahlster, W. 2011). Industry 4.0 is the result and has been further researched since that time. The adoption of Quality 4.0 and Procurement 4.0 helps organizations automate and simplify time-consuming and error-prone business processes. This leads to superior product performance from an operational, economic and environmental perspective. Quality 4.0 is not a direct replacement for existing quality management practices in organizations that have stood the test of time. Rather, Quality 4.0 builds on existing quality systems and practices to deliver significant improvements in the value chain in terms of customer satisfaction, operational efficiency and productivity. Purchasing is facing new challenges as part of the transfer of Industry 4.0. The tasks will change significantly. In Fig. 4, the influence on operational or strategic processes is used as an indication to identify the differentiation of Purchasing 4.0 (Kleemann, F. 2017). The requirements for purchasers will also change significantly, and they will have to be much more focused on systems in the future (Blechmann J., Engelen M. 2020).

## 2.2 Literature Review

The literature research shows that science has been more intensively focused on Quality 4.0 and Purchasing 4.0 since 2013 and 2017, respectively. As shown in the introduction, the theoretical aspects are based on the evolution of Industry 4.0. Google Trends can be used as a tool to analyze which search terms were used by users and how often. It was used to identify the search queries in this field of research. The literature research is based on 2017 until today. Secondary literatures and analyses were used to identify the state of research.

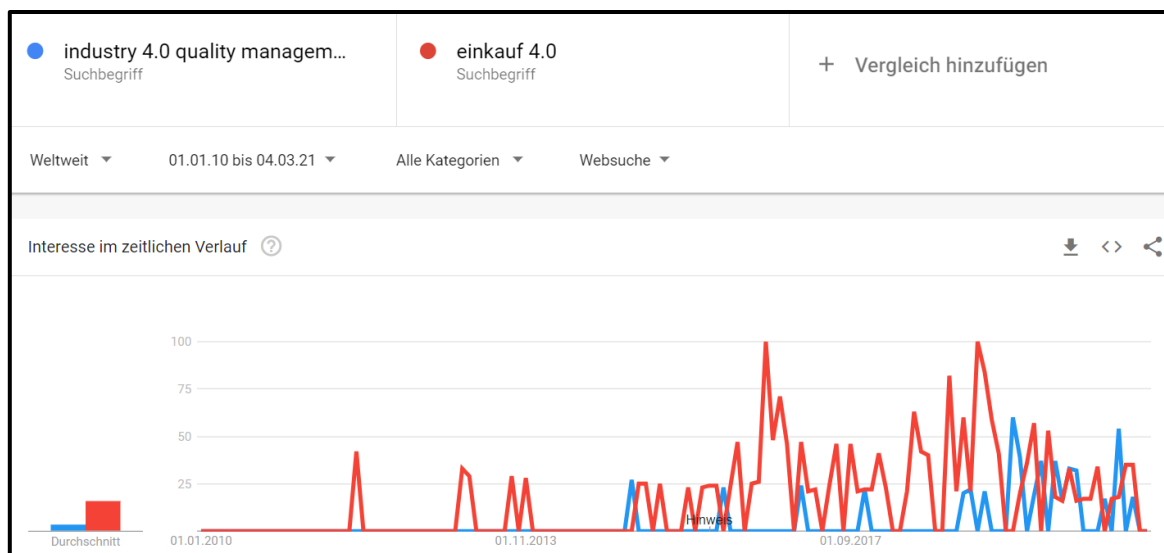


Fig. 3 – Comparison Industry 4.0 quality management with Einkauf 4.0. Source: Google Trend, Retrieved March 02, 2021

Further analysis demonstrates that different priorities can be identified and that publications by Google Scholar are increasing from 2017. Furthermore, the literature search was done using Google Scholar, Scopus, SpringerLink, ProQuest, Emerald insight and ACM. All keywords were used with an AND connection in the highest level to identify the suitable literature in the automotive industry. Therefore "automotive industry" AND "industry 4.0" AND "Quality 4.0" OR "Procurement" were used to search the search machines.

Tab. 1 – Comparison Literature Research. Source: Own Diagram

Keywords	Google Scholar	Scopus	SpringerLink	ProQuest	Emerald insight	ACM	Total	
"automotive Industry"	143.000	40.595	34.289	542.493	> 7.000	5.016	765.393	
"automotive Industry" AND "Industry 4.0"	8.710	216	639	8.223	280	61	18129	
"automotive Industry" AND "Industry 4.0" AND "Quality 4.0"	39	2	2	38	6	0	87	
"automotive Industry" AND "Industry 4.0" AND "Procurement 4.0"	65	0	5	40	15	0	125	
							<b>Relevant literature Quality 4.0</b>	<b>87</b>
							<b>Relevant literature Procurement 4.0</b>	<b>125</b>

Based on the evaluations of GoogleTrends, the literature was included as a search parameter from 2017. Table 1 shows the results in the relevant AND connection. For Quality 4.0, 87 suitable literature sources were identified. For Purchasing 4.0, 125 publications were found. In the further search the references were verified with their contents to the topic of this work in order to identify the current scientific status. The qualitative literature search highlights the fact that there is no clear definition of Purchasing 4.0. In their publication, Zafari and Teuteberg underline that currently no indicators can be identified to verify an clear definition of Purchasing 4.0 on an empirical basis (Zafari, F. and Teuteberg, F., 2018). In the Fraunhofer pre-study, purchasing is assigned a key function as a pioneer in digitalization (Fraunhofer IML and BME e.V., 2016). In terms of content, Einkauf 4.0 | Purchasing 4.0 is differentiated from eProcurement. The level of connectivity in combination with digitization define the differences. MRP indicates individual jobs, ERP is used to describe cross-functional processes, and eProcurement is used to describe overlapping processes. At the highest level of connectivity and digitization, strategy and processes are assigned to Procurement 4.0.



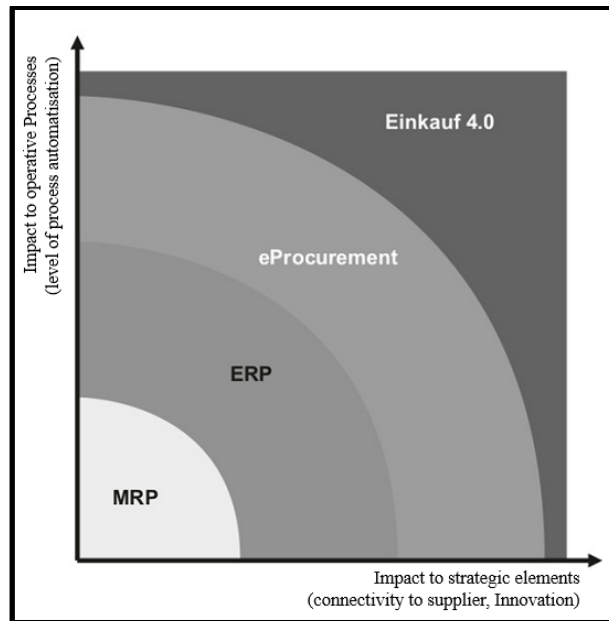


Fig. 4 – Differentiation to eProcurement. Source: Kleemann, F. (2017)

Prof. Dr. Florian C. Kleemann from the University of applied Sciences in Munich presented the effects of Industry 4.0 on other functional areas at the 11th International Bodensee Forum. With the help of the Rediness Model 4.0, the need for action in the direction of Purchasing 4.0 is to be demonstrated. The readiness level is graded in 5 levels (Kleemann, D. F. C. (n.d.) 2018):

- Level 1 = Traditional - Operative Purchasing
- Level 2 = Beginner - Selective eProcurement
- Level 3 = Established - Comprehensive eProcurement
- Level 4 = Expert - Selective Purchasing 4.0
- Level 5 = Excellence - Full Purchasing 4.0

In the context of the qualitative literature research, the current scientific discussion about a clear definition of Purchasing 4.0 has not yet been concluded. However, important characteristics can be identified. The relevant literature was reviewed using MAXQDA. This is a program for qualitative analysis of literature sources and downstream keyword search. With the help of this methodology, this shows the current research focus by means of code analysis. In relation to Purchasing 4.0, this shows that digitization, networking, transparency and automation are to be regarded as current research priorities.

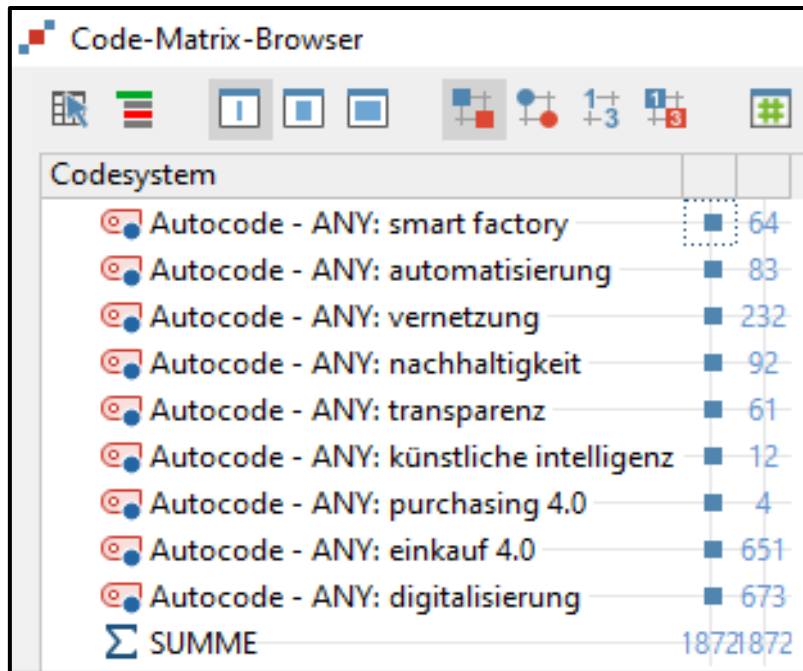


Fig. 5 – Code Matrix MAXQDA Einkauf 4.0. Source: MAXQDA. Own research

Of 1.872 code markings, 673 points (approx. 36%) already relate to digitization. Digitalization includes in this document key word like BigData and Artificial Intelligence (AI). This is identified as the basis for further important elements for Purchasing 4.0. Networking with the business partner is a fundamental element for achieving transparency along the supply chain.

Specially the code markings for “Einkauf 4.0” demonstrate that the scientific is more focused in Germany than in other countries. The English equal key word “purchasing 4.0” confirmed that with 4 code markings in the analysis. The further analysis was extended to German-language literature. Especially in the combination "Automotive industry - pruchasing 4.0 - sustainability" there are only limited publications available.

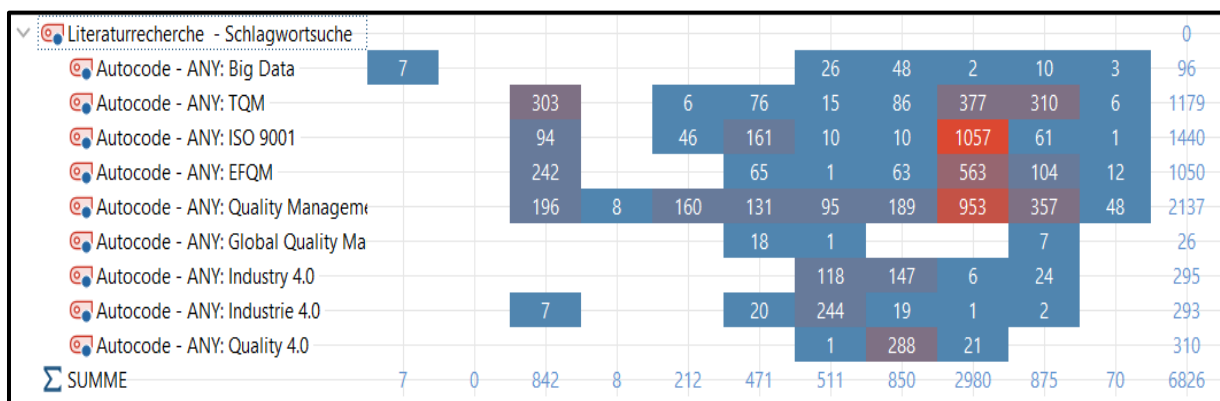


Fig. 6 – Code Matrix MAXQDA Quality 4.0. Source: MAXQDA. Own research

The current scientific discussion on a clear definition of Quality 4.0 has not been finished. However, important characteristics can be identified. The review of the relevant literature using MAXQDA Code Analysis shows the current focus of the research. The analysis of the aforementioned literature Quality 4.0 shows the connection between various certifiable, operational quality management systems (leading ISO 9001, followed by TQM and EFQM) and subsequently general quality management itself. These show and form the focus of current research. In the qualitative literature research, it is particularly noticeable that there is no clear

definition of the term Quality 4.0 and what is meant by it. Out of 6.826 code labels, 2.137 points (approx. 31%) already refer to Quality Management which includes in this document key word strategy and competitiveness. Another 1.440 points (21,1%) leads to ISO 9001, 1.179 points (17,3%) and 1.050 points (15,4%) which is considered an extended basis for it. This is identified as the basis for further important elements for Quality 4.0. Networking with the business partner is a fundamental element for achieving transparency and competitiveness in the global market.

### **3 METHODOLOGY**

Current science is focused on how the requirements for cooperation between business partners will be structured in the future. In specific, studies are being done on what effects this will have on internal departments and what requirements will arise from this. In the context of this study, the following research question arises: How will the future industrial environment change by 2030 in the area of Purchasing 4.0 and Quality 4.0?

This research question is analyzed by:

- GoogleTrends as secondary data
- Qualitative and quantitative literature research
- MAXQDA

#### **GoogleTrends:**

A quantitative analysis was carried out via Google's online service as of when the search terms "Quality 4.0" and "Purchasing 4.0" were entered as keywords for the first time. This was used in this study to identify when interest in the search terms first began.

#### **Qualitative and quantitative literature research:**

The study is based on a qualitative research of necessary information through a conducted internet and literature search of typical internal and external factors from available guidance information, professional journals and literature. The results are mirrored with the experience and knowledge of the authors.

A separate, already existing publication was also used to approach this research question in a complementary way. Already at PEFnet on November 26, 2020, it was shown in the article "The way to purchasing 4.0 in the automotive industry and the impact on sustainable procurement" that the requirements for the cooperation between OEM, Tier 1 and Tier 2 will change significantly (PEFnet20; 2020).

#### **MAXQDA:**

The final analysis of the results is done using the QDA software - MAXQDA which is one of the most popular and used program for qualitative literature keyword analysis (e.g. Bauer, 2014; Kuckartz, 2014).

As part of the literature search, the relevant publications were imported into MAXQDA. By analyzing the literature, it was possible to identify codes in order to match the content of the literature sources.

The following keywords | codes were identified for Purchasing 4.0:

- Digitalisierung | Digitalization
- Einkauf 4.0 | Procurement 4.0

- Vernetzung | Connectivity
- Nachhaltigkeit | Sustainability
- Automatisierung | Automatisation
- Smart Factory

For Quality 4.0 there are important keywords which are relevant for this topic:

- Industrie 4.0 | Industry 4.0
- Total Quality Management | TQM
- European Foundation for Quality Management | EFQM
- International Standard Organisation for 9001 | ISO 9001

The lexical search then made it possible to perform a precise analysis of the keywords. The keywords which are used as autocodes are verified to see how often the relevant and imported literature uses them. This method is suitable to represent the current scientific status. From an existing market study and supplementary surveys from the author's relevant professional network on Quality 4.0, it appears that it is not a direct replacement for existing quality management practices in organizations that have proven themselves. Rather, Quality 4.0 builds on existing quality systems and practices to deliver significant improvements in the value chain in terms of customer satisfaction, operational efficiency and productivity. Adopting Quality 4.0 helps companies automate and simplify time-consuming and error-prone business processes. This leads to superior product performance from an operational, economic and environmental perspective.

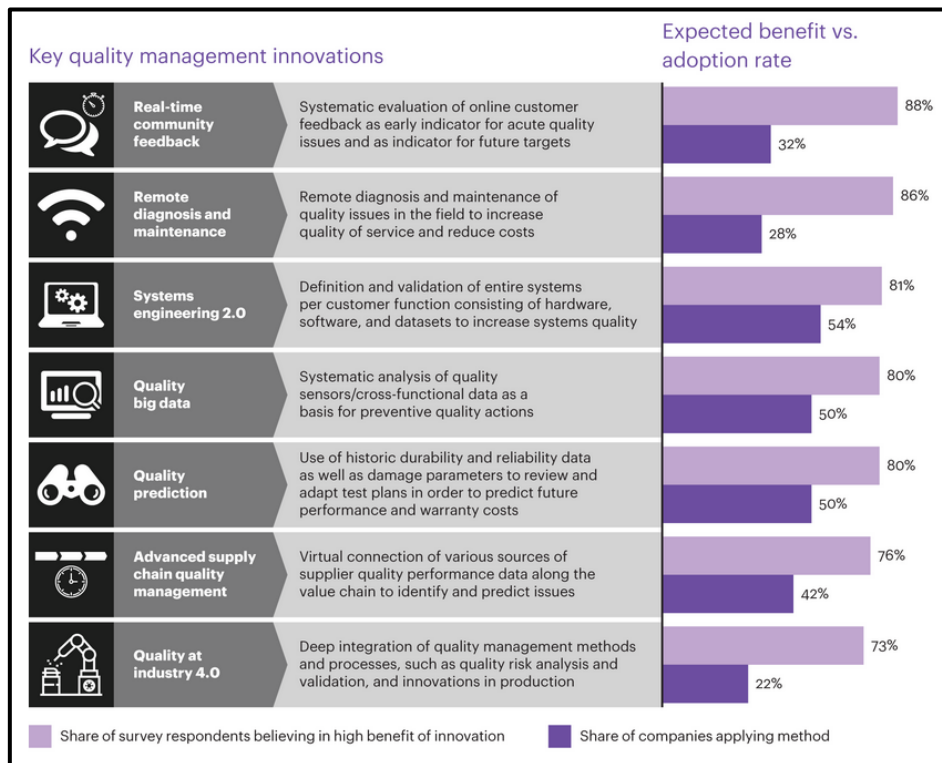


Fig. 7 – Market Survey: Important innovations in quality management. Source: A.T. Kearney. (2019)

Finally, all data is brought together in a structured way, evaluated and validated by means of an influence analysis (e.g. Bauer, Blasius, 2014; Bogner, Littig, Menz, 2014; Kuckartz, 2014) and

the five-point Likert scale from "strongly disagree" to "strongly agree" was used to capture the respondents' answers to the leverage/importance/significance factors.

## 4 RESULTS

The research indicates that the transformation of digitalization is recognized across industries and different research is currently being implemented. In the future, digitization, networking and the use of AI will establish themselves. This is already shown in the cooperation between Daimler, IBM and Google. The requirements for internal departments and employees will change significantly. The scientific studies have not yet been completed. Maximum data transparency, BigData, networking and partnerships will take on a high priority in the future. This changes the requirements and tasks for the employees who need IT affinities to be able to perform the analyses with the help of AI. BigData analytics, shared data space between partners, machine learning, visualization and simulation or intelligent objects (control of material flow) are future technologies that will change companies by 2030 (Bogaschewsky, 2020). The impacts of Industrie 4.0 on purchasing and quality management have still only been partially scientifically researched. Especially the effects on employees and the changing requirements are currently discussed controversially. In the automotive industry, the value chain is shifting both vertically and horizontally to different scales. Both the scientific community and the OEMs agree that digitization is a medium to an end in order to further develop networking between the OEMs and the suppliers (in the future, partners). This is necessary in order to be able to implement the seven fundamental trends. Quality 4.0 stands for the digitalisation and paradigm shift of quality management and is complementary to the concept of Industry 4.0. Machines, plants and systems are becoming increasingly intelligent and are starting to stabilise processes and make them more robust. The direct influence of people on value creation in terms of error culture is steadily decreasing (AMMC 2018). The result of the previous survey, enriched with the author's data, also shows that, in general, the proportion of respondents sees great benefits in the above-mentioned innovation:

Tab. 2 – Items with impact, importance and ratings. Source: Own research

Item	Impact	Importance/significance levers	Rating
Real-time community feedback	88%	5	4,4
Remote diagnosis and repair	86%	4	3,44
Systems engineering 2.0	81%	4	3,24
Quality big data	80%	5	4,0
Quality prediction	80%	3	2,4
Advanced supply chain quality management	76%	4	3,04
Quality and Industry 4.0	73%	5	3,65

Based on the market survey by A. T. Kearney and author interviews, a picture emerges that shows the weighting and thus the ranking of which topic blocks are priorities and are up for possible implementation. Highest impact will be the „Real-time community feedback“. The lowest one will be Quality and Industry 4.0 itself.

## 5 DISCUSSION

This study is a partial study of the author's dissertation on Global Quality Management – the Importance and Impact of Competing Global Industrial Enterprises and on Procurement 4.0 - The combination of the newest purchasing tools and Methods in the automotive industry and their impact on a global sustainable procurement. Due to predetermined time constraints and limitations in relation to the scope of the study carried out, it is not possible to use a broad data base for analysis in this study. The detailed literature search demonstrates the current scientific discussion. The doctoral theses indicated will continue research to identify the impact of change in the automotive industry on sustainability in the value chain. The partnerships between OEMs and suppliers demand new methods from both quality management and purchasing. The OEMs' requirement to guarantee sustainability along the supply chain is putting new demands on the interaction between the two business units. In the context of the author's dissertation on Purchasing 4.0, these interrelationships and the possibilities for influence are analyzed in more detail. The following research questions will be answered:

- How high is the impact of newest Purchasing 4.0 methods and tools in the automotive industry on a global sustainable procurement?
- What can Purchasing 4.0 contribute to stabilizing the value chain in the long term and increasing competitiveness?
- What are the opportunities of using Big Data and Artificial Intelligence?
- Which impact does Purchasing 4.0 have on the development time of new technologies in the automotive industry?

In the context of the author's dissertation on Global Quality Management – the Importance and Impact of Competing Global Industrial Enterprises, these interrelationships and the possibilities for influence are analyzed in more detail. The following research questions will be answered:

- What are the possibilities but also the limits of global quality management? How can global quality management be implemented and operated under the influence of local conditions, country-specific conditions and the prevailing level of education of the population?
- Is there an increasing importance of Global Quality Management in the sense of - quality as a competitive factor?
- What impact does the environment of Industry 4.0 and Quality 4.0 have on the requirement and operation of existing Quality Management Systems?

## 6 CONCLUSION

Scientific research has increased significantly since 2017 and is far from complete. Requirements for the specialist departments of purchasing and quality must be further researched. The 4<sup>th</sup> industrial revolution opens up many new opportunities. Companies that do not follow this path will not be able to survive in the mid-term. The increasing demands on products, must be developed in a shorter time with increasing quality requirements at target costs. Industry 4.0 changes both the internal requirements and tasks in the specialist departments and the cooperation with business partners. If future technologies are used jointly, competitive advantages are created and the requirements can be met. Time will tell the extent and speed at which this will take place (Radziwill, N. M. 2018). Further research will focus in particular on the Readiness Model. This will involve further study of the German automotive industry. In addition to surveys to identify the state of Readiness for the implementation of

Purchasing 4.0 in the automotive industry, experts will be interviewed. digitalization and the networking of OEMs with suppliers will be more closely analyzed, and the effects and opportunities for influencing sustainable procurement will be a key component. Based on Quality 4.0 in the context of global quality management systems, further research will focus on the existing degree of implementation and maturity. In this context, globally positioned German industrial companies will be further investigated. In addition to surveys to determine the framework conditions and maturity level for the implementation of Quality 4.0 in the Industrie 4.0 environment, specific expert interviews will be conducted. The implemented quality management systems and their possible global networking in the companies will be analyzed in more detail to make their effects and possibilities for increasing competitiveness in the global market visible. This will be an essential part of the elaboration.

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## **Contact information**

### **Bunzendahl, Sebastian**

Comenius University – Faculty of Management  
Odbojárov 10, Bratislava, Slovakia  
E-mail: bunzendahl1@uniba.sk  
ORCID: 0000-0002-5963-5428

### **Schneider, Oliver**

Comenius University – Faculty of Management  
Odbojárov 10, Bratislava, Slovakia  
E-mail: schneider15@uniba.sk  
ORCID: 0000-0002-9798-3511

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# **SOCIAL RESPONSIBILITY OF THE COMPANY AND ITS IMPACT ON THE REPUTATION AND THE EMPLOYER'S BRAND**

*Jana Charvát Janechová, Natália Augustínová*

## **Abstract**

The paper deals with the area of corporate social responsibility, which is being formed as an independent scientific discipline. The pillars of corporate social responsibility penetrate the internal company's environment in particular through the implementation of social aspects. Growth of competition on the labour market, digitization and technology interference, together with the effort to preserve quality human resources, decrease of fluctuation and maintaining employee satisfaction and work motivation lead corporations to firmly integrate corporate social responsibility into the overall corporate strategy. The aim of the submitted study is to analyse and evaluate the impact of social responsibility on the reputation and brand of the employer and highlight those employers' activities that tend to have the most significant impact on reputation and employer's brand.

*Keywords: corporate social responsibility, social pillar, employer branding*

## **1 INTRODUCTION**

Recently, we have been witnessing the trend of introducing social aspects into the internal company's environment. We can argue whether this trend is conditioned by a current demand in the labour market or a targeted strategy to increase the employer's attractiveness and create the employer's brand. The fact is that corporate social responsibility is becoming more and more known to potential employees, primarily through job offers, which are always complemented with a social benefits package. The competitiveness of companies as potential employers, therefore, reaches the level of comparing social benefits.

The employer's brand describes the employer's reputation as a place to work and its value offer for employees instead of the more general reputation of the company's brand and value offer for customers. We have been observing the trend of integrating social responsibility into the company's overall strategy in the Slovak business environment on a long-term scale. We can assume that this trend will gradually become the standard and the occasional involvement of social responsibility activities will replace the permanent strategic business model. Armstrong recommends linking the CSR strategy to a competitive strategy and creating a work environment, while ensuring that personal and employment rights are respected and that personnel policies and procedures are applied while making sure that employees are treated fairly and ethically. (2015)

## **2 THEORETICAL BACKGROUND / REFERENCES REVIEW**

Building a positive image of the employer is considered an essential prerequisite for gaining a quality and loyal workforce, considered to be one of the primary corporate goals. Building a positive image of the employer means establishing valuable relationships with stakeholders - potential and current employees. The means are communication and promotion of the company's positive aspects leading to the internal and external environments. (Backhaus and Tikoo, 2004) Brand building is a long-term and complex process.

The most urgent need today is to align the company's strategy with the requirements of sustainable development. (Bednárík, 2019) Corporate social responsibility, as an essential management concept of the 21<sup>st</sup> century focused on the environmental, social and economic pillars, can also be a valuable contribution to the company in terms of building a brand. Considering the employees, we should mention the importance of the social pillar, including corporate philanthropy and corporate volunteering, employment policy, employee health and safety, education, employment of minority and vulnerable groups, gender equality, child labour rejection and respect for human rights. (Čábyová, 2012) However, we state that the individual areas of corporate social responsibility are interconnected and follow each other. Hence, involvement in all areas brings an advantage to every single party involved, although this activity may not be directly targeted at this aspect.

For this reason, too, it is necessary to develop all areas of social responsibility. Building a positive brand, based on this fact, is a process that must show the signs of authenticity. Only a real focus on sustainability, which comes from within the company, can withstand the competition, whether it is customers or employees, and bring the expected results. Pretended interest in socially responsible entrepreneurship can have the opposite effect. Such trade dishonesty can be perceived very negatively by customers, suppliers, and other stakeholders. For this reason, it is time to work on authentic conduct and image for a long time. In his research, Bednárík also drew attention to the fact that 77.8% of medium-sizes companies declare social responsibility as an important part of management. However, on closer examination, he found out that only 42.2% of entrepreneurs also apply it in practice. Therefore, we can say that the practical implementation of corporate social responsibility in practice is often at a lower level than manifested by the company in public. Thus, it is necessary to consider the degree of theoretical and practical applications. Carlini presents two essential characteristics. Based on this, we can assess the employer in the field of social responsibility. The first value is the very merit of social responsibility, which must be rooted deep in the company's functioning. Subsequently, these are internal social responsibility activities focused on employees' rights. The following model is intended to help determine brand positioning and, overall, to build strong and sustainable brands that are attractive to employees (Carlini, 2019).

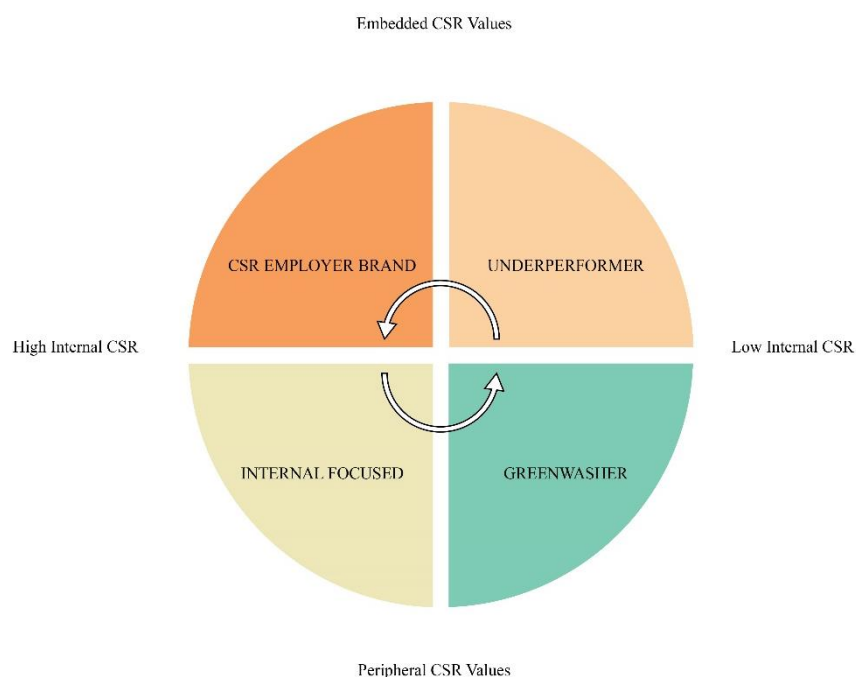


Fig. 1 – Building employer brand. Source: own processing based on Carlini, 2019

We can see that the focus on values and, consequently, internal communication can bring an employer's image engaged in social responsibility. As we mentioned, building a positive image of the employer can also be achieved through corporate social responsibility. This view is also shared by Arrend and Brettel, emphasizing this concept's ability to facilitate the building of a positive corporate image and thus strengthen the competitive advantage. (2010) This concept can create a positive image, important for hiring new employees. Currently, it is essential for employees what company they work for. "No one wants to be ashamed to say which company one works for. No one wants to keep one's values at home when one goes to work in the morning," said Chouinard and Stanley (2014).

A survey by Ipsos shows that up to 78% of Slovak employees consider it necessary whether the company they work for behaves responsibly. (Môciková, 2018) These values are at such a high level of priority for some employees and potential workers that they are willing to sacrifice their financial evaluation and prefer a socially responsible company, even though pay conditions would be more advantageous at another employer. (Heslin - Ochoa, 2008) We can see that focusing attention on the mentioned concept can also bring an unexpected reassessment of employees' priorities. This concept is often perceived by employees as an additional activity focused on care and subsequently, the employees accept their employer as a unified system taking care of them. Besides, these activities can bring about a faster process of integrating, improving, and meeting employees' psychological needs. (Aguilera, 2007) This care and the satisfaction of their psychological needs can make employees proud of their work and the employer. Therefore, we conclude that corporate social responsibility can build a sense of pride in employees. This positive perception can be transformed into an increased identification with the company; therefore, employees build deeper relationships with their employer. (De Roerck et al., 2016) If a company invests time and resources in the internal environment for a long time, the result can be the desired pride of the employee for their employment relationship. This emphasis on the relationship with employees can reduce turnover and an overall improvement in the company's reputation. (Šatanová et al., 2013) On the other hand, this initiative and caring for the well-being of the whole company help improve employees' work performance. We should mention increasing inspiration for teamwork (Melynyte - Ruzevicius, 2008) or greater enthusiasm for work, which increases the efficiency and overall productivity of employees. Such incorporation of social responsibility can help increase employees' participation in the activities and become more emotionally involved, which has a stronger identification with their company. (Skudiene– Auruskeviciene, 2012) When employees themselves engage in those socially responsible activities, they are positively influenced by the view of their work results. (Heslin - Ochoa, 2008) Thus, these activities, focused on the environmental, economic, but mainly social area, can increase the performance of employees, and we can say that "good functioning and prosperity of companies is possible only thanks to energetic and passionate employees." (Chouinard - Stanley, 2014) If a company wants to be active in the long run, it is necessary to focus on its employees' activities. Given the changes in public attitudes, which are increasingly and gradually raising their demands for sustainability, we can say that incorporating social responsibility into the functioning of the company is essential.

A survey of Slovak employees' preferences on a sample of 2.756 respondents of economically productive age, carried out by an online questionnaire in 2020 by the Grafton recruitment agency, points to a suitable way of attracting new employees and motivating existing ones. The most important motivator is the pay level, followed by personal development, new experiences, and work meaningfulness. Demotivating factors include low wages, poor organization and no option of career growth. The primary needs towards employment include stability and job

security followed by work-life balance and the need to contribute to improving the world or people's lives. (Grafton, 2020)

Tab. 1 – What are the primary needs of people towards employment now. Source: own processing based on Grafton, 2020)

NEEDS	CRUCIAL	IMPORTANT
A job they enjoy	50%	50%
Stability and job security	70%	30%
Personal development, education	25%	75%
Work-life balance	60%	40%
Good financial evaluation, do not have to deal with	30%	70%
Contribute to the improvement of the world or the lives of people through their work	55%	45 %

### 3 METHODOLOGY

The basis for the theoretical part processing of this paper were domestic and foreign literary sources dealing with corporate social responsibility and its potential impact on the reputation and brand of the employer. The selection of sources was made due to the content consistency and topicality, especially in relation to modern and current solutions.

The practical part presents research, the aim of which was to find out to what extent the particular company applies social responsibility as part of the corporate strategy. For example, we chose Lidl, a German supermarket chain founded in 1973, which operated 3.100 stores in Germany only through the gradual expansion and widening of the network in 2010. The company is currently represented in 30 countries and operates 10.500 stores. The company Lidl Slovenská republika, v.o.s. has been active in the business since 2004 and currently consists of a store network of 147 shops, employing more than 5.000 employees not only in sales, but also in administration, logistics, and central services. Lidl is one of the most attractive employers in Slovakia, the proud owner of the prestigious international award Top Employer Slovakia, Top Employer Europe 2020 and the Top Employer in 2019 in the field of trade and services.

The practical part aimed to determine whether Lidl, while declaring firmly established social responsibility in its corporate strategy, applies its principles towards employees and how this is manifested in the context of its reputation and employer brand. Besides, we wanted to investigate how these principles are applied. We anticipate that the company, as a responsible employer, will engage in regular employee benefits, such as, an extra holiday, family support, health care, involvement within the social support activities for the others, such as collections, volunteering, etc.

To obtain relevant information to be used in the practical part, we made use of the analysis of available materials - mainly annual reports, social responsibility reports, press releases, articles, and posts from social networks. We examined areas affecting the employer's reputation and brandings, such as fluctuation, motivation, benefits, internal communication, ethics, morality, and equal opportunities.

Additional information was obtained directly from Lidl in an online questionnaire consisting of 15 questions on application of corporate social responsibility to the company's corporate strategy. We questioned the integration of these activities within the personnel structure, results,

and evaluation. We were interested in how the company applies the social benefits pillar, what tools and media are used to communicate activities, to understand the financial and non-financial profit that results from applying the principles of corporate social responsibility.

## **4 RESULTS**

This part aims to analyze the obtained data, explaining the selected topic in detail. The intention is to present objective results without personal preferences. From the research carried out within the dissertation thesis in October 2020, Lidl perceives corporate social responsibility as a competitive advantage. The agenda of corporate social responsibility is implemented by the communication department, directly responsible to the company's management. The company has an established code of ethics, cares for employees' health and safety, focuses on training and retraining, philanthropy and volunteering, declares equal opportunities and non-discrimination, and respects human rights, employment policy, work-life balance and pleasant working environment for the individuals. Social responsibility activities are regularly evaluated and are part of marketing communication. Lidl has noticed the spread of its goodwill, building a positive image and increasing its attractiveness. Lidl perceives the financial profit resulting from social responsibility activities mainly through increasing competitiveness.

### **Company values for employees**

Fairness - equal treatment for every employee without any differences;

Dynamics - a quick response to the changes brought day by day;

Results - work to the maximum;

Personal development - the employer supports education;

Stability - the employer keeps the commitments which results in stable human resources.

### **Occupational corporate policies**

The company commits employees to principles that are based on the strategy of social responsibility and at the same time affect the performance, motivation and satisfaction of its employees. Occupational policies address issues of economic, social and environmental responsibility. They concern customer satisfaction, mutual support and respect, compliance with directives and laws, improvement of sales space, work procedures, but also praise and recognition in routine work.

### **Fluctuation decreasing**

According to the company, a motivating corporate culture is effective in reducing the level of fluctuation, which has an impact on the attractiveness of the employer and at the same time supports the loyalty and performance of the current ones. Furthermore, it is a pleasant working environment, a sophisticated system of benefits and expansion of the development opportunities for employees.

### **Remuneration**

Full-time work is 38.75 hours per week, with extra time paid or compensated with equal pay for men and women in all positions. The rewards include benefits, such as, a meal fee of 4€ per day, MultiSport card, fruit package, birthday surprise, gift for children in the 1<sup>st</sup> grade of elementary school, for parents-to-be, pension savings allowance, a summer camp for employees' children, healthy breakfast every month, health day and holidays beyond the set law for employees up to 33 years of age or unpaid leave above the set limit. The system is regularly re-evaluated based on the data of an internal survey. By 2020, employees can choose the benefits from the cafeteria system they prefer.

## Education

Education is carried out according to the method of “learning by doing” with the coach's permanent support. Each position has a sophisticated system of involvement and the employee determines his or her training program after the initial stages. It is tailor-made so that the employee can use the acquired knowledge in actual practice. The offer of training is wide, intended for all positions, such as training program for sales managers, learning by doing, language courses, job rotation, public library, small talk or qualification programs according to individual needs. Furthermore, the Lidl Forum Conference, Departmental Workshops, Management Academy and Trendy Skills Workshops on agility, integrity and diversity, by which the company responds to the changing environment.

## Personal development

Evaluation and feedback support personal development. Each employee follows the process of evaluating their potential once a year. Evaluation is used to select tailor-made training, but also to identify future manager talents with growth potential.

## Graduates

Sophisticated career start program with vacancies for graduates. Cooperation with secondary schools, such as dual education. University students attending 2<sup>nd</sup> year of university and higher can participate in the Retail Academy and the “Intern” and “Trainee” programs.

## Peer program

It is a communication partner program, supporting to solve employee problems in various areas, not just working issues. All staff can also use the help of a psychologist on the phone.

## Engagement

Employees are involved in corporate life by promoting social responsibility, such as food collections for families in need or environmental projects. Active involvement of employees in socially responsible activities to change the thinking of employees and spread awareness of the need to support others. The expected result should be a stronger identification with the employer’s brand.

## Internal communication

Annual communication of CSR topics takes place towards all the employees, mainly via the Intranet, the We are Lidl application, bulletin boards, visuals, internal newsletters and the new concept of internal CSR space communication. Several times a year through the magazine Among us and training of new employees. Once or twice a year, internal communication occurs via the CSR calendar and CSR workshops and small talks.

Tab. 1 – Lidl’s social responsibility program. Source: own processing

Fluctuation decreasing	Remuneration	Education	Personal development	Graduates	Peer program	Engagement	Internal communication
Motivational company culture	Overtime compensation	learning by doing	learning by doing	retail academy	Psychologist on the phone	CSR activities	intranet
Pleasant working environment	Reimbursement of overtime hours	Language courses	Language courses	Intern			we are Lidl
Advanced benefit systems	Multisport card	Lidl Forum conference	Talent management	trainee			boards

Development of skills	Fruits	Resort workshops	Personal education plan				visuals
	Birthday surprise	Manager academy					In house newsletter
	First-grade pupil surprise	Trendy skills workshops					„Among us“ magazine
	Gift for the parents-to-be	Qualification programs					Training
	Healthy breakfast						CSR calendar
	Healthy day						CSR workshops
	Extra days off						small talks
	Unpaid days off above the set limit						CSR space

## 5 DISCUSSION

How does social responsibility affect the employer's brand? As Bednárík pointed out in his research, the implementation of corporate social responsibility in practice is necessary (2019). Authentic social responsibility can be assessed on the basis of activities put into practice. If the company has a CSR concept in place, it should also demonstrate it by a considerable number of activities and interest in different issues within the economic, environmental and mainly social area in the context of its employees. As we found out in the paper, the company Lidl has long communicated its focus on social welfare, which is confirmed by a large number of various activities that should contribute to reducing the negative impact on the environment, financial prosperity and especially satisfaction of its employees. The application of corporate social responsibility and work with the social pillar may increase the employer's attractiveness when considering employees' views. The intersecting pillars of corporate social responsibility affect employees and this focus can change their attitudes, opinions and influence their performance. It can affect engagement and work motivation. As shown by an example from practice, a motivating corporate culture can help reduce fluctuation. If we are based on the author Carlini et. al., then Lidl has the assumption to be perceived as an CSR employer brand, however, further research is needed to consider other aspects. This study's limit is the lack of confrontation of the perception of the application of social responsibility considering the company's employees and their opinion on the employer's brand for whom they work. We cannot assess to what extent the mentioned activities of the employer are accepted and requested. However, what we can say based on the findings is that the implementation of corporate social responsibility and active work to create a sustainable image of the company can affect the overall image of the company as an employer. Thus, the company can gain employees willing to be integrated into the operation and often become loyal supporters - workers of the company. Despite the long process, this activity can bring many positives, both financial and non-financial. Changing entrepreneurial operations based on sustainability principles is a voluntary commitment that every company should consider.



## 6 CONCLUSION

The topic of social responsibility and its impact on the employer's reputation and brand is a topical issue. In this paper, we examined the results of applying the social responsibility program in the company's strategy and its effects on the reputation and brand of the employer. The acquired knowledge points to the importance of defining the goal in employment in the corporate strategy, such as being a TOP employer. Furthermore, it is necessary to develop employees' potential and commitment, reward innovation, motivate performance, be open to new ideas, create safe conditions in the workplace, and promote employees' health. Gaining feedback from workers through regular satisfaction surveys and providing feedback to all employees has proven to be a way to improve and innovate the social responsibility program. If individual programs supporting the motivation and satisfaction of employees work in symbiosis, if they are requested by employees and supported by the employer, they can lead to the employee being at the same time an ambassador of the company's values. We think this area needs further and deeper research. A confrontation between the two parties involved, the perspective of employees and the employer, could provide a broader and more comprehensive view on social responsibility, its impact on the employer's reputation and brand.

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## Contact information

### **Mgr. Jana Charvát Janechová**

University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication  
Nám. J. Herdu 2, 917 01 Trnava  
E-mail: [jana.charvat@fmk.sk](mailto:jana.charvat@fmk.sk)  
ORCID: 0000-0002-9062-4110

### **Mgr. Natália Augustínová**

University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication  
Nám. J. Herdu 2, 917 01 Trnava  
E-mail: [natalia.augustinova@fmk.sk](mailto:natalia.augustinova@fmk.sk)  
ORCID: 0000-0002-6574-1374

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# POSSIBILITIES OF QUESTIONING AS THE BASIS OF BUILDING A VALUABLE RELATIONSHIP BETWEEN PLACE AND THE LOCAL COMMUNITY

*Tamás Darázs*

## **Abstract**

This paper verifies the options of practical fulfillment of process models of authors proposing local brands' formation. Well-known authors dealing with the issue of the place's brand have pointed out in the long term aspect that the creation of the brand of the place has characteristic features, distinguishing the whole process from the creation of a brand in other sectors of economic practice that must be respected. The paper's primary goal is to obtain information about using the analytical step of ASK involving the community in the process of brand creation by questioning the forming part of the "ATLAS" model in practice. The information flow should simulate the acquisition of an analytical basis for marketing communication in tourism focused on the region to ensure that the communication is aligned with the local community and is not too distanced to be perceived as such by it.

To fulfill the goal, the paper obtains results through a questionnaire conducted on sample 1254, forming a relevant basis for testing three hypotheses and verifying two assumptions. In the data processing, the Chi-square test of the square contingency and testing using the agreement of the mean values for several sample sets was used. Graphical display methods and comparative graphic display methods were used to present particular results.

Our research results confirm that there is a possibility of asking as a starting point for the process of creating a placemark and that there is a possibility of obtaining statistically relevant data through primary quantitative research of perceived and experienced aspects of the brand. The research also confirmed a statistically significant relationship between the marketing communication of local marketers and the lived and perceived brand of the place. Based on the research results, we can conclude that the survey, as part of the ATLAS model, can be used in the creation and management of the brand of the place.

*Keywords: place branding, local communities, ATLAS model*

## **1 INTRODUCTION**

The creation of a brand of the place is still a current issue, constantly expanding, but to this day, it has not brought generally accepted results that would already prove their applicability in practice. Authors dealing with the place's brand have pointed out in the long term aspect that the creation of a brand of the place has characteristic features distinguishing the whole process from the creation of a brand in other sectors of economic practice that must be respected. These authors also point out, again in the long term aspect, that a brand of the place is not a static matter that can be easily determined, set, and performed according to plan, because practice shows that if this is the case, an expensive visual presentation is not perceived by the local community as the bonding moment, they take it as something distanced from their values. It seems that the local community, communication with it, and working following public values based on the local community are the key to a functional brand of a place containing the values and visions of local communities. That is the reason why this article is devoted to verifying the

possibility of communication with local communities to obtain solutions in determining the direction of development of the brand of the place, as proposed by the model of creating an effective placemark called ATLAS.

## **2 THEORETICAL BACKGROUND**

In recent years, the theoretical flow of building and the process of creating a brand of the place has become increasingly present, leading to more illusory, participatory labeling of places on a regional basis, where the concepts of community, quality of life and sustainability form the essential starting points for creating a marketing concept (Govers 2018; Zenker and Beckman 2013; Kavaratzis 2012; Houghton and Stevens 2011). Kavaratzis and Kalandides (2015) say that a brand of the place originates in the place itself, that is, the people who live there.

Based on the ideas of Ballantyne and Aitken (2007), Hereźniak and Anders-Morawska (2021) that argue that due to the instability and heterogeneity of interactions between participants of the brand of the place, create the proper brand of the place becomes a shared experience where different groups contribute their values, resources and relationships while making the brand “collective ownership”. They also argue that the local creating process’s research focus should move from researching the perception of a place to determining the needs and values of its population to reach the effort to develop policies to meet them as comprehensively as possible. Such thinking requires actual, not just “decorative” involvement in a multi-dialogue with the community and listening to different social groups.

Official communication is not the only element: personal observation, word of mouth, the media, etc., are other contact points with the brand (Avraham and Ketter, 2008). The omission of this fact often leads to a mismatch between the desired and perceived attributes of the place’s brand (Költringer and Dickinger, 2015). We think the brand of the place should therefore mediate this discrepancy.

It is, therefore, clear that the perception of a brand of the place is a highly complex process. Researchers Kavaratzis and Hatch (2013) tried to clarify it in 2013, implementing a process approach using identity as a central element in building a brand that reflects the place’s culture and its image. They argued that building a brand of the place should be a dynamic process to be determined based on communities and not by deciding on the brand’s vision and goals, which the public administration then tries to push towards the community. They, therefore, say that create a brand is, unlike economic practice, a dialogue between all parties involved.

The researchers Kavaratzis and Pedeliento (2019) revised the original model from 2013, in which they proceeded to a more precise definition of the conceptualization of the local brand through a cultural approach, which they try to question and modify and add. Examining other authors’ findings, they highlight examples demonstrating the need to connect a place’s perceived image with its identity.

Aligned with the ideas of Kavaratzis and Hatch (2013), Govers (2018) agrees that the reputation of a place is built by people who feel connected to the place by communities doing imaginative things because they think the reputation is built by making relevant messages, which is done by strengthening and demonstrating identity in original, creative, innovative, captivating and inspiring initiatives, while showing the world what the community is about, with the set goal to build a distinctive, relevant, authentic, consistent and unforgettable reputation.

Kavaratzis and Hatch (2019) revised their model from 2013 in which they tried to reconsider the role of local brands, their presumed static and persistent perception as simple advertising tools, or their use only as visual expressions. Instead, they suggest a procedural view of brand formation. In their work, they evaluated many new approaches that could affect their results

(see, e.g., Campelo, Aitken, Thyne and Gnoth (2014), Chekalina, Fuchs, and Lexhagen, (2018), Zenker, Braun and Petersen, (2017)). Based on their reflections on the dynamics of the place's brand, they claim that the place and its brand are elusive, which must be constantly researched to be structured. As per the authors, this incomprehensibility of branding concludes that the role of a brand is to facilitate the creation of the meaning of the brand for others and not to try to define it and design its firm meaning. They also suggest an "ATLAS wheel", a management tool through which it is possible to monitor the place's brand and influence its ongoing formulation. The ATLAS model's starting point is that managers should ask involved parties about the brand through an analytical step while capturing perceived and experienced aspects. It is a step that may include available resources, investigating external and internal environmental factors, identifying perception studies, or examining other aspects that could be used and highlighted while building brand value.

### **3 METHODOLOGY**

The paper's primary goal is to obtain information about the possibility of using the analytical step of ASK involving the community in brand creation by questioning while forming part of the "ATLAS" model in practice. Based on the considerations of Kavaratzis and Hatch (2019), this paper seeks to verify the possibility of quantifying the perceived and experienced aspects of the brand of the place in a selected region, in particular, whether citizens perceive the element in which they live as an administrative section or as a social element. The acquisition of information should simulate the acquisition of an analytical basis for marketing communication in tourism focused on the region to ensure that the communication is aligned with the local community and is not too difficult to be perceived by the locals.

The paper's primary goal is fulfilled by verifying the predetermined assumptions (A) and hypotheses (H).

A1: There is a possibility to question as to the primary starting point of the ATLAS model

A2: There is a possibility to obtain statistically relevant data through primary quantitative research of perceived and experienced aspects of the brand.

H1: There is a statistically significant relationship between local marketers' marketing communication and the lived brand of the place.

H2: There is a statistically significant relationship between the place's marketing communication and the perception of the marketing of the site or place.

H3: There is a statistically significant relationship between the respondents' characteristics and the perception of the or place and its marketing.

To fulfill the primary goal, an experiment with an online questionnaire survey was carried out, with the attendance of 1254 respondents ( $n = 1254$ ) in several stages. To achieve the relevance of the sample, a simple selection step was performed without repetition, focused on the inhabitants of the selected area to achieve the highest possible sufficiency and power of the sample. The experiment during which the respondents were interviewed through an online questionnaire was carried out using the social network Facebook -the questionnaire was distributed in the form of paid advertising. The participants of the experiment were from Slovakia, which is part of the European Union. All participants in the experiment were from a pre-selected administrative unit called "Šal'a district", corresponding to the LAU1 classification according to the standard European classification of territorial units for statistics. This administrative unit consists of one district town, managing this unit, and 12 municipalities (villages). The primary population of this unit is about 53,000 inhabitants. This unit was chosen

for the research purpose with intention. The reason why - is its location, characteristics and history. The Šaľa district is located in the southern part of the Nitra region, its superior administrative unit. The district is characterized by a relatively small area, including the number of inhabitants, but with a high population density. In the district town, the population is mixed primarily - Slovak nationality, in rural parts of Hungarian nationality. The past causes the ethnic and cultural composition of the unit in connection with Austria-Hungary. The largest employer in the Šaľa district is the Duslo Šaľa chemical plant, located 2 kilometers north of the district town. These particular 2 kilometers are the symbolic reason why this district is so attractive for our particular experiment. In the years 1938-1945, the border between the Slovak state and the Kingdom of Hungary stretched between the factory and the city. In the sixties, the factory was deliberately built on the former Slovak territory, in case of a new shift of borders. The fragmentation of the district's culture is well visible here – this used to be an independent district until 1960; it later disappeared and belonged to another district until it was re-established in 1996. It is not uncommon for senior citizens of this area to live in 7 different state units without ever leaving their community. However, as the country in which this administrative unit is located, Slovakia is characterized by a strong culture of the place built on a solid relationship with the place, especially the place of birth. This relationship may have survived to the present day as the cause of later industrialization, poverty, as well as the fragmentation of the terrain into various basins and valleys, in which to this day there is a difference in the dialect of the population, even though it is only a few kilometers apart.

The research used as a tool questionnaire, consisting of four parts with the following primary and control questions:

1. Questions determining the nature of the perception of the region brand
2. Questions determining the nature of living of the region's brand
3. Questions expressing the perception of site marketing
4. Classification questions

Mathematical-statistical methods processed the result of quantitative and qualitative information. The Chi-square test of square contingency was used to determine the qualitative dependences based on a comparison of empirical and theoretical frequencies for each category of observed traits. To verify some hypotheses' correctness, the test of agreement of mean values for several sample files, "ANOVA" was also used. Graphical display methods and comparative graphic display methods were used to present particular results.

## **4 RESULTS**

The first series of questions within the questionnaire focused on obtaining data on perceived and experienced aspects of the place's brand. Data on perceived aspects were researched through a series of questions on whether respondents identify their home through an administrative unit or historical, geographical or another territory if someone asks them where they live (see Fig. 1). Depending on the answer, respondents were then asked, through check-up questions, how they would specify their place of residence more into details if someone did not know the unit they mentioned. 97% of respondents who defined their home through an administrative unit were able to describe it through the town or more significant place that manages this unit. Respondents who described their home through a non-administrative unit were confronted with a control question about another unit or attributes, such as a more well-known historical or geographical place, or a designation derived from the world names to which they could describe the place they live in if the person asking did not know the historical or geographical region or context mentioned. Based on the control question results, the respondent

was asked, associated with a non-administrative unit and the processing of the results through a test of conformity of shares; there is a statistically significant difference between respondents' answers to the particular question. It suggests that even those respondents who expressed bonds with a region other than the administrative region have statistically demonstrably stronger bonding in terms of perception of the place for the territory's administrative division. The conclusion of the set of questions about the perceived brand of the place is that the inhabitants of the Šal'a district perceive themselves as residents of the administrative unit based on a statistically relevant sample.

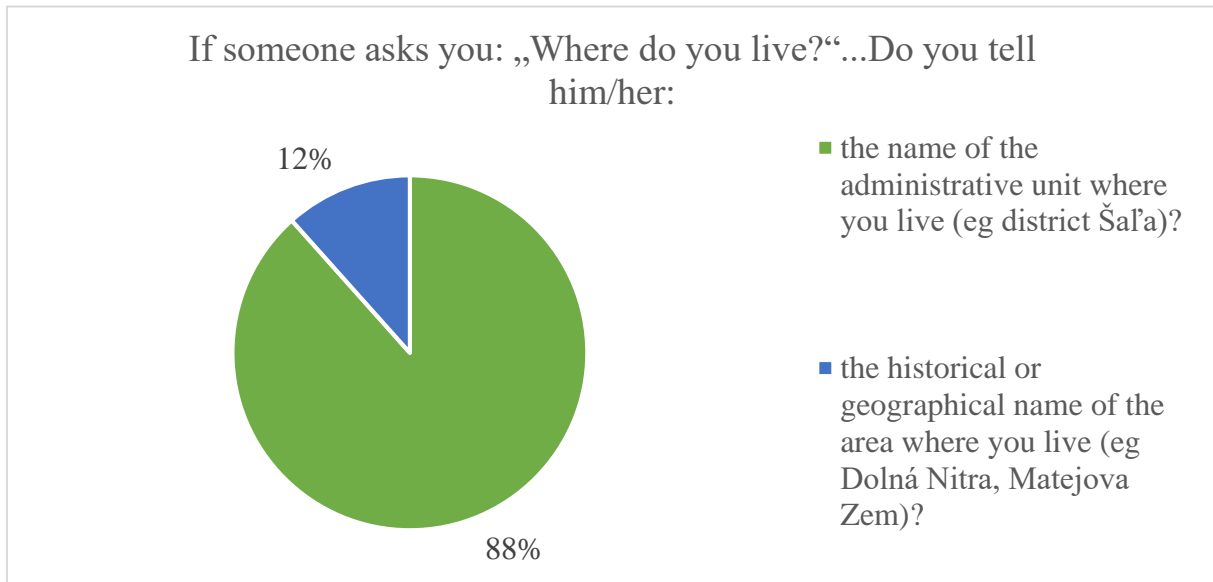


Fig. 1 –Answers to the primary question from the first question series. Source: own research

The second series of questions researched the aspects of the brand that were being experienced. By analyzing the answers through contingency tables, it is visible that the brand's experienced aspects do not differ from the perceived aspects of those respondents who perceive their home in the context of historical, geographical or another overall aspect. However, we notice a significant difference between the experienced and perceived brand among those who perceive their region in the administrative unit context. While 88.4% of the respondents' total number to the question about the perceived brand expressed their opinion that they perceived the brand of the place in the context of administrative division, only 22% of the question about the lived brand did so. Based on the analysis of data through contingency tables, we can say that 63% of respondents, who previously perceived the brand of the region in the context of administrative division, were in the question about the lived brand indifferent, or they said they did not know where they felt at home more, they felt simply at home where they lived or were born (see Fig. 2). The results of the second set of questions about the brand lived to suggest that the respondents express very weak bonding to some more significant aspect than the administratively smallest possible one in which they live their daily lives.

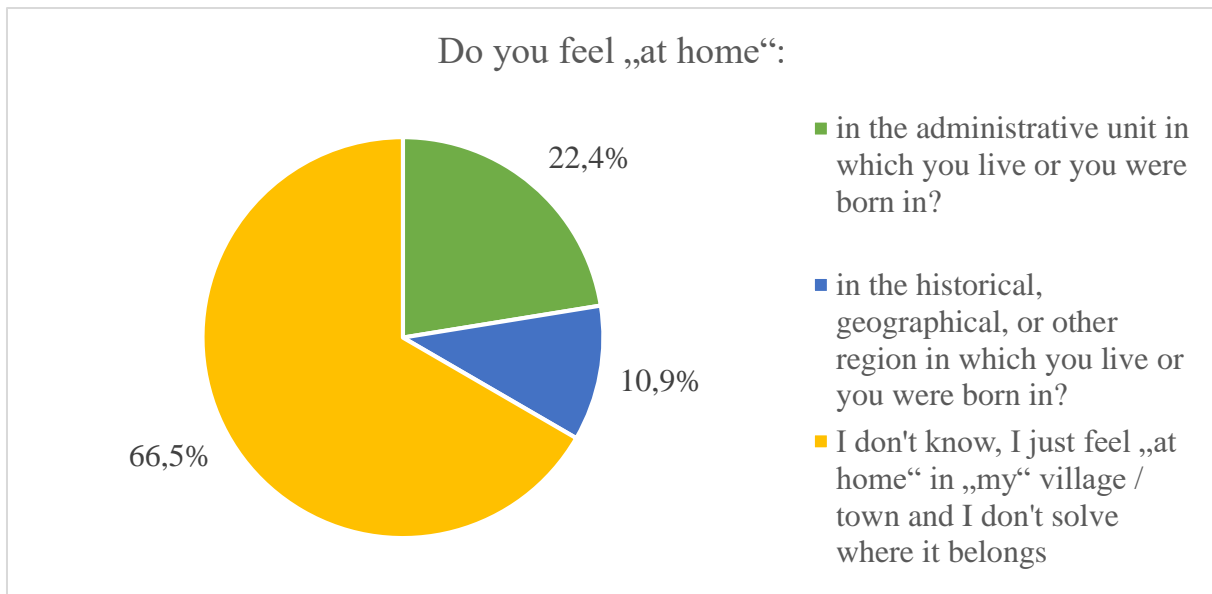


Fig. 2 –Answers to the primary question from the second series of questions. Source: own research

The third series of questionnaire questions was devoted to the marketing communication of the place where the respondents live currently or were born and completed a questionnaire with this place in mind. This series of questionnaires addressed several aspects of marketing communication. The first was the question of how the region most addresses respondents. The answer that was the most significant was that the place addresses the respondents to the greatest extent through social networks, which could be given by the sample that was addressed by our method of questioning. This was followed by responses “through websites and public radio services”, which may have been due to the time during which citizens learned about new measures related to COVID-19 through these media. The next after these responses followed the response “through the initiative of individuals, groups such as civic associations”, which may support the theory of Robert Govers (2018). According to the respondents, the control question about communication tools could be more effective; we did not find significant differences between the primary and the control question, except for the answer “website,”, which according to the respondents, could be more effective. Based on where the respondents receive the most information about the region, with a tolerable error of 5%, we revealed, through chi-square statistical testing, the dependence between whom they receive information from and with which local community they feel connected. As an additional question to the third series of questionnaire testing, a question was asked about attributes that can build the public value of people living in a given place. The respondents identified the most significant attributes as events, whether organized by the territory's administration, natural or legal persons, folk art events, and others, such as fishing competitions. It is also worth mentioning the significantly represented marketing communication tools of building public value represented in sports events and organizing events about local gastronomy and customs. The most important question of the third section of the questionnaire testing was the question, “Do you agree with the statement that the marketing activities of the administrative territory or place you filled in the previous questions about affecting your relationship with the unit as a whole?”. To this question, up to 79% of respondents said yes and that the marketing activities affect their relationship to the region's values.

The answers to this question are based on the respondents' conscious perception, so it was necessary to verify this question by statistical surveys. Comparing the answers from this question and the question shown in Figure no. 2 showed a 95% probability that there was a



relationship between the marketing activities of the place and the living brand. A graphical representation of the results obtained by combining these two questions is presented using a comparative imaging method in Figure 3. It can be seen that respondents who do not show a relationship to any department except their municipality/city where they live indicate that marketing does not affect their relationship with that unit. On the contrary, those respondents who have demonstrated a relationship with an administrative, or historical or other region claim to perceive the impact of marketing activities on their relationship to their units.

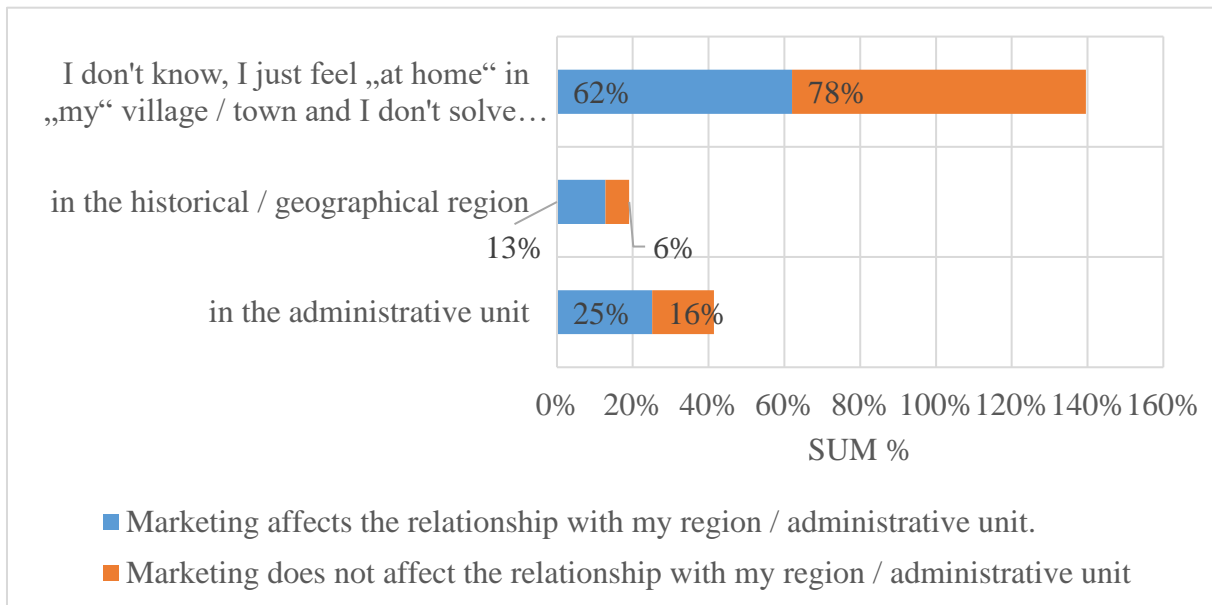


Fig. 3 - A combination of the results of the question shown in Fig. 2 and whether the respondents perceive any influence of marketing on their relationship to the values of the place. Source: own research

The fourth section of the questionnaire focused on respondents' classification characteristics, based on which the chi-square test did not show any dependence between age, residence in the village or town, gender, family relationship or income of respondents with whether they perceive local marketing activities. Thus, the dependence between the respondents' characteristics and their sensitivity to marketing activities was not proven.

## 5 DISCUSSION

This research attempts to develop the ideas presented in their work by the couple Kavaratzis and Hatch (2019). Their work introduced the ATLAS placemark management model, in which they propose that the placemark interact with and build on local communities. At the end of their research, they state that a more detailed practical examination of the possibilities of their design is needed.

This article therefore seeks to determine whether it is possible to create a placemark on the basis of the views of communities obtained through primary quantitative research.

The questionnaire survey of respondents' attitudes and characteristics was divided into four parts. The conclusion of the first section on the perceived brand of the place is based on primary and control questions that respondents perceive themselves as residents of the administrative unit more than residents of other places, which are as a social construct in the surveyed area due to later industrialization, geographical division and relatively greater poverty - compared to other parts of the European Union – still present.

The second set of questions about the lived brand and their comparison with the results of the question about the perceived brand suggest that the respondents express weak bonds to a larger unit than the administratively smallest possible one in which they live their daily lives.

The analysis of the results from the third series of questions on the perceived aspects of the place's marketing communication addressed to the inhabitants of the place revealed several interesting findings. The results confirm Robert Govers's ideas that the place's brand is also created through imaginative groups. Through our primary and control questions, the questionnaire compiled by us was able to identify the perceived communication tools and point out the inhabitants would welcome those whose streamlining. Based on the comparison of the information obtained in the third series of questionnaire questions with others, we performed several statistical tests of dependencies. We have revealed a dependency, suggesting that what kind of brand of the place citizens feel depends on their daily life; it depends on the quantity and quality of information that individual brand of the place, operating in the same space, provide. We found that a significant representation of respondents in their ability to recognize a brand of the place is evoked by events that should, however, build public values and not be consumption of culture, as well as the promotion of local uniqueness, in the form of culture, traditions or gastronomy. The most important finding, based on this series of questionnaires, is that there is a positive relationship between the place's marketing activities and the living brand.

Based on the classification questions, we also confirmed that there is no dependence between the respondents' characteristics and their sensitivity to the place's marketing activities.

Our research results imitate the situation where a local tourism organization decides how it will present its brand of the place, thus confirm the assumption A1 that there is a possibility of questioning as part of the ATLAS model. They also confirm the A2 assumption that it is possible to obtain statistically relevant data through primary quantitative research of perceived and experienced aspects of the brand. The obtained data bring many interesting findings. We confirm hypothesis H1 that there is a statistically significant relationship between local marketers' marketing communication and the place's lived brand. We also confirm hypothesis H2 that there is a statistically significant relationship between marketing communication of the place and perception of the site's marketing. However, we do not confirm hypothesis H3 that there is a statistically significant relationship between respondents' characteristics and the site's perception of marketing.

Based on the research results, we can say that the survey, as part of the ATLAS model, can be used in the creation and management of the brand of the place. The ATLAS model authors emphasize that such an analytical step is significant so that the brand of the place does not become just an expensive visual for foreign communities. Based on our results, we also support these claims because practice also shows that important decisions about a place's brand are often made intuitively. A person as one of the tools of the marketing mix is omitted from this whole process, although we can consider this person not only as of the inhabitant of the place but also for the holder of sales support, place product, co-creators of services that belong to the umbrella of the brand, as well as create an image of the place, in the eyes of other people.

## **6 CONCLUSION**

Top-listed authors dealing with the specific locality brand have pointed out already long-term that the creation of a brand of the locality has characteristic features, distinguishing the whole process from the creation of a brand in other sectors of economic practice that must be respected. These authors also point out in a long term aspect that a brand of the locality is not static, which can be easily determined, set, and performed according to plan because practice shows that if this is done, the result is expensive professional presentation, not even familiar to

the local community instead of efficient brand of the place. It seems that the local community, communication with it, and cooperation while following public values based on the local community are the key to a functional brand of the locality embracing the values and visions of local communities. That is why this paper deals with verifying the possibility of communication with local communities to get solutions in determining the direction of development of the brand of the locality, as proposed by the model of creating an effective brand of the place called ATLAS.

Our research confirms that there is a possibility of questioning as a starting point for creating a brand of the place and that there is a possibility of obtaining statistically relevant data through primary quantitative research of perceived and experienced aspects of the brand. The research also confirmed a statistically significant relationship between the marketing communication of local marketers and the lived and perceived brand of the locality. Based on the research results, we state that the survey, as part of the ATLAS model, can be used in creating and managing a brand of the place so that the brand of the place does not only become an expensive visual for local communities they do not care about but to respond to local needs and values.

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### **Contact information**

#### **Ing. Tamás Darázs**

University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication  
Nam. J. Herdu 2, Trnava 917 01, Slovak republic  
E-mail: darazs.tamas.95@gmail.com  
ORCID: 0000-0002-1873-6441

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# BASIS OF THE DIGITAL KPI TOOLBOX FOR OSH MANAGEMENT

*Arman Dehghani, Eleonora Fendeková, Peter Marković*

## Abstract

This article aims to explain the basis for a digital toolbox of Occupational Safety and Health Management KPIs. In addition to the research on the current state of knowledge and existing key figures in OSH, the development of an Excel-based Minimum Viable Product (MVP) is part of this work as a basis for gathering user requirements for the development of an IT solution. To achieve this goal, the following aspects were investigated: the difference of KPI compared to other key figures, KPI suitable key figures in OSHM as well as ensuring that all management relevant aspects were considered in the developed KPI toolbox.

The data collection of this qualitative investigation was initially done with a comprehensive literature review of 150 German and international sources. Based on literature study, KPI suitable definition and subsequent expert discussion, 73 potential KPIs were identified from 300 key figures frequently used in occupational safety and health. In the next step, these were assigned to five clusters of the OSHM system proposed by ILO guideline (ILO-OSH 2001) during four further workshops by six experts. All five clusters could be covered with potential KPIs.

The collected and aligned key figure pool serves as MVP of an IT solution providing a KPI dashboard for the management of the companies and complements other company-relevant key figures. Thus, the previously existing gap on the topic of OSHM relevant KPI is addressed and a basis for a digital solution is provided, which can be applied in practice.

**Keywords:** *Occupational Safety and Health, Key Performance Indicator, Efficiency, Personnel Management, Productivity, Performance Measurement*

## 1 INTRODUCTION

Digitization has a wide range of facets. Above all, the rapid availability of extensive information is one of the most important expectations from this era. Occupational safety and health management (OSHM), like all other fields of management, is therefore undergoing fundamental change. The expectation of top management is to be able to make decisions as quickly as possible. This requires comprehensive information and data.

One of the focus areas of management is the performance measurement of the organization. Peter Drucker believes what gets measured, gets managed (Väyrynen, Häkkinen, Niskanen, 2015, p.10). It shows that for managing a company, activities and processes are needed which can be measured. Key Performance Indicators are essential as performance measurements for monitoring and controlling due to their characteristics of a condensed presentation of important objectives and critical success factors of a company (Parmenter, 2015, p.7). However, key figures are often wrongly classified as KPIs, even though their characteristics lead them to be defined as result indicators, performance indicators, or key result indicators (Parmenter, 2015, p.4). This results in an unmanageable number of key figures, which makes impossible the precise control of OSHM by means of focused views into the system.

Considering the digitalization aspects, the objective of this work is to create a pool of key figures for OSHM, which will be used as a database for the future IT solution. Based on the

definition of the term Key Performance Indicator and its characteristics by Parmenter follows the development of a matrix, for the filtration of the key figure pool to extract potential KPIs.

The individual steps of the KPI extraction describe the conceptual approach (in IT known as user story) for the development of the digital toolbox, which will be created after proof of concept.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

One of the most important focus areas of management is the performance measurement of the company. To make the right decision in time, the facts, also the measurement data, should be made available in a timely manner and at an early stage as a basis for decision-making. The digital transformation in the industry has made it possible to collect and accumulate ever greater amounts of data. This makes it possible to initiatively optimize the performance of the control modules in occupational safety and to take preventive action against possible risks. In short, OSH needs modern management tools to better fulfill its role in the company.

This chapter explains the three different aspects of this article, namely modern occupational safety and health management, the theoretical basis of key figures and existing key figures in Occupational Safety and Health Management (OSHM). These were essential to provide a common understanding in expert discussions.

### **2.1 Theoretical basics of holistic OSHM**

OSHM Systems help to achieve occupational safety and health goals that serve to improve safety and health at work, prevent accidents at work and work-related illnesses, and make work humane (LASI, 2013, p.5). The positive effects of implementing such system at organizational level, both in the reduction of hazards and risks and in productivity, is now widely recognized by governments, employers, and workers (ILO, 2009, p.1). The entrepreneurial duties which are derived from the legal conditions are correspondingly complex and relate to both the normative, strategic, and operative management level (Brauweiler, Zenker-Hoffmann, 2019, p.1). The introduction of an OSHM system means that support from top management and the consideration of occupational safety and health requirements in all processes of an organization is ensured (Ritter, 2009, p.1). An important question in this regard is how top management can best control this system. OSH experts provide management with information and analysis on key indicators to raise awareness and reflect observable support for safety engagement in the enterprise (Costin, 2019, p.3). In general, management strategies are described as a set of decisions and actions designed to improve OSH performance while also benefiting employees and the environment (Živkovic, 2015, p.667). OSHM approaches have changed through time, in reaction to social, political, technical, and economic developments (Mambwe, 2021, p.2). Available literature indicates that OSHM plays a key role to overcome safety and health problems, promote work safety, lower the risk at work and prepare a safer work condition (Podgòrski, 2015, p.144). Training, employee participation, preventative actions, OSH policy, reporting of accidents and near-misses, risk management, and culture for continuous development are success elements in influencing OSH, according to Mwanaumo and Mambwe (2019, p.27). They stressed that management should incorporate OSH decision-making into the firm's decision-making process since it minimizes or eliminates risks and solves safety culture and motivational difficulties (Mwanaumo, 2019, p.27). According to ILO Guideline, the OSHM system should contain the main elements of policy, organizing, planning and implementation, evaluation, and action for improvement, as shown in Fig.1 (ILO, 2009, p.6). In the context of this work, the action for improvement has been replaced by the management review, because the improvement actions are finally discussed in a management review and approved by

management. In addition, the management review can be found in every management system and should therefore be emphasized. In this context, it is important to remember that continuous improvement and audit as a control system play an important role in this model.

The model of modern OSH is based on a holistic understanding of safety and health at work: It emphasizes the personal responsibility of an organization, its managers and employees and involves managers more closely in occupational safety and health and relies on regular evaluation with the aim of continuous improvement, integrates occupational safety into the operational processes and regards it as a process (BAUA, 2002, p.33).



Fig. 1 – Main elements of a management system. Source: own illustration based on ILO-OSH-2001

## 2.2 General overview of key figures and key performance indicators

Indicators are often utilized to aid the measures and planning choices. They are statistical metrics that evaluate certain characteristics of a research subject and are a way for quantifying abstract concepts. (Yang, 2020, p.5). Basically, a distinction is made between two overarching types of key figures: absolute and relative key figures. Absolute key figures are individual or summed values that stand alone, such as single figures, differences, or mean values (Ziegenbein, 2007, p. 165). Relative key figures, also called ratio figures, are always in relation to each other. They relate absolute key figures to each other. Here, also, a further distinction can be made between breakdown, index, or relationship figures (Joos-Sachse, 2014, p. 65). Indicators can also be divided into qualitative and quantitative components. The former is used to evaluate objective properties, whereas the latter is used to measure the properties of things using numerical numbers. These two indicator types are typically used in tandem in the creation of an indicator system that progresses from a single indication to a multi-dimensional and multi-scalar system (Yang, 2020, p.5). In addition, there are different grouping options for these information carriers. Thus, they can be classified regarding their measurement level (strategic, operational, normative) or their prevention character (early indicator/performance driver or late indicator/diagnostic key figure) (Eschenbach, Siller, 2011, p.104). The use of key figures is reflected in different systems and procedures. A well-known model in practice is the Balanced Scorecard (Kaplan, Norton, 2018, p.8 ff.), which enables a comparison of the organization at any level (internal, industry-wide or over time), and makes the strengths and weaknesses of the company apparent (Vollmuth & Zwettler, 2013, p. 16). Whereby in practice all indicators are combined and condensed in a report without having analysed their individual influences on the organization or the company. A necessary condition, however, is prioritization in connection with the organizational objective. It must be considered that, for example, not every key figure is a KPI.

A KPI is a performance indicator that focuses on and measures parts of organizational performance (Parmenter, 2015, p. 7). Provided in aggregated form by controlling, it can be found in great variety in practice. The resulting data is essential and the foundation for current and future corporate success (Parmenter, 2015, p. 11). Thus, KPIs are an essential part of external reporting, but also increasingly serve as early or late indicators for the internal control and development of organizations. KPIs facilitate decision-making as well as performance measurement and assessment. (Parmenter, 2015, p. 12 f.). Accordingly, they play a particularly important role for managers at all levels.

Tab. 1 – KPI criteria. Source: own research

Parmenter criteria	Description	“SMART”	Description
Key figure of non-financial nature	Quantities (e.g. dollars) count towards a KRI	Specific	plausible definition
Measurability and monitorability	Planning, measurement, and control lays the foundation for alignment with the day-to-day activities of a company through KPIs	Measurable	Measurability and conscious selection of data origin
Focus of TOP Management	fundamental for corporate management	Achievable	Accessibility, high cost-benefit effect
Easy recognition and assignment	Statement and measures of the KPI understandable for all employees	Reasonable	Relevant for companies and their systems and processes
Assignability	Consultable by manager	Time-bounded	timed, fixed
Influence on critical success factors	e.g. influence on BSC for realization of multiple business goals of different areas		
“limited dark sides”	Avoidance of adversarial and dysfunctional behavior		

A key figure must fulfil certain criteria to be considered a KPI. The above table shows these criteria according to Parmenter with very brief explanations of the points (Parmenter, 2015, p. 11 ff.) and the well-known acronym “SMART”, taken up by the authors Kjellen and Carlucci among others (Podgórski, 2015, p. 151). In this investigation, Parmenter’s approach was used as a decision criterion for KPIs because of its more precise definition.

As can be seen from this section, the corporate objective and KPIs are closely linked. Accordingly, there are countless of these indicators, as each company defines them individually. It should be noted that KPIs quickly provide the company, especially top management and decision-makers, with a transparent overview through their measurement and control function, can be viewed as a control element in the most diverse phases and accordingly have a special significance for the company’s success.

### 2.3 Key figures of OSHM

In OSH in particular, key figures are used to document the legitimacy of an occupational safety and health management system by comparing the time before and after the implementation of countermeasure and to argue the need for further action. They thus create a basis for negotiation, for example, for the budget that is applied in the context of occupational safety measures (VDSI, 2011, p.10). Hale emphasizes three different uses of performance indicators (Hale, 2009, p.1): 1. Monitoring a system’s degree of safety (whether that is a department, a site, or an industry),



2. If the answer to question 1 is that action is required, choose where and how to act. And 3. Motivating individuals who can take action to do so.

Like all management systems, OSHMS are only effective if they contain goal-oriented control and improvement processes. The objectives must be defined in such a way that the degree of achievement of the objectives can be determined and evaluated in the sense of a results control (BAUA, 2002, p.17). OHS risk management requires a method of measurement to be carried out efficiently. Indicators that offer measurements of key parameters are required for OSH risk management (Kaassis, 2018, p.3). Standardised safety management methods offer corporations some protection against liability. Even though the legislation does not change, liability in OSH arises because of precedents that invalidate once-accepted procedures. As a result, techniques to assess compliance are required, and several recent advancements in this area have developed (Pons, 2019, p.4). Xu claim that safety monitoring is an important part of safety management, and that a lack of effective communication among project stakeholders is a roadblock to improving it (Xu., 2019, p.120).

After all, in the field of occupational safety and health, preventive measures are preferable to reactionary ones because they take advantage of the opportunities and avoid the risks instead of first generating them from the experiences that have occurred (early warning indicator) (Kern & Schmauder, 2005, p. 22). So-called “lagging indicators” are therefore not sufficient, as they do not capture or verify the current economic benefits of occupational safety and health. In order for the functions just mentioned to have an effect, it is advantageous to refer to the individual elements of an occupational safety and health management system mentioned in 2.1 (strategy, organization, planning and implementation, control and evaluation, management review). As with the key figures of other fields, the occupational safety and health management of a company can choose from a pool of indicators (International Labor Organization, 2009).

### **3 METHODOLOGY**

This work presents the basics for a digital toolbox that can provide the key figures, among others, the KPIs in occupational safety management to the decision maker. But what is the right measurement data to assess the performance of occupational safety in a company? Is every key figure automatically suitable as a key performance indicator? In the age of digitalization, how can we act in a timely manner? The following theses (T) were examined in this context:

T1: There are key figures in occupational safety and health management that are suitable as potential key performance indicators.

T2: The potential KPIs for occupational safety and health cover all aspects of the OSHMS.

T3: The key figures obtained can be applied using a toolbox for selecting the potential KPIs.

#### **3.1 Research Design**

Figure 2 illustrates the process of this quantitative investigation. It starts with collecting existing OSH key figures, in next Step the Key figures were analyzed based on Parmenter’s seven criteria which explained previously.

In this way potential KPIs were extracts in “1,2,4, all” Principle, known from agile work models, in expert workshops. This makes it possible that better ideas can be generated faster and more diversely than ever before.

Moving forward to third step a pool of 73 KPIs identified from 300 existing Key figures. The last step would be the creation of a demonstrator (excel-based) to proof the requirements of the IT-Solution (user experience) and correctness of procedure.

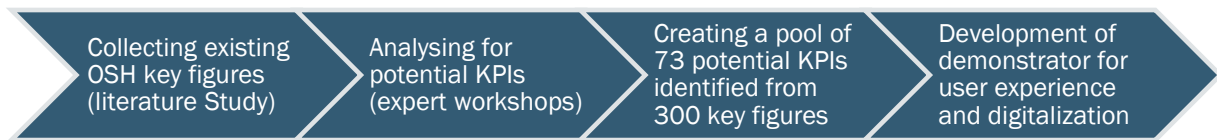


Fig. 2 – Research Design. Source: own illustration

The data collection of this investigation was initially carried out with a comprehensive literature research of 150 sources. The information was drawn from German and international reference books, scientific articles from trade journals, magazines, or online portals, as well as protocols and reports from authorities like ILO, OSHA, LASI and BAUA. In addition, the internal sources of a German group with 18 global production sites and corresponding IT solutions (such as procedures, instructions, minutes of the committees, etc.) were used.

The focus of this investigation is on the processes, among others risk assessment process, and workplace-related aspects of OSH. The cultural aspects were explicitly not considered, as the topic of behavior-based safety is very multifaceted and should be treated separately. Since the risk assessment process is similar in all companies, regardless of industry and size, the result is not negatively affected, but only a structured approach is taken. In addition, aspects such as sectors, company sizes, and company structures were not included so that the result remains as general as possible and applicable to all types of companies. For this investigation, the existing data are collected as secondary data and quantitatively evaluated. The collected data resulted in a pool of key figures in which all common indicators of occupational safety and health management are listed.

### 3.2 Data processing and data analysis

In addition to the research on the current state of knowledge and existing key figures in OSH, the development of an Excel-based Minimum Viable Product is part of this work as a basis for gathering user requirements for the development of an IT solution. Data processing was performed using Excel to create the MVP version for the selection of KPIs. This format enabled an uncomplicated development of the relevant KPIs through the filter function. One reason for collecting the data in Excel was the ease of use of this tool by the experts, regardless of their IT affinity. At the same time, the Excel file can be imported into almost all existing IT solutions. Thus, the application complexity is kept low with simultaneous optimal connection to various IT tools.

Due to the lack of explanatory theories and models in this case an explorative approach is the best method of proceeding by performing an empirical investigation. The chosen approach is considered inductive, as from the specific data of the empirical investigations, patterns and relationships have been identified and have been formed into a model explaining the reliable and meaningful KPIs and check their applicability based on the data obtained in the risk assessment process and identified counter measures

### 3.3 Choice of Workshop participants

As participants of Workshops were involved, experts who had practical experience in the implementation and running of an OSHM system and largely cover the spectrum of the currently practiced OSHM concepts. To investigate the research question and its theses, six OSH experts were chosen. Main intentions of the participation of the experts were:

- Incorporating further practical experience with management of OSH (safety manager or an experience more than 5 years in OSH),

- Definition of requirements from a practical point of view for a KPI toolbox as part of an OSHM,
- Involvement of operational and near-operational OSHM experts in the development of the toolbox,
- Development of already used indicators and parameters,
- Discussion of possible indicators and parameters with experts,
- Discussion of the completeness and applicability/practicability of the KPI box.

## 4 RESULTS

Before being classified into the characteristic criteria of a KPI, a collection of key figures is created. This took place with a focus on occupational safety and ergonomics in the international context through a literature research. A general search resulted in 300 key figures, which can be used to identify various sub-areas within occupational safety and ergonomics. Thus, the first thesis (T1: There are key figures in OSHM that are suitable as potential key performance indicators) was investigated and confirmed.

In the next section, the identified key figures are classified into five clusters. These five clusters result from the classification of the OSHMS according to ILO-OSH 2001. The following filter criteria were considered: indicator code, cluster indicator (five management elements: policy, organizing, planning & implementation, control & evaluation, and management review) , key figures abbreviation, Key figure Description, Data collection type (formula / survey), source title, source link / author, seven criteria of KPIs (1. non-financial, 2. regularly monitored, 3. CEO focus, 4. Simple, 5. team based, 6. significant impact on the business, and 7. limited negative side), and Potential KPI.

This categorization was assigned in the framework of a total of four experts' workshops and with a principle known of agile working (1,2,4, all): Everyone was immediately involved, no matter the size of the group. Knowledge and imagination were tapped from distributed and previously unknown sources. Open and fruitful conversation unfolded, Ideas and solutions were reviewed as quickly as possible. And most importantly, the ideas belong to the participants. This simplifies follow-up and implementation. The work of persuasion was eliminated, Simple and elegant. The Five Building Blocks of this method are done as follows:

1. Design the invitation: The questions in relation to a research thesis to be solved were asked,
2. Structure and materials needed: Unlimited number of groups, Sufficient space for participants to work in pairs and foursomes, pens, and paper for participants to record observations and findings,
3. Involvement of participants: Everyone in the group was involved. Everyone had the same opportunities to be involved,
4. Groups composition: At the beginning, each person on his own, then in pairs, then in fours, finally the whole group,
5. Procedure and duration: Everyone thinks alone about the chosen problem, packaged as a question (E.g. How can we best map the potential KPIs to OSHM pillars? How would you deal with this situation? What ideas or actions would you suggest?) (1 minute), Then, in pairs, these ideas are further developed (2 minutes), Ideas from the pairs are refined in groups of four. Commonalities are brought together, and differences are highlighted (4 minutes), Pose the question "What idea did your group find most noteworthy?" Each group presents one noteworthy idea (this step can be repeated if needed) (5 minutes).

The following table (2) shows the determined key figures per cluster and the KPIs contained in it which fulfill all criteria according to David Parmenter.

Tab.2 – Number of determined key figures, included potential KPIs in each cluster. Source: own research

Cluster	Determined key figures	Included potential KPIs
Strategy	31	9
Organization	47	16
Planning & implementation	87	19
Control & Evaluation	126	26
Management review	9	3
Total	300	73

The result confirms that the second these (T2: The potential KPIs cover all aspects of the OSHMS) is also correct. The most of the key figures are assigned to the cluster control and evaluation and as it can be seen, the key figures in the area of management review are the least and this also shows the need for improvement in the area of communication with top managers as mentioned in the introduction:

**Potential KPIs of cluster strategy:** 1. Extent of participation in expert committees, 2. Number of proposals/instructions by the employee for improving OSH, 3. Number of Occupational safety and health strategies revised and implemented by top management, 4. Employee suggestions in OSH, 5. OSH refresher courses, 6. Percentage of employees who have participated in training courses on OSHM system structures and processes, 7. Number of used KPIs in OSHMS compared to other companies, 8. Number of health care staff per thousands of employees, 9. Average overtime hours per person,

**Potential KPIs of cluster organisation:** 1. Scope of the flow of information to the public, 2. Participation in OSH training of the employee, 3. Staff turnover rate due to health care, 4. Percentage of workplaces with defined responsibilities and tasks in OSH, 5. Proportion of high-quality OSH, 6. Percentage of employees who are informed about risk assessment and resulting measures, 7. Number of departments in which OSH reporting and documentation exist, 8. Number of departments with Balanced Scorecard, 9. Number of auditors per thousands of employees, 10. Total of hours in safety and health training in the month, 11. Total of man-hours in safety and health training, 12. Number of health and safety reports produced, 13. Number of issued HSE newsletter, 14. Percentage of personnel trained in safety, security, and facilities measures, 15. Percentage of staff with adequate Occupational safety and health training, 16. Total HSE training offered,

**Potential KPIs of cluster planning & implementation:** 1. Assessment of potential dangers, 2. Degree of fulfilment of the prevention measures, 3. Occupational disease rate, 4. Health rate, 5. Number of improvement objectives, 6. Implemented measures for risk minimization, 7. Number of contractors assessed for compliance/implementation of their OSHMS, 8. Number of risk assessments carried out in the divisions, 9. Outlet height of the employees in trial period, 10. Promotion/Ascent, 11. Number of execute safety plans, 12. Number of implemented safety and health programmers, 13. Number of safety inspections for month, 14. Number / Percentage of solved safety non-conformances from previous audit, 15. Percentage of implemented safety and environmental standards and systems, 16. Percentage of assessment of health hazards, 17. Percentage of corrective actions closed out within specified timeframe, 18. Percentage of emergency response covered, 19. Percentage of OSH committee recommendations implemented.

**Potential KPIs of cluster control & evaluation:** 1. Frequency of compliance audits, 2. Detected vulnerabilities (safety issues), 3. Frequency of interruptions due to injury/illness, 4. Overtime due to illness or injury, 5. Frequency of unsafe acts, 6. Number of reported (legal process tide) occupational diseases, 7. Rate of reported (legal process tide) occupational diseases, 8. Absences due to occupational diseases, 9. Work-related sickness rate, 10. Illness-related absence rate, 11. Frequency of accidents, 12. Severity of the loss of capacity due to absence, 13. Percentage of OSHM processes optimized through improvement measures, 14. Percentage of medical consultations due to employee health check-ups, 15. Number of accidents due to lack of PPE, 16. Number of safety accidents per 100.000 hours worked, 17. Number of days since last incident, 18. Number of indicators to judge safety program effectiveness, 19. Percentage of audits conducted on schedule, 20. Number of safety accidents due to non-conformance per month, 21. Percentage of operating times with free accidents, 22. Percentage of security violations, 23. Lost time injuries per 1.000 hours worked, 24. Lost time injuries per 100.000 employees, 25. Number of risks mitigated, 26. HSE index.

**Potential KPIs of cluster management review:** 1. Extent of participation in expert committees, 2. Number of proposals/instructions by the employee for improving OSH, 3. Average overtime hours per person.

Thus, all 300 key figures were assigned to their relevant ILO cluster and the potential KPIs were identified. The following Figure (3) shows an excerpt from the Excel-based demonstrator.

Code	Cluster	Key figure	Description	KPI?
A001	Strategy	Extent of information flow to the public	All information that is deliberately given by companies to the public in the context of occupational safety and ergonomics	potential KPI
A002	Strategy	Scope of voluntary services to promote safety and health outside the company's own organization	Employee participation in public sports activities, health days, or community service events	other key figure
A003	Strategy	Scope of participation in expert committees	Number of expert bodies in which representatives of the organization participate	potential KPI
A004	P&I	Extent to which performance-converted employees exceed the minimum employment rate.	More performance-transformed employees than necessary	other key figure
A005	P&I	Scope of voluntary fringe benefits	Number of voluntary fringe benefits above and beyond the usual/statutory requirements	other key figure

Fig. 3 – Screenshot of KPI Demonstrator tool

The excel-based demonstrator shows that the possibility to create a database for digital KPI dashboards is already given. Thus, the third thesis is also covered (T3: The key figures obtained can be applied using a toolbox for selecting the potential KPIs). These Data pool will be presented as a digital dashboard after the user experience phase is completed. According to managers review and preference some of these KPIs can be shown in the dashboard to be tracked on daily basis.

## 5 DISCUSSION

The aim of this article was to provide the foundation for a digital toolbox of KPIs for Occupational Safety and Health Management. First, the topic of OSH management is treated as the main field of work. In this section the terms such as OSHM, risk assessment and essential

terms in the field of OSH are explained, which are necessary for understanding the dissertation and further development. The next part deals with the definition of KPIs and their framework. There is a big misunderstanding in this context; every key figure is automatically understood as a KPI and everyone tries to create more KPIs for management to make better decisions. The last part of the literature research is an attempt to clarify which key figures are available in OSHM with the aim of finding potential KPIs. In addition to research into the present state of knowledge and existing key figures in OSH, the creation of an Excel-based Minimum Viable Product as a platform for collecting user needs for the creation of an IT solution is part of this foundation. This investigation's data was first gathered by a comprehensive literature evaluation of 150 sources. The data was gathered from national and international reference books, scientific publications published in trade journals, periodicals, and internet portals, as well as government procedures and reports.

From 300 key figures often used in occupational safety and health, 73 relevant KPIs were selected based on a complete literature review and subsequent expert debate. This part verifies the first thesis regarding the existence of potential KPIs in OSHM.

Following that, during four more workshops led by six experts, they were assigned to five clusters of the OSHM system established by the ILO guideline (ILO-OSH 2001). Potential KPIs might be developed for each of the five clusters. Thus, the second thesis was proven.

The third thesis was thus proved that a database was created for programming or linking the key figures into existing system. The pool of gathered and aligned key figures acts as a database for an IT solution that provides a KPI dashboard for corporate management and supplements other company-relevant key statistics. As a result, the previously existing gap on the issue of OSHM relevant KPI is addressed, and a foundation for a digital solution that can be used in practice is established.

In this investigation, certain key figures from OSH have been identified as KPI worthy. Depending on the included KPIs, now the discussion of the KPI system, is to be considered superordinate. Since some companies have either too many key figures and KPIs for the control of occupational safety and health, in others, too few key figures or KPIs are used, the underlying systems must also be reconsidered. Because one variant lets hardly an overview of the overall picture, and the other does not create an overall picture, since too many aspects are not considered. Therefore, a model with a few KPIs for data aggregation and several PIs for different topics would be the logical middle ground. Such models are implemented, among others, by David Parmenter and his 10-80-10 rule (Parmenter, 2015, p.19). While the size of 10 KRIs, 10 KPIs and 80 PIs or RIs seems excessive for a KPI system in OSH, it can certainly be oriented to the circumstances.

Nevertheless, care must be taken to continuously analyze the stock of key figures. This is the only way to reduce it to those indicators that make a significant contribution to corporate management and are requested by management. Even if management is tempted to further expand a collection of key figures that has already been started, this should be refrained from due to the usefulness and clarity of the data.

As can be seen from the results, the number of potential KPIs in cluster of management review is very low. Thus, there is a necessity for further improvement in OSHM in this context. After creating the Excel list as the basis of the toolbox, the existing key figures were separated based on the predefined filters. These filters serve as the future selection menu of the toolbox. Both the database and the filters can be expanded as needed.

In this study, KPIs that are valid for all companies were examined. The cultural factors were expressly excluded since the issue of behavior-based safety is very complex and should be

addressed individually. Furthermore, characteristics like as industries, company sizes, and company structures were not included for the conclusion to be as broad and relevant to all sorts of businesses as feasible. It is advisable to investigate the dependence of the KPIs on industry type, company size and structure as the next steps. And thus, to specialize the toolbox for company purposes.

## 6 CONCLUSION

The control by key figures in OSH offers great potential to reduce costs for the company, to support the safety and health of employees preventively and in the long run, to maintain a competitive organization through certifications.

This This paper describes the strategy of data collection for an organization's digital KPI toolbox for OSHM. The establishment of the KPI definition and the critical parameters of KPI categorization are discussed. According to the ILO-OSH 2001, the findings of the qualitative research (literature review and expert workshops) were classified into five clusters: policy, organization, planning and execution, evaluation, and action for improvement. A total of 73 key indicators were selected as eligible for KPIs out of a total of 300 key figures assessed. The outcome was developed as an Excel-based demonstration (beta version) as a “proof of concept”. Based on top management decisions, a collection of detected KPIs may be chosen for transmission to data visualization tools to create live dashboards. Each KPI may be clicked to provide further information for lower-level managers. The other major figures represent OSH specialists in five distinct groupings. e identified KPIs.

It should be specifically noted that the KPI system is to be continuously improved. In this context, the introduction of further KPIs is essential to obtain a more comprehensive overview of several versatile aspects of occupational safety and to be able to include them in decisions. After all, occupational safety measures cannot be derived from accident figures alone. For this purpose, it is advisable to install a few potential KPIs or KRIs and a larger number of RIs and PIs to immerse deeper into the background of the KPIs and KRIs depending on the situation.

The digital transformation and Industry 4.0 make it possible to collect and accumulate ever greater amounts of data. This opportunity should be used to proactively optimize the performance of the control modules in OSH and to have a preventive effect on possible risks. This is because preventative procedures are desirable to reactive ones since they raise productivity and prevent hazards rather than learning from those that have already happened. After the toolbox has been tested in an accompanying field trial in a multinational organization, it will be made available as an IT solution. A group of identified KPIs based on top managers decision can be selected to transfer to data visualization software to make live dashboards. The other key figures stand for OSH experts in 5 named clusters.

After implementation, this mature system of key performance indicators must be regularly checked for updating, usability and corrected. Because apart from the benefit for the enterprise, the employee and its health is the most important resource of the organization, which already can be derived from article two, paragraph two in the basic right of the Basic Law of the Federal Republic of Germany with the words: “Everyone has the right to life and physical well-being ” (German Basic Law Art. 2, para.2).

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## Contact information

### **Arman Dehghani, MSc.**

University of Economics in Bratislava (EUBA), Faculty of Business Management  
 Barlachstr. 12, 80804 Munich, Germany  
 E-Mail: [diss.armandehghani@gmail.com](mailto:diss.armandehghani@gmail.com)  
 ORCID: 0000-0002-6317-8741

### **Prof. Elenoerea Fendeková, Ph.D. Ing.**

University of Economics in Bratislava (EUBA), Faculty of Business Management  
 Fakulta podnikového manažmentu Ekonomickej univerzity v Bratislave, Dolnozemska cesta  
 1/b, 852 35 Bratislava 5, Slovenská republika  
 E-mail: [eleonora.fendekova@euba.sk](mailto:eleonora.fendekova@euba.sk)  
 ORCID: 0000-0001-7572-9531

### **Prof. Peter Markovič, Ph.D., Ing.**

University of Economics in Bratislava (EUB), Faculty of Business Management

Fakulta podnikového manažmentu Ekonomickej univerzity v Bratislave  
Dolnozemska cesta 1/b, 852 35 Bratislava 5, Slovenská republika  
E-mail: peter.markovic@euba.sk  
ORCID: 0000-0003-3870-8082

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# REGIONAL INTEGRATED TERRITORIAL STRATEGIES

*Kristína Dzureková*

## *Abstract*

Regional development is an important part of the country's development and progress towards a modern society. The present paper deals with an integrated approach to regional development. The aim of the paper was to find out the allocation of financial resources from the European Investment and Structural Funds within the Regional Integrated Territorial Strategies in the Trnava self-governing region, the Nitra self-governing region and the Trenčín self-governing region. Observation and analysis of relevant documents were used as methods of research and data collection. Survey results provides information about the size of allocated funds, the number of projects and the focus of projects in selected regions. It shows how and for which projects funds from European Union funds are used.

**Keywords:** *regional development, integrated strategy, integrated territorial investment, Trnava region*

## **1 INTRODUCTION**

In 2014, the Slovak Republic concluded a Partnership Agreement with the European Union on the use of European Structural and Investment Funds in the 2014-2020 programming period. The partnership agreement contained a strategy and priorities with the use of investments in the amount of 15.3 billion Euros. The priority for this period for Slovakia was investments in transport infrastructure, research, development and innovation, support for small and medium-sized enterprises, environmental protection, energy efficiency and renewable resources (Úrad vlády SR, 2015). In addition to the basic objectives such as ensuring smart, sustainable and inclusive growth, the aim of the Partnership Agreement was also to ensure the efficient and effective implementation of the European Funds and an integrated approach to territorial development. The application of the integrated approach in the use of the European Structural and Investment Funds as well as in territorial development is primarily based on Regulation of the European Parliament and of the Council 1301/2013. Based on this regulation, it was necessary for an integrated approach to be used for the purpose of comprehensive development of Slovakia's regions, with regard to their internal needs (Úrad podpredsedu vlády SR pre investície a informatizáciu, 2018). The aim of the paper was to find out the allocation of financial resources from the European Investment and Structural Funds within the Regional Integrated Territorial Strategies. The paper provides interesting information about the size of allocated funds, the number of projects and the focus of projects in the Trnava self-governing region, the Nitra self-governing region and the Trenčín self-governing region. It shows how and for which projects funds from European Union funds were used.

## **2 THEORETICAL BACKGROUND**

The theory of integration is based on the assertion that cooperation in one area increases cooperation in other areas as well. Integration is thus the result of an effort to minimize inconsistencies and maximize consistency and synergy (Jaleel, Talha, Shah, 2019). The idea of an integrated approach has its origins in the beginnings of European cohesion policy, when the

founding states signed the Treaty of Rome in order to strengthen the unity of economies and ensure harmonious development by reducing disparities between regions. This approach emphasizes the need to coordinate and involve more public policies in the process of developing and reducing disparities. However, this form of public policy cooperation can only be applied at regional level, because each region is specific and has different growth factors (Panorama, 2010). An integrated approach to the implementation of the European Structural and Investment Funds can manifest itself on two levels, namely horizontal and vertical. The horizontal level is based on the support of various sectoral activities, which are complementary and the vertical level counts on the involvement of relevant actors in these activities on the basis of the principles of decentralization, subsidiarity and partnership (MIRRI SR, 2020).

Integrated territorial development therefore represents the interconnection of sectoral policies at different hierarchical levels in order to achieve resource efficiency and sustainable development and thus increase the quality of life of the population. It seeks to increase the competitive potential of the areas not only in the national but also in the European context (Kociuba, 2017). Integrated regional development is based on sustainable development, as defined in the Lisbon Treaty as well as in the Europe 2020 Strategy. Sustainable development is socio-economic development in which political, economic and social measures are coordinated with a view to maintaining the balance of natural processes to meet the living needs of people of the present and future generations (Szafranek, 2014). Regions are doing this development on the basis of integrated territorial strategies, which are a complex tactic of development activities in a given area. The coordinating body for integrated territorial strategies is the self-governing region, it is responsible for organizational and technical support, coordination of involved entities, elaboration of documents, monitoring and evaluation of integrated territorial strategy, communication with the Managing Authority. In the programming period 2014 - 2020 was Managing Authority Ministry of Agriculture and Development rural areas of the Slovak Republic (MP SR, 2013). Integrated territorial strategies are elaborated as Programs of economic and social development of self-governing regions. For the successful implementation of integrated regional development, overcoming obstacles to coordination and comprehensive management, all stakeholders must be involved in the development of an integrated regional strategy. When creating a strategy, it is important that the internal problems of the area are correctly identified and the triggers of these problems are understood. Integrated territorial strategies also set out indicators that check that regional development is being carried out correctly. Means of control can be applied so-called „soft form”, for example by providing regional analysis or cooperation (Vulevic, Castanho, Naranjo Gómez, Cabezas, 2021). Integrated territorial strategies are the basis for integrated territorial development and are supported by integrated territorial investments. Integrated territorial investments are important for achieving the development of the regions. As a new instrument of territorial development they were introduced 17 December 2013 by Act applying Regulation (EU) No. 1303/2013 of the European Parliament and of the Council in Article 30 (Chrisidu-Budnik, 2018). They make to possible to combine investments from several priority axis of one or more operational programs, with that they make funding more simply and thus ensure the implementation of integrated territorial strategies (Európska komisia, 2014a). They also enable the support of projects that are thematically different but at the same time complement each other and are interconnected. These investments are implemented mainly in provincial towns and areas that are connected to them in the framework of regional operational programs (Kowalska, 2017).

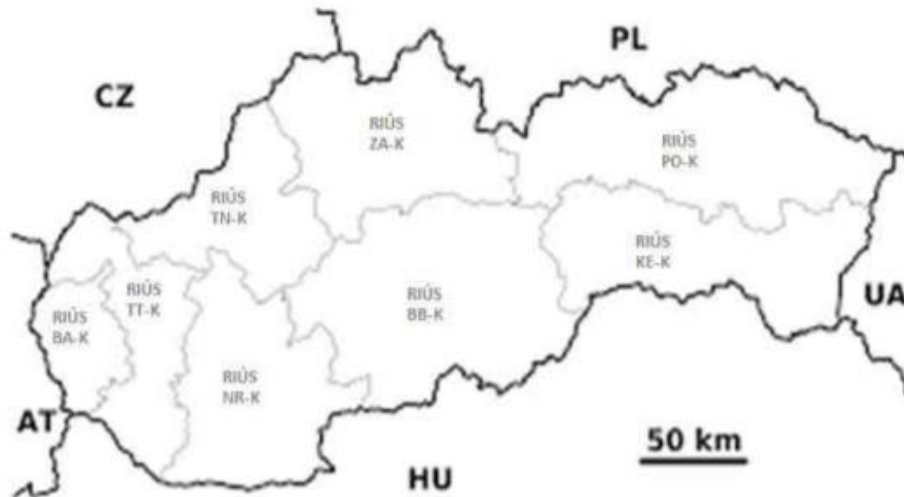


Fig. 1 - Graphical representation of the distribution of Regional Integrated Territorial Strategies. Source: MP SR, 2013

More than 70% of the EU's population lives in cities. Cities are centers of regional development. These areas make up a large part of GDP, but they are also places where problems such as unemployment, poverty or pressure on the environment are concentrated. Integrated territorial strategies therefore seek to increase the sustainable development of cities and thus strengthen their resilience. Sustainable urban development combines efforts to support several areas, such as education, social development and economic development. The basis for such development is strong partnerships bringing together civil society, the local economy and different levels of government. Sustainable urban development uses the European Regional Development Fund and seeks to focus funding in an integrated way on areas where it is needed and to use funding in synergy with the European Social Fund (Európska komisia, 2014b). The strategy of sustainable urban development is elaborated as Programs of economic and social development of several municipalities and it is a part of integrated territorial strategies, which are created by self-governing regions. This enables the use of resources not only for territorial urban development but also for the self-governing region as a whole. The strategy of sustainable urban development does not only concern the territory of the city but also its functional areas, and in this whole area there are constant interactions within the framework of development and problem solving. The criterion for defining the territory of sustainable urban development is the center, which has at least 40 thousand inhabitants, the existence of a core city and neighboring municipalities. Due to the fact that the strategy of sustainable urban development is elaborated as Programs of economic and social development, it does not represent an additional financial burden for local governments. The body that coordinates sustainable urban development is the relevant regional city, which implements sustainable urban development strategies and generally monitors sustainable urban development in its territory. In addition to sustainable urban development, the Community-led local development is also a tool of an integrated approach, it seeks to involve local actors in decision-making on the economic, social and environmental development of the territory of the given community. It aims to encourage local communities to engage in integrated development and to address local needs and opportunities. Within its scope, it seeks to stimulate innovation, support entrepreneurship and discover the untapped potential of the community and territory (MIRRI SR, 2020).

The essence of integrated development is based on the principle of partnership, so the basis for effective functioning are the Cooperation Councils for Sustainable Urban Development and the Partnership Council for self-governing regions. The Cooperation Councils coordinate the creation of territorial strategies for sustainable urban development, approve operations for inclusion in the list of projects for implementation, approve operations within thematic investment packages, monitor and evaluate the implementation of territorial strategies for sustainable urban development. These councils are chambers of Partnership Councils and ensure coherence between integrated territorial strategies of sustainable urban development and integrated territorial strategies of sustainable regional development. The number of cooperation councils is the same as the number of areas of sustainable urban development. The Partnership Councils, together with the Cooperation Councils, are the first level of management of integrated territorial development. Just as the Cooperation Councils are bodies whose competencies are linked to the urban development, so the Partnership Councils are linked to development at the level of regions. Total number of Partnership Councils is 8 and they are created on the initiative of the self-governing regions. They provide a platform for cooperation between several socio-economic partners. They prepare integrated territorial strategies, compile a list of projects, prepare and approve operations, coordinate, monitor and evaluate the implementation of integrated territorial strategies. The first level of management is followed by the second, which is formed at the national level by the Managing Authority of the Operational Program Slovakia and the last third level is the Ministry of Investment, Regional Development and Informatization of the Slovak Republic, which is responsible for approving projects, monitoring implementation and evaluating the benefits (MIRRI SR, 2020).

### **3 METHODOLOGY**

A survey of the allocation of European Structural and Investment Funds within the Regional Integrated Territorial Strategies was carried out. Observation and analysis of relevant documents were used as methods of research and data collection. The aim of the survey was to find out the allocation of financial resources from the European Investment and Structural Funds within the Regional Integrated Territorial Strategies, taking into account the amount of funds, the number of projects and the focus of projects. Three regions located in western Slovakia were examined, namely the Trnava self-governing region, the Nitra self-governing region and the Trenčín self-governing region. These three regions were selected because they have approximately the same size of territorial units and represent the area of almost the entire past West Slovak region. Based on the analysis of documents, more precisely the Regional Integrated Territorial Strategies of selected regions and the analysis of available information from the ITMS2014 + portal, the priority axes and objectives of these strategies were monitored, how much funding selected regions received from the European Structural and Investment Funds and how much funding they allocated to each priority axis and objective. Furthermore, it was examined how many projects were submitted by individual self-governing regions, how many of these projects were properly completed, how many were exceptionally completed and how many had a contract concluded and are still ongoing. In addition, it was also observed in which districts of the regions the most as well as the least projects were submitted. The district of the regional city was not taken into account, as naturally in this district the most development projects were submitted within all three regions. Subsequently, it was monitored how many projects were submitted within the individual objectives, which objective had the most submitted projects and which the least. This observation also included monitoring in which districts of the regions the most and the least projects were submitted within the selected specific objectives. We displayed the resulting findings in tables and then described them.

#### 4 REGIONAL INTEGRATED TERRITORIAL STRATEGIES OF THE TRNAVA, TRENČÍN AND NITRA SELF-GOVERNING REGIONS

The Trnava, Trenčín and Nitra regions are located in the west of Slovakia and in the past together formed the West Slovakian region. In terms of size and number of inhabitants, they are approximately the same territorial units within the regions of Slovakia. The area of the Trnava Region is 4,146.3 km<sup>2</sup>, the area of the Trenčín Region is 4,501.8 km<sup>2</sup> and the Nitra Region has an area of 6,343.7 km<sup>2</sup>. The population of the Trnava Region is 564,917, the Trenčín Region has 584,569 and the Nitra Region has 674,306 inhabitants.

The Trnava self-governing region is located in the western part of the Slovak Republic. In the north it forms a common border with the Czech Republic and the Republic of Austria and in the south with the Republic of Hungary. The region consists of 251 municipalities, with a significant concentration of inhabitants in 17 of them with the status of a city. According to the territorial-administrative division, it is divided into 7 districts: Dunajská Streda, Galanta, Hlohovec, Piešťany, Senica, Skalica and Trnava (Statistical Office of the Slovak Republic, 2021a).

The Trenčín self-governing region is located in the northwest of Slovakia. Its western part forms the border with the Czech Republic and other parts of the region border with other Slovak regions. The region consists of 376 municipalities and 18 of them have the status of a city. More than half of the region's population living in cities. The region is divided into 9 districts: Bánovce nad Bebravou, Ilava, Myjava, Nové Mesto nad Váhom, Partizánske, Považská Bystrica, Prievidza, Púchov and Trenčín (Statistical Office of the Slovak Republic, 2021b).

The Nitra self-governing region is located in the southwest of Slovakia and in the south it forms the border with the Republic of Hungary. The southernmost point of Slovakia is located in the village of Patience. The region consists of 354 municipalities and 15 of them have the status of a city. The self-governing region consists of 7 districts: Komárno, Levice, Nitra, Nové Zámky, Šaľa, Topoľčany and Zlaté Moravce. The largest area is the district of Levice, which is also the largest district in Slovakia (Statistical Office of the Slovak Republic, 2021c).

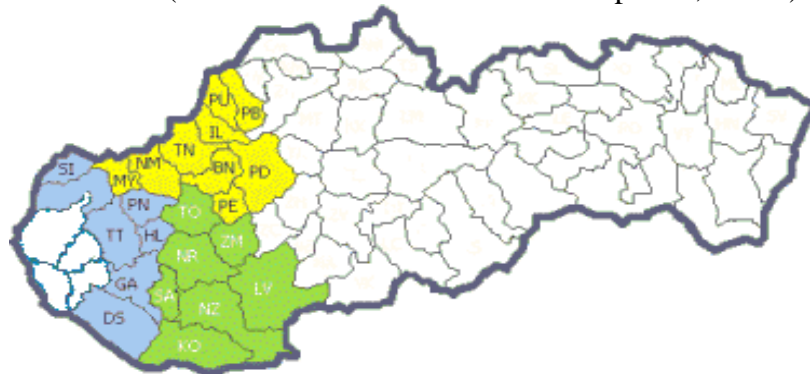


Fig. 2 - Graphical representation of districts of western Slovakia. Source: Szollosyova, 2013

Regional integrated territorial strategies for 2014-2020 represent implementation mechanisms of an integrated approach to regional development. Their main purpose is to increase the effectiveness of development policies supported by the European Structural and Investment Funds. The strategies aim to improve the quality of life and competitiveness of the regions concerned. These strategies also include the sustainable urban development of the regional city of Trnava, the sustainable urban development of the regional city of Trenčín and the sustainable urban development of the regional city of Nitra. Sustainable urban functional areas of regional

cities were established in order to create cooperation between municipalities and their representatives in the creation of common public policies and the joint provision of services for residents.

The Regional Integrated Partnership Councils of selected regions were established by the Ministry of Agriculture and Regional Development in 2015. In February 2016, the Councils approved the integrated strategies of the Trnava, Trenčín and Nitra self-governing region.

For the 2014-2020 programming period, EUR 145,571,691 was allocated from the European Structural and Investment Funds for the Trnava self-governing region, EUR 154,086,927 for the Trenčín self-governing region and EUR 166,255,975 for the Nitra self-governing region. The Regional Integrated Territorial Strategies for the period 2014-2020 have several priority axes and within each of them several specific objectives. Priority Axis No. 1 entitled Safe Ecological Transport in region has the following specific objectives:

- Improving accessibility to TEN-T infrastructure and roads I. class,
- Increasing the attractiveness and competitiveness of public passenger transport in region,
- Increasing the attractiveness and transport capacity of bicycle transport.

Priority Axis No. 2 Easier access to efficient and better quality public services in region has specific goals:

- Support the transition to the provision of social services and social guardianship at community level,
- Modernize health infrastructure,
- Increasing the gross training of children in kindergartens,
- Improving the key competencies of primary school pupils,
- Increasing the number of secondary vocational school students in practical training.

Priority Axis No. 3 with a specific objective Promoting employment and job creation in the cultural and creative industries.

And Priority Axis No. 4 aims to:

- Improving the supply of drinking water to the population and the disposal of waste water.
- Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure (TT SK, 2016).



Tab. 1 Specific objectives of the Regional territorial strategies. Source: Own processing

Specific objective	Trnava self-governing region	Trenčín self-governing region	Nitra self-governing region
<b>Priority Axis No. 1</b>			
<i>Improving accessibility to TEN-T infrastructure and roads I. class,</i>	23 443 111 (16,10%)	35 000 000 (22,71%)	37 500 000 (22,55%)
<i>Increasing the attractiveness and competitiveness of public passenger transport in regions,</i>	3 502 694 (2,40%)	6 000 000 (3,89%)	6 369 481,81 (3,83%)
<i>Increasing the attractiveness and transport capacity of bicycle transport.</i>	22 285 806 (15,30%)	13 879 827 (9%)	11 821 037 (7,11%)
<b>Priority Axis No. 2</b>			
<i>Support the transition to the provision of social services and social guardianship at community level,</i>	21 225 000 (14,5%)	12 000 000 (7,78%)	24 500 000 (14,70%)
<i>Modernize health infrastructure,</i>	8 825 700 (6,06%)	15 407 100 (10%)	15 988 500 (9,61%)
<i>Increasing the gross training of children in kindergartens,</i>	8 075 000 (5,54%)	4 000 000 (2,59%)	10 688 974,68 (6,42%)
<i>Improving the key competencies of primary school pupils,</i>	3 168 413 (2,17%)	3 000 000 (1,94%)	3 499 456,19 (2,10%)
<i>Increasing the number of secondary vocational school students in practical training.</i>	11 474 999 (7,88%)	11 000 000 (7,13%)	17 000 000 (10,22%)
<b>Priority Axis No. 3</b>			
<i>Promoting employment and job creation in the cultural and creative industries.</i>	17 800 000 (12,22%)	17 800 000 (11,55%)	17 800 000 (10,70%)
<b>Priority Axis No. 4</b>			
<i>Improving the supply of drinking water to the population and the disposal of waste water.</i>	16 575 000 (11,38%)	28 000 000 (18,17%)	15 013 000 (9,03%)
<i>Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure</i>	6 195 968 (4,25%)	8 000 000 (5,19%)	6 075 525,32 (3,65%)
<b>Together</b>	<b>145 571 691</b>	<b>154 086 927</b>	<b>166 255 975</b>

All three selected regions had the most funds within the budget allocated to Improving accessibility to TEN-T infrastructure and roads I. class and the least funds were allocated to Increasing gross training of children in kindergartens. The Trnava self-governing region invested the most funds in Increasing the attractiveness and transport capacity of bicycle transport. The Trenčín self-governing region invested the most funds in Improving the supply of drinking water to the population and the disposal of waste water. And the Nitra self-governing region has allocated the most money to Support the transition to the provision of social services and social guardianship at community level.

When comparing regions, Trenčín self-governing region and Trnava self-governing region invested the least in Improving the key competencies of primary school pupils. The Nitra self-governing region has invested at least among all three regions in Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure.

When comparing financial resources and the number of projects, 580 projects were submitted in all three regions, and EUR 465,914,593 was allocated to these projects from the European Structural and Investment Funds. We could see that the size of funds proportionally

corresponded to the number of projects, so the more funds the region received, the more projects it submitted.

Tab. 2 Project in regions. Source: Own elaboration ITMS2014+, 2017

<i>Name of the region</i>	<i>Total number of approved projects</i>	<i>Number of duly completed projects</i>	<i>Number of exceptionally completed projects</i>	<i>Number of projects with a concluded contract</i>
<i>Trnava</i>	175	34 (19,42%)	3	138
<i>Trenčín</i>	177	36 (20,33%)	1	140
<i>Nitra</i>	228	72 (31,57%)	3	153
<i>Together</i>	580	142 (24,48%)	7	431

The previous table shows the number of projects that were submitted in each region. The projects are divided in the table according to the number of completed projects, the number of exceptionally completed projects and the number of projects for which a contract has been signed and is still ongoing. Most projects were submitted in the Nitra self-governing region, which is not surprising given that this region also had the largest amount of funds. The fewest projects, again in connection with the budget, were submitted in the Trnava self-governing region. The highest number of properly completed projects was in the Nitra self-governing region with a percentage success rate of 31.57% of the total number of submitted projects. It was followed by the Trenčín self-governing region with a percentage success rate of 20.33% and the last was the Trnava self-governing region with a success rate of 19.42%. The highest number of exceptionally completed projects was in the Nitra self-governing region and Trnava self-governing region, while the Trenčín self-governing region had only one project exceptionally completed. The lowest number of ongoing projects in relation to the number of submitted projects was in the Trnava self-governing region, followed by the Trenčín self-governing region and the last was the Nitra self-governing region. All three regions submitted a total of 580 projects, of which 142 have been duly completed so far, which represents 24.48% of the total number of submitted projects.

Tab. 3 Number of projects for specific objective. Source: Own elaboration ITMS2014+, 2017

	<i>Trnava</i>	<i>Trenčín</i>	<i>Nitra</i>	<i>Together</i>
<b><i>Priority Axis No. 1</i></b>				
<i>Improving accessibility to TEN-T infrastructure and roads I. class,</i>	7	7	10	24
<i>Increasing the attractiveness and competitiveness of public passenger transport in regions,</i>	10	5	6	21
<i>Increasing the attractiveness and transport capacity of bicycle transport.</i>	23	17	13	53
<b><i>Priority Axis No. 2</i></b>				
<i>Support the transition to the provision of social services and social guardianship at community level,</i>	10	8	16	34
<i>Modernize health infrastructure,</i>	0	0	0	0
<i>Increasing the gross training of children in kindergartens,</i>	30	27	63	120
<i>Improving the key competencies of primary school pupils,</i>	50	77	71	198
<i>Increasing the number of secondary vocational school students in practical training.</i>	16	13	16	45
<b><i>Priority Axis No. 3</i></b>				
<i>Promoting employment and job creation in the cultural and creative industries.</i>	1	1	3	5
<b><i>Priority Axis No. 4</i></b>				
<i>Improving the supply of drinking water to the population and the disposal of waste water.</i>	5	8	13	26
<i>Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure.</i>	22	14	17	53

The most submitted projects within all three regions were in the Priority Axis No. 2, namely the goal of Improving the key competencies of primary school pupils. Together, the regions submitted 198 projects under this objective, with most of the projects being the Trenčín self-governing region, followed by the Nitra self-governing region and the last being the Trnava self-governing region. The second largest number of projects was submitted under the objective of Increasing the gross training of children in kindergartens, where the Trnava self-governing region submitted 30 projects, the Trenčín self-governing region 27 projects and the Nitra self-governing region 63 projects. The third largest number of projects was submitted under specific objectives Increasing the attractiveness and transport capacity of bicycle transport and Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure.

The fewest projects were submitted under Priority Axis No. 3 and its goal Promoting employment and job creation in the cultural and creative industries. This fact was probably caused by the fact that this goal focused primarily on the area of sustainable urban development of regional cities of selected regions. The second smallest number of projects was submitted under the goal Increasing the attractiveness and competitiveness of public passenger transport in regions, in which all three regions together submitted only 21 projects. The Trnava self-governing region submitted the fewest projects under the Improving the supply of drinking water to the population and the disposal of waste water, the Trenčín self-governing region and the Nitra self-governing region submitted the fewest projects under the Increasing the attractiveness and competitiveness of public passenger transport in regions goal. Despite the fact that within Priority Axis No. 2 there was a goal of modernization of health infrastructure and funds from regional budgets were also allocated to it, none of the regions submitted any projects within it.

## **5 DISCUSSION**

Within the regional integrated territorial strategies, most projects were submitted in the Nitra self-governing region, which is also responsible for the fact that this region had the largest amount of funds for the 2014-2020 programming period, exactly 166,255,975 Euros. We could see that the size of funds proportionally corresponded to the number of projects, so the more funds the region received, the more projects it submitted. The largest number of funds within the three selected regions was allocated to the specific objective Improving accessibility to TEN-T infrastructure and roads I. class, but at the same time the largest number of projects was not submitted within this objective. Each self-governing region had a larger amount of funds allocated to other specific objectives. The Trnava self-governing region invested the most funds in Increasing the attractiveness and transport capacity of bicycle transport. The Trenčín self-governing region invested the most funds in Improving the supply of drinking water to the population and the disposal of waste water. And the Nitra self-governing region has allocated the most money to Support the transition to the provision of social services and social guardianship at community level.

As part of integrated development, all self-governing regions focused primarily on improving primary schools and kindergartens, while again most projects were submitted in the Nitra self-governing region. After that each region focused on a different area in terms of the number of projects. Trnava self-governing region and The Trenčín self-governing region submitted projects mainly to the goal Increasing the attractiveness and transport capacity of bicycle transport and Nitra self-governing region focused projects on the goal Improvement of environmental aspects in cities and urban areas through the construction of elements of green infrastructure. It is interesting to note that, despite the fact that the budgets were allocated funds into the objective modernization of the medical infrastructure, no project was submitted. The Trnava self-governing region submitted the smallest number of projects under the objectives of Improving the supply of drinking water to the population and the disposal of waste water. The Trenčín self-governing region and the Nitra self-governing region submitted the lowest number of projects under the objective Increasing the attractiveness and competitiveness of public passenger transport in regions.

When comparing funding and the number of projects. Most projects were submitted under the objective of Improving the key competencies of primary school pupils, but at the same time the regions jointly allocated the least financial resources from the budgets for this goal. The Nitra self-governing region had the most projects within its strategy under the objective of Improvement of environmental aspects in cities, but at the same time it had the least funds allocated for this goal. The Trenčín self-governing region and the Trnava self-governing region had the least funds allocated for improving key competences primary school pupils, but it had most projects for this goal.

## **6 CONCLUSION**

The European Structural and Investment Funds represent an important source for the Slovak Republic to support the development of municipalities, cities and regions. Regional integrated territorial strategies operate on an integrated principle, which means that a large number of different entities and partners are involved in development projects, which helps to solve the problems of municipalities, cities and regions more effectively and comprehensively. Regional integrated territorial strategies use integrated territorial investments, which are based on the possibility of combining funding from several operational programs and thus support development activities.

The presented article dealt with regional integrated territorial strategies of the Trnava self-governing region, the Trenčín self-governing region and the Nitra self-governing region. The analysis of the documents focused on finding out the allocation of financial resources from the European Union funds as well as on the number and focus of projects within selected regions.

The number of projects was directly moderately related to the amount of financial resources, the more funding the more projects. The Nitra self-governing region had the most projects and the Trnava self-governing region the least. Of the total number of 580 projects, 24% have been properly completed so far, which represents 142 projects. Naturally, the Nitra self-governing region had the most duly completed projects.

All three regions submitted the most projects to improve primary schools and kindergartens. Subsequently, each region had different priorities for the Trnava self-governing region and the Trenčín self-governing region, it was the bicycle infrastructure, and for the Nitra self-governing region it was the improvement of environmental conditions in cities.

A new programming period begins this year and currently the regions are working on the development of new Regional Integrated Territorial Strategies, which, like the previous one, should improve life in municipalities and cities.

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## Contact information

### Mgr. Kristína Dzureková

Faculty of Social Sciences, University of Ss. Cyril and Methodius  
Bučianska 4/A, Trnava  
E-mail: [kristina.dzurekova@gmail.com](mailto:kristina.dzurekova@gmail.com)  
ORCID: 0000-0002-5740-3754

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# SOLVENCY RATIO ESTIMATION FOR REGULATORY PURPOSES

*Ivana Faybikova*

## **Abstract**

The main aim of the article is to transfer the reader through the process of solvency ratio estimation for regulatory purposes of insurance company with internal model approach. Solvency ratio is very important figure both for internal subjects (e.g. management) and external objects (e.g. investors and capital ratings agencies). While introducing the process, we are explaining economic capital term and methods of risk aggregation, which are a very sensitive methodology process inside the insurance company, especially in the internal models approaches. For clear understanding of solvency ratio estimation and capital requirements, we have introduced inspiring literature sources and theoretical background, such as Enterprise Risk Management and its processes and actions inside the insurance company, risk components and regulations under which risk estimation is subject to and term of insolvency with possible impacts and reasons of formation. We have described most used risk requirement regulatories – Solvency II Directive and Swiss Solvency Test. As part of the solvency ratio estimation we have focused on methodology and methods of risk aggregation which are very commonly used. In the final part of the article we have engaged in the analysis of Annual risk review of international insurance company.

**Keywords:** *Risk, Solvency ratio, Risk Aggregation, Required Capital, Insurance Company, Internal Model*

## **1 INTRODUCTION**

Nowadays is topic of risk management, including the estimation of economic capital in insurance companies very actual and not only because of the ongoing pandemic situation. International companies doing their business worldwide are required to report to the responsible supervisory authorities the state of required capital and available resources, including the solvency ratio. Insurance companies are generally obliged to conduct their business in such a way that a situation cannot arise in which they will not be able to pay liabilities to their clients. A situation where only one insurance company become insolvent can affect ordinary people, businesses, the whole industry or the country, including the strength of the state's economy. As part of the Risk Management, a term *Enterprise Risk Management (ERM)* was created. This term describes a process carried out by the board of directors, management bodies and other personnel of the company. The ERM process is used in setting strategies and is designed to identify potential events that may affect the company (Lam, 2014). Also, to manage the risk to suit its nature and to provide reasonable assurance as to the achievement of the insurance company's objectives. Effective risk management not only serves the risks that have already arisen, it also describes the methods by which the risk can be diversified or the ways in which the risks can be prevented. In general, we can summarize the ERM processes (*About ERM / Enterprise Risk Specialists*, n.d.) as risk identification, risk analysis, risk reports, risk control and risk monitoring. In the event of a situation where the available capital would be lower than the required capital, a sense of concern on the part of clients or investors would be appropriate. In such a case, the responsible regulator could require the insurance company to take measures to recover the appropriate capitalization. The responsible regulator also has a power to ask an



insurer to reduce its risks or to transfer a portfolio to another insurance company. In general, we can say that methodologies for estimating capital requirements contribute to the early identification of risks and the protection of policyholders' interests.

## **2 THEORETICAL BACKGROUND**

Insurance companies are currently required to comply with several legal and regulatory provisions. The regulation of the insurance sector does not only serve to control insurance companies and dictate the conditions of their business. It is also a starting point for creating a competitive environment in the insurance market (Massey, 2002), which can also be welcomed by the insurers themselves. Measures issued by regulators are often in the form of recommendations, limits, acceptable procedures. Everything that the insurance company finally applies to business practice after approval by the regulator is a combination of what it must adhere to and its own know-how. A typical example of risk management are internal models, which are used mainly by large international insurance companies. An internal model is a tool approved by the relevant supervisory regulator that serves to estimate risk or capital more accurately, especially for companies, large companies, which could potentially harm the use of a standard formula or a partial internal model due to over-capitalization. As insolvency problems do not fall into the insurance company overnight, it is important to monitor the business behaviour of the insurance company. Among the factors that can get the insurance company into difficulty were identified from experience (Massey, 2002): insufficient reserves, rapid business growth with underrated premiums, fraud, overvalued assets of the insurance company, catastrophic events with insufficient preparedness for extreme claims, change of business strategy, complications after an association of companies, with the associated company experiencing significant financial difficulties and reinsurance failures.

One of the best-known authors in the field of ERM is James Lam (*Enterprise Risk Management: From Incentives to Controls*, 2014), who has described in detail managing and executive side of risk management within insurance companies. In his publication he deals with the theoretical background and practical procedures of qualification and quantification of risks and regulation aspects and components, which are closely related to the topic of our article. Publication which describes modern risk aggregation methods as well is *Correlations and Dependencies in Economic Capital Models* (Schawn & Spivak, 2009), who addressed correlations and dependencies in determining the economic capital of an insurance company, describing various methods of risk aggregations, such as the VCV approach, a copula method, risk diversification using fixed correlation coefficients and many more.

To summarize – insurance companies are subject to various regulations and controllers, which control and evaluate their financial sufficiency, risk profile and solvency margin according to the methodology specified by the regulator. The most used methodologies used in Europe region are Solvency II Directive, prepared by the European Insurance and Occupational Pensions Authority with effect from 2016 and the Swiss Solvency Test for all insurance companies operating in Switzerland, with effect from 2011.

### **2.1 Directive Solvency II**

From the beginning of 2016, all insurance and reinsurance companies in the European Union have to comply with the rules of the Solvency II regime. The Solvency II Directive sets out the principles according to which insurance and reinsurance undertakings are to monitor the solvency of an insurance undertaking and introduces risk-based economic requirements. Solvency requirements should better reflect the real risks for insurance companies and should contribute to greater protection of insurance dependents. In addition, the measures contribute

to optimizing the costs of insurance and reinsurance undertakings and to preventing over-capitalization. The Solvency Capital Requirement takes the risk profile of each insurance company separately into account. If the insurer manages its risks effectively and transparently, it can be compensated in the form of a permit to hold a smaller amount of capital. If an insurer fails to manage its risks or accepts higher risks, it is expected to have a higher amount of capital to ensure that policyholders' claims are satisfied at maturity as well as in unexpected situations. The aim of the Solvency II Directive is to contribute to the unification of the insurance market in the European Union and to its greater stability. The Directive represents a systematic and comprehensive approach to risk management, with solvency being presented for the purposes of this methodology as the insurer's ability to settle liabilities at any time, exclusively from its own resources. According to the Solvency II Directive, insurance and reinsurance undertakings within the European Union have to hold eligible capital to cover the Solvency Capital Requirement (SCR). The Solvency Capital Requirement is the amount of capital that must be held by an insurance undertaking in order to meet the conditions set out in the first pillar of the Solvency II Regulation. This pillar deals with the definition of minimum capital requirements for insurance companies, taking the methods of underwriting risks into account and the nature of assets and liabilities in insurance companies. The purpose of the SCR is in addition to the ability to absorb unexpected and large losses also forming of guarantee for persons in relation to the insurance company and that the insurance company will be able to meet its obligations in the agreed amount and on time. In addition to the SCR, Pillar I also defines a Minimum Capital Requirement (MCR), which determines the amount of capital held below which an insurance company may not fall. The SCR is set at a level that ensures that the insurer can meet its obligations to policyholders and beneficiaries over the next 12 months with a probability of 99,5 %, limiting the chances of financial destruction to less than once in 200 cases.

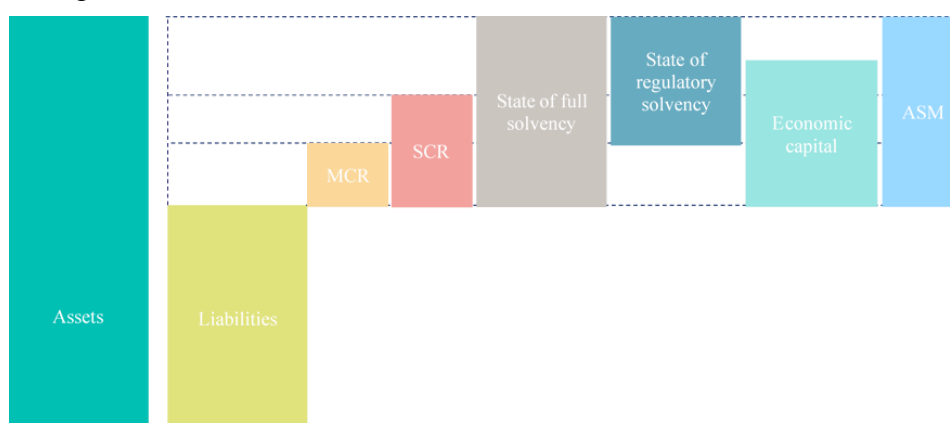


Fig. 1 – Balance sheet within the Solvency II methodology. Source: Cipra, 2015

In addition to SCR and MCR, it is important to know the actual state of the surplus of assets over the liabilities of the insurance company, which we also call the Available Solvency Margin (ASM). It is important that inequality applies:

$$MCR < SCR \leq ASM \quad (1)$$

In general, the aim of the Solvency II Directive is to harmonize the laws and regulations of the 27 member states of the European Union in terms of insurance. If the supervisory authority finds that the requirement does not adequately reflect the risk associated with an insurance business, it may adjust the capital requirement by adjusting it. The calculation formula has taken a modular approach, which means that the individual exposure of each risk category is evaluated and aggregated together. The insurance company calculates this requirement according to a standard formula or using an internal model.

## 2.2 Swiss Solvency Test

The Swiss Solvency Test (SST) methodology is also used to assess the capital strength of an insurance company. According to the SST methodology, the solvency requirement is met if the value of the available capital exceeds the value of the required capital. According to the SST, the capitalization of an insurance undertaking is appropriate if it is likely that the insurance company will be able to meet all its obligations to the policyholders, even under adverse conditions. The principles on which the SST is based are equivalent to the principles set out in the Solvency II Directive. The SST has been in force since 1<sup>st</sup> January 2011 and has become an indispensable tool for the Swiss state regulator – *Eidgenössische Finanzmarktaufsicht* (FINMA), which allows to identify solvency problems in a timely manner and take remedial action based on pre-established intervention thresholds. FINMA specialists annually check the SST reports submitted by insurance companies, which were required even on a monthly or quarterly basis during the COVID-19 pandemic situation. In general, the SST defines the minimum amount of capital required for an insurance company. The value of the required capital is determined on the risks that the company assumes basis, and in general the higher the risk is, the higher the value of the required capital will be. The first step of an insurance company in estimating the required capital according to the SST methodology is to determine the value of available capital (*Risk-Bearing Capital*), while it is necessary to value items in the insurance company's balance sheet – assets and liabilities on a market-consistent basis. Subsequently, the determined available capital is assessed whether it meets the requirements of the SST methodology and whether the value of available capital sufficiently covers the liabilities of the insurance company even in less favourable periods. All relevant market, credit and insurance risks are considered in the SST methodology. The main intention of the FINMA regulator determining the capital requirements is for the insurance company to remain financially undamaged even in the event of a significant negative event once a century. The calculated required capital is also referred to in the methodology as Target Capital.

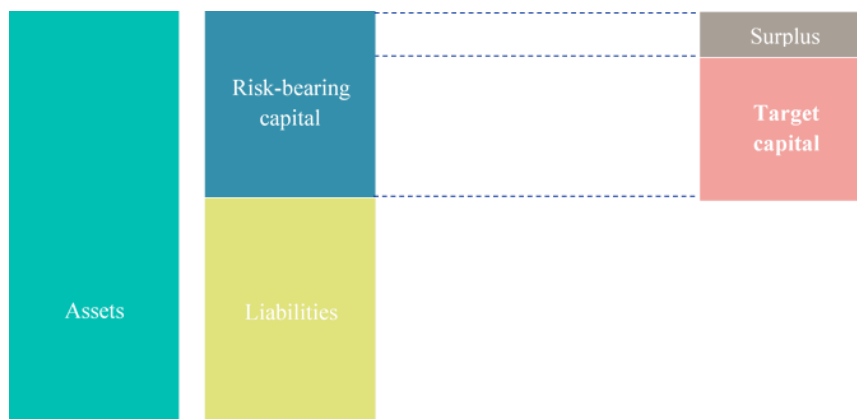


Fig. 2 – Balance sheet within the SST methodology. Source: Finma, 2018

The SST methodology is based on three basic principles (Finma, 2018):

- Market-consistent valuation: financial instruments having a market price have to be carried at the market price in the balance sheet in order to ensure the insurance company's balance sheet reflects economic reality.
- Capital requirements are risk-based: market, credit and insurance risks need to be considered when determining target capital.

- The balance sheet is whole taken into account and considers the interdependence between asset risks and liability risks.

The SST methodology enables an early identification of insurance companies that are experiencing financial difficulties. As available capital is determined at market value, any changes in interest rates or stock prices will be immediately reflected in available capital, which we could observe even during the COVID-19 pandemic situation. The SST methodology allows insurance companies to manage their respective risks and, as SST relies on market-consistent valuation principles and risk-based capital requirements, provides relatively accurate picture of the risk situation of insurance companies. Individual methodologies need a model in which they will estimate the amount of target capital. According to the SST methodology, insurance companies use the standard model prescribed by FINMA to assess their risks, but if the risk situation of the insurance company cannot be accurately reflected in the standard model, the insurance company is invited to create its own internal model. Such internal models have to comply with the requirements of the SST methodology and may only be used with the consent of FINMA. (Finma, 2018)

### 3 METHODOLOGY

Capital regulations in the terms of internal models are creating some space for special and specific methods of computing solvency ratio, especially risk aggregation process. Even before risk aggregation or estimation of the solvency condition begins, it is very important to understand the term of risk, all its components and appropriate risk types.

Risk can be defined as a variable that can cause a deviation from the expected result – loss, danger or adverse consequences due to the occurrence of a loss event. In the insurance industry, we most often define risk as the occurrence of a possible event that adversely affects the operation of the insurance company, including non-fulfilment of strategies. To understand the nature of risk, it is necessary to know the following risk factors (Lam, 2014):

- **Exposure** expresses the maximum amount of damage that will occur if a damage event occurs. Exposures are estimated by the responsible actuaries for each of the risks – for example, exposure for life insurance risks, exposure for reserves.
- **Volatility** expresses the uncertainty of the future which means the variability of potential results. Volatility is an important factor in risk in terms of possible loss, and the higher the volatility, the higher the risk itself.
- **Probability** tells us about the possible occurrence of a loss event and the higher the probability, the higher the risk. Probability, like other concepts of risk, needs other concepts to increase its informative value. Namely, the probability of the occurrence of a loss event may not be too high, but the value of the damage may be unbearable for the insurance company. Catastrophic risks are a typical example.
- **Time horizon** – before recognizing the risk, it is necessary to understand the period that we look at when modelling and estimating. Individual model inputs, such as exposure or liability values, including economic assumptions, have different time intervals and therefore the time horizon and any aliquot part of the input need to be considered in risk modelling.
- **Severity** is the amount or severity of damage that is likely to be suffered when a damage event occurs. Knowledge of the probability of the occurrence of a loss event and the amount of probable damage that the insurance company will suffer as a result of the event will help to get an idea of the size of the risk incurred by the insurance company.

- **Correlation** expresses the interrelationship between individual risks and is one of the key inputs in risk aggregation, while it is true that the higher the correlation between individual indicators, such as risk factors, the higher the value of risk itself. Highly correlated risk exposure increases the level of risk concentration within the insurance company. The degree of risk diversification in an insurance company is therefore indirectly related to the level of correlations.
- **Capital** (understand a required capital) is the amount of funds that the insurance company needs to dispose of in case of need to cover unexpected losses. In general, there are two reasons why insurance companies need to hold capital. The first reason is the fulfilment of cash requirements, such as costs associated with investments or expenses of the insurance company, and the second reason is to cover unexpected losses resulting from the expected maximum amount of damage at a given risk. The level of capital to cover both above mentioned reasons is most often referred to as economic capital.

Among the most common risks to which an insurance company is subject and which are part of various methodologies for estimating the required capital, we can include market risk, credit risk, life risk, non-life risk and catastrophic risk. In the practice, risks are described by loss distributions which are compounded with experts of each risk field. Simulated loss distributions are inputs for risk measure determination and following determination of economic capital of the insurance company.

### 3.1 Economic capital

Economic capital determines the amount of capital that an insurance company needs to remain solvent in unexpected situations. The insurance company is subject to the regulator, to whom it is obliged to report calculations according to which it holds capital – so-called “required capital”. From the risk management point of view, it is an effort to optimize risk, so to optimize the shape of the density function. The aim of insurance company’s management and responsible persons is to implement strategies that will help to flatten the curve and thus reduce potential losses. (Lam, 2014)

To be able to estimate economic capital figure, we first need to estimate risk measure. Risk measure is value of risk, which is very easily compounded as difference between expected loss and probability level. Under this term we understand selected measure according to regulatory methodology – Value-at-Risk or Expected Shortfall with most used probability levels 99,5 % (SII, insolvency once in 200 cases) and 99,0 % (SST, insolvency once in century).

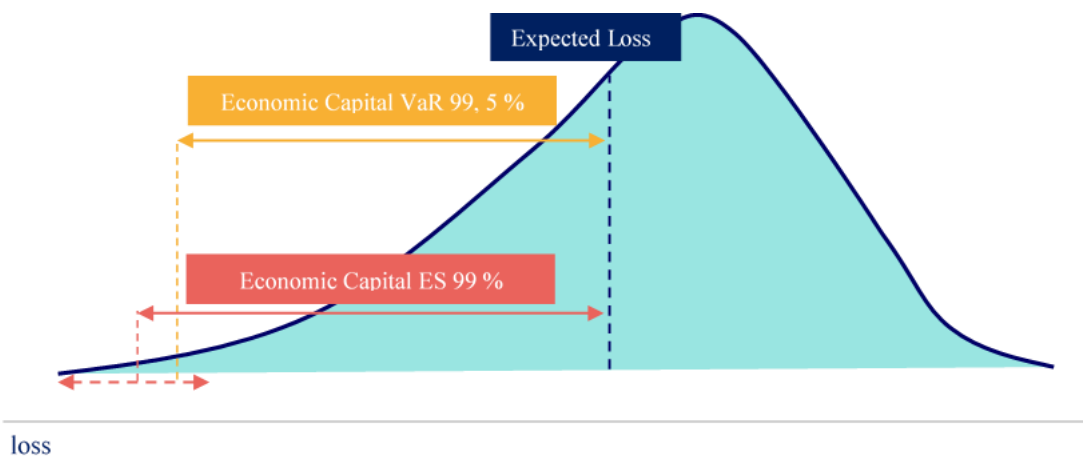


Fig. 3 – Economic capital under probability ES 99 % and VaR 99.5 %. Source: own resource

Economic capital modelling can be understood as modelling two key components, the marginal distribution of risks and the aggregation method, which combines them into one distribution and subsequently into the final value of the required capital. For the purpose of this article we consider economic capital and required capital equivalence.

### 3.2 Risk Aggregation

Very effective and key process used in internal models for estimating the required capital is the process of risk aggregation, where the insurance company's individual risks are combined into the final value of the required capital. The result of aggregation is diversified value of risk and usually is lower than if we did not use aggregation in risk estimation. When managing risks, it is important to realize that just like under-capitalization also over-capitalising of an insurance company can be devastating. Prior to the actual application of the selected aggregation method, the insurance company is obliged to assess the risks of the selected approach and consult with the responsible supervisory authority, such as the responsible regulators. The most used aggregation methods include Monte Carlo simulation using copulas, VCV matrix and so-called copula tuning. When aggregating risks, it is important to realize that not all risks faced by an insurance company will suffer adverse losses at the same time. Some areas of insurance may experience adverse financial losses, other expected losses or even profits. If we look on the final aggregated capital of an insurance company (with any probability level), it would be lower than the simple sum of the individual risks for the same probability. The degree of diversification between risks is the value by which the aggregated capital at a given probability level differs from the direct amount of individual risks at the same probability level. In methodologies it is called a diversification benefit. The diversification benefit (DB) can be expressed as follows (Shaw & Spivak, 2009):

$$DB = 1 - \frac{RC_{aggregated}}{\sum RC_r} \quad (2)$$

where  $RC_{aggregated}$  expresses the total aggregated (diversified) capital of the insurance company for all risks and  $RC_r$  expresses the separate value of economic capital for each risk  $r$ . Diversification is very important for the insurance company and according to the authors R. Shaw, W. Diffey and G. Spivak (2009) the dependency is a reason why insurance companies exist. If we considered diversification only between individual risks when modelling risk, the capital of the insurance company would be significantly overestimated. In practice, diversification is already considered at lower levels of aggregation between risk factors (e.g. life risk within mortality, morbidity and longevity), also between countries, as multinational companies often cover entire continents and within types of underwritten business, such as non-life, motor insurance and accident insurance. All the above-mentioned diversifications in the models are called intra-diversification and diversification between individual risk types when estimating the final economic capital is called inter-diversification.

Insurance companies select different approaches for risk aggregation. In general, we distinguish different methodologies in increasing order of complexity (Shaw & Spivak, 2009):

- Simple summation: method where standalone values of risk types are simple summed up; method is overestimating economic capital (upper bound of economic capital) and ignoring dependence within risk types (applying 100 % correlation).
- Fixed diversification: uses correlations, but approach is still very static without possibility to be sensitive to exposure changes.

- Variance-covariance matrix (VCV): standalone risk measures of estimated risks are needed for the aggregation; strong reliance for “expert judgement” while setting up the correlation matrix;
- Copulas: modern tool used for estimating economic capital, which needs full distributions or losses for each risk type; copulas in general are used to model the dependencies of risk factors;
- Structural modelling is method which is usually used in combination of VCV method or copulas.

Internal model aggregation methodology is checked in deep details by the authority with high requirements, so the most used aggregation approaches are VCV and copula or their combination.

In methods upper we have mentioned correlations and correlation matrixes. In insurance, the word “correlation” is usually used with the meaning of a relationship or dependence, and the strength of such a dependence is most often determined using a correlation coefficient. Correlation quantifies the linear relationship between 2, 3, ... , n random variables. The dependence between random variables, such as risk drivers or risks means that there is some connection or relationship between them.

Tab. 1 – Correlation matrix of five risks. Source: own research

Correlation matrix	risk A	risk B	risk C	risk D
risk A	1	0,12	0,25	0
risk B	0,12	1	0	0
risk C	0,25	0	1	0,07
risk D	0	0	0,07	1

Risk correlation matrixes are well used in Variance-Covariance method of estimating risk measures. Required capital under VCV method is calculated as follows (Shaw and others, 2009):

$$RC = \sqrt{\sum_{i,j} Corr(i,j) \times Capital(i) \times Capitaj(j)} \quad (3)$$

where i and j are risks being aggregated. This method is used when no copula method is needed (but not recommended for market & credit risks), but also as part of complex capital estimation method, where copula is used for calculating dependencies and compounded VCV required capital refers as copula turning value. One of the reasons why copulas are used, is missing direct correlation between different risk units and different risk types as specified on Fig. 4.

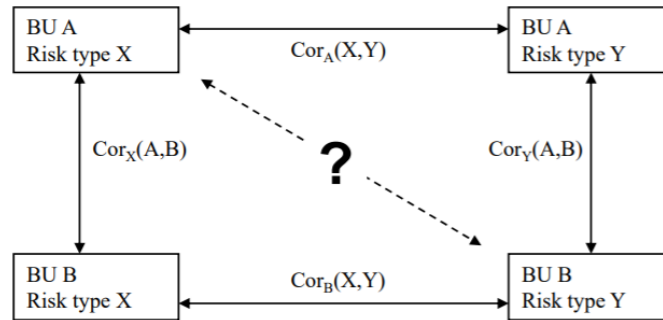


Fig. 4 – Balance sheet within the SST methodology. Source: own research

The purpose of aggregation is to combine risk types into a common multidimensional distribution that describes the probability that losses of different risks will occur simultaneously (in the same scenario). In order to do something like this, it is necessary to define the dependencies between the individual risks. In this case, the copula is a very effective mathematical tool that makes it possible. The most used form is correlations, which roughly tell whether similar movements (losses) are likely to occur in the main part of the distribution. However, correlations often, for example in a multidimensional normal distribution, lead to weak dependencies on tail events, while expectations are exactly the opposite. If a large loss occurs at one of the risks, it is highly likely to affect another type of risk. The proof of this statement is the pandemic situation of COVID-19, when we could observe a strong influence of financial markets, which was reflected in insurance companies in a significant increase in the value of market risk. The copula method makes it possible to define the dependence of the tail when extreme events occur. Prior to dome application, simulations of individual risks are not interdependent. The dome allows the connection of individual simulations of all types of risks with a new simulation scenario. They are set in such a way that the required statistical properties reflecting the dependences are met after the application of the copula. In general, we can therefore consider the copula as a tool for reorganization, or rearrangement of positions for individual simulations. In the case of zero dependence within risk types, there is absolutely no rearrangement. In the case of complete dependence, we see high losses for multiple risks in one scenario, which is almost unrealistic. The aim is to find an arrangement within an absolute independence and full dependence, where common events occur with the required frequencies based on the parameterizations defined by the responsible actuaries for the individual areas.

With using copulas an insurance company can identify all dependencies within all risk units (through the hierarchy) and within all modelled risk types. While risk aggregation using a copula method, usually the following steps are applied:

1. Generation of copula dependencies – random variations in between 0 to 1 that reflect the selected copula method and targeted dependencies are generated for all units inside the hierarchy. T-copula or Gaussian copula is most often used for modelling.
2. Applying the distribution assumption to random variations – all random variations are converted to stresses using the inverse of the cumulative normal distribution according to the standard deviation of each unit in the hierarchy. Reason of “inverse” method is an interest in strong unexpected losses with lower probability, not small losses with high probability of claim occurrence.
3. Marginal losses – simulated losses and gains using described loss functions are calibrated based on the exposure of the given hierarchy unit. Output if this step is obtaining simulations of losses and gains (in practice are compounded hundreds of



thousands of simulations) for each hierarchy unit and risk type with the required dependencies.

The final product of these steps is a multidimensional distribution of losses and profits from which is determining the value of risk using the chosen estimate rate and probability level.

### 3.3 Solvency ratio

Solvency is the ability of an insurance company to meet its financial obligations to clients and creditors over the long term, most often determined by the degree of solvency. The solvency ratio is an indicator of performance that speaks about the financial health of a company. It is a very important metric for creditors, potential investors and any other external entities that would be interested in cooperating with an insurance company. External partners prefer a higher solvency ratio, which is evidence of financial strength, as opposed to low, which indicates potential financial barriers in the future.

Solvency ratio SR is determined as follows:

$$SR = \frac{\text{available financial resources}}{\text{required capital}} \quad (4)$$

where available financial resources represent the excess of the market value of the assets over the market value of the liabilities at the valuation date and required Capital represents the capital estimated by the insurance company according to the given methodology and is needed to cover possible unexpected losses. In few methodologies are from both figures deducted costs of future regulatory risk capital stemming from the present portfolio of assets and liabilities, called market value margin (MVM, term used in SST methodology) or risk margin (RM, term used in Solvency II methodology).

## 4 RESULTS

Risk measure computation, risk aggregation and economic capital estimation are main processes which leads to the most important step in risk calculation – the solvency ratio. Solvency ratio is figure, which is in scope of internal subjects such from the Risk Management to Board, but also external subjects as investors or rating agencies. An international insurance company we will look at is one of the biggest international multi-line operating insurance companies – Zurich Insurance Group, Ltd.

### 4.1 Zurich Insurance Group, Ltd.

Zurich Insurance Group, Ltd. (ZIG) is (Zurich, 2021) a leading multi-line insurer that serves its customers in global and local markets. With number of 55 000 employees provides a wide range of property and casualty, life insurance products and services in more than 215 countries and territories. Zurich's customers include individuals, small businesses, and mid-sized and large companies, as well as multinational corporations. As part of ERM is ZIG having an effective structure for cooperation between the Board of Directors, management and internal control functions. This structure establishes checks and balances and is designed to provide for institutional independence of the Board from the Group Chief Executive Officer and the Executive Committee which together are responsible for managing the Group on a day-to-day basis.

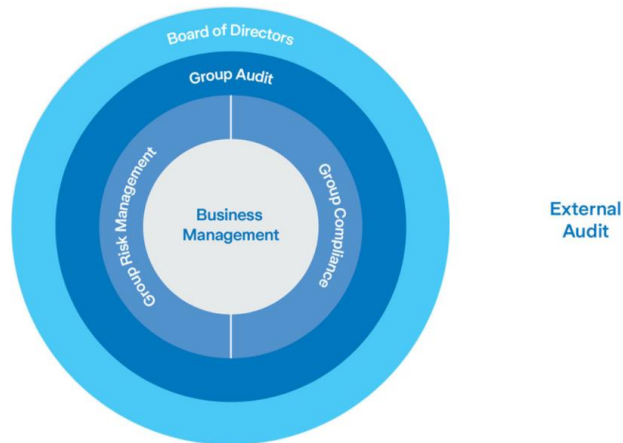


Fig. 5 – Three lines of defense at ZIG. Source: Zurich, 2021

ZIG uses the three-lines-of-defence model (see Fig. 5) in its approach to governance and enterprise risk management. Zurich’s three-lines-of-defence approach runs through Zurich’s governance structure, so that risks are clearly identified, assessed, owned, managed and monitored:

- **Business Management:** The 1<sup>st</sup> line of defence and consists of business management and all functions except for 2<sup>nd</sup> line. This line takes risks and is responsible for day-to-day risk management.
- **Group Risk Management (GRM) and Group Compliance (GC):** The 2<sup>nd</sup> line of defence is responsible for ZIG’s enterprise risk management framework (GRM) and providing assurance to management that compliance risks within its mandate are appropriately identified and managed (GC). The Group CRO regularly reports risk matters to the Group CEO, senior management committees and the Risk and Investment Committee of the Board.
- **Group Audit:** The 3<sup>rd</sup> line of defence consists of the assurance function Group Audit, which is responsible for auditing risk management, control and governance processes.

The Board and External audit are then ultimately responsible for the supervision of the control and assurance activities and for auditing the Group’s financial statements and for auditing ZIG’s compliance with specific regulatory requirements. The Audit Committee regularly meets with the external auditors.

For capital requirements the GRM field is responsible. As of 1<sup>st</sup> January 2021, final figures of company’s risk profile with solvency ratio were introduced based on Swiss Solvency Test methodology. Final margins as of 1<sup>st</sup> January 2021 are as follows (Zurich, 2021):

- **Solvency ratio (SR):** The solvency ratio is calculated as Group’s SST available financial resources minus market value margin divided by the net of SST target capital and MVM. In 2020, the solvency ratio remained strong with an estimated SST ratio of 182 %.
- **Available financial resources (AFR):** The Group’s AFR are derived from the SST net asset value. The net asset value represents the difference between the market-consistent value of assets and liabilities according to the market-consistent valuation methodology under SST methodology. During 2020, the Group’s AFR increased by USD 3,8 billion to USD 52,1 billion, compared to USD 48,3 billion as of value in 2019.

- Target capital (TC): The Group uses an internal risk model to determine the required TC. The Group's TC in 2020 is amounted to USD 31,3 billion, which is lower compared to TC in 2019 and impacts solvency ratio state.

Tab. 2 – Group SST Ratio and underlying components. Source: own research

	2020	2019
Total risk capital (diversified)	26,9	21,2
Other effects on total risk capital	(1,4)	(1,7)
Market value margin (MVM)	5,8	5,1
<b>Target capital</b>	<b>31,3</b>	<b>26,4</b>
Target capital minus MVM	25,5	19,5
<b>Available financial resources (AFR)</b>	<b>52,1</b>	<b>48,3</b>
AFR minus MVM	46,3	43,2
<b>Solvency ratio</b>	<b>182 %</b>	<b>222 %</b>

From the Tab. 2 we can see that solvency ratio of Zurich Insurance Group, Ltd. has moved from 222 % (2019, as of 1<sup>st</sup> January 2020) to 182 % (2020, as of 1<sup>st</sup> January 2020). Solvency ratio reduction in 2020 occurred due to falling interest rates and higher market volatility as a result of the COVID-19 pandemic. The main drivers of the AFR increase in 2020 were the depreciation of USD, positive equity market development, new net issuance of subordinated debt eligible as capital and Life model updates. Regarding target capital, an increase of USD 6,7 USD billion compared to 24,6 USD billion as of 1<sup>st</sup> January 2020, primarily due to an increase in market risk. While equity markets and credit spreads at the end of 2020 tracked closely with year-end 2019 levels, elevated market volatility had a profound impact on the market risk.

To better understand a financial stability of insurance company is to see full development of solvency ratio during last few years.

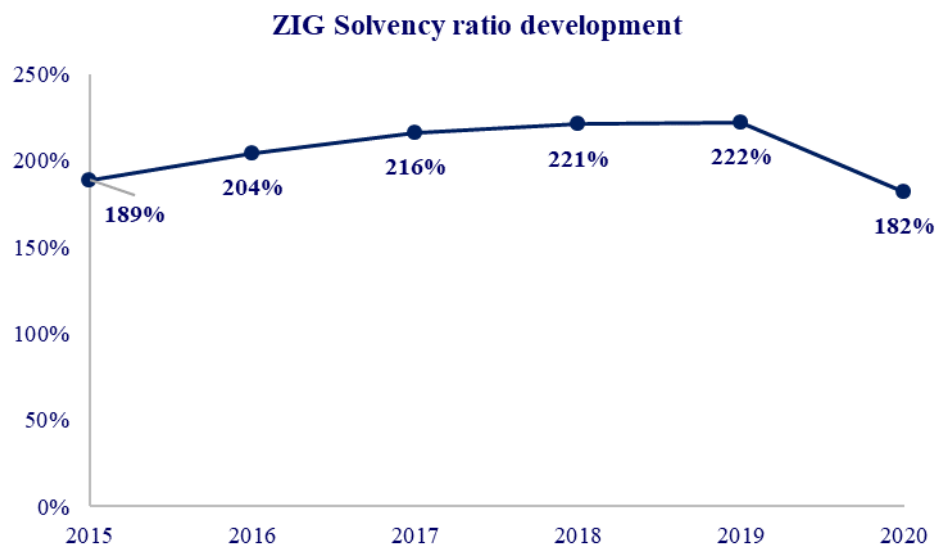


Fig. 6 – ZIG Solvency ratio development in years 2015-2020 as of end-years. Source: own research

We can see that pandemic year (2020) has impacted solvency ratio based on SST methodology quite significantly (-40 %). We can expect that through the year was the insurance company

asked from the authority (mainly FINMA) to prepare results of financial status as target capital, available financial resources and solvency ratio for few times and all figures with considering financial markets situation and pandemic situation were checked and further are monitored. As company has described, strong movements were mainly caused due to financial markets drops and volatility what creates a place for better preparation for such strong unexpected situations as pandemic with all its impacts was and still is.

## 5 CONCLUSION

The article was theoretically based with orientation to solvency ratio estimation for regulatory purposes. We have explained and approached regulatory methodologies Solvency II Directive and Swiss Solvency Test, which are most common used in European Union region. All requirements are connected with systematic process called Enterprise Risk management which we have described as well with term of risk, economic capital and risk aggregation methods. We have introduced VCV and copula aggregation methods and showed required capital and solvency ratio figures in real-world practice using annual results of one of the biggest international companies in the world – Zurich Insurance Group, Ltd.

### Acknowledgement

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### **Contact information**

#### **Ing. Ivana Faybikova**

University of Economic in Bratislava, Faculty of Economic Informatics

Dolnozemska cesta 1, Bratislava 852 35, Slovakia

E-mail: [ivana.faybikova@euba.sk](mailto:ivana.faybikova@euba.sk)

ORCID: 0000-0001-6708-9503

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# THE IMPACT OF THE TRANSITION TO DISTANCE EDUCATION ON THE FORMATION OF HUMAN CAPITAL

*Irina Gushchina*

## **Abstract**

The problems of the influence and interaction of such concepts as education, human capital, the level of development of society and the economy, the digital economy and the knowledge economy are analyzed. On the one hand, the state of society, economy and education system depends on the state and quality of human capital. On the other hand, without education, it is impossible to form human capital capable of developing an individual and society in the modern digital economy and the knowledge economy. The article raises the issue of the quality of human capital formation using distance learning technologies. There were identified the main difficulties of the forced transition to online education associated with the Covid-19, there were summarized the results of studies by the ONF, PISA and the World Bank. Prospects for further development of human capital are assessed.

**Keywords:** *human capital, distance education technology, e-learning, competence, informational educational environment.*

## **1 INTRODUCTION**

Human capital includes both innate abilities and talents, as well as traits, qualities and properties acquired during a person's life, which are the determining source of income for a particular person. The costs contributing to its growth are considered as investments in human capital. Education is one of the essential elements of human capital, because it enables the individual to acquire in the learning process abilities and qualities that contribute to the development of a person's potential, his personality and can be used in specific labour activities.

Education is the leading structural factor in the formation of human capital. Attention to innovative forms of education is natural. In the past few years, the e-learning market has been actively developing. This is due to the rational efficiency of using electronic educational platforms, the ability to reach a wide audience of students, and the flexibility of the schedule.

In the digital economy, education is gradually moving into the online environment. However, the announcement of the self-isolation regime in March 2020 hastened the massive adoption of distance learning technologies, which has been proceeding at different rates in previous years with varying results. More often this happened in a short time and without preliminary information preparation for both trainees and trainers. As a result, real, both positive and negative, opportunities for distance learning came to light. So far, they are selective, but the period of self-isolation has shown how the urgent need to transfer to distance learning without interrupting the educational process can strengthen or destroy social ties both within universities and the entire education system in society.

How is it necessary to organize the interaction of participants in the educational process in the new educational environment in order to obtain the most optimal result in the formation of human capital? Logistics alone is not enough for effective home-schooling. All participants in the learning process must be psychologically prepared for this learning format. Methodological

support is also important for many teachers: how to build an online lesson, what resources and technologies to use.

## 2 OVERVIEW

With the transition to the knowledge economy and further to the digital economy, the main increase in employment is accounted for by professions with a predominance of intellectual work. Moreover, according to development forecasts, not only “intellectual” professions will prevail in the spheres of employment, but those that require purely human qualities - creativity, non-standard thinking, adaptability to rapidly changing conditions and circumstances, illogical thinking. That is, such professions in which soon it will not be possible to replace a person with technical means and artificial intelligence.

An innovative and digital economy is impossible without an effective education system and modern knowledge, a competitive quality of life and a modern infrastructure for the life of a modern specialist. In the world, an increasing share of the gross domestic product is created precisely by human capital. The accumulated human capital serves as the foundation of the digital economy and the knowledge economy. But it is a person with a high level of education and culture, professional training, business and social activity that becomes the main force of social development in the new society.

Therefore, the importance of education, the constant acquisition of new knowledge and skills in the knowledge-based economy and digital technologies is an indisputable fact. Since human capital is not only knowledge, but also skills, managerial skills, culture and motivation, modern education is faced with a huge task-not only to transfer knowledge and initial skills of activity, but also to form a conscious attitude to oneself as an owner of human capital, which should not only be used and owned, but also multiplied, because human capital is the property not only of its owner, but also of the organization and society as a whole (Aedo et al., 2020)]. The formation of a person as a person takes place only in social conditions, so the creation of human capital is the result of cumulative social efforts. Thus, the task of education is not only to create potential human capital, but also to properly treat it. In addition, it is also necessary to understand that this capital requires constant investment, even on the part of the person himself. If the education system succeeds in this task, the owners of capital will constantly increase their assets at the expense of the development of society and their own development.

The coronavirus pandemic has caused an unprecedented crisis in all areas. In the field of education, this emergency has led to a massive face-to-face closure of educational institutions in more than 190 countries, in order to prevent the spread of the virus and mitigate its impact. According to UNESCO, by mid-May 2020, more than 1.2 billion students at all levels of education worldwide had graduated from face-to-face classes. (Al-Samarrai et al., 2020)

The pandemic has transformed the contexts in which curricula are implemented, not only because of the use of platforms and the need to consider others of those for which the curriculum was originally designed, but also because certain knowledge and skills are more relevant in the current context (Beschasnaya et al., 2020). Some decisions need to be made and resources are available that pose a challenge to school systems, educational institutions, and teachers. This concerns curriculum adjustments and prioritization and contextualization necessary to ensure that the content is relevant to the current situation, based on consensus among all stakeholders. Equally important, these adjustments should prioritize the competencies and values that have come to the fore in the current situation, namely solidarity, self-learning, self-care and others, social and emotional skills, health and resilience, among others.

### 3 DISCUSSION

For now, it is impossible to say with any certainty what impact the crisis will have on the implementation of curricula in the different grades of primary and secondary education, but it is expected that differences in learning achievement will be exacerbated, in light of the prevailing educational inequalities and unequal access to curriculum coverage.

This isn't about the distance learning experience we've all had in the last couple of months. It's about what happened during these months of physical distancing with learning, with the educational results of schoolchildren. It must be admitted that, although efforts to quickly organize distance learning allowed at least not to lose students, hardly managed to teach them with the same efficiency as in the traditional educational process.

If we are honestly talking about the fall in GDP and incomes under quarantine conditions, then we must just as honestly talk about the fall in the volume and quality of education during this period. The victims are not only hundreds of thousands of entrepreneurs, but also millions of schoolchildren. But if financial capital can be restored (at least help from the National Welfare Fund), then human capital is more difficult to restore (Saavedra, 2020).

Recognizing losses in the quality of knowledge and skills gained does not mean reproaching schools. They tried their best in conditions in which educational organizations would have simply stopped working completely thirty years ago. Yes, they weren't ready for distance learning. It is no coincidence, according to a survey by the ONF, 40% of parents believe that distance learning leads to a decrease in the level of knowledge, children do not master the program, and in order to improve the learning outcomes, they will need to study additionally, including in summer and even autumn. We see confirmation of these data in the poll of the ONF: approximately 66% of parents believe that their children have an inadequate academic load, that they lose in the quality of education and knowledge (ONF, 2021).

Is it possible to estimate these losses? Interestingly, today the difference in educational outcomes is often measured in terms of study time. For example, a 10 point difference in PISA is equivalent to an additional year of study. The converse is also true: less study time affects educational success. Leading education economist Harry Patrinos of the World Bank estimates that the loss of one semester (six months) of training is equivalent to the loss of 5% of human capital (and future earnings) (Saavedra, et al., 2020). Even if we assume that, on average, the system worked with an efficiency of 50%, this means a loss of 2.5% of human capital.

This is a very modest figure and parents have nothing to worry about. But the problem is that these losses are unevenly distributed. Strong and successful students, children from educated families who had computers and helping parents, lost almost nothing. But children who already had an academic gap, children who could not study effectively since they did not have the Internet, a computer, or a workplace, lost much more (Al-Samarrai et al., 2020). Both the World Bank and UNESCO have stated this in recent reports. We can say that the lag of these children behind successful students has increased, and the chances of success in education and professional activity have fallen even more.

It's not just about educational backlog. Researchers show that for some children this situation has become a serious psychological test, a blow to social ties. The term "educational poverty" is actively using. It characterizes such school failure that creates risks of long-term failure in work and social life and reduces the country's human capital. According to our estimates, the share of schoolchildren at risk of "educational poverty" could have increased from 25% to 35% during this time. The reason for this is very simple. The forced learning format is the least suitable for children who are lagging or poorly organized without sufficient family support. The situation is complicated by the fact that the lagging students are not evenly distributed. We are



talking about entire schools in which it was not possible to organize any effective distance learning. According to ONF estimates, there may be up to 20% of such schools. It turns out that for entire school teams there are risks of lagging behind (ONF, 2021).

One of the factors in responding to external challenges in the field of education is the competence of institutions and their employees. During the period of widespread introduction of distance learning, teachers must demonstrate several components of their professionalism. Since the teacher plays an important role in building the human capital of students, teaching staff in general play a key role in responding to the COVID-19 pandemic and have faced a number of different emerging demands during the social and health crisis. Most teachers not only had to re-plan and adapt their learning processes, including adjusting methods and curricula, developing materials, and diversifying the media, formats, and platforms used, but also had to participate in student material safety activities. and their families, for example, distribute food, health products, and school supplies. Teachers and teaching staff have had to deal with the need to provide socio-emotional and mental health support to students and their families, an aspect of their work that is becoming increasingly important during the pandemic.

The development and implementation of educational responses to social and health crises requires the active participation of all parties involved in education, both during periods of isolation and in the process of opening schools. It is necessary to improve the ability of management teams to find creative, contextual answers to organizational, educational and support questions of teachers, allowing them to address issues of educational continuity, social and emotional support and strengthening the social role of schools. It is also crucial to enable teachers and teaching staff to make flexible pedagogical decisions in a context-sensitive manner, while maintaining an appropriate balance between autonomy and the provision of support.

Governments and educational institutions face the challenge of preserving teachers ' jobs, salaries and benefits, and especially ensuring their well-being. Constant engagement with teachers to ensure their return to school will be crucial in ensuring that children return. In this scenario, teachers need priority support during isolation and during the school opening process in at least the following areas (UNESCO, 2020):

- Training, advice, and resources for working in a variety of distance learning formats, including training in the skills and methodologies of using ICTs and other distance learning and learning platforms in education, as well as criteria for contextualized and flexible curriculum decisions, evaluation, and feedback for learning.
- Support and develop advances in methodological innovation and the introduction of alternative forms of learning - the inclusion of learning through play in the curriculum and contextualization of the experienced situation - and educational strategies to accelerate and resume the learning of students who are more seriously affected during the training. a pandemic.
- Priority health care, social and emotional support and capacity building in teaching social and emotional skills to students and their families.
- Guarantees of continued employment and decent working conditions and contractual terms.
- Strengthen local teacher networks through spaces for support, learning, and developing collaborative offerings to address instructional, instructional, and socio-emotional support.

## 4 CONCLUSION

Distance education innovations look very attractive. The world of knowledge is presented as an open, boundless and dynamically changing information space, but the teacher in the usual sense disappears, along with him, authority, value orientations disappear. When analysing such a concept, it becomes obvious that the principle of unity and collectively is destroyed and replaced with individualism, which negatively affects the formation of human capital. The student becomes the main consumer of educational services, which changes the classical concept of the purpose of higher education as the secondary socialization of the individual. As a result, with online education, classical interpersonal communications are transformed, direct communication and contact between the subjects of the educational process are reduced. Information computer technologies should be guided not only by the educational area of knowledge, but also by the person, the learner, the educator, the individual. Only in this capacity can distance education become a popular form of education that contributes to the qualitative formation of human capital.

What was the test of the strength (stability) and competence of each of the participants in the education system in connection with the accelerated transition to distance learning? Since the main actors in the implementation of the educational process are teachers and students, we will share the results of our observations (cases) how the competencies of each of the participants affect the strength of the structure called "education" as a whole. During the period of total distance learning using electronic devices and information resources, teachers are required (especially at the implementation stage) to show several components of their professionalism - impeccable knowledge of the subject of the discipline, didactic literacy, methodological support of the discipline. development and verification of the training content, formation and maintenance of communication with teachers. information technology literacy.

In conclusion, it should be noted that the identified contradictions create not only problems, but also opportunities for the educational system as a whole and each educational institution individually to determine the effectiveness of the digital solutions used, the need for retraining of teachers and technical modernization. It is important to draw the right conclusions from such a "global" experiment. Indeed, it is in the process of obtaining education that new competent specialists (labour resources) are formed, on which the formation of the human capital of the individual and society depends.

### Acknowledgement

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### Contact information

#### **Irina Gushchina (postgraduate student)**

Herzen State Pedagogical University of Russia, Institute of economics and management,  
 Department of Education and Personnel Management  
 48, Moika Emb., St. Petersburg, Russia, 191186  
 E-mail: [i.sychevaaa@gmail.com](mailto:i.sychevaaa@gmail.com)  
 ORCID: 0000-0003-2299-6593

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# CONSUMER PERSONALITY AND ITS INFLUENCE ON CONSUMER EMOTIONAL BEHAVIOR AND DECISION-MAKING IN THE FOOD PRODUCTS MARKET

*Lenka Havettová, Tamás Darázs*

## **Abstract**

The paper aims to analyze the consumer's personality, selected personality characteristics, social factors and then evaluate their impact on the emotional and rational buying behavior and making purchasing decisions in the food market.

To determine the behavior of consumers in the market of food products, the questionnaire was chosen as the method of necessary data identification. The questionnaire consisted of two parts: Eysenck's personality test and the attitude test "Consumer Behavior and Decision Making". Eysenck's personality test was used to determine the respondents' personality characteristics, based on which they were classified into quartiles as per the personality type. Evaluation of emotional reactions was performed through an attitude test, with items in which the respondents indicate the degree of their agreement or, vice versa, disagreement with the above statements. Based on the obtained data, a gross emotionality score was calculated. The higher the score obtained, the more emotional the consumer's tendency to behave in the food market. We evaluated individual respondents based on the interval of the evaluation scale - determined by us. The research conclusions are based on the clarification of the dependence of the personality type determined based on emotional lability/stability on the emotional or rational buying behavior and dependence of the type of consumer temperament on emotional or rational purchasing behavior through the statistical tools  $\chi^2$  square contingency test and Cramer's contingency coefficient.

This paper presents the existing relationship between the consumer's personality and emotional behavior and decisions on the market based on the questionnaire results. As a result, attention is paid towards the need to consider the element of personality in creating marketing strategies, subsequently marketing communication and customer segmentation.

***Keywords:** consumer, personality, emotions, consumer behavior*

## **1 INTRODUCTION**

The focus of marketing is undoubtedly the market. From a psychological point of view, the market can be understood as ongoing economic processes, but we should focus on people, their needs, value orientation and lifestyle. Understanding consumer behavior and claiming to be familiar with the customer's needs is very challenging because often customers behave entirely differently from what their desires and needs suggest. In practice, there are several factors influencing consumer behavior, no doubt, one of the most important being the individual's personality, which is now often neglected. This paper focuses on this often skipped factor in creating marketing strategies, marketing communications or customer segmentation.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

Consumer purchasing behavior refers to the purchasing behavior of the final consumer. Many factors, specifics and characteristics influence the individual, i.e., the consumer, in his decision-making. The consumer has specific buying habits, buying behavior, and preferences to buy or the retailers and shops to visit. Thus, the purchase decision results from each of these factors, specifics and properties, according to Ramya & Ali (2016).

Karmarkar & Yoon (2016) argue that while the study of consumer behavior has been added with improved ability to generate new knowledge, many of the mechanisms on which judgments and decisions are based remain difficult to be researched.

According to Olsen, Tudoran, Honkanen & Verplanken (2016), personality is a critical element in determining a consumer's purchasing decision in the purchasing process.

The importance of researching personalities as a determinant of buying behavior comes from the fact that individuals differ by their personalities, as Küster & Vila (2017) claimed.

According to Atkinson (2007), consumer personality is characterized by characteristic and specific patterns of thinking, emotions, and behavior defining an individual's style of interaction with the physical and social environment.

Islam, Rahman & Hollebeek (2017) successfully used the Big Five model in their research, based on the theory of traits, evaluating personality by reflecting how an individual ranks on five personality traits, including openness to experience (i.e., the readiness of the individual not to accept the new aspect or new ideas), conscientiousness (i.e., the tendency of a person to focus on results as organized, careful and responsible), extraversion (i.e., the tendency of an individual to be social and interactive), pleasantness (i.e., the orientation of a person to be polite, empathetic when cooperating with others ) and neuroticism (i.e., a person's tendency to depression, anxiety and distress).

The Big Five model and the resulting temperaments have recently been popularly used to determine the correlation of the consumer's personality and its various influences on buying behavior. An example is a work of Pelton (2020), who researched the dependence of personality type with the use of a mobile application, as well as the paper by Lynn (2021), researching the dependence between personality and buying behavior. Bazzani (2017), Liu (2017) and Pelau (2018) also provide beneficial research on the influence of personality that we took as an inspiring tool for our research.

## **3 METHODOLOGY**

This paper's primary goal is to analyze the consumer's personality, selected personality characteristics, and social factors and then evaluate their impact on buying behavior and making purchasing decisions in the food market.

To determine the behavior of consumers in the market of food products, the questionnaire was chosen as the method to get the necessary data. The questionnaire was conducted online using Google Forms. A total of 978 respondents took part in this survey. Only those respondents filling in the questionnaire completely and correctly were included in the final evaluation of the obtained data. All calculations and results we got from the file, modified based on control questions of 558 respondents.

In the initial phase, it was necessary to evaluate the results of the Eysenck personality test. An evaluation method was used to evaluate this test, consisting of applying the template's values

to a horizontal and vertical axis showing the tendency for extroversion and lability. Based on the final position, the affiliation to the quarter of temperament is determined.

Tab. 1 - Intervals of the evaluation scale of individual temperament types as per the Eysenck personality test.

Source: own research

Temperament type	Rating scale on the “y” axis	Rating scale on the “x” axis
Melancholic	<13-24>	<0-11>
Choleric	<13-24>	<13-24>
Phlegmatic	<0-11>	<0-11>
Sanguine	<0-11>	<13-24>
Not specified	=12	=12

The second part of the questionnaire, “*Consumer Behavior and Decision Making*” was a means of obtaining information for assessing respondents' emotional reactions, opinions, and attitudes in the food market.

Evaluation of emotional reactions was performed through an attitude test. Respondents indicated the degree of their agreement or, vice versa, disagreement with the above statements concerning behavior and decision-making when purchasing food products. The Likert scale was used, with the value 1 meaning “*strongly disagree*”, 2 for “*disagree*”, 3 stating “*I do not know*”, 4 meaning “*agree*” and 5 meaning “*strongly agree*”.

Based on the data from the second part of the questionnaire, a gross emotionality score was calculated, reaching values in the range of 1 to 40. The higher the score, the higher the consumer's tendency to behave emotionally in the food market. We evaluated individual respondents based on the evaluation scale's interval (Table 2).

Tab. 2 - Intervals of the evaluation scale of emotionality. Source: own research

Consumer	Gross emotionality score
Rational	<1-24>
Emotional	<24-40>

The presented research's final stage consisted of identifying possible causal dependencies between the respondent's personality type and rational and emotional consumer behavior in the food market. The following hypotheses were established:

- Hypothesis H1a - Personality in terms of lability/stability influences emotional behavior and decision-making.
- Hypothesis H1b - The type of consumer temperament influences emotionality in behavior and decision-making in the food market.

When verifying the statistical hypotheses set by us, the  $\chi^2$  square contingency test was used to research the dependencies using contingency tables to summarize the existence of a statistically significant relationship between qualitative features. The formula for the test criterion is:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^s \frac{(E_{ij} - T_{ij})^2}{T_{ij}} \quad (1)$$

where

$\chi^2$  – test criterion

$E_{ij}$  – the empirical amount in the  $i$ -th row and the  $j$ -th column

$T_{ij}$  – the theoretical amount in the  $i$ -th row and the  $j$ -th column

$r$  – rows

$s$  – columns

If the test criterion  $\chi^2$  calculated is greater than or equal to  $\chi^2$  for the significance level  $\alpha = 0.05$  for degrees of freedom  $(r-1)*(s-1)$ , we reject hypothesis  $H_0$  there is a dependence between the given variables. Vice versa, if the test criterion  $\chi^2$  calculated is less than  $\chi^2$  for the significance level  $\alpha = 0.05$  for degrees of freedom  $(r-1)*(s-1)$ , then we accept hypothesis  $H_0$ .

If the  $H_0$  hypothesis was rejected, the Cramer's contingency coefficient was used to determine the degree of dependence between the variables examined. In general, it can be considered the most appropriate degree of association between two nominal variables and can range from 0, which is interpreted as no relationship, to 1, which indicates the „perfect“ relationship. In its interpretation in psychological research, it is possible to use Cohen's scale from 1988. According to Cohen, a correlation less than 0.1 is interpreted as trivial, a correlation from 0.1 to 0.3 as small, a correlation from 0.3 to 0,5 as medium and the correlation above 0.5 as large.

## 4 RESULTS

### TEST 1

Assessment of personality type influence determined based on emotional lability/stability on emotional or rational buying behavior.

The  $\chi^2$  square method was used to assess and compare emotional behavior. To analyze the relationship between the respondent's personality type, determined based on emotional lability/stability and his emotionality manifested in buying behavior, hypothesis  $H_{1a}$  was formulated. After evaluating the statistical method used, the result of the research is that the consumer's personality in terms of emotional lability/stability influences his emotional behavior in the food market, and thus hypothesis  $H_{1a}$  was confirmed. Using Cramer's correlation coefficient, the relationship between the analyzed variables was confirmed to be tight.

### TEST 2

Assessment and comparison of emotional behavior of individual temperaments (personality types).

To analyze the relationship between the respondent's personality type and his emotionality manifested in consumer behavior, hypothesis  $H_{1b}$  was formulated. After evaluating the statistical method used, the research results show that the consumer's personality influences his emotional behavior in the market, and thus hypothesis  $H_{1b}$  has been accepted. Using Cramer's correlation coefficient, the relationship between the analyzed variables was confirmed to be tight.

## **5 DISCUSSION**

Our paper aims to point out the consumer's type of personality, influencing the behavior and purchasing decisions in the food market. By personality, we mean different psychological traits leading to consistent and constant responses to stimuli from the environment. To define the personality of the respondents of our research, the Eysenck personality test was used, thanks to which it was possible to determine for each respondent his temperament, emotional lability or stability, as well as extroversion or introversion. Subsequently, we investigated whether these characteristics impact individual respondents' degree of emotionality manifested in purchasing decisions in the food market. The survey results point to the influence of personality in terms of stability or lability to emotional behavior in the market. Liability means an increased degree of variability. It is often referred to as increased emotionality or hypersensitivity. On the other hand, emotional stability is characterized mainly by good integration of personality, resilience and perseverance, and stability of emotions. Therefore, we claim that market segmentation and targeting in creating a communication strategy should also consider what sentiment or emotional attitudes should be resulting from the outcome of marketing communication, taking into account target groups.

As in the previous case, we statistically confirmed the influence of the consumer's temperament on emotional behavior and decision-making in the food market. The most rationally decisive consumers were classified in terms of temperament as phlegmatic, whom we consider being calm, peaceful, but mainly thinking and thoughtful people, which was also reflected in their consumer behavior. On the contrary, we recorded the most significant influence of emotions on consumer behavior and decision-making in melancholics, characterized by sensitivity and emotional lability. Emotions also have a significant influence when buying for choleric, who are often considered reckless and too quick with the reaction, which is also reflected in their emotionality of consumer behavior.

Following the results of the research, one of which was to prove the existence of the influence of the consumer's personality in terms of emotional stability or temperament on emotional behavior in the food market, we pay attention to the need to consider this element when creating marketing strategies, marketing communication and customer segmentation.

## **6 CONCLUSION**

The presented paper's main goal was to draw attention to the consumer's personality, selected personality and psychological characteristics, and social factors and subsequently evaluate the influence on shopping behavior and make purchasing decisions in the food market.

To determine the behavior of consumers in the market of food products, we chose the questionnaire as the method of researching the necessary data. The questionnaire was conducted in an online environment, using Google Forms with the participation of 978 respondents. However, only those respondents who filled in the questionnaire completely and correctly were included in the final evaluation. All calculations and results are obtained from a sample adjusted based on control questions of 558 respondents.

The questionnaire consisted of two relatively separate parts, a personality test and an attitude test.

In the initial phase, it was necessary to evaluate the results of the Eysenck personality test. We used the evaluation method, consisting of applying the values determined by a template to a horizontal and vertical axis showing the tendency for extroversion and lability. Based on the final position, the affiliation to the particular quarter segment is determined, with each quarter representing a different temperament (sanguine, choleric, phlegmatic, melancholic).



The second part was a test of attitudes “Consumer Behavior and Decision Making”. Our goal was to obtain information to evaluate respondents’ emotional reactions, opinions, and attitudes in the food market. Respondents indicated the degree of their agreement or, vice versa, disagreement with the above statements concerning behavior and decision-making when purchasing food products. The Likert scale was used. After calculating the gross emotionality score, which could reach values in the range of 1 to 40. The higher the score, the more emotional the consumer’s tendency to behave in the food market and vice versa; the lower one, the consumer was considered rational.

Subsequently, the relations between the consumer's personality and emotional or rational decision-making in the market, through the  $\chi^2$  test of square contingency. We formulated hypotheses. After applying the statistical method, we came to certain conclusions which in both tests confirmed the existence of dependencies of the consumer’s personality in terms of emotional stability (H1a) and temperament (H1b) on the emotional behavior of consumers in the food market.

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### **Contact information**

#### **Ing. Lenka Havettová**

Slovak University of Agriculture  
Tr. Andreja Hlinku 2, Nitra, 949 76, Slovak republic  
E-mail: havettovalen@gmail.com  
ORCID: 0000-0002-7195-8406

#### **Ing. Tamás Darázs**

University of Ss. Cyril and Methodius in Trnava  
Faculty of Mass Media Communication  
Nam. J. Herdu 2, Trnava 917 01, , Slovak republic  
darazs.tamas.95@gmail.com  
ORCID: 0000-0002-1873-6441

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# INVESTIGATING FACTORS INFLUENCING YOUNG CONSUMERS' E-LOYALTY TO TOURISM SITES

*Hoang Duc Sinh, Vo Viet Hung, Nguyen Thi Phuong Dung*

## **Abstract**

The customers' loyalty plays a vital role in tourism development and the frequency of visiting tourism sites. Certain variables emanating from external and internal sources tend to influence the e-loyalty of the tourists in Vietnam. The paper aims at analyzing the influence brought by such variables on the e-loyalty of the young customers towards the tourism sites. The study deploys a structural equation and utilizes a sample to generate a different model, including two separate external variables namely eWOM and site design. The study also aims to analyze two internal elements, customer satisfaction, trust, and how their intention to purchase online platforms is affected. The variables are essential for studying tourism and e-commerce because previous studies did not pay much attention to them. The results indicate that the internal variables tend to have more impact compared to the external variables. The research also proposes a causal model that can be applied successfully by the tourism firms to enhance e-loyalty and increase their market share. The performance analysis of the variables indicates satisfaction is the leading variable in enhancing e-loyalty among the customers. From the study, trust emerges to be the most important variable that affects e-loyalty. Tourism companies should; therefore, not only carefully consider trust, but also the external and internal variables that influence consumer behavior and affect their intention to make online purchases.

**Keywords:** *eWOM, e-loyalty, social media, satisfaction, site design, trust, Vietnam, young consumers*

## **1 INTRODUCTION**

Over the years, tourism has developed and kept the pace associated with technological development. With the ease brought by technology, tourism operations and conduction of transactions electronically have gained popularity. Electronic commerce in the tourism industry has made it possible for people to book in advance the tourism sites that they intend to visit in the future (Pantano & Pietro, 2013). The ease that consumers gain when going online has led to the development of the concept of electronic loyalty and how frequent they are likely to visit tourism sites. Younger consumers are more informed and can easily understand the application of e-commerce in enhancing their experience and saving them time while choosing their tourism destination. Tourism for young tourists aims at getting information from numerous sources to process them and use such information in making decisions regarding the tourist sites to visit, which enhance their satisfaction and meet their expectations. The tourist companies strive to persuade online users to choose their destinations, and they do so through their enticing websites to achieve commercial benefits. The websites tend to market the sites, making the young consumers indecisive on the best destinations. Various tourism products are promoted in Vietnam to attract and retain customers and increase their loyalty. Ideally, loyalty leads to increased sales as the customers get satisfied and refer their peers to purchase the same products. With the country endowed with many tourism sites, competition has been rising with increased demands from the consumers. Online transactions tend to be risky hence eliciting trust-related issues which affect consumer loyalty. The heightened insecurity resulting from such

transactions forms a clear basis for the analysis involving the level of loyalty consumers portray towards certain tourism companies that operate online (Lin et al., 2009).

Vietnam receives a considerable number of tourists yearly, given its endowed resources (Tung, 2020). Over the years, it has increasingly become the preferred destination for many people, as evidenced in its influx data (Tseng et al., 2018). The exponential growth of tourism activities in the area makes the country ideal to study the behavior of young consumers and their electronic commerce loyalty and how they recognize a tourism site and develop loyalty over time. The study has been poorly studied since the link between the product and the consumers has been ignored and how the site and services offered affect consumer loyalty. Understanding and advancing the causal model that explains the relationship between the products, consumers, and the site is key in enhancing economic sustainability in the country and enhanced market orientation for the tourism companies. The paper considers young people since over 95% utilize social media, the internet, and mobile telephony when pursuing any tourism product (Bizirgianni & Dionysopoulou, 2013). The number of trips to be made to Vietnam is expected to rise given the nature of young people to explore more and visit new places. The study analyzes the reasons for the reduced loyalty among the youth towards specific tourism sites. The impact of the youth is related to their ability to influence each other following their satisfaction level. By studying the online loyalty of the young consumer, the paper seeks to find a solution and bridge the existing gap in the related studies.

Through the paper, the empirical and theoretical literature regarding online behaviors can be enriched. Certain external variables such as eWOM, site design and the variables emanating from the internal aspects of the consumer, for example, trust and satisfaction are analyzed to reach a conclusion. The previous studies have ignored the inclusions of both the variables due to the difficulty in obtaining data; hence analysis has always been based on the consumers' intention to repurchase. The study includes the importance-performance-analysis model, IPMA, in analyzing the most critical variable in influencing consumer decisions.

## **2 LITERATURE REVIEW**

### **2.1 The Concept of E-loyalty**

Over the years, electronic commerce has emerged and proved to be essential in easing the way people conduct businesses. The development has been widely utilized in tourism, leading to consumers' online loyalty (Parra-Lopez et al., 2018). Online loyalty is essential to online marketers, with the target being young people who are more literate. The approach to attract and retain online consumers enhances the business of the tourism companies and creates a long-lasting relationship with the consumers. The consumers express their loyalty through frequent returns to the site and referring other people to visit the site or use their discount codes online while booking for the destination (Mahadin et al., 2020). Various studies have indicated that there is no unanimity regarding the specific measurement of consumer's e-loyalty in the tourism industry, with online loyalty being ignored and at many times analyzed in the same context as the offline activities (Huang, 2008). The behavioral element of the consumers towards tourism has been minimally studied compared to the attitude aspects. E-loyalty entails the willingness of the consumer to repeat purchases online or recommend the product to other people through social media or mobile telephony (Mouakket & Al-Hawari, 2012).

Many authors have treated the concept as merely a given extension of consumer loyalty that takes place offline. The attitudinal approach has primarily dominated the concept instead of the behavioral approach used to analyze the behavioral element of the consumers. It has been established the consumer's intention is the ideal predictor of behavior in the tourism industry

(Mouakket & Al-Hawari, 2012). Study of the e-loyalty has been complex, hence the need to delve further to analyze the various elements that influence the consumers' online behaviors (Gallarza & Saura, 2006).

Ideally, loyalty comprises three dimensions. Consumers can show loyalty to various sites, and this can be vertical to mean the loyalty expressed simultaneously at different levels, horizontal for more than a single provider within the same level of experimental loyalty which is expressed towards a certain type of holidays. Online loyalty has been found to remain present even with various alternatives (Anderson & Srinivasan, 2003).

## **2.2 E-loyalty Drivers**

Various models and theories have been utilized to study multiple factors related to online loyalty within the tourism industry (Buhalis et al., 2020). The classic loyalty theory was developed in the offline tourism context and focused more on the behavioral approach towards loyalty applied by some scholars while studying the online aspects of tourism and how e-loyalty has affected the industry. The studies, however, do not mention any factors that affect e-commerce, such as site design or the impact the young consumers have on the development of the industry (Kassim & Asiah Abdullah, 2010). According to Oliver's model, customer loyalty tends to stand out. This can occur in four different phases that depict an increase in the level of consumer engagement from one stage to another. The phases include cognitive fidelity, affective fidelity, conative loyalty, action loyalty, and willingness to take actions. The model has, however, been faulted since it does not take into consideration false loyalty. Its applicability is since online consumer behaviors have been found to fluctuate due to the various alternatives being available.

Other studies have been based on the intentional and the attitudinal approach to customers' e-loyalty towards tourism both in the online and offline context. The studies have been conducted using structural equations for predicting the consumer's intention for repetitive purchases or recommendations, and they tend to be limited and largely cognitive (Sparks, 2007). Most scholars in the group have focused on the perceptions of the consumers and their associated internal factors. E-loyalty is considered to depend fully on the consumers' attitudes and, to a certain degree, the various social norms (McMullan & Gilmore, 2003). Other studies seek to have entirely predictive power by incorporating relationships and variables that have been proven to influence e-loyalty. The group incorporates other external variables that have been proven to influence the design and reputation of the tourism company and the level of services being offered at the site, perceived value, and electronic word of mouth (Lin et al., 2009).

The planned behavior theory dictates that subjective norms, attitudes, and perceived controls can explain the aspect of consumer loyalty, and they enhance the consumers' belief regarding the results (Ajzen, 2002). Including behavioral control, in theory, improves intention predictability given the unforeseen event does not take place. According to various studies, predicting loyalty using the theory generates a result that is less than 40% (Ajzen, 2002). In addition, the existing technology and various social networks imply that consumers tend not to have voluntary control regarding online consumption. The drawback from the theory has led to the emergence of a technology acceptance model that is based on the online context and the reasoned action theory. These make the technology acceptance model to be widely utilized in e-commerce (Galib et al., 2018). The model does not put the various social norms regarding the use of perception in determining the e-loyalty among customers.

The most used theory in the study and by other authors arises due to the limitations of the other model of understanding consumer behavior. The previous model's key limitation relates to their instability nature in the online context. The widely used model considers the implication of

external factors such as the reputation the company has and the information available in the public domain that can influence decisions. The causal model considers the internal and external variables while analyzing online behaviors and consumer e-loyalty towards specific sites (Soo Kim, 2005). The aim is to understand the variables that can be better used to enhance e-loyalty among the consumers.

### **2.3 External Variables; eWOM and Site Design**

Electronic word of mouth entails the negative or positive statements issued by the actual, former, or potential consumers regarding a product or the tourist site and is made available to people online. The perception the consumer hold regarding a website has been found to be relevant and links them to the choice of a tourism site. The sites characteristics that tend to influence eWOM include the communicative and technical design and having this in mind, the first hypothesis includes:

**Hypothesis 1:** *Design characteristics sites has directly impact on the site's potential to generate eWOM.*

eWOM has influenced loyalty and purchase retention in the tourism sector. The perceived risk associated with the online transactions makes customers search for various information related to the online website. The spread of information online tends to impact the behavioral aspects of consumers in tourism, especially the youth. Although some effects have been devoted to exploring the influence of eWOM on online purchases and the consumer's e-loyalty, literature about e'loyalty of customers remains limited. The desire to repurchase is also enhanced through the available information, and organizations' efforts of improving their sites to influence online purchases and feedbacks (Kanwel et al., 2019).

**Hypothesis 2:** *The site's potential to generate eWOM has directly impact on the intention to purchase online.*

Considering the first hypothesis, the potential of the site to generate eWOM directly influences the intention of the clients to repurchase. The improvements put in place to enhance the site's outlook leads to positive eWOM that is pivotal in retaining the clients leading to recommendations and repurchases (Yoo et al., 2013).

**Hypothesis 3:** *The site's potential to generate eWOM has directly impact on the site e-loyalty.*

### **2.4 Internal Variables: Satisfaction and Trust**

Online transactions rely on the existence of trust, which is an essential variable in stimulating purchases from online consumers in Vietnam. Electronic commerce has a higher level of associated risks due to its intangible nature, and so are online tourism activities (Phani & Prasanna, 2016). Trust is based on the ability of the tourism companies to offer the products they market with the same intended quality continuously. The sellers must ensure they remain reliable and their integrity is upheld. Their actions should be ethically justifiable to gain the online trust from the pool of customers willing to venture into the unknown (Kassim & Asiah Abdullah, 2010).

Trust is assumed to impact satisfaction directly since the clients will feel satisfied once the companies meet their expectations and gain their trust (David, 2002). However, unlike in another field, trust is indirectly related to the intention to purchase within the online tourism environment. Numerous studies are required within the tourism context, given the contradictory outcomes from the previous studies. Due to this, the following hypothesis emanates in relation to the internal variables:

**Hypothesis 4:** *Trust has directly impact on the consumers' satisfaction.*

Business requires strategies to meet the consumer's expectations within the tourism sector. An adequate approach is essential for the development of the companies, and this can only be achieved once the customers get satisfied. Online satisfaction relates to the shopping experience previously encountered. Satisfaction can be defined as the evaluation conducted by the consumer of an online purchase to ascertain whether the product met the expectations or not (Xu, 2018).

Satisfaction arises once the consumer is sure the product achieved the desire objectives. According to various empirical studies, consumers' satisfaction tends to influence their online shopping characteristics and behaviors, influencing their e-loyalty and intention to make purchases. Due to some exception in the study, it has found to need to delve further into the study leading to the below two hypotheses:

**Hypothesis 5:** *The consumers' satisfaction has directly impact on the intention to make an online purchase.*

The intention of the online consumers to make a purchase online through the company's website or social media platform is directly related to their past experience and whether the previous purchases satisfied them. Satisfied consumers will always make a plan to repurchase the product or refer others to make the same purchase (Mouakket & Al-Hawari, 2012).

**Hypothesis 6:** *The consumers' satisfaction has directly impact on e-loyalty towards the site.*

The intention to purchase and site e-loyalty are positively related. The purchase intention refers to the consumers' declared will in the online context to buy a product. The e-loyalty aspect, on the other hand, entails the intention of the consumer to repeat purchases on a given site and recommend other people to visit the site and make their online purchases. The effect of e-loyalty on the site has been proven by many scholars, with the consumer's intention remaining the focal point (Meng et al., 2011).

**Hypothesis 7:** *The intention to make an online purchase has directly impact on the site's e-loyalty.*

Online consumers tend to portray their site e-loyalty through their intention to make an online purchase. They express their choice of the site through their affirmed action to purchase after viewing other alternatives. The perceived benefits generated from a given tourism site can be shown through the number of consumers displaying their intention to book for the site visit online platforms (Buhalis et al., 2020).

### **3 METHODOLOGY**

#### **3.1 Data Analysis and Research Design**

The research to establish the influence of the internal and external variables on the e-loyalty on tourism sites was conducted from the second day of February to the fourth day of March 2021. The method applied was quantitative in nature and was causal and descriptive. In studying human behavior optimally, the PLS-SEM was utilized due to its advantages and because of the optimal potential to enhance prediction while applying reflective indicators and Vietnam's large sample size (Pan et al., 2015). To clearly determine the external and internal variables that the companies should manage to enhance e-loyalty, the study applied the Importance-Performance Analysis, also known as IPMA (Azzopardi & Nash, 2013). The aim of the analysis is to establish how the variable affects e-loyalty among young people in Vietnam.

Tab. 1 - Demographic profile of respondents. Source: own research

Gender	Men	Women	Total
Year			
1st	96	104	200
2nd	74	86	160
3rd	44	76	120
4th	41	69	110
Total (%)	255 (43%)	335 (57%)	590 (100%)

### 3.2 Data and Sample Collection

The sample was made up of 590 subjects, out of which 97% between 19 and 25 years. The sample size consisted of various students undertaking different degree programs and from various years the chosen Vietnamese universities. Students were chosen for analysis purposes due to their great commercial impacts and for them is making part of the youth. Generally, they represent the virtual consumers due to their age bracket and for having adequate knowledge compared to others in the overall public. The sample size was chosen in adherence to the rule that dictates the size to be ten times that of the proposed variables when applying the structural equation. The rate of response among the students was 96%.

Questionnaires were utilized as the means of data collection from the students. The data collection method was ideal since it enhances the accuracy of the desired information required for analysis purposes (Marshall, 2005). The questionnaire was administered on the selected variables to obtain feedback required for analysis. The study applied the Delphi technique through two expert groups to construct a definitive relationship and item content (Williams & Webb, 1994). The questionnaire aims to establish the consumers' fulfillment level, their trust level, e-loyalty, and the effects of electronic word of mouth on their purchasing behavior and site loyalty. The questionnaire used included various items aimed at understanding their behavior, as indicated in figure 2. The Likert scale was used, and it contained five different response alternatives, with the lowest being 1 to mean no agreement and 5 to refer to total agreement. Ideally, the questionnaire refers to the various online purchases relating to the tourism products through an e-commerce platform, social network, or telephony.

### 3.3 Measurements and Variables

The study utilizes both the dependent and independent variables. In the survey, e-loyalty is the dependent variable. E-loyalty is the consumer's desire to repeat purchases and recommend the site to others to consume the product, whether the same or different. Therefore, online consumer loyalty is related to the various holistic experience of the consumers regarding e-commerce through the site. The independent variables in the study include the site design, consumer trust, eWOM, purchase intention, and satisfaction. The study measures the degree of online loyalty through repetitive purchases and the recommendations consumers make regarding the site. The site's dimension measurements factors attribute that can influence electronic word of mouth communications. To effectively attain the desired results, the control variable involved is the extent to which consumers purchase tourism products and services online through various websites, social networks, and telephony. The control variable is key in the verification of the purchasing power of the consumers.



Tab. 2 - Model of Measurement: Basic Data. Source: own research

Questionnaire Items	Overall %	$\Lambda$	CR	AVE
Regarding the purchase you made on the online site for various products - Through social networks, mobile, and web.				
DES1: I appreciate the speed, accessibility, and usability of the site.	68.2%	0.89	0.84	0.72
DES2: Appreciation of site communicative and Interactive capacity.	69.9%	0.81		
WOM1: Appreciation of the ability to post negative comments on the site.	83.6%	0.86	0.88	0.79
WOM2: Appreciation of the ability to post negative comments on the site.	75.3%	0.92		
TRU1: I Prefer to perceive trust elements of the Company through the site.	88.50%	0.85	0.77	0.63
TRU2: I like perceiving the trust and security of the site.	83.80%	0.72		
SAT1: My expectations have been fulfilled through online buying.	76.40%	0.89	0.92	0.85
SAT2: I felt satisfied upon purchasing online.	76.70%	0.95		
INT1: My intention is to buy tourism products online.	72.3%	0.9	0.89	0.82
INT2: I am likely to purchase tourism products through the internet.	79.99%	0.90		
LOY1: Upon buying the products, I would recommend to others the site's importance.	82.1%	0.80	0.88	0.79
LOY2: I would buy the product again from the same tourism site.	85.49%	0.91		
I have bought some products via e-commerce sites.	98.22%	-	-	-

## 4 RESULTS

### 4.1 Descriptive Analysis of the Results

The various items included in the questionnaire had an overall score above 65.5% of the highest value that would have been achieved if all the respondents assigned a five-point rating to the elements. Among the items, three obtain a score of more than 74.5%, six items obtain over 79.5%, including the items used to analyze e-loyalty. The items related to the site's design are the least valued since they obtained a score of below 70%. Among the students sampled, 98.22 % reported having used or consumed the tourism products and services through e-commerce.

### 4.2 Identification of the Latent / Inferred Variables

Explanatory analysis of the various factors was conducted to ascertain the specific latent variables that the items under consideration belong to. The latent variables include the perceived ability of the sites to stimulate eWOM, trust (TRU), design of the site (DES), intention to purchase (INT), loyalty towards the site (LOY), and satisfaction (SAT).

According to the results, all the variables have importance and the increased performance level. The intention to make an online purchase and performance are the essential variables due to their high performance and high importance index that relates to the e-loyalty towards the site. The variables require a high level of attention in relation to the resources required due to their proximity to the highest level of the proximity line. Site design, eWOM, and trust levels tend to be less relevant in achieving online loyalty among the consumers.

Evaluation of the measurement model was conducted to relate the variables observed to their respective latent variables. Through the study of individual reliability, it was observed that all the variables obtained the minimum required level ( $\lambda \geq 0.70$ ). The implication is that the model applied showed internal consistency and that the variables observed clearly measured their various latent variables.

Among the external variables, site design and characteristics that make the sight unique tend to illicit eWOM among the online customers. The eWOM elicited could be negative or positive

depending on the experience of the customers, and this has an effect in influencing others online to visit the site or not. The information available online, in turn, influences the purchasing intention of online clients, which subsequently affects the loyalty towards the tourism sites. The ability of the online consumer to trust the company is essential in enhancing their satisfaction level. Satisfaction is a key element in increasing the purchasing intention of consumers that consequently leads to loyalty among the sites.

The study establishes that satisfaction among consumers influences online loyalty and their purchasing behavior. The relationship has been found to be positively and directly related. The implication is that young people are more likely to purchase products online when their expectations are met and they are satisfied. Achieving a high level of e-loyalty tend to be difficult compared to the effect of satisfaction on the customer intention to make a purchase. The importance-performance results indicate that customer satisfaction is highly important in reducing the thought and pessimism regarding online transactions. The study further found out that no variable has reduced performance or importance, indicating how crucial they are in enhancing online loyalty and repeat purchases.

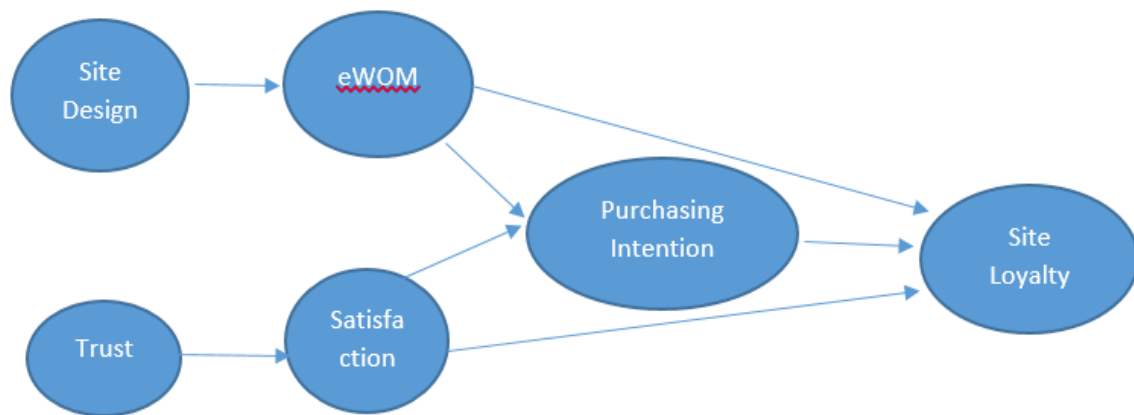


Fig. 1 – Theoretical Framework. Source: own research

The above structural model indicates the existing relationship between the variables and how they are key in influencing site loyalty. From the model, it is clear that the satisfaction level among the youth is directly influenced by trust, and the trust indirectly influences the purchase intention and e-loyalty. Tourism firms should well consider the relationship to increase their web loyalty given the impersonal nature of internet transactions. The purchasing intention is positively and directly affected by the level of satisfaction among the consumers.

The characteristics of the site have also been found to lead to information generation; hence is directly and positively influences eWOM. Positive eWOM influences the online consumers' intention to make a purchase and the repeated purchase leads to site loyalty. However, site design and site loyalty are indirectly related. It has also been observed that eWOM tends to be higher in negative information than positive ones. Site loyalty is determined by the consumers' desire to make purchases repeatedly. In order to achieve e-loyalty among the consumers, purchase intention and satisfaction remain to be essential variables.

## 5 DISCUSSION

According to the study, a large number of young people were found to have used electronic commerce in the tourism sector (98.22%). A higher score was achieved hence confirming the potential exhibited by the youth in relation to the online and the positive attitude they have towards e-commerce within the sector. The implication is that youths are likely to make numerous trips to the tourism sites in the coming years in Vietnam.

The causal model generated indicates that the internal variables (satisfaction and trust) have a more significant influence on the e-loyalty of the consumers compared to the external variables (eWOM and site design). Given the above, the external variables are equally important and should be taken as influential enough to change consumers' perception regarding Vietnam tourism sites. Specific characteristics of the site, as evidenced online, indicate specific characteristics of the site that influences eWOM due to its usability, interactivity, speed, and accessibility. The characteristics of the site are crucial for young people. The findings are essential for eWOM and site design actions which the tourism companies could utilize.

The study establishes that young people prefer communication conducted within the online context. They tend to like reading, writing comments, and conducting an evaluation on various sites. These characteristics portray the potential influence paused by online media. The eWOM tends to be higher in the case of the hostile experience since the youth prefer to listen to other people's experiences before venturing independently. The impact of negative eWOM tends to be superior among the young people compared to the positive eWOM; hence they tend to affect consumer's intention to make a purchase online.

## 6 CONCLUSION

The internal and external variables emanating from the young consumers are critical in influencing their e-loyalty towards various tourism sites. The paper adequately analyses the internal and external features that affect e-loyalty in the tourism sector. There are numerous financial and commercial benefits associated with e-loyalty, which are related to the existence of young people who utilizes online platforms on a daily basis. The digital segment has high purchasing capacity, with the youths making the vast part of this. The study is of great importance given the breaks that exist within the online environment, with insecurity being the main concern in the tourism sector due to the intangible nature of online transactions.

Theoretically, the formation of site loyalty requires a model that is practical and statistically significant to be in place for the smooth operation of the tourism companies. The models entail consideration of the external variables (eWOM and site loyalty), internal variables (satisfaction and trust), and the purchasing intention of consumers online. Tourism companies in Vietnam aim at understanding the behavioral aspects of the customers to come up with better products that will influence further the youth to make an online purchase. The development of the causal model enhances the predictability of the customers' site loyalty and their purchasing intention.

Deducing from the findings, tourism companies should place more effort in understanding the operation of e-commerce and the effect this has on the e-loyalty of the consumers. Making more efforts will ensure that customers remain satisfied, leading to site loyalty hence increased revenue to the companies. The companies should strive to improve the perceived security that the youth desire to enhance their loyalty and satisfaction. Market orientation should be promoted to ensure the external variables are also addressed by the companies. The youth tend to react quickly to the information available online, and this is crucial for companies to use such information to continuously improve.

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## **Contact information**

### **Hoang Duc Sinh**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: dhoang@utb.cz  
ORCID: 0000-0001-6382-4056

### **Vo Viet Hung**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: vvo@utb.cz  
ORCID: 0000-0003-0705-8419

### **Nguyen Thi Phuong Dung**

Foreign Trade University, HCMC Campus  
15 D5 Street, Ward 25, Binh Thanh District  
E-mail: nguyenthiphuongdung.cs2@ftu.edu.vn  
ORCID: 0000-0002-7606-4743

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# STRUCTURAL EQUATION MODELLING IN THE RESEARCH OF ENTREPRENEURIAL ORIENTATION: A SYSTEMATIC LITERATURE REVIEW

*Vojtech Hruby*

## **Abstract**

**Objective:** To systematically review recent research of the entrepreneurial orientation utilising structural equation models. In particular, to review trends in number of research papers on these subjects, assess the methods used, number and type of the entrepreneurial orientation's dimensions and measures used.

**Method:** Web of Science database was first searched separately for the terms 'entrepreneurial orientation' and 'structural equation modelling' between 2011 and 2020 to look for trends in number of articles, countries where the research had been conducted and categories it was assigned to. In the second phase the Web of Science was searched for the combination of the two terms between 2019 and 2020 in title, abstract, key words, and key words plus. Exclusion and inclusion criteria were applied and data from selected articles was extracted using an extraction form and statistically analysed.

**Results:** The number of articles on both the entrepreneurial orientation and the structural equation modelling has been growing and the growth has accelerated in the last three years. 20 (39%) articles were selected out of 51 hits resulting from the combined search. Research had taken place in 14 countries of which 5 amounted to 55% of all studies. 89% of studies were classified in at least one of the three Web of Science categories: business, management, economics. Average sample size was 278 companies and the most frequently used method was PLS-SEM. 85% articles proposed recommendations for future research. The entrepreneurial orientation had mostly been measured with (Covin & Slevin, 1989) measure (46%) and 3 dimensions had been used in 90% of studies.

**Conclusions:** the theoretical concept of Entrepreneurial Orientation has been gaining popularity and structural equation modelling has been frequently used to analyse various correlations. PLS-SEM is the most frequently used method as well as the selection of 3 dimensions measured by the original (Covin & Slevin, 1989) measure.

**Keywords:** *Autonomy, Competitive Aggressiveness, Innovativeness, Partial Least Square, Proactiveness, Risk-taking*

## **1 INTRODUCTION**

The entrepreneurship is often considered to be the fundamental driving force of firms' productivity and growth. (Schumpeter, 2013) saw entrepreneurs as individuals striving to create new combinations, i.e., introduce new products and practically linked entrepreneurship with innovation. These two terms are frequently spelled out by governments world over seeking to reinvigorate the growth of economies as well as firms' owners and managers looking to fulfil noble visions or to simply hit the tough budget numbers. The key concept of the entrepreneurship from the perspective of the social science research is the entrepreneurial orientation. (Rauch et al., 2009) who studied the relationship between the entrepreneurial

orientation and firms' performance concluded that the entrepreneurial orientation represents a perspective research field for building a relevant understanding of the entrepreneurship.

The utilisation of the structural equation modelling method in the social science research has indeed taken off during last 30 years. Its popularity may stem from the fact that a number of key concepts is not directly observable. The structural equation modelling combines latent variables representing a theoretical concept such as the entrepreneurial orientation and measured data (indicators, manifested variables) that is used as an input for the statistical analysis resulting in the proof of relations among latent variables (Williams et al., 2009). The author of this review set out to review the use of the entrepreneurial orientation and the structural equation modelling in the recent research individually and together. The main focus of this review was gaining a better understanding of methods used, number and type of the entrepreneurial orientation's dimensions and measures most often adopted in the research.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

### **2.1 The entrepreneurial orientation**

The entrepreneurial orientation construct was first formulated by (Miller, 1983), who described an entrepreneurial organization as one that engages in product innovations, somewhat risky behaviour and is pro-active in relation to its competitors. (Lumpkin & Dess, 1996) developed the theory further and added two more dimensions: competitive aggressiveness and autonomy. They argued that an enterprise in order to be successful needs its leaders and creative individuals be able to act independently, without any bureaucratic constraints. Competitive aggressiveness expresses how a company responds to risks. Contrary to (Miller, 1983), (Lumpkin & Dess, 1996) emphasized that all the dimensions can vary independently in a given situation and can be defined as follows:

Autonomy is an expression of a free spirit, which is essential for all new. It is an independent action of an individual or a team aimed at enforcing the realization of an entrepreneurial concept or vision (Lumpkin & Dess, 1996). Innovativeness is a willingness to introduce new concepts through experimentation and creative process focused on the development of new products, services, and processes. Risk taking was described as the decision making and realization without the knowledge of probable outcomes when some steps may include a significant resource allocation. Proactiveness is a forward looking perspective typical for a market leader who takes hold of opportunities expecting future demand. Competitive aggressiveness is an intensive effort to overcome the competition (Lumpkin & Dess, 1996).

### **2.2 The structural equation modelling**

The method allows researchers to model variables, that cannot be measured directly and at the same time to calculate measurement errors for variables, which can be measured. SEM evaluates two types of models: a) measurement model (outer model), which expresses the dependence between latent variables and their indicators, b) structural model (inner model), which expresses relations among latent variables. These relations reflect hypothesis based on theoretical assumptions (Mora, 2012). SEM provides a researcher with the option to: a) model relations among predictors (independent variables) and criterions (dependent variables), b) take into consideration latent variables, measured by indicators (measure variables), c) model measurement errors for measured variables and d) statistically test theoretical assumptions against empirical data. The holistic analysis, which SEM is capable of, is feasible with two statistical techniques: a) covariance-based SEM, b) variance-based SEM – PLS (Roldán & Sánchez-Franco, 2012). PLS method was developed by Herman Wold with the aim of reflecting



on theoretical and empirical conditions common in behavioural social sciences. The basic PLS algorithm runs in two phases: a) during the first phase the score of a latent variable is iteratively estimated, b) in the second phase final estimations are calculated (Hair et al., 2011). Since its creation in 1973 by Karl Jöreskog the covariance based structural equation modelling method has kindled lively interest among researchers. It estimates maximum probability with the goal of reproducing the covariance matrix (i.e., minimizing the difference between the observed and estimated covariance matrix) without focusing on the explained variance. In other words, with CB-SEM method R2 is a by-product of the main statistical goal of achieving a good fit of the model (Hair et al., 2011).

### **3 METHODOLOGY**

#### **3.1 Data sources and search methods**

Three consecutive searches were conducted in the Web of Science in February and March 2021. The Web of Science was first searched for the term 'entrepreneurial orientation' and then independently for the words 'structural equation modelling' in the title or abstract or author key words or key words plus. The Web of Science offers an option to search for all four terms using a single search term 'Title', which was used in this review. The above defined search strategy was similar to that used by (Lyon, 2000). Below is the detailed description of the author's approach:

#1 TOPIC: ("entrepreneurial orientation") AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article) Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC Timespan=2011-2020

#2 TOPIC: ("structural equation modelling") AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article) Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC Timespan=2011-2020

The third search combined the previous two but focused on a shorter period of time:

#3 #2 AND #1 Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC Timespan=2019-2020

#### **3.2 Inclusion and exclusion criteria**

Only articles published in English language in refereed journals indexed in the Web of Science were included. The publication period of 10 years (between 2011 and 2020) for the search #1 and #2 was selected. Author estimated this period would be long enough for any trends in the number of published articles to be noticed. This would then help to draw conclusions about these terms' popularity and impact on contemporary research endeavours worldwide.

For the search #3 the following additional inclusion criteria were added: i) article must contain a structural model drawing, i.e. a simple use of structural equation modelling method itself was not enough and a graphical expression of dependencies among theoretical constructs must have been included; ii) clear data analysis and iii) conclusions derived from the findings must be presented; iv) only articles with full text available were considered.

Similar to (Arain et al., 2010) the author decided to exclude review papers as they survey and summarise previously published studies, rather than reporting new facts and analysis (Saunders et al., 2015).

### 3.3 Selection and evaluation

All articles returned by the search #1 and #2 were included. The title, abstract, author key words and Web of Science key words plus in the search #3 were screened by the author for possible inclusion. Full texts were downloaded for the articles identified as possibly satisfying the inclusion criteria and evaluated for selection. The screening process was repeated on a 10% random sample of selected papers to validate the screening process (Chan et al., 2017). The screening process was also repeated on all papers containing one of the search terms only in the Web of Science category key words plus and not in title, abstract and author key words. Key word plus proved to be an unreliable field for inclusion suitability evaluation. E.g., articles with the search term ‘Entrepreneurial orientation’ only in the field key word plus and not in other search fields mostly did not research this construct at all and were only loosely connected to the subject.

### 3.4 Data extraction

Author of this review extracted data from all studies selected for inclusion by breaking down each study into its constituent parts and recoding recording the key points using data extraction form and applying rules on what to extract (Saunders et al., 2015) (see ‘data extracted’ column in Tab. 1). Data were recorded in a MS Excel spreadsheet.

Tab. 1 – Data Extraction Form. Source: adapted from (Chan 2017)

No.	Items	Data extracted
1	Name of first author	text
2	Publication year	date
3	Journal	text
4	Title	text
5	Country in which research was done	text
6	Category	text
7	Primary objective/research question	text
8	Method used to address primary objective/research question	text
9	Research sample size	number
10	Term "entrepreneurial orientation" used in the title	yes/no
11	Term "structural equation modelling used in the title	yes/no
12	Entrepreneurial orientation dimensions number	number
13	Entrepreneurial orientation dimensions type	text
14	EO measure	text
15	Summary findings	text
16	Recommendations for future research	yes/no

Information extracted for items 1 – 6 renders basic description of the selected articles. Primary objective/research question, unless explicitly specified by the author, was defined as the first

objective mentioned in the abstract or elsewhere in the main text. Summary findings, unless summarised in the abstract, were extracted as the first finding from the summary section.

The final version of the full list of data extracted is included in Appendix 1.

## **4 RESULTS**

The search #1 of the Web of Science for the term “entrepreneurial orientation” returned 2104 articles published between 1.1.2011 and 31.12.2020 with the term appearing either in the title, abstract, key words, or key words plus. Second search #2 with the otherwise same set-up for the term “structural equation modelling” resulted in an identification of 9663 papers. The combination of the above searches using Boolean operator AND (#1 AND #2) lead to an identification of 51 articles published between 1.1.2019 and 31.12.2020. One duplicate record was removed, and 50 full-text articles were downloaded and assessed for eligibility. 30 articles were then excluded for the following reasons: i) 25 papers did not research the term entrepreneurial orientation and the only reference to it was in the Web of Science field ‘key words plus’, ii) 3 articles contained no information about how the entrepreneurial orientation was measured and what type and number of the construct’s dimensions were used, iii) 1 article did not use any structural model to visualise contingencies among theoretical constructs, iv) 1 article proposed new dimensions of the entrepreneurial orientation without any reference to published research. Figure 1 shows the flow diagram of the identification process for the sample of 20 studies included in this review. The full list of studies is included in the review in Tab. 2, with citations included in the final list of citations.

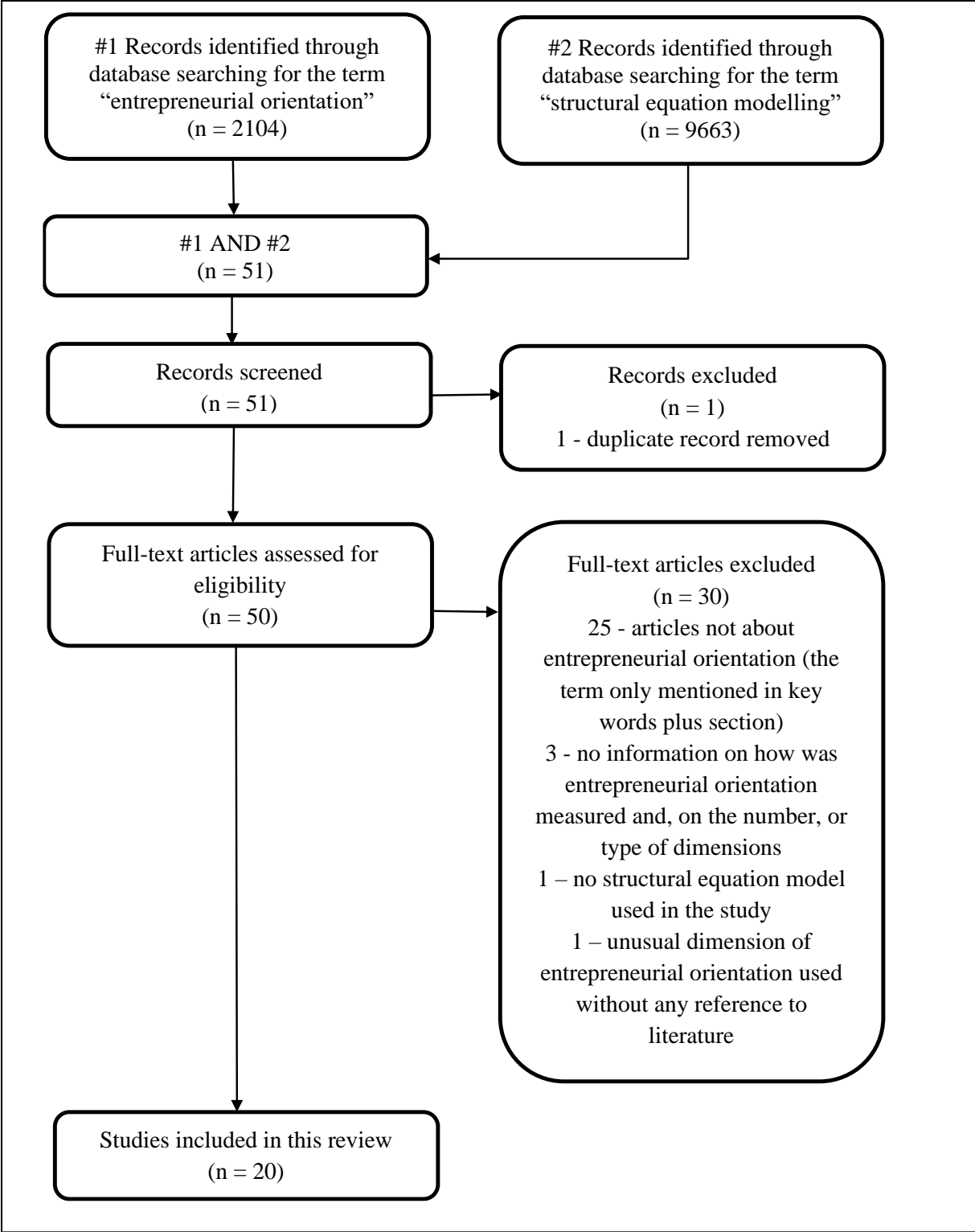


Fig. 1 – Flow diagram of the identification process for the sample of 20 articles included in this review. Source: own research

Tab. 2 – Studies included in this review. Source: own research

Author	Year	Journal	Title
Al-Dhaafri	2020	Benchmarking - An International Journal	Impact of total quality management, organizational excellence and entrepreneurial orientation on organizational performance: empirical evidence from the public sector in UAE
Ali	2020	Benchmarking - An International Journal	Effect of entrepreneurial orientation, market orientation and total quality management on performance. Evidence from Saudi SMEs
Alshanti	2019	Journal of Innovation and Knowledge	Market-sensing capability, knowledge creation and innovation: The moderating role of entrepreneurial orientation.
Aslam	2020	Supply chain management - an international journal	Determining the antecedents of dynamic supply chain capabilities
Bhatti	2020	Entrepreneurial Business and Economics Review	Organizational capabilities mediate between organizational culture, entrepreneurial orientation, and organizational performance of SMEs in Pakistan
Cannavale	2019	The Journal of Entrepreneurship	Entrepreneurial Orientations and Performance: A Problematic Explanatory Approach in the Iranian Knowledge-Based Industry
Cheah	2019	Journal of Cleaner Production	Internal oriented resources and social enterprises' performance: How can social enterprises help themselves before helping others?
Eniola	2020	Small Enterprise Research	Entrepreneurial self-efficacy and orientation for SME development
Ferreira	2019	International Journal of Innovation Science	Dynamic capabilities, innovation and branding capabilities and their impact on competitive advantage and SME's performance in Portugal: the moderating effects of entrepreneurial orientation
Hernandez-Perlinez	2019	Economic Research - Ekonomiska Istrazivanja	Innovativeness as a determinant of entrepreneurial orientation: analysis of the hotel sector
Hernandez-Perlinez	2019	Economic Research - Ekonomiska Istrazivanja	Socioemotional wealth, entrepreneurial orientation and international performance of family firms

Irun	2020	Journal of Business Research	Network market orientation as a relational governance mechanism to public-private partnerships
Isichei	2020	International Journal of Emerging Markets	Entrepreneurial orientation and performance in SMEs. The mediating role of structural infrastructure capability
Khan	2019	Human Systems Management	Entrepreneurial orientation, intellectual capital, IT capability, and performance
Kim	2019	Industry and Innovation	What facilitates external knowledge utilization in SMEs? - An optimal configuration between openness intensity and organizational moderators
Kiyabo	2019	Journal of Global Entrepreneurship Research	Strategic entrepreneurship, competitive advantage, and SMEs' performance in the welding industry in Tanzania
Martins	2019	European Business Review	The effects of market and entrepreneurial orientation on the ambidexterity of multinational companies' subsidiaries
Seet	2020	International Journal of Manpower	Understanding early-stage firm performance: the explanatory role of individual and firm level factors
Valos	2019	Journal of Strategic Marketing	How do alternative strategic orientations influence social media performance?
Veselinovic	2020	Total Quality Management & Business Excellence	The interplay of entrepreneurial orientation, total quality management, and financial performance

#### 4.1 EO and SEM publishing trends

The number of published articles on the subject of the entrepreneurial orientation has been growing steadily since 2011, when the lowest number of papers was published – 67 (3.18% of the total of 2104 articles). The maximum number was recorded for the last year of the selected period – 525 (24.95%). The average number in a year was 210 articles and median was 183. There was only one occasion of no growth in the number of articles year on year (2016/2017), when the number remained 224. The trend is reported in the Figure 2.

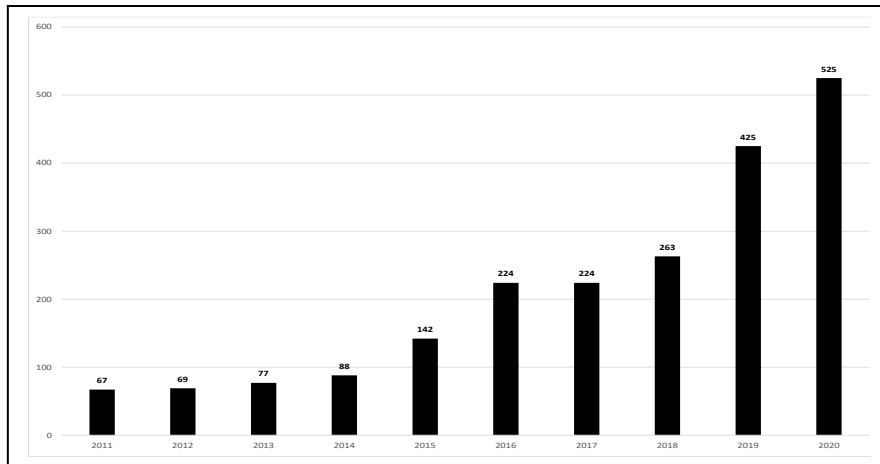


Fig. 2 – Number of published articles on the Entrepreneurial Orientation. Source: own research

Similar trend was unveiled for the frequency, with which the articles utilising the structural equation modelling had been published with the total number over the period of ten years between 2011 and 2020 of 9663. Minimum of 311 in the first year and maximum of 2245 in 2020. Average number of articles in a year was 966 and median value was 844. In 2014 the number of articles decreased from 412 in 2013 to 411. Since 2017 the number of publications has been accelerating as is visualised in Figure 3.

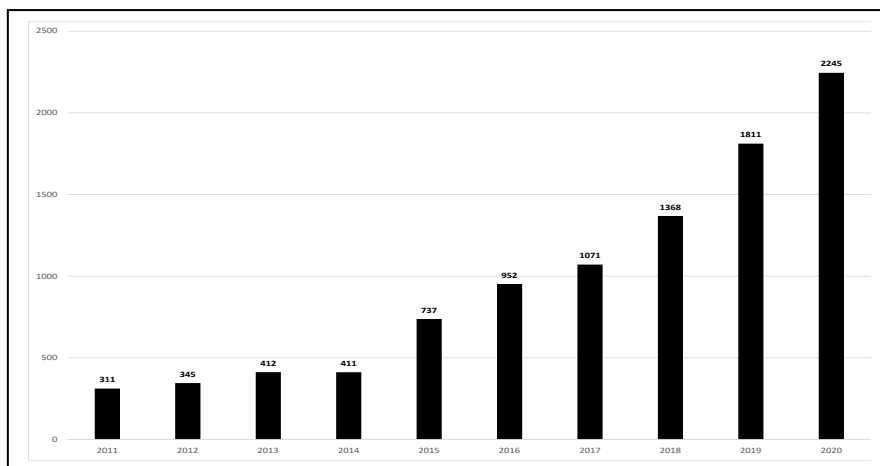


Fig. 3 – Number of published articles utilising the structural equation modelling. Source: own research

## 4.2 Characteristics of the research sample

Slightly more prolific proved to be the year 2019 with 11 (55%) published articles in comparison with 9 (45%) in 2020. Research discussed in 3 (15%) articles took place in Pakistan. Australia, Nigeria, Spain and United Arab Emirates were the place of research of 2 (10%) studies each. There were 9 other countries where 1 (5%) study originated. The most popular Web of Science categories under which the research articles were listed were ‘Business’ and ‘Management’ with 9 (35%) papers. 6 articles were listed in more than on category. Partial least square – Structural equation modelling (PLS-SEM) was the most frequently used research method utilised in 11 (52%) articles. Average sample size was 278, minimum 102, maximum 477 with median value of 280. The term ‘entrepreneurial orientation’ appeared in the title of majority of studies – 12 (60%), while ‘structural equation modelling’ was only once used in the title 1 (5%). Authors of selected articles included their recommendations for the future research

on 17 (85%) occasions. Characteristics of the articles selected for this review are summarised in Tab. 3.

Tab. 3 – Characteristic of studies included in this review. Source: own research

Characteristics	Number of articles (%)
Publication year	
2019	11 (55)
2020	9 (45)
Country	
Pakistan	3 (15)
Australia	2 (10)
Nigeria	2 (10)
Spain	2 (10)
United Arab Emirates	2 (10)
Bosnia and Herzegovina	1 (5)
Brazil	1 (5)
China	1 (5)
Iran	1 (5)
Jordan	1 (5)
Korea	1 (5)
Malaysia, Singapore	1 (5)
Portugal	1 (5)
Tanzania	1 (5)
Web of Science Category	
Business	9 (35)
Management	9 (35)
Economics	5 (19)
Green Sustainable Science Technology	1 (4)
Environmental Sciences	1 (4)
Industrial Relations Labor	1 (4)
Method	
PLS-SEM	11 (52)
SEM	7 (32)
CB-SEM	1 (5)



CFA	1 (5)
fsQCA	1 (5)
Sample	
Avg. sample size	278
Min. sample size	102
Max. sample size	477
Median sample size	280
EO used in the title	
Yes	12 (60)
No	8 (40)
SEM used in the title	
Yes	1 (5)
No	19 (95)
Recommendations	
Yes	17 (85)
No	3 (15)

### 4.3 Entrepreneurial orientation characteristics

Authors of the selected group of studies quite overwhelmingly favoured the (Miller, 1983) approach to studying the entrepreneurial orientation expressed only by 3 dimensions – 18 (90%) papers. 2 (10%) articles included all 5 dimensions of the entrepreneurial orientation as defined by (Lumpkin & Dess, 1996). Interestingly, only Proactiveness and Risk-taking were used in all 20 (100%) studies. Innovativeness, which was one of the 3 original dimensions in (Miller, 1983) was only used 19 (95%) times, and one article replaced it with Autonomy, which in total was utilised 3 (15%) times. The least studied dimension 2 (10%) was found to be competitive aggressiveness.

11 different measures of the entrepreneurial orientation were used in the articles selected for this review to measure the concept. The most frequently adopted measure was the one introduced by (Covin & Slevin, 1989), which was used in 11 (46%) studies. (Miller, 1983) was cited 4 (17%) times. 9 other measures were referred to, all of them only once (4%). The findings are summarised in Tab. 4. Author of this review did not investigate if those less known measures were original or adopted from one of the better known ones.

Tab. 4 – Characteristic of the entrepreneurial orientation in this review. Source: own research

Characteristics	Number of articles (%)
EO dimensions number	
3	18 (90)
5	2 (10)
EO dimensions used	

Proactiveness	20 (100)
Risk-taking	20 (100)
Innovativeness	19 (95)
Autonomy	3 (15)
Competitive aggressiveness	2 (10)
EO measure	
Covin, Slevin, 1989	11 (46)
Miller, 1983	4 (17)
Campos et al., 2012	1 (4)
Covin, Slevin, 1991	1 (4)
Ebrahimi & Mirbargkar, 2017	1 (4)
Fernandes and Santos, 2008	1 (4)
Hughes and Morgan, 2007	1 (4)
Jantunen, 2005	1 (4)
Knight, 1997	1 (4)
Liu et al., 2014	1 (4)
Lumpkin & Dess, 2001	1 (4)

## 5 DISCUSSION

The results of this study indicate that there has been a lively interest within the social science research community in the theoretical construct of the entrepreneurial orientation and the analytical tool of the structural equation modelling. The author set out to look at trends in the frequency of publishing scientific articles where this construct and modelling method stood at the centre of research. A deep dive into a vast number of refereed articles indexed in the Web of Science aimed at gaining better understanding also of methods used, number and type of the entrepreneurial orientation's dimensions and measures most often adopted in the research. A few well know and widely cited papers in the 1980's, 1990's and 2000's (Miller, 1983), (Covin & Slevin, 1989), (Lumpkin & Dess, 1996), (Lyon, 2000) laid the foundations of research of the entrepreneurial orientation often utilising the structural equation modelling method. Some of the questions preceding this review were: is this field of research drying or gaining pace? Is the structural equation modelling often used in this field of social science research? Is any other method gaining prevalence? Has the scientific community preferred to look at the entrepreneurial orientation as a three or five-dimensional construct? What are the most cited measures?

The analysis confirms that the number of published articles researching the entrepreneurial orientation (2104) or utilising the structural equation modelling (9663) has been growing over the period of last ten years between 2011 and 2020 and the growth has been accelerating during last three years. The total of 20 articles on the entrepreneurial orientation utilising the structural

equation modelling met the selection criteria. Most studies took place outside of Europe 16 (80%). By far the most popular proved to be the partial least square – structural equation modelling 11 (52%) and 3-dimension approach 18 (90%). The questionnaire developed by (Covin & Slevin, 1989) was the most frequently used measure.

The concept of entrepreneurship as a way of introducing new combinations to the market while undertaking risk (Schumpeter, 2013) has attracted new popularity with the ascent of the Internet. It's been often studied in the social sciences as the theoretical construct of the entrepreneurial orientation. This review has confirmed past studies (Lyon, 2000), (Farkas, 2016) in that the construct has been gaining popularity and the number of papers on the topic has been growing. It can be concluded that a lot of authors from various fields within the social science see it not only as an interesting research subject, but also as a legitimate way of studying the entrepreneurship from the science point of view in the context of many industries and different countries.

The structural equation modelling method has appeared more than four times more often in the research articles over the period of ten years than the entrepreneurial orientation. Some authors (Sarstedt et al., 2014) argue that this method in general and the partial least square – structural equation modelling method more specifically, is particularly useful in the social science research. A cohort of scholars (Ronkko & Evermann, 2013) has voiced their concerns over the method's supposed advantages and has argued in favour of the covariance-based approach to the structural equation modelling (CB-SEM). This review uncovers the fact that a growing number of researches has been choosing the structural equation method as a tool for modelling dependencies and analysing their research problems. That's in line with (Henseler et al., 2014), who have not only been promoting the partial least square structural equation modelling, but have also insisted that no method is universally applicable and better than other methods and that the individual research context needs to be considered before selecting a suitable method.

While some of the previous research (Lumpkin & Dess, 1996) has looked at the theoretical construct of the entrepreneurial orientation as a multidimensional one, consisting of 5 individual dimensions – innovativeness, risk-taking, pro-activeness, autonomy, competitive aggressiveness – this review has proved that at least over the period of last two years the overwhelming majority opted for the original approach of (Miller, 1983), who defined the construct as a three dimensional. In this review author's view, the reason behind this trend may be quite simple: it's arguably easier to measure three-dimensional construct than a five dimensional one. On top of that a well-known and reliable measure developed by (Covin & Slevin, 1989) is freely available and multiple examples of its use can be found in the literature.

This review's strengths lie in the robust search and data extraction procedure that has built on the similar and repeatedly cited articles (Chan et al., 2017), (Arain et al., 2010). The fact that the selection criteria stipulated that the search terms must appear not only in the title or abstract, but also in the key words, increased the chance that relevant articles would be captured. The obvious limitation of this study is the use of only one database, the Web of Science, which is comprehensive but not complete and therefore relevant and eligible papers might have been missed.

## **6 CONCLUSION**

This article aimed to systematically review recent research of the entrepreneurial orientation utilising structural equation models. Based on the search results, a well-designed data extraction procedure and a list of exclusion and inclusion criteria, it can be concluded that the popularity of the entrepreneurial orientation and the structural equation modelling expressed as a number of published articles, has been growing. The researchers most often look at the construct

through the lens of three dimensions, measuring it with the (Covin & Slevin, 1989) measure and utilising the partial least square – structural equation modelling.

To get a broader picture, practitioners should extend the search to other databases and look at a longer period of time. The scope of this review did not allow to analyse the structural equation models used in the selected papers. The way researchers model the relations among predictors (latent variables) and criterions (dependent variables) may prove to be an interesting area for future research. It can also analyse what indicators (measure variables) have been used to measure latent variables and how the research theoretical assumptions have been statistically tested.

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### **Contact information**

#### **Ing. Vojtěch Hrubý**

Brno University of Technology , Faculty of Business and Management

Kolejní 2906/4, Brno, 612 00

E-mail: xphruby05@vutbr.cz

ORCID: 0000-0001-9165-5544

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# SENIOR UNIVERSITIES IN PORTUGAL: EXPLORATORY STUDY FOR THE APPROACH OF POSITIVE ORGANISATIONS

*Luis Jacob, Sónia Galinha, Ricardo São-João*

## **Abstract**

The Association Network of Seniors Universities in Portugal (RUTIS) is a non-formal lifelong education project represented in the Economic and Social Council (CES) and involves more than 65,000 seniors, 368 organisations and 7,500 volunteer teachers. It is presumably the country in the world with proportionally the largest number of senior learners (Jacob, 2020). In this exploratory quantitative research through a questionnaire survey addressed to a sample of 1,016 individuals, the main goal is to get to know the Senior Universities as a positive organisation. The secondary goals were considered: i) to characterize the students in the sociodemographic component ii) to assess the reasons for attending university, iii) to know the importance assigned to university and iv) to assess the benefits perceived by students in this context. The results show that: i) the majority of students are female (71.85%), aged between 65-74 years (57.1%), married (65.26%), with a low level of education (47.74%) and the most representative income level is 41.54% (n=422), in the range of 401-1000€. There is a moderate positive correlation ( $\rho=0.62$ ) and statistically significant ( $p\text{-value}=0$ ) between the monthly income and the level of education of older students. ii) The possibility of remaining active, acquiring new knowledge, socializing and keeping busy are the main reasons given for enrolling/attending the US. iii) As for the importance assigned, the data point to: staying active, socializing and learning. iv) The perceived benefits are to continue having an active life, having more knowledge and improving mental health. The study data are relevant from the perspective of Martin Seligman's positive organizations (Seligman, Steen, Park, & Peterson, 2005; Galinha, 2020).

**Keywords:** *Leadership, Positive organisations, Universities, Seniors.*

## **1 INTRODUCTION**

RUTIS is the leading organisation of senior universities (SU) in Portugal. The SU are attended essentially by individuals over 50 years old. They attend on average four subjects per week, going 3 days a week in a wide technical and cultural offer. The teachers are of all ages, mostly with higher education degrees, teaching 2 hours of classes per week, equally represented by retired and active people, satisfied volunteers with a taste for teaching and helping others. The positive influence of these organisations in the lives of seniors is evident. The data shows an improvement in the perception of the physical and mental health condition of the students; an increase in the number of social contacts and consequently a reduction in the feeling of loneliness; a possible reduction in the antidepressant medication taken; levels of depression are substantially lower than in the general population; the level of knowledge has increased, essentially in the digital area, self-esteem has risen and the students feel more active and better integrated in the community. In summary, Portuguese SU are present in practically all the national territory, are born from civil society, are an example of volunteering and contribute to improving the quality of life of seniors. The study of changes in human development in the over 50s and organizations has occupied the scientific community in a very peculiar way, being an object of study of present and future (Galinha, 2019b, Pordata, 2021).

## 2 SENIOR UNIVERSITIES AS POSITIVE ORGANISATIONS

RUTIS aims to regularly create and streamline activities in the social, cultural, knowledge and social areas in accordance with the 2016 Council of Ministers Resolution that makes the legal framework. RUTIS have as their model the international experience, where in 1973 in Toulouse the first university of the third age by Vellas in order to enhance the image of the elderly before the society, promoting their active development with more autonomy in cultural and educational activities, within the scope of a policy that promotes the self-esteem, training and socialization of older people. The first SU in Portugal were created in the early 1980s, but their great growth took place in the first decade of the 2000s. Portugal has the largest worldwide SU network, with its institutions covering almost the entire national territory. SU are present in practically the entire Portuguese territory and were born from civil society.

There are two major models of SU organization worldwide. A model associates with formal universities, while other model developed based on non-profit associations or self-organized groups. The Portuguese SU are based on formal self-organized or public non-profit association organizations. SU are an excellent example of volunteering to improving the quality of life of senior citizens. Educational activities will be on a non-formal basis, without certification purposes and in the context of lifelong training.

Managing an organisation is managing a social system, based on a thorough understanding of the mechanisms of behavioural motivation and the functioning of complex social systems (Godin, 2008; Neves, Caetano, & Ferreira, 2011; Vala & Monteiro, 2013; Álvaro & Garrido, 2016; Yzerbyt & Leyens, 2018). The manager is a sense facilitator, able to engage individuals in the pursuit of organisational goals (Mintzberg, 2010; Cunha, Rego, Cunha & Cardoso, 2016; Galinha, 2020). As Costa (2003) points out, on the uniqueness of their mission, which is essentially pedagogical and educational, educational institutions thus reach a dimension where important decisions are taken, in educational, curricular and pedagogical terms.

According to Matos (1997, p. 1), "it is never too much to state that only development can be considered as the purpose of education. This idea of development "contains the notion of a permanent construction either of what the person gets to know, or of what he gets to know how to do, or even of what the person is becoming, a concept valid for all who inhabit the school ethos, members of an educational community".

Bertrand and Guillemet (1994) state that it is possible to find five common points in organisations: the behaviour of an organisation is guided by a culture, mission, aims, intentions and objectives; it makes use of knowledge and know-how to fulfil the tasks envisaged and achieve the objectives set; it presupposes a structuring and integration of activities: formal division of labour, allocation of responsibilities, coordination, integration, centralisation or decentralisation; it is based on the participation of people and their characteristics: intelligence, sensitivity, motivation, personality; and, the organisation is a totality that organises and controls the set of activities.

According to Seligman, Steen, Park and Peterson (2005), Positive Psychology is the study of positive experiences, positive personalities and organisations that allow individuals, institutions and communities to flourish. The social well-being is composed of relationship opportunities, sources of social support and sharing of social values (Santos, 2020). Lopes, Galinha and Loureiro (2010) and Galinha (2020) point out the importance of Martin Seligman's perspective within organisations in general, and educational institutions in particular, towards the construction of a positive holistic profile of capabilities and possibilities. For Galinha (2019a) and Marujo and Neto (2019, p. 656), it will be relevant to consider "virtuosity as a relational, communal, ethical process, and therefore contributing to the common good and to public

happiness". In this model, the classification system for positive aspects emphasises strengths and character, called "Values in Action (VIA) - Classification of Strengths and Virtues". In this manual the strengths were divided into emotional, cognitive, relational and civic characteristics and into six groups of virtues: wisdom, courage, humanity, justice, temperament and transcendence.

The Lifelong Learning Institute conducted a study into the motivations for lifelong learning. In a survey of 860 adults aged 55 to 96 who participated in a range of lifelong learning activities, eight out of ten respondents cited the pleasure gained from learning (Lamdin & Fugate, 1997). In the Survey on Lifelong Learning of over 1000 people aged 50 and over, 90% of respondents identified the desire to keep up with what is happening in the world, their own spiritual or personal growth and the satisfaction of learning something new as reasons for going to school. In another study, from the University of Southern Maine (The LLI Review, 2010), the average age was 73.4 years and respondents consistently cited the desire for community living as one of the main motivations for participating in lifelong learning projects.

In Portugal, in surveys conducted among students in US (non-formal education), the results were identical, the main justification for going back to school consists of the need or desire to learn and improve their knowledge (40%), followed by the desire to maintain activity (13%). After retirement, 43% of seniors responded that they would like to engage in a hobby and 75% agreed with the existence of training provision for retired people (Jacob, 2015).

### **3 METHODOLOGY**

This is a quantitative exploratory study carried out in Portugal during 2019-2020 and addressed to 1016 individuals attending Portuguese Senior Universities in order to get to know these positive organisations (Jacob, 2020; Marujo & Neto, 2019). The secondary goals were considered: i) characterise the students of senior universities ii) evaluate the reasons for attending, iii) know the importance given to the iii) knowing the importance attributed to it and iv) listing the benefits perceived by students in their attendance. The survey applied for data collection SRIB-Sociodemographic, Reasons, Importance and Benefits (Jacob, 2020) contemplated: i) sociodemographic questions (gender, age, marital status, years of attendance/university, number of subjects attended/year, attendance/number of days per week, schooling, monthly income); ii) importance of personal reasons for attending university - 4-point Likert-type scale (1- not significant, 4- very significant); iii) importance given to the Senior University - 4 point Likert scale (1- not very important, 4- very important); iv) benefits perceived by the seniors - 5 point Likert scale (1- worsened considerably, 5- improved considerably). The random sample of 1016 individuals was selected from a universe of 45,000 students enrolled in the US, corresponding to approximately 2.26% of the population. The descriptive study is presented using frequency tables. The sample mean (with the respective standard deviation - SD) and the extreme values (maximum/minimum) observed will be used as location measures. The present study has a substantially descriptive character. However, the following research hypotheses were considered at the inferential level: Ho-null hypothesis: There is no association/relationship between students' monthly income and their level of education; Ha-alternative hypothesis: There is an association between students' monthly income and their level of education. Spearman's correlation coefficient was used to measure the association/relationship between the variables. A significance level  $\alpha=5\%$  was set.

### **4 RESULTS**

The demographic characterisation of the sample of students attending Portuguese SU is depicted in Tab. 1.



Tab. 1 - Demographic characterization of the students. Source: own research

	<i>n</i>	%
<b>Gender</b>		
Female	730	71,85%
Male	286	28,15%
<b>Age group</b>		
≤ 64 years old	285	28,05%
65 - 74 years old	581	57,19%
≥75 years	150	14,76%
<b>Marital Status</b>		
Married / Living with a partner	649	65,26%
Single	54	5,31%
Widow(er)	214	21,06%
Divorced	85	8,37%

Frequency of each class (n); percentage of frequency (%)

Tab. 1 shows that most students are female (71.85%), between 65 and 74 years old (57.1%) and married/cohabiting (65.26%). The average age of the students is 68.71 years (SD=6.7), the youngest and the oldest being 51.1 and 91 years, respectively. The average number of subjects attended in the US is 3.8 subjects (SD=1.6), with students having attended only a single subject as well as students having attended six subjects throughout each academic year. Regarding the number of days spent in the US per week the average was 3 days (SD=1.2), with attendance varying between one and six days. Afterwards, it was checked how long the students have been attending the US, with the following frequency: less than a year (13.48%, n=137); between 1 and 5 years (55.61%, n=565); more than 5 years (30.91%, n=314).

Tab. 2 tries to portray the socio-economic condition of the students enrolled in the Portuguese US. It shows that almost all the students are retired (88%, n=894), as far as schooling is concerned, a minority has primary education (16.44%, n=167) and the remaining classes are relatively homogeneous, with a higher prevalence of students with basic education (31.30%, n=318). Therefore, we can verify that almost half of the registered students (47.74%) have a low level of education. Regarding the level of income, the most representative class, 41.54% (n=422), is in the range of 401 - 1000€.

Subsequently, a moderate positive correlation (Spearman's correlation coefficient  $\rho=0.622$ ), and statistically significant ( $p\text{-value}=0$ ) was found between monthly income and schooling of senior students i.e. the null hypothesis is rejected for a significance level  $\alpha=5\%$ . This is valid for these generations, where very few continued studying, so that those who managed to finish higher education usually had access to better remunerations. The possibility to remain active, to learn and acquire new knowledge and to stay busy are the most important reasons for the respondents to have started attending SU, reasons that are also present in the consulted bibliography.

Tab. 2 - Socio-economic characterization of US students. Source: own research

	n	%
<b>Professional status</b>		
Retired	894	88,00%
Working	41	4,03%
Housewife	62	6,10%
Other	19	1,87%
<b>Academic Qualifications</b>		
Up to primary education	167	16,44%
Primary education	318	31,30%
Secondary education	247	24,31%
Higher education	284	27,95%
<b>Monthly personal income</b>		
< 400 €	159	15,65%
401 - 1000 €	422	41,54%
1001-1500€	248	24,41%
>1500€	187	18,41%

Frequency of each class (n); percentage of frequency (%)

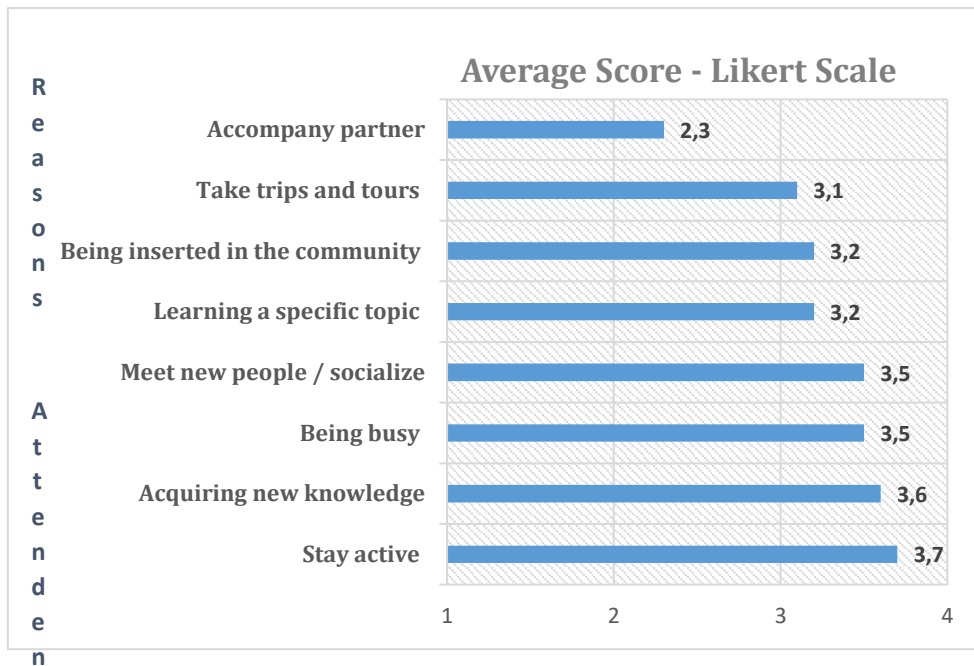


Fig. 1 - Reasons for SU attendance: average score in a four-point Likert scale (1- not significant, 4- very significant). Source: own research

Fig. 1 shows the mean score on the Likert-type scale taking into account the main reasons for attending the PED. It can be seen that the mean scores obtained in each of the items that make up the scale are higher than the centre of the scale (2). The items with the highest and lowest mean scores respectively were "Acquiring new knowledge" and "Accompany partner".

When called upon to assign a level of importance to some aspects of the university/senior academy, the importance of remaining active and learning was once again reinforced. In addition to these aspects, socialising also appeared to be an important characteristic, which demonstrates that, more than an educational response, US is a social response. The respective information can be seen in Fig. 2. The average scores obtained are higher than the centre of the scale (2).

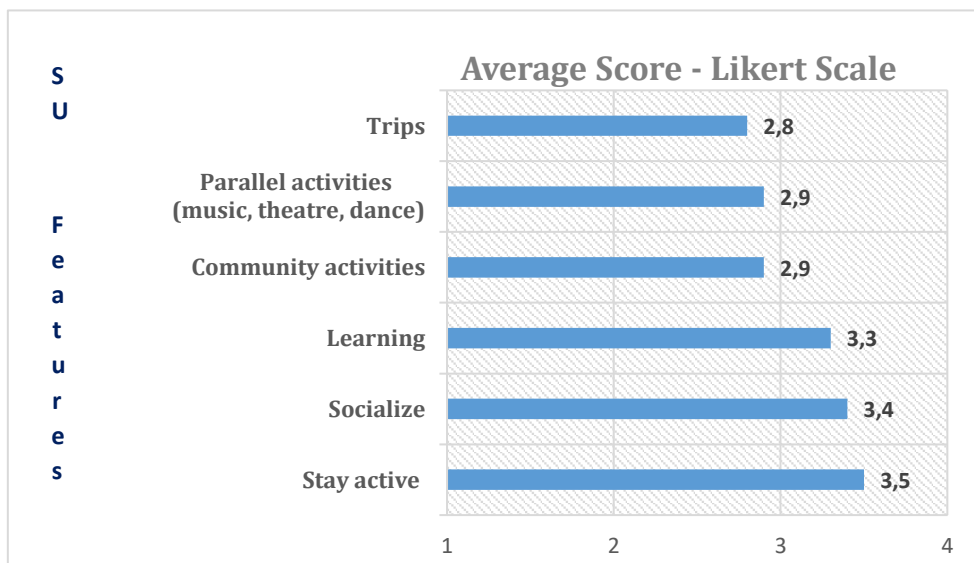


Fig. 2 - Importance given to the features of the SU – average score in a four-point Likert scale (1- not very important, 4- very important). Source: own research

Continuing to lead an active life, having more knowledge and improving mental health are the most identified gains from attending SU (Fig. 3), which is in line with the literature consulted. In addition, we found that senior students are very homogeneous in the valuation of the benefits perceived by attending SU with very identical sample mean values (between 4.2 and 4.5).

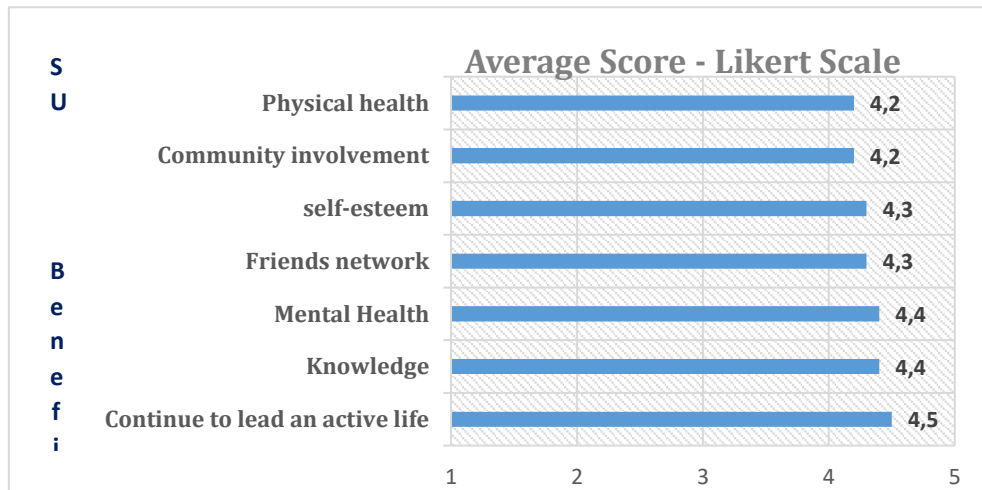


Fig. 3- Perceived benefits of attending SU – average score in a five-point Likert scale (1- got a lot worse, 5- got a lot better). Source: own research

## 5 DISCUSSION

The positive correlation ( $\rho=0.62$ ) found between income and students' level of education is particularly valid for these generations, where very few of them continued studying, so that those who managed to complete higher education usually had access to better salaries. The modal age range of students at senior universities is between 60-75 years, meaning that they started their primary education in the 1950s and 1960s. This means that (in the period 1960-1973), out of approximately 200,000 new primary school pupils, only 5,000 complete a degree course (less than 3%)" (Loura, 2020, p.22). Still maintained is the positive relationship between schooling and earnings "This condition is aligned with the fact that, on average, the risk of poverty for the adult population decreases with increasing educational attainment. The risk of poverty for someone who had education at secondary school level or above is about half the risk faced by someone who has less than secondary education" (INE, 2014).

Seniors attending university reveal the importance attributed to staying active, socialising and learning themes. There is also consistency with regard to the perceived benefits since there is data on seniors continuing to lead an active life, have more knowledge and improve their mental health. Cross-sectional consistency is verified (Jacob, 2015, 2020; Lamdin & Fugate, 1997). These data are important in light of the study of positive organisations in general and leadership in particular by providing useful monitoring data to leadership on initial and over time satisfaction of learners (Godin, 2008; Marujo & Neto, 2019; Santos, 2020; Pordata, 2021). The study data are relevant from Martin Seligman's perspective of positive organizations (Seligman, Steen, Park & Peterson, 2005; Galinha, 2020).

## 6 CONCLUSION

The results reveal that these senior universities are mainly attended by women (71.85%), aged between 65-74 years (57.1%), married (65.26%), with an income between 401-1000€ (41.54%).

There is a moderate positive correlation ( $\rho=0.62$ ) statistically significant ( $p\text{-value}=0$ ) between monthly income and schooling of senior students. It is found that the prioritization of seniors' interests is matched. That is: there is a connection between the respondents' interests in attending SU, what the students consider important for their attendance and the perceived gains. In other words: the possibility for seniors to remain active, acquire new knowledge, socialise and keep themselves busy are the main reasons given for enrolling/attending. In the same vein, when seniors attend university they reveal the importance attributed to staying active, socialising and learning themes. There is also coherence regarding the perceived benefits since there is data on seniors continuing to lead an active life, have more knowledge and improve their mental health. Cross-sectional consistency is verified which predicts retention as learners since expectations and reality are associated. These data are important in light of the study of positive organisations in general and leadership in particular as they provide useful monitoring data to leadership on initial and over time satisfaction of learners.

The benefits of this study include the sociodemographic profile of students at the Senior Universities, as well as the knowledge of the reasons, importance and benefits of attending classes at this educational organisation that promotes the well-being of its students. We suggest in future research a multicentric study, where this type of educational organizations with a positive approach from different countries may be represented, particularly Australia, Brazil and Spain, thus allowing a more holistic and comparative view where the inferential approach assumes greater prominence.

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## **Contact information**

### **Luis Jacob, PhD.**

Polytechnic Institute of Santarém  
Complexo Andaluz, 2000 Santarém, Portugal  
E-mail: luis@rutis.pt  
ORCID: 0000-0001-6434-1996

### **Sonia Galinha, PhD.**

Polytechnic Institute of Santarém, CIE\_UMa Centro de Investigação da Universidade da Madeira, Portugal  
Complexo Andaluz, 2000 Santarém, Portugal  
E-mail: sonia.galinha@ese.ipsantarem.pt  
ORCID: 0000-0001-6138-9695

### **Ricardo São João, PhD.**

Polytechnic Institute of Santarém - School of Management and Technology; Centro de Estatística e Aplicações da Universidade de Lisboa (CEAUL)  
Complexo Andaluz, 2000 Santarém, Portugal  
E-mail: ricardo.sjoao@esg.ipsantarem.pt  
ORCID: 0000-0003-3137-0891

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# THE TRANSMISSION MECHANISM OF MONETARY POLICY IN EUROPE: EVIDENCE FROM SMALL MACRO-ECONOMIC MODEL

*Lukáš Jursa*

## **Abstract**

The transmission mechanism of monetary policy is analyzed on the example of ten independent currency areas in the period 2000 to 2020 using a sign-restricted Bayesian VAR model and subsequent evaluation by plotting the analysis of response functions. It is necessary to analyze how monetary policy is passed on to the domestic economy. This knowledge is key to the conduct of monetary policy but is also useful for commercial banks and other institutions. The transmission of monetary policy is an essential element for central banks. This work follows this assumption about relevance of the transmission mechanism of monetary policy. The aim is therefore to assess the impact of monetary policy implementation on the domestic economy. Monetary restrictions in all monitored countries lead to a significant effect on output and price levels. The rise in interest rates is followed by a decline in output, but also in price levels. Real output reacts with higher force and in the long run compared to the reaction of the price level. However, central banks are also able to influence consumer price development. The price level of the new member states then responds more markedly to the monetary restriction. I do not observe these fundamental differences in output. The transmission of monetary policy in the euro area is as strong as in the case of the whole country. The results of the paper further suggest that changes in monetary policy do not have a major impact on the development of the real exchange rate.

*Keywords:* monetary policy, European Union, transmission mechanism, sign restriction, SRVAR

## **1 INTRODUCTION**

Knowledge of monetary policy transmission is essential for the creation of optimal monetary policy by central banks. This is also the reason why several monetary economists are focusing on this issue. For the analysis of the transmission of monetary policy in the countries of Central and Eastern Europe, there is a particular problem with the lack of observations for full-fledged research. This work then builds on existing research and extends it to a longer time horizon. A significant benefit of the work is the discovery of time delays in the monetary policy. The aim is therefore to assess the impact of monetary policy implementation on the domestic economy. It is then an analysis of basic macroeconomic variables.

The transmission mechanism of monetary policy is analyzed on the example of ten independent currency areas in the period 2000 to 2020 using a sign-restricted Bayesian VAR model and subsequent evaluation by plotting the analysis of response functions. The vector autoregression VAR model, which has become the basis for several studies in various economic fields, cannot be clearly overlooked when assessing the impact of monetary policy. Bayesian approach (BVAR) is also a computationally simple and computationally pure method of creating a tolerance band for the analysis of response functions. I use the application of sign restrictions and the rejection method defined by Uhlig (2005).



Monetary restrictions in all monitored countries lead to a significant effect on output and price levels. The rise in interest rates is followed by a decline in output, but also in price levels. Real output reacts with higher force and in the long run compared to the reaction of the price level. However, central banks are also able to influence consumer price development. The price level of the new member states then responds more markedly to the monetary restriction. I do not observe these fundamental differences in output. The transmission of monetary policy in the euro area is as strong as in the case of the whole country. The results of the paper further suggest that changes in monetary policy do not have a major impact on the development of the real exchange rate. The interest rate response is assessed mainly to verify the overall stability of the models, as it is appropriate for the currency shock to gradually disappear. It also happens. The only interesting finding is in the interest rate response to the currency shock in Romania. The tightening of monetary policy appears to be followed by an easing again. The central bank is probably not entirely sure about the conduct of monetary policy, and the overshoot is offset in the next period.

Knowledge of the impact of monetary policy on price level and thus inflation is probably more crucial for the central banks of all countries. Especially because ensuring price stability is the goal of monetary policy today. Only after ensuring price stability do central banks monitor the development of economic output. But paradoxically the output of the economy can control central banks more.

The paper's outline is as follows: In Section 2, I describe the general theoretical framework. Section 3 presents SRVAR model, my empirical model, and data. Section 4 illustrates and discusses the estimation results and contains further extensions of our model. Section 5 concludes.

## **2 THEORETICAL BACKGROUND**

Thus, the chain of causal relationships used by the central bank to achieve its ultimate monetary policy goal can be imagined under the term monetary policy transmission mechanism (Leeper et al., 1996; Bernanke and Mihov, 1998; Mishkin, 1995). The central bank therefore achieves predefined goals through its tools and transmission process. Friedman (1968), for example, has already discussed specific policy goals. However, it can be stated that the goals are not monetary policy axioms, because they change over time. Since the 1990s, for example, it has been possible to observe the transition to a modern central bank strategy in the form of inflation targeting (Svensson, 2000, 2010; Ball and Sheridan, 2004).

In the following section, let us try to apply the theoretical transmission mechanisms defined above and focus on the real monetary processes that affect Europe. However, it should be noted that there are rather few comprehensive contributions to the transmission of monetary policy for the whole of the European Union. It is therefore appropriate to create comprehensive analyzes for all countries. Much attention has traditionally been focused on the transmission of the ECB's monetary policy within the single monetary area (Peersman, 2004; Favero et al., 1999; Mojon and Peersman, 2001). Peersman (2004) concludes that the unexpected short-term rise in interest rates in the euro area is followed by a strengthening exchange rate and a decline in output over two quarters. Prices then react significantly more slowly, and the price level does not fall until several quarters after GDP, but the effect is longer-term. Mojon and Peersman (2001) add that the decline in economic output is mainly due to a decline in investment. Private consumption is declining to a lesser extent. Employment is falling in line with GDP, but less sharply, leading to a pro-cyclical response to labor productivity. There is also an immediate effect of liquidity on M1, but a more gradual decline in M3 and other credit aggregates. Real

estate prices react to the monetary restriction significantly more slowly. These results for the euro area are often compared with the process of monetary policy transmission in the US (Leeper et al, 1996; Christiano et al, 1999). However, the transmission of monetary policy in the United States is very similar to that in the euro area. Leeper et al. (1996) conclude in the USA that monetary policy does respond to developments in real economic variables and is not based solely on arbitrary decisions by the Bank Board. Endut et al. (2018) argue that their results suggest a nontrivial role for the bank-lending channel at the aggregate level. However, the conduct of normal monetary policy can be disrupted by the emergence of a financial and economic crisis. Janssen et al. (2015) argue that expansionary monetary policy shock has large positive effects on output and inflation during the acute phase of a financial crisis. During the recovery phase of a financial crisis, output and inflation are generally non-responsive to monetary policy shocks.

Ganev et al. (2002) focus on the countries of Central and Eastern Europe. They conclude that interest rates and the exchange rate have a major impact on inflation and output in Central and Eastern European countries. In addition, the exchange rate channel of monetary policy transmission is stronger and more stable than the interest rate channel. Arnoštová and Hurník (2005) then state on the example of the Czech Republic that the interest rate channel plays a key role. The main reason is the stable development of the nominal exchange rate. The negative reaction of the output to the tightening of monetary policy and the growth of the interest rate is evident after only a few months and the overall effect disappears in 4 months with a peak of -0.01%. However, due to the limited sample of data, the result is not entirely conclusive. Franta et al. (2011) then state that until the global economic crisis, the sensitivity of output in the Czech Republic to monetary policy increased. In the following period, this transmission develops steadily. In the case of Hungary, Vonnák (2007) claims that consumer prices are affected in the first year after the increase in the central bank's interest rate. The impact of the tightening of monetary policy is long-term and the price level has been lowered for several years. However, monetary policy only partially affects output. The reason is that the decline in investment after monetary restraint is relatively flexible to offset by consumption. Therefore, the output does not react so significantly. Similar conclusions for Bulgaria are reached by Minea and Rault (2009). The output of the economy is only slightly affected by the monetary policy shock. And, paradoxically, the economy follows the ECB's monetary policy. However, this result is typical of countries with low monetary policy autonomy to the euro area. Krušec (2011) then claims that an unexpected restrictive monetary policy in the Czech Republic, Poland and Hungary leads to a decline in the inflation rate. The shock of one percentage point on the interest rate leads to a drop in the inflation rate by half and one percentage point. Inflation then stabilizes and returns to its original level within 6 months. Using the euro area as an example, Ciccarelli et al. (2014) show that economic activity and banking sector have shown substantial fragility over the last years with remarkable country heterogeneity. Their results suggest that the bank-lending channel has been to a large extent neutralized by the ECB non-standard monetary policy interventions, but the policy framework until the end of 2011 was insufficient to overcome credit availability problems stemming from deteriorated firm net worth and risk conditions.

Giuliodori (2005) then deals with the issue of monetary policy transmission in the old EU member states. For example, in Denmark, the United Kingdom and Sweden. It is concluded that the price of housing is significantly affected by interest rate shocks, and thus by changes in monetary policy. In addition, the price of real estate increases the effect of interest rate spillovers into consumer behavior. Especially in countries where the mortgage and real estate markets are more developed and more competitive. Cloyne et al. (2020) show that the aggregate response of consumption to interest rate changes is driven by households with a mortgage.

### 3 METHODOLOGY

#### 3.1 Sign restriction SRVAR

Research in the field of macroeconomic dynamics is based on several econometric procedures and models. However, the vector autoregression VAR model, which has become the basis for a number of studies in various economic fields, cannot be clearly overlooked when assessing the impact of monetary policy (Blanchard and Quah, 1989; Kim, 1999, 2001; Sims and Zha, 2006). The construction of the VAR model and its modifications is based on the pioneering work of Sims (1980). The application, but also the econometric method itself, therefore, lies on the shoulders of economic giants. However, it is still alive and popular because of constant modifications and improvements (Sims et al., 1990; Faust, 1998; Doan et al., 1984). Especially in terms of a more convincing interpretation, elimination of some shortcomings and conjectures. Stock and Watson (2001) argue that VAR models remain a powerful tool for data description and economic policy analysis (Boeckx et al., 2017; Lewis and Roth, 2019; Feldkircher et al., 2019). Stock and Watson (2001) further state that the main advantages are flexibility, ease of use, and relatively easy interpretation of results. Christiano (2012) adds that this econometric approach has undoubtedly stood the test of time and still plays a key role.

The SRVAR method itself will be defined in the following text. The algorithm according to Uhlig (2005) is followed in the work. Uhlig (2005) first characterizes the basic VAR model:

$$Y_t = B_{(1)}Y_{t-1} + B_{(2)}Y_{t-2} + \dots + B_{(l)}Y_{t-l} + u_t, t = 1, \dots, T, \quad (1)$$

where  $Y_t$  is  $m \times 1$  data vector at time  $t = 1 - l, \dots, T$ ,  $B_i$  are matrices of coefficients of size  $m \times m$  and  $u_t$  is one step ahead of the estimation error with variance covariance matrix  $\Sigma$ . A time trend and constant can also be added to equation (1).

More clearly, the VAR model (1) can be modified as follows:

$$Y_t = BY_{t-1} + u_t \quad (2)$$

According to Bian and Gete (2015), the goal of any structural vector autoregression is to map the estimation errors in the reduced form  $u_t$  to the structural shock  $\varepsilon_t$ . This process should have a clear economic interpretation and the relationship between  $u_t$  and  $\varepsilon_t$  is orthogonal.

According to Uhlig (2005), there is the following relationship between the reduced form and the structural shock:

$$u_t = A\varepsilon_t \quad (3)$$

Therefore, according to Uhlig (2017):

$$\Sigma = AA' \quad (4)$$

If we assume that the matrix  $A$  is a square, then according to Uhlig (2017), there are as many structural shocks as the observed time series. Bian and Gete (2015) add that the sign restriction method identifies a set of  $A$  matrices consistent with the theoretical signs of the responses to structural economic shocks.

However, it is also necessary to define the response function for the application of sign restrictions. Uhlig (2017) states that in the case of the horizon  $k = 0, 1, \dots, K$ , a shock  $j$  of the magnitude of one standard deviation and a positive sign, the response function can be defined as follows:

$$\tilde{r}_k = \tilde{B}^k \tilde{A}e_j \quad (5)$$

where  $e_j$  is a vector of the same size as  $\varepsilon$  with only zero inputs, except 1 for input  $j$ . From  $\tilde{r}_k$  the response functions for individual time series are read. Sign constraints are commonly set for inputs in  $\tilde{r}_k$  at different horizons  $k$ .

The method used by Uhlig (2005, 2017) is used for estimation. This is the Bayesian approach (BVAR), which is a computationally simple and computationally pure method of creating a tolerance band for the analysis of response functions (Sims and Zha, 1998, 1999).

According to Uhlig (2005), model (2) is then estimated using the maximum likelihood method (ML). Estimates for  $(B, \Sigma)$  are given as follows:

$$\hat{B}_i = (Y'_{t-1} Y_{t-1})^{-1} Y'_{t-1} Y_t, \hat{\Sigma} = \frac{1}{T} (Y_t - Y_{t-1} \hat{B}_i)' (Y_t - Y_{t-1} \hat{B}_i). \quad (6)$$

Uhlig (2005) found that priors and posterior for  $(B, \Sigma)$  belong to the Normal-Wishart family  $\mathcal{W}_m \left( \frac{S^{-1}}{\nu}, \nu \right)$  with  $E[\Sigma^{-1}] = S^{-1}$ . The matrix of coefficients in the column vector form  $vec(B)$  follows the normal distribution  $\mathcal{N}(vec(\bar{B}), \Sigma \otimes N^{-1})$ .

### 3.2 Clarification of Model

Models will be defined in a basic form as VAR (2). However, the delay may subsequently vary depending on the results of the information criteria. Within the specification, the effort will not disproportionately increase the maximum delay of the model. This is due to the relatively limited analysis period and the small number of observations. In this way, enough degrees of freedom will be ensured. The quantities are sorted according to the usual procedure for these models. The resulting model can be described as a small macro-economic model.

The empirical model, which is based on the defined theoretical model (1) and (2), is as follows. The transmission mechanism is described by a system of structural equations:

$$\begin{bmatrix} y_t \\ p_t \\ i_t \\ R_t \end{bmatrix} = B \begin{bmatrix} y_{t-1} \\ p_{t-1} \\ i_{t-1} \\ R_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{y,t} \\ \varepsilon_{p,t} \\ \varepsilon_{i,t} \\ \varepsilon_{R,t} \end{bmatrix}, \quad (7)$$

The empirical model (7) is based on the unlimited VAR ( $p$ ) model without a level constant and with one delay  $p = 1$ ,  $\varepsilon_{\xi t}$  are residuals and  $B$  is a matrix of coefficients of delayed variables.

Basic economic variables are included in the small macroeconomic model (7). These are the output of the economy ( $y$ ), the price level ( $p$ ), the short-term nominal interest rate ( $i$ ) and the real exchange rate ( $R$ ). All variables are endogenous in the models and no exogenous variables are included. Using a short-term nominal interest rate, a restrictive monetary policy shock is assessed. The euro area model will not include a variable for the real exchange rate.

The application of sign restrictions to the matrix  $A$  in equation (3) is essential for the analysis. The Uhlig (2005, 2017) procedure is as follows:

$$\begin{bmatrix} y \\ p \\ i \\ R \end{bmatrix} = \begin{matrix} & \varepsilon_m & \varepsilon_1 & \varepsilon_2 & \varepsilon_3 \\ \begin{bmatrix} - \\ - \\ + \\ ? \end{bmatrix} & \begin{bmatrix} ? \\ ? \\ ? \\ ? \end{bmatrix} & \begin{bmatrix} ? \\ ? \\ ? \\ ? \end{bmatrix} & \begin{bmatrix} ? \\ ? \\ ? \\ ? \end{bmatrix} & \begin{bmatrix} ? \\ ? \\ ? \\ ? \end{bmatrix} \end{matrix} \quad (8)$$

I applied a weak sign restriction (8) to the movement of output ( $-y$ ) and price level ( $-p$ ) of the given economy. After a short-term interest rate shock ( $+i$ ) and a tightening of monetary policy, theoretical assumptions should lead to a decline in the output and price level of the economy (Leeper et al., 1996; Bernanke and Mihov, 1998; Mishkin, 1995). These are therefore relatively

easily defensible ties. The rise in interest rates is causing a decline in investment activity and an overall decline in credit aggregates. Loans and mortgages are becoming more expensive. In addition, higher mortgage repayments, but also rising opportunity costs, lead to lower consumption. The output of the economy is falling, and employment is also falling. This is followed by a reduction in the dynamics of price level growth. However, in the research I will apply the restriction only for five periods ( $K = 5$ ), i.e., three months. Subsequently, it is possible to move the output and the price level completely freely. This will ensure that differences across countries can be monitored, but also the strength of the effect of tightening monetary policy and overall transmission.

The specific delay ( $p$ ) of model (7) is based on information criteria. However, a lower delay is always preferred over a higher one. The reason is mainly the total length of the observed period and the availability of data for analysis. Excessive increase of the delay ( $p$ ) would inevitably lead to a decrease in the degrees of freedom of the model. The information criteria used are SBIC (Schwarz-Bayesian Information Criterion), HQIC (Hannan-Quinn Information Criterion), AIC (Akaike's Information Criterion) and FPE (Akaike's Final Prediction Error).

At the end of this section, it is also necessary to mention that time series that will not be completely stationary will enter the VAR models. For example, time series with interest rates that would be difficult to interpret cannot be adjusted appropriately. However, this is a common practice based on this work (Sims, 1980; Sims et al., 1990). Christiano et al. (2005) then apply the approach to real data. However, the model will also be verified by an overall stability test precisely due to the entry of nonstationary time series. If the VAR model passes the stability test, then nonstationary time series do not represent a limitation of the econometric framework.

### 3.3 Data and Variables

Time series are created for the period from January 2000 to February 2020. I obtain data on a monthly basis. The data file contains a total of 242 observations. For the Bulgarian economy, the period under review is shortened due to a lack of observations in the time series for the 3M interbank interest rate. Thus, it is the period from January 2000 to June 2018 with a total number of observations of 222. The model for Bulgaria covers 91.74% of the entire reference period. Observations before 2000 are not used.

Tab. 1 – Coverage of monitored countries and classification for analysis purposes. Source: own classification

Euro Area [EA] (19)	AT, BE, CY, EE, FI, FR, DE, GR, IE, IT, LT, LV, LU, MT, NL, PT, SK, SI, ES
Old member economies [OME] (3)	DK, GB, SE
New member economies [NME] (6)	BG, CZ, HU, HR, PL, RO

**Notes:** Abbreviations indicate the two-digit ISO country code; EA indicates the euro area.

According to Hajek and Horvath (2016), it is appropriate to avoid data from the 1990s for the countries of Central, Eastern, and South-Eastern Europe due to the turbulent period, which was characterized by many structural breaks. On the other hand, more recent data (since February 2020) are affected by the global economy in a global pandemic, which is not the subject of this article. These periods therefore create time constraints in which the research will move. However, for a smaller number of variables and delays, the number of observations is sufficient. The data are then obtained from the Eurostat (2020) database.

The dataset contains variables for 8 non-euro area EU countries. One country that is not a member of the EU or the eurozone (United Kingdom). And the euro area is seen as a single

entity from a monetary policy perspective because the member countries of the single monetary area cannot conduct monetary policy independently according to national preferences. In addition, we are widening the view and the euro area is perceived as a single entity from an economic point of view. The variables are aggregated for the euro area. The whole data set therefore contains a total of 10 politically independent currency areas.

The monitored countries are divided according to their own division into three groups (Table 1). I consider Denmark (DK), the United Kingdom (GB) and Sweden (SE) to be old member economies [OME]. Bulgaria (BG), the Czech Republic (CZ), Hungary (HU), Croatia (HR), Poland (PL) and Romania (RO) for the new member economies [NME]. According to this breakdown, the United Kingdom (GB) is therefore still considered one of the EU countries. The breakdown results mainly from assignments to other countries. The last group is therefore the euro area itself [EA] (19).

All monitored variables at levels (Table 2) for each country were subjected to unit root tests. These are specifically the Augmented Dickey-Fuller (ADF) test and the Kwiatkowski – Phillips – Schmidt – Shin (KPSS) test. The advantage of the KPSS test is especially a different null hypothesis and the test is used primarily as a supplement to the ADF test in case of an ambiguous result. Unit root tests for quantities in levels are shown in Table A1. It is obvious that the price level and output are considerably non-stationary variables in all countries. A similar result is observed for the interest rate and the real exchange rate. However, for Croatia, Poland and Romania, the interest rate at levels is already stationary.

Tab. 2 – Descriptive statistics and sources of variables (2000M01 - 2020M02). Source: own research

Variable	Source	Description	Min	Median	Max	St. dev.
<i>y</i>	Eurostat (2020)	Industrial production index (IPI), 2015 = 100, s.a.	48.900	99.800	135.600	16.178
<i>p</i>	Eurostat (2020)	Harmonized index of consumer prices (HICP), 2015=100, s.a.	23.766	92.254	112.554	14.372
<i>i</i>	Eurostat (2020)	3M interbank interest rate, monthly average %.	-0.610	2.670	73.220	5.850
<i>R</i>	Eurostat (2020)	Real exchange rate (nominal exchange rate Domestic/EUR, deflated by HICP)	0.615	7.398	386.894	95.659

**Note:** Variables in levels

To ensure the stability of the models, it was decided to adjust the variables to year-on-year changes (Table A2). Interest rates were kept at. The reason is a problematic interpretation because these interest rates are calculated per annum. Thus, by means of the year-on-year change (y-o-y), the result was improved and most of the variables become stationary. Problems occur mainly in the price level and the month-on-month change (Table A3) seems to be a more appropriate adjustment to remove the unit root. But adjusting for month-on-month changes would not allow long-term information to be included in time series. For this reason, partially non-stationary time series and interest rates at levels enter the individual models for the monitored countries. If the models are stable, then the econometric framework is not destabilized. The stability of the models is verified using the inverse values of the roots of the autoregressive polynomial in Table A4.

## 4 RESULTS AND DISCUSSION

The following part of the paper is devoted to the results of monetary policy transmission in the given monetary areas (Table 1). In addition, the results are compared and differences across similar research are discussed. The evaluation is based on the construction of the SRVAR model (3.7) without a level constant and its interpretation by means of response function analysis (IRF). Thus, the Bayesian VAR model is analyzed by obtaining median impulse and response selections and plotting them at specified confidence intervals. Sign restrictions are applied for 5 periods ( $K = 5$ ), starting with the first.

The key period for the evaluation of the IRF is the monetary policy horizon (12 to 18 months). However, the maximum horizon for the IRF is set at up to 60 months. The main advantage is the ability to monitor the overall gradual disappearance of the response, which indicates that the models are de facto stable (Figures 1, 2, A1, and A2). Only statistically significant responses of specific variables to the interest rate shock will be evaluated.

The stability of the models is verified not only graphically by the disappearance of the response to the currency shock, but also by the inverse values of the autoregressive polynomial (Table A3). All published models have passed this test and the IRF is stable. Interest rates at levels did not affect the overall stability of the models. 68% confidence intervals are used when plotting IRF.

SRVAR models for individual currency areas are constructed with the smallest possible delay ( $p$ ). This is mainly due to the shorter analysis period and the lower number of observations. In the event of greater delays and a significant decrease in the degrees of freedom, the econometric framework could also be disrupted. The accuracy of the specification is verified using information criteria: SBIC (Schwarz-Bayesian Information Criterion), HQIC (Hannan-Quinn Information Criterion), AIC (Akaike's Information Criterion) and FPE (Akaike's Final Prediction Error). The individual information criteria are in Table A4. SRVAR models are constructed with a delay ( $p = 2$ ).

### **The impact of monetary policy on economic output**

Figure 1 shows that after the shock to monetary policy and the rise in interest rates, there is a relatively flexible decline in output in all countries monitored. Thus, interest rates are spilling over to loans and mortgages on the market very quickly. Lending activity and the credit aggregate are declining. Investments that are part of GDP are declining. Given the rise in opportunity costs and rising credit costs, households are also likely to respond with declining consumer sentiment. Consumption does not compensate for the decline in investment activity and output is clearly and significantly declining in all countries monitored.

I did not confirm the conclusion of Vonnák (2007) and Minea and Rault (2009) that the output in Hungary and Bulgaria is not affected by monetary restrictions. Rather, the Hungarian and Bulgarian economies respond to the monetary policy shock in much the same way as the rest of Europe. Moreover, according to Figure 1, we see that output in Bulgaria is responding with a very significant decline, which is one of the largest. However, the results may be given by a longer period of analysis. The monetary policy itself and the ability of central banks to influence the economy are still evolving. And this is exacerbated in the countries that underwent a transformation in the 1990s. Here we could apply the conclusion of Franta et al. (2011) for the Czech Republic. The sensitivity of output to monetary policy appears to be increasing.

However, in other countries, the result is consistent with research (Arnoštová and Hurník, 2005; Ganev et al., 2002; Krušec 2011; Peersman, 2004; Favero et al., 1999; Mojon and Peersman,

2001). The rise in short-term interest rates is followed by a decline in output. In addition, the monitored countries react very similarly to the euro area itself.

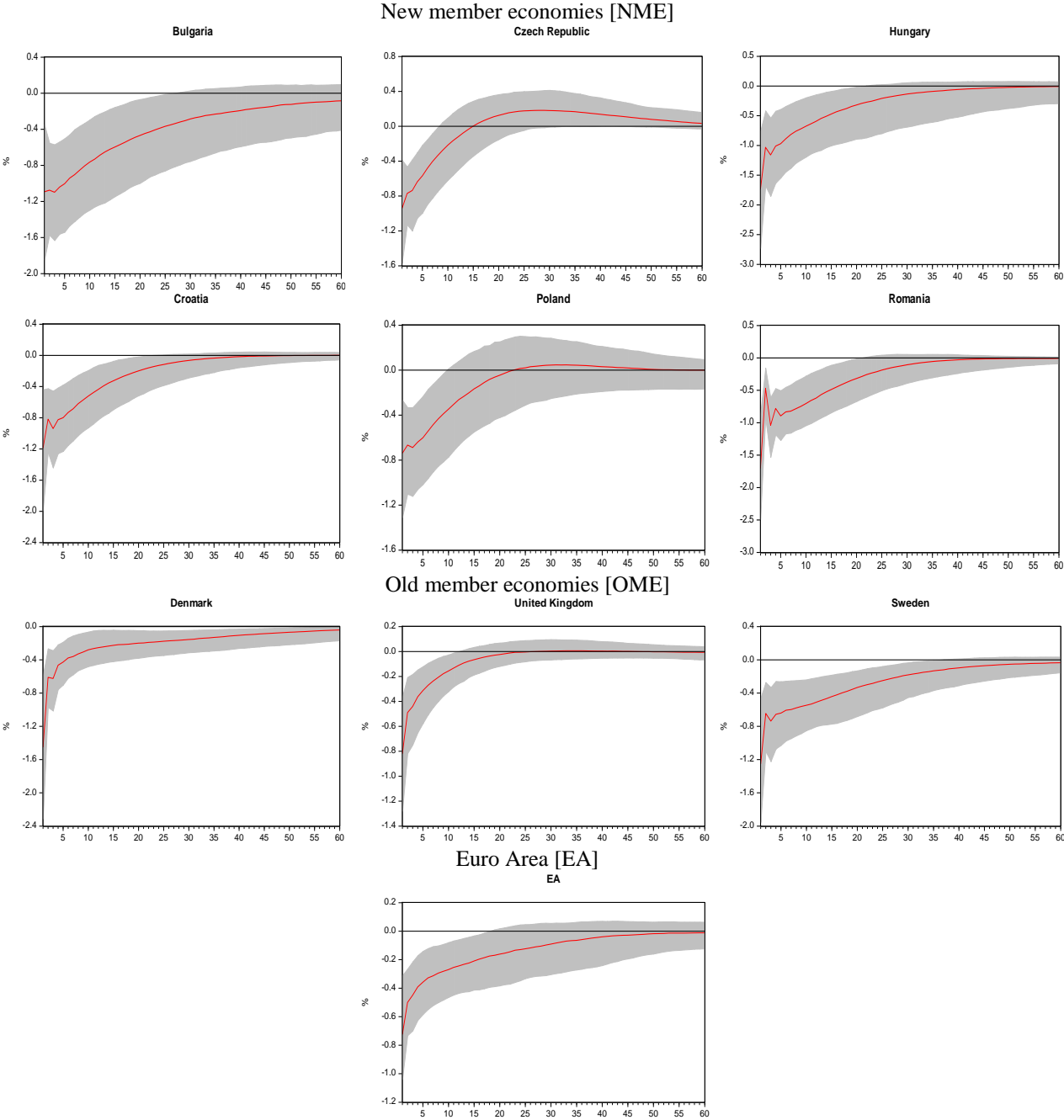


Fig. 1 – The response of economic output in the NME, OME and EA countries to the tightening of monetary policy. Source: own research

**Notes:** Shock value is one standard deviation  $\pm 2$  S.E using the sign restriction method ( $K = 5$ ). The variables that respond to shocks is the output of the economy. The SRVAR model is defined in (3.7). Shock is to the system is defined as 3-month interest rate ( $i$ ). I use 68% confidence intervals when plotting IRF, and report median responses. The horizontal axis indicates the individual months, the vertical axis indicates the year-on-year percentage change.



We also cannot recognize differences according to individual groups of states. The reaction of the output to the monetary restriction is rather heterogeneous across the individual monitored countries than between the groups themselves. The economies of Hungary, Denmark, Romania, Bulgaria, Croatia, and Sweden are the most responsive. The peak response in these countries is approximately over -1% in the first months. The response to the shock then gradually fades away. It lasts the longest in Sweden, Denmark, and Bulgaria. In contrast, it will fade the fastest in Croatia and Romania. I then found a weaker response in the Czech Republic, Poland, the United Kingdom, and the euro area. In these countries, the peak response is below -0.8% in the first months. In addition, the response to the currency shock will fade relatively quickly in 10 months. Slightly longer in the euro area. We also see that the openness of the economy does not, at first glance, affect the output response to the currency shock. A very open small economy, such as the Czech Republic, reacts similarly to a more closed economy, such as Poland. In addition, the results are similar for the new member economies [NME] and the old member economies [OME].

Despite the fact that the euro area is a very diverse whole, and its member states are also the problematic southern wing of the EU, the transmission of monetary policy to the output of the economy is similar to that of non-euro area member states. The ECB is therefore able to influence the development of the real economy and seems to be relatively fundamental. The peak response of the output to the currency shock is -0.7% in the first months.

### **The impact of monetary policy on price level**

Knowledge of the impact of monetary policy on price level and thus inflation is probably more crucial for the central banks of all countries. Especially because ensuring price stability is the goal of monetary policy today. Only after ensuring price stability do central banks monitor the development of economic output.

Figure 2 shows that all monitored central banks can influence the development of the price level over time. However, again, differences can be observed across the countries studied. Here I can confirm the conclusions of Krušec (2011), who claims that after the monetary restriction, the inflation rate in Hungary, Poland and the Czech Republic is declining and the whole effect will disappear after 6 months. However, the overall horizon may be slightly larger. In Hungary, the price level reaction becomes insignificant after 10 months, but in the case of Poland and the Czech Republic it is up to 20 months. However, the finding is not shocking, because the horizon of monetary policy itself is also 12-18 months. Krušec (2011) further states that inflation targeting is an appropriate strategy of central banks in these countries. And this is probably so from the point of view of my research. Poland, Hungary, and the Czech Republic can influence the development of the price level through their monetary policy, and their monetary strategy appears to be effective in achieving the target.

Vonnák (2007) and Minea and Rault (2009) further claim that the price level in Hungary and Bulgaria is fundamentally affected after the monetary restrictions. Thus, even more strongly than the output of the economy and the currency shock is reflected mainly in the development of consumer prices over a one-year horizon. I can also partially confirm that. The impact on the development of the price level is significant, with the effect disappearing after one year in Hungary (Vonnák, 2007) and after 20 months in Bulgaria. However, when comparing the impact of the currency shock on output (Figure 1) and the price level (Figure 2), the output response appears to be more pronounced. Nevertheless, the price level is significantly affected. It is in Bulgaria that we can observe the most significant drop (up to -0.33%) in the price level, which follows the monetary restriction. In Romania, the impact of tightening monetary policy is lower, but again it is long-lasting and negative.

In addition, it can be observed between old and new member economies. The price level in the old member economies and the euro area responds more moderately to monetary restraint than in the new member states. However, this may be due to the fact that the new member economies are achieving higher price level growth as they catch up with price level developments in more developed countries. For this reason, the response of the inflation rate to monetary restraint may also be more pronounced.

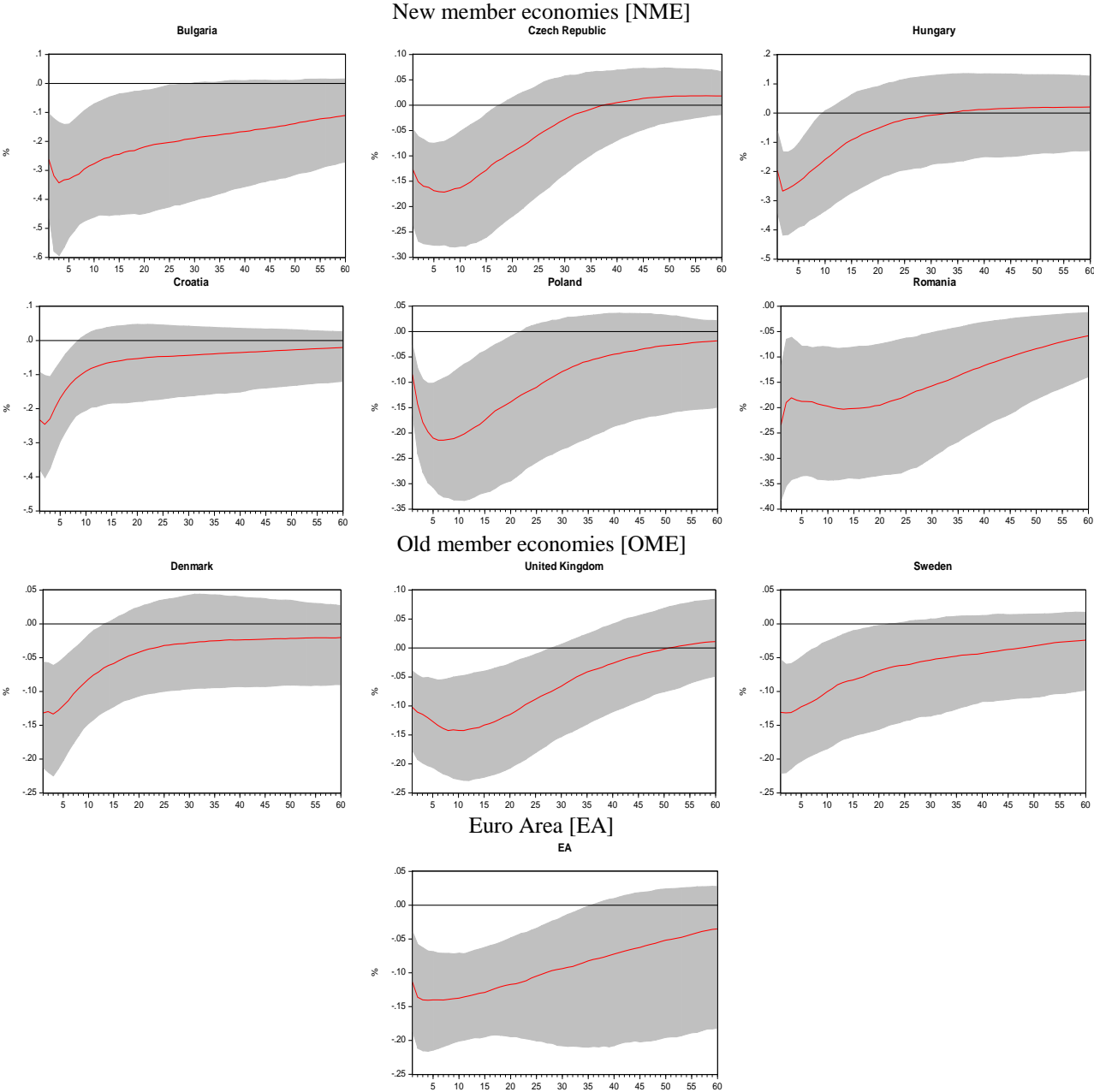


Fig. 2 – The response of price level in the NME, OME and EA countries to the tightening of monetary policy.

Source: own research

**Notes:** Shock value is one standard deviation  $\pm$  2 S.E using the sign restriction method (K = 5). The variables that respond to shocks is the price level of the economy. The SRVAR model

is defined in (3.7). Shock to the system is defined as 3-month interest rate ( $i$ ). I use 68% confidence intervals when plotting IRF, and report median responses. The horizontal axis indicates the individual months, the vertical axis indicates the year-on-year percentage change.

### **The impact of monetary policy on interest rate and real exchange rate**

The impact of monetary restrictions on the development of the interest rate and the real exchange rate is shown in Figures A1 and A2. The interest rate response is assessed mainly to verify the overall stability of the models, as it is appropriate for the currency shock to gradually disappear. It also happens. The only interesting finding is in the interest rate response to the currency shock in Romania. The tightening of monetary policy appears to be followed by an easing again. The central bank is probably not entirely sure about the conduct of monetary policy, and the overshoot is offset in the next period. The results of the paper further suggest that changes in monetary policy do not have a major impact on the development of the real exchange rate (Figure A2). It can be assumed that the development of the real exchange rate is more influenced by the theory of purchasing power parity (in the case of OME) or the catching-up process (in the case of NME).

## **5 CONCLUSION**

In this paper, I assessed the transmission of monetary policy in ten independent monetary areas in the period from 2000 to 2020. The period before 2000 was not used mainly due to the turbulent period in the countries of Central and Eastern Europe. I use the sign-bound Bayesian VAR model and then interpret it by plotting the analysis of the response functions. Sign restrictions are particularly advantageous for removing some of the limitations of conventional VAR models, but also because of easily defensible theoretical assumptions. This is a slight restriction only on the sign of the movement of the response functions.

Monetary restrictions in all monitored countries lead to a significant effect on output and price levels. The rise in interest rates is followed by a decline in output, but also in price levels. Real output reacts with higher force and in the long run compared to the reaction of the price level. However, central banks are also able to influence consumer price development. The price level of the new member states then responds more markedly to the monetary restriction. I do not observe these fundamental differences in output. The transmission of monetary policy in the euro area is as strong as in the case of the whole country. The results of the paper further suggest that changes in monetary policy do not have a major impact on the development of the real exchange rate. The interest rate response is assessed mainly to verify the overall stability of the models, as it is appropriate for the currency shock to gradually disappear. It also happens. The only interesting finding is in the interest rate response to the currency shock in Romania. The tightening of monetary policy appears to be followed by an easing again. The central bank is probably not entirely sure about the conduct of monetary policy, and the overshoot is offset in the next period.

Knowledge of monetary policy transmission is key for the central bank. It is an essential component for creating an optimal monetary policy and predicting the impact on the domestic economy. However, other entities can also benefit from the results, as this knowledge will give them a comparative advantage over competitors in the market. Economic entities can then better adapt and respond to economic change.

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## **Contact information**

**Ing. Lukáš Jursa**

VŠB-Technical University of Ostrava, Faculty of Economics, Department of National  
Economy

Sokolská tř. 33, Ostrava 70200, Czech Republic

E-mail: lukas.jursa@vsb.cz / lucas.jursa@gmail.com

ORCID: 0000-0002-5734-7262

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## APPENDIX

Tab. A1 – Unit root tests for variables in levels. Source: own research

	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	-1.67	-2.02	-1.46	-2.54	-1.83	-1.86	-2.32	-2.83	-1.98	-1.70
<i>p</i>	-0.68	-1.65	-0.16	-1.84	-0.40	-1.24	-1.34	-3.07	-1.56	-2.07
<i>i</i>	-0.54	-2.20	-1.45	-1.57	-2.85*	-1.28	-3.47***	-6.31***	-1.88	-1.63
<i>R</i>	-1.73	-2.20	-1.91	-	-3.57**	-3.28*	-3.61**	-2.15	-2.44	-2.03
	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	0.31***	0.19**	0.26***	0.15**	0.31***	0.20**	0.09	0.16**	0.17**	0.29***
<i>p</i>	0.44***	0.2**	0.38***	0.43***	0.41***	0.40***	0.31***	0.45***	0.25***	0.22**
<i>i</i>	1.23***	1.26***	1.48***	1.52***	1.33***	1.70***	1.36***	1.49***	1.49***	1.51***
<i>R</i>	0.48***	0.40***	0.18**	-	0.42***	0.43***	0.11	0.33***	0.16**	0.30***

<sup>a</sup>  $H_0$  (ADF): There is a unit root

<sup>b</sup>  $H_0$  pro (KPSS): Variable is stationary

Notes: The description and characteristics of the variables are in Table 2, the t-statistics for the ADF test and the LM-statistics for the KPSS test are reported at \* 10%, \*\* 5% and \*\*\* 1% level of significance. The time series for interest rates in Bulgaria is shortened to period from January 2000 to June 2018.

Tab. A2 – Unit root tests for changes in variables (y-o-y). Source: own research

	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	-2.20	-2.83*	-3.81***	-3.79***	-2.15	-2.71**	-3.65***	-3.77***	-3.69***	-4.64***
<i>p</i>	-1.79	-2.84*	-1.81	-2.19	-2.29	-2.80*	-2.61*	-5.21***	-1.95	-2.52
<i>i</i>	-	-	-	-	-	-	-	-	-	-
<i>R</i>	-1.69	-2.75*	-2.22	-	-3.35**	-4.70***	-3.56***	-3.08***	-3.25***	-3.24***
	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	0.49**	0.18	0.21	0.06	0.53**	0.14	0.09	0.06	0.08	0.15
<i>p</i>	1.01***	0.14	0.85***	0.72**	0.87***	1.11***	0.51*	1.36***	0.36**	0.24
<i>i</i>	-	-	-	-	-	-	-	-	-	-
<i>R</i>	0.98***	0.25	0.18	-	0.40*	0.47**	0.04	0.15	0.10	0.16

<sup>a</sup>  $H_0$  (ADF): There is a unit root

<sup>b</sup>  $H_0$  pro (KPSS): Variable is stationary

Notes: The description and characteristics of the variables are in Table 2, the t-statistics for the ADF test and the LM-statistics for the KPSS test are reported at \* 10%, \*\* 5% and \*\*\* 1% level of significance. I did not compute differences for interest rates.



Tab. A3 – Unit root tests for changes in variables (m-o-m). Source: own research

	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	-20.2***	-21.5***	-15.6***	-6.31***	-21.8***	-20.2***	-19.5***	-23.6***	-21.2***	-15.0***
<i>p</i>	-9.72***	-12.7***	-14.1***	-2.52	-13.6***	-7.01***	-9.14***	-4.11***	-14.5***	-12.5***
<i>i</i>	-	-	-	-	-	-	-	-	-	-
<i>R</i>	-11.3***	-12.6***	-5.78***	-	-12.8***	-11.7***	-10.6***	-11.6***	-13.2***	-12.8***
	BG	CZ	DK	EA	HR	HU	PL	RO	SE	UK
<i>y</i>	0.54**	0.18	0.12	0.07	0.25	0.13	0.07	0.04	0.09	0.09
<i>p</i>	1.02***	0.11	0.94***	0.57**	0.95***	1.09***	0.50**	1.40***	0.31	0.25
<i>i</i>	-	-	-	-	-	-	-	-	-	-
<i>R</i>	0.98***	0.16	0.12	-	0.36*	0.18	0.04	0.19	0.07	0.14

<sup>a</sup>  $H_0$  (ADF): There is a unit root

<sup>b</sup>  $H_0$  pro (KPSS): Variable is stationary

Notes: The description and characteristics of the variables are in Table 2, the t-statistics for the ADF test and the LM-statistics for the KPSS test are reported at \* 10%, \*\* 5% and \*\*\* 1% level of significance. I did not compute differences for interest rates.

Tab. A4 – Moduli of roots of a characteristic polynomial for individual models. Source: own research

Modul	BG	CZ	DK	HR	HU	PL	RO	SE	UK
M1	0.976	0.996	0.964	0.975	0.989	0.985	0.976	0.975	0.996
M2	0.976	0.972	0.964	0.963	0.967	0.964	0.960	0.975	0.971
M3	0.953	0.956	0.944	0.897	0.906	0.964	0.952	0.954	0.943
M4	0.953	0.956	0.944	0.897	0.906	0.952	0.952	0.925	0.943
M5	0.872	0.916	0.814	0.897	0.899	0.914	0.844	0.925	0.935
M6	0.872	0.916	0.752	0.799	0.899	0.914	0.844	0.875	0.935
M7	0.633	0.672	0.752	0.771	0.754	0.776	0.758	0.676	0.659
M8	0.618	0.536	0.584	0.474	0.650	0.551	0.620	0.611	0.412

Note: A value less than 1 indicates that the model is stable (Lütkepohl, 2005).

Tab. A4 – Lag selection criteria. Source: own research

	FPE	AIC	SC	HQ
BG	2	2	1	2
CZ	2	2	2	2
DK	2	2	2	2
HR	2	2	1	2
HU	2	2	1	2
PL	6	6	2	2
RO	2	2	2	2
SE	4	4	1	2
UK	2	2	1	2
EA	2	2	1	2

Note: The values indicate the selected lags of the model according to individual information criterion.

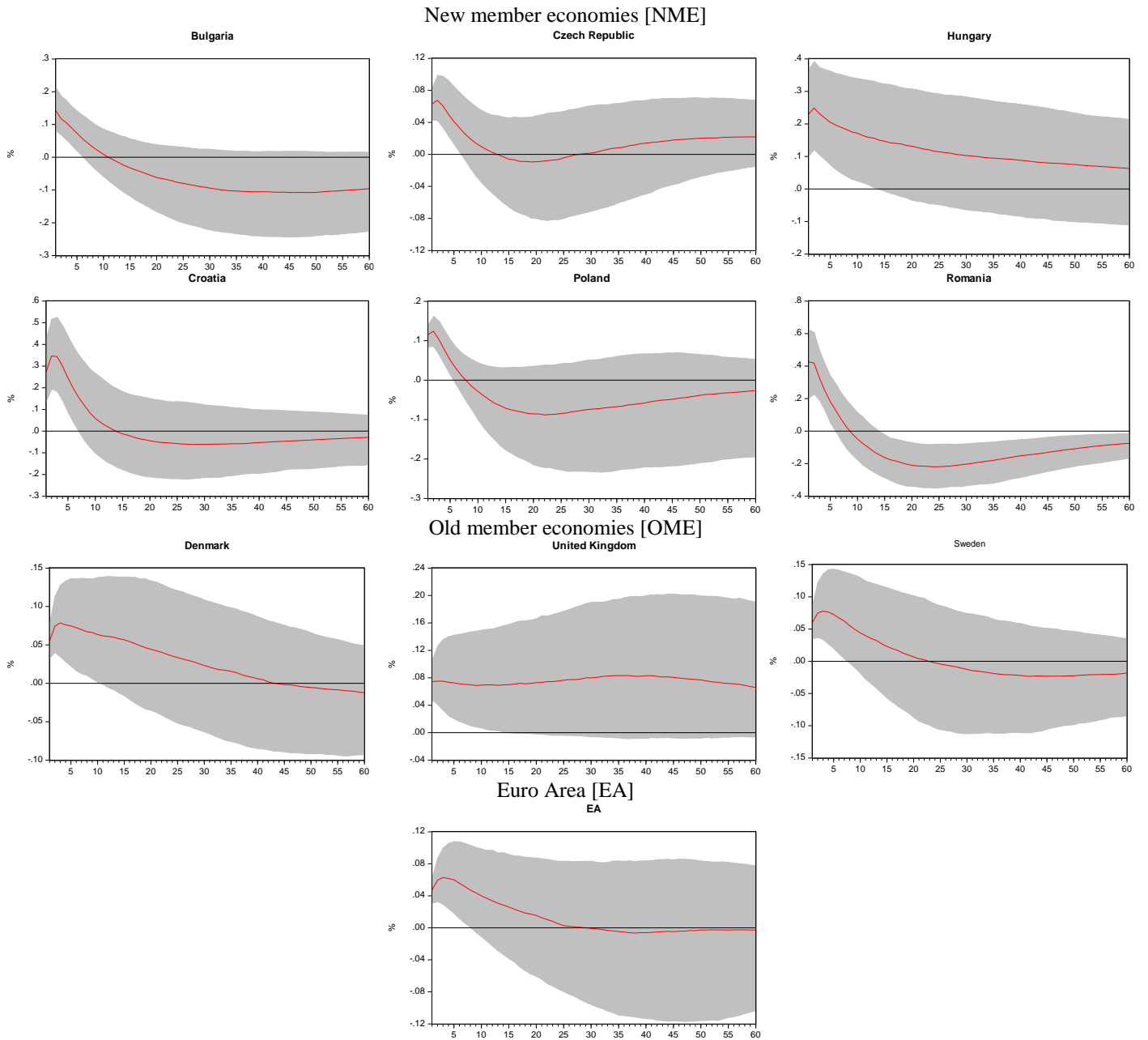


Fig. A1 – The response of interest rate in the NME, OME and EA countries to the tightening of monetary policy.

Source: own research

Notes: Shock value is one standard deviation  $\pm 2$  S.E using the sign restriction method ( $K = 5$ ). The variables that respond to shocks is the interest rate of the economy. The SRVAR model is defined in (3.7). Shock is to the system is defined as 3-month interest rate ( $i$ ). I use 68% confidence intervals when plotting IRF, and report median responses. The horizontal axis indicates the individual months, the vertical axis indicates percentage (*per annum*).

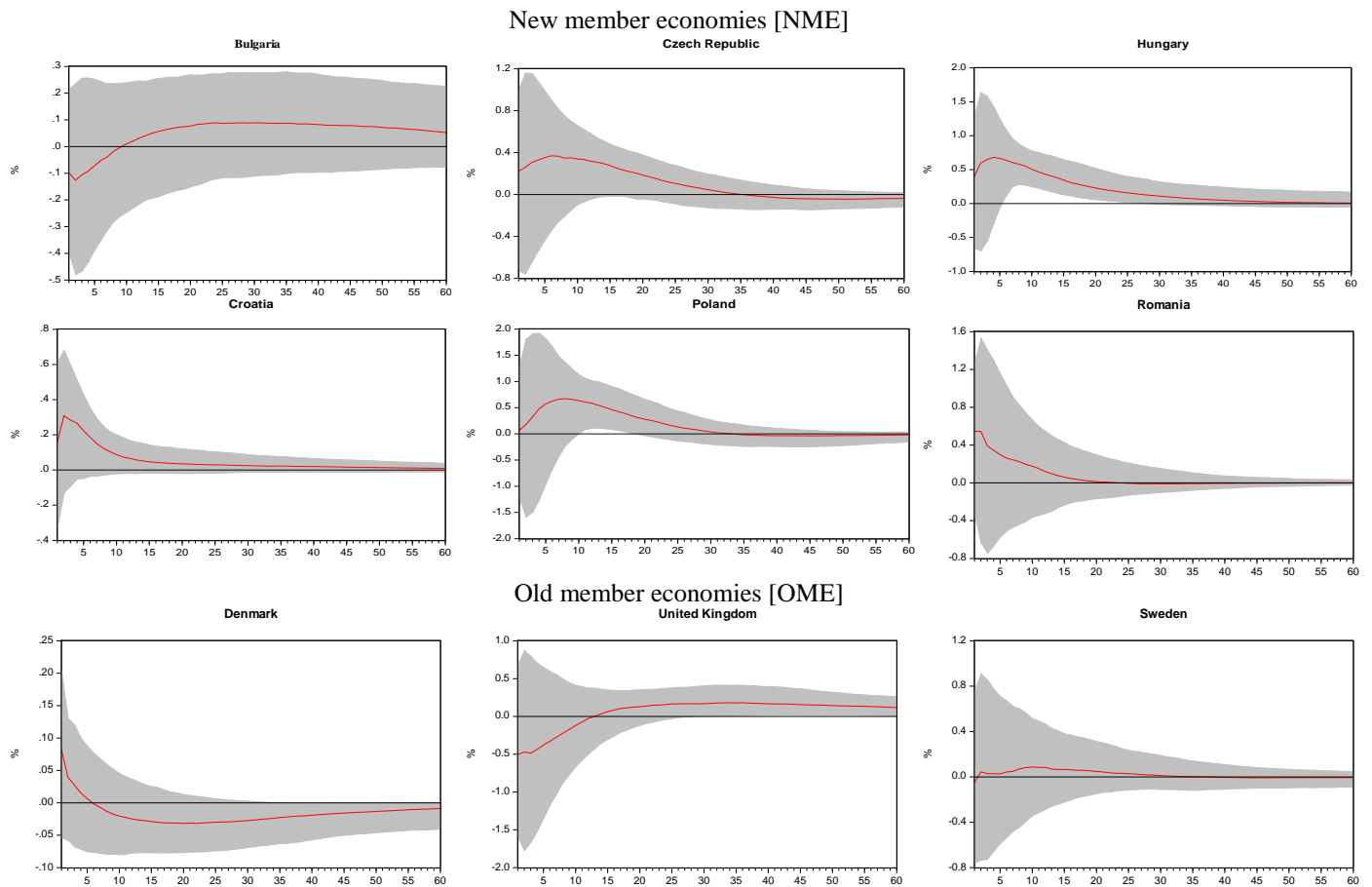


Fig. A2 – The response of real exchange rate in the NME, OME and EA countries to the tightening of monetary policy. Source: own research

Notes: Shock value is one standard deviation  $\pm 2$  S.E using the sign restriction method ( $K = 5$ ). The variables that respond to shocks is the real exchange rate of the economy. The SRVAR model is defined in (3.7). Shock is to the system is defined as 3-month interest rate ( $i$ ). I use 68% confidence intervals when plotting IRF, and report median responses. The euro area model does not include a variable for the real exchange rate. The horizontal axis indicates the individual months, the vertical axis indicates the year-on-year percentage change.

# SPORTSMEN AND ENTREPRENEURS: TWO OF A KIND?

*Oskar Karlík, Marian Holienka, Slavomír Abrahamovský*

## **Abstract**

Sports and entrepreneurship have a lot in common, and the commonalities between the two are embodied especially in the individual personality of a sportsman and an entrepreneur. The two domains develop and cultivate similar individual characteristics, which makes sportsmen prone to entrepreneurship and equips them with qualities applicable on entrepreneurial field. The presented research is a part of the international project ENDURANCE: Entrepreneurial Capacity-building for Sport (co-financed by the Erasmus+ program of the EC) which aims at using the links between sports and entrepreneurship to reignite entrepreneurial spirit and modernize the way entrepreneurship is tackled in VET and sports communities. The main aim of the presented paper is to explore these individual-level commonalities in the context of Slovakia. In doing so, we performed a qualitative inquiry among ten Slovak former athletes – current sportsmen who personally experienced starting and running an own entrepreneurial activity. We focused on the respondents' sports background and experiences in starting and running a business, with an aim to find out how the sports background contributed to their later career in entrepreneurship. We transcribed the obtained material and performed a content analysis to map the occurrence of various factors in respondents' narrations. Our findings indicate that the most frequently cited qualities developed through sports career and utilized in entrepreneurship (i.e. the commonalities between these two domains) include hardworking, perseverance, setting up plans and goals, diligence and patience.

*Keywords: business, education, endurance, entrepreneurship, sport*

## **1 INTRODUCTION**

Sport is the most popular recreational activity, for centuries being an important element of society. Entrepreneurial spirit has also been embedded in societies for ages, helping people to grow socially and economically. The role of entrepreneurship in response to socio-economic challenges of nowadays is greater than ever before, and new forms of entrepreneurship are emerging. Linkages between sports and entrepreneurship are manifold, and this direction is gaining momentum in academic literature (Jones et al., 2020; Nová, 2015; Pellegrini et al., 2020; Ratten, 2015). Yet, in Slovakia, these linkages are rarely recognized and capitalized upon, especially in the field of tailored education and training offerings towards sports community. We did not come across any entrepreneurship training tailored to former or current athletes or sports community, so these target groups must satisfy with generic offerings that fail to address their certain specifics. However, the participation of athletes in generic entrepreneurship training is rather low. Also, while there are study sports management study programmes at sports-oriented secondary and tertiary schools, their coverage of entrepreneurship is quite limited. Finally, the Slovak academic literature on interconnections between sports and entrepreneurship is, to our best knowledge, practically non-existent. All these gaps motivated our research orientation and this study, which is a part of a broader international cooperation and research project, in particular.

The commonalities between sport and entrepreneurship are embodied especially in the personality of an individual – a sportsman and/or an entrepreneur (Pellegrini et al., 2020). The

two domains develop and cultivate similar individual characteristics, which makes athletes prone to entrepreneurship and equips them with qualities that can be capitalized also on entrepreneurial field. Moreover, sports career of professional sportsmen positively affects other individual-related aspects relevant for entrepreneurship, such as personal resources or social capital. At the same time, professional involvement in sports compromises other spheres of life, which might act as an impediment of later attempts to join the entrepreneurial path. The presented paper represents a qualitative inquiry among former athletes – current sportsmen who personally experienced starting and running an own entrepreneurial activity. Thus, its main research question is: What are the individual-level commonalities of sportsmen and entrepreneurs?

The structure of the presented paper is as follows: Section 2 presents a review of academic literature on commonalities between sportsmen and entrepreneurs. Next, section 3 explains the data and methods of the research presented in this paper, while section 4 introduces its findings. Then, section 5 discusses the main findings and their implications, and section 6 concludes.

## **2 LITERATURE REVIEW**

The role of athletes as entrepreneurs is an under-explored area of the entrepreneurship and sport management literature. Athletes as entrepreneurs are utilizing human capital in the form of social, emotional and leadership abilities (Ratten, 2015). Sport and entrepreneurship have been mentioned several times as relatives based on the academic literature. In general, entrepreneurs show some common internal characteristics such as resilience, high levels of internal locus of control, and high needs for achievements (Jones and Jones, 2014; Ratten, 2015). Through their training and involvement in sports rivalry, sportspersons are surely prone to acquire numerous characteristics typical for entrepreneurship, as these individuals are proactive and resistant to stress (e.g. Mitchell, 2005; Neergaard and Krueger, 2008). Also, sportspeople are characterized by a higher locus of control, situational control, need for achievement, resilience, and discipline than the average person. All of these traits are related to higher entrepreneurial orientation and intentions (Pellegrini et al., 2020). Individuals who are successful either in sports or entrepreneurship are likely to be successful also in the other domain, due to a set of personality traits that are advantageous to both (Jones et al., 2020). Therefore, it is necessary to accept athletes as new form of entrepreneurs (Ratten, 2015).

Athletes develop resilience from their sports experience that encourages self-development on outside activities including business ventures (Miloch et al., 2012; (Ratten, 2015). On the other hand, entrepreneurs who have resilience are willing to work hard to achieve their goals, to adapt to changes in order to take advantage of the new situation and are able to learn from their mistakes (Cooper, Estes & Allen, 2004; London, 1993). It is therefore reasonable to assume that the resilience of the entrepreneur changes as a result of their business requiring them to adjust their strategies and to develop skills for coping with different kinds of situations with optimism and courage. Successful entrepreneurs establish their business goals and take timely decisions to achieve those goals in increasingly competitive and uncertain environments. The information available to entrepreneurs is often ambiguous, incomplete or is constantly changing. In these circumstances, resilient entrepreneurs, who show a high degree of tolerance for ambiguity and adapt quickly to change, may be better prepared to succeed (Ayala & Manzano, 2014). Such an uncertain and ever-changing environment is not only typical for entrepreneurs but also for athletes, who often have to make decisions at a given moment with incomplete information in fractions of a second. Thus, resilience is a result of the interaction between entrepreneurs and their environment (Ayala & Manzano, 2014). Resilience is used to characterize individuals who are able to easily and quickly overcome setbacks related to their

life and career aspirations (Zautra, Hall & Murray, 2010), therefore being an important quality for entrepreneurs (Sutcliffe & Vogus, 2003).

Athletes and entrepreneurs understand, that their environment cannot exist without competition. The need to accept and balance the principles of “accepting the competitor“, competitive balance, the principle of “collaborating to compete”(Nová, 2015). „Competitive sports cultivate the aptitude to constantly better oneself and aim for becoming the best” (Neergaard and Krueger 2008, p. 19). Students who practiced sport as young children usually grow-up in competitive social contexts capable of generating the skills necessary for entrepreneurship (Stambaugh and Mitchell 2018; (Pellegrini et al., 2020).

Another feature that is commonly attributed to both entrepreneurs and sportspersons mentioned in the literature is the self-efficacy. Self-efficacy is a part of an individual’s emotional capital as it enables them to control themselves and reach life goals. This confidence is important in the business world as individuals compete for new sources of ideas and innovation. Part of the athletes’ confidence is also sourced in their cognitive capabilities as a result of behavioral training. This motivates (former) athlete entrepreneurs to believe they can achieve business success and obtain the necessary leadership resources. As competition is part of an athlete’s life, overcoming challenges becomes part of the emotional make up of these individuals. Individuals with self-efficacy overcome many obstacles to fulfil their goals and objectives (Luthans and Jensen, 2002). The desire to fulfil goals is strongly embedded in athletes as they develop their willpower to win and achieve sporting success (Ratten, 2011a, 2011b). Part of an athlete’s make-up is their ability to understand strengths and weaknesses and how to leverage these into successful outcomes on the sports field. Athletes who focus on hard work and positive outcomes are more motivated to pursue their life dreams and goals. Often, their future performance will depend on their optimism and positive nature (Luthans and Jensen, 2002; (Ratten, 2015).

Also, based on their experience in sports, athletes develop opportunity recognition ability, which is a key entrepreneurial trait (Luthans, Avey, Avolio, Norman & Combs, 2006). The knowledge, expertise, and experience the athletes possess enable them to be productive business leaders, with a capacity for imaginativeness, which is a crucial characteristic in innovation occurring (Summers & Morgan, 2008; (Kovačić et al., 2017). Sports provides a variety of opportunities for constant innovation which is believed to be paramount to successful entrepreneurship. It means innovating the product design, service design and discovering how the particular service can be delivered more effectively and efficiently. In sports the offer for customers is not just the product but the sport experience, which is a much broader concept than the product in “pure business”(Nová, 2015). Both athletes as well as entrepreneurs are unique groups of people who stand out from the rest by being opportunity-driven, goal-oriented, innovative, risk-taking, and leadership oriented (“Examination of Sports Entrepreneurship and Entrepreneurial Strategy,” 2016).

Recognizing the commonalities between sport and business can play an important role in an athlete's life. This is especially important when an athlete nears the end of his/her professional sporting days and the pursue of entrepreneurial opportunities can lead to a successful after-sport lifestyle (Summers and Johnson Morgan, 2008). Athletes cannot maintain their sport career at a professional and competitive level forever. For this reason, most of professional athletes may need to transit towards a different career, either by obtaining a more managerial role in sport and related industries, or by moving to a completely new industry. In both cases, the athlete is faced with entrepreneurial challenges.

### 3 METHODOLOGY

The purpose of the presented paper is to understand the individual-level commonalities of sportsmen and entrepreneurs. We are focusing on current or former entrepreneurs with former/concurrent athlete background in Slovakia. With this specific purpose, this partial research is an integral part of the international project ENDURANCE: Entrepreneurial Capacity-building for Sport (Erasmus+ 2020-1-SK01-KA202-078223), which is co-financed by the Erasmus + program of the European Commission. The project aims at using the links between sports and entrepreneurship to reignite entrepreneurial spirit and modernize the way entrepreneurship is tackled in VET and sports communities. The findings presented in this paper, together with findings by other ENDURANCE project partners, will inform the broader mapping of commonalities, overlaps and pathways between sports and entrepreneurship, which is undertaken to establish a solid basis for developing the education and training materials on entrepreneurship aimed at sports community. The presented analysis was undertaken by representatives of two ENDURANCE project partners – Comenius University in Bratislava (project coordinator) and Private secondary sports school M.C. Sklodowska Str. 1 in Bratislava.

The presented paper is a qualitative study that attempts to explore a phenomenon under investigation through execution of semi-structured interviews and employing a content analysis to exploit the materials obtained. In our study, we focused on respondents capable to talk about commonalities between entrepreneurship and sports from their own personal experience obtained through their own connected sport-entrepreneurship / entrepreneurship-sport pathway. Thus, they might be former athletes, current entrepreneurs, current athletes and entrepreneurs at the same time (dual career, hybrid entrepreneurs), or sports professionals (e.g. coach, instructor, physio, fitness coach, sports nutrition specialist) who are self-employed, (co-)Founders and (co-)owner-managers of sports-oriented companies. After recruiting potential respondents from these categories, we have reached a final sample for the presented study that comprised of ten active or former professional athletes who were, at the time of data collection, involved in starting-up or actively running their own businesses. All the respondents came from Slovakia, while several of them also had an international professional experience. The respondents were approached and interviewed during February 2021. Due to the constraints related to the COVID-19 pandemics, we were not able to conduct the interviews in person. Therefore, we organized a series of online voice and video calls, while several respondents provided their answers in written format. Each interview lasted from approximately 30 minutes to 1 hour, depending on the experience and business activities of the selected respondent. The obtained material was then transcribed in a common format to allow for further analysis.

Tab. 1 - Sample of interviewed respondents. Source: own research

ID	Sports career		Business career		Age	Gender
	Sport	Type	Type	Sector		
1	Football	Active, youth cat.	Freelancer / co-owner	IT bus. dev./fun art	25	male
2	Skiing	Active, youth cat.	Co-owner	Car dealer	27	male
3	Swimming	Active, youth cat.	Co-owner	Accounting	25	male
4	Tennis	Active, senior cat.	E-sport team co-owner, tennis coach	E-sport, Sport	21	male
5	Cycling	Active, senior cat.	Director of the national cycling team, coach	Sport	26	male

6	Tennis	Active, senior cat.	Tennis academy owner	Sport	46	male
7	Football, Canoeing	Active, youth cat.	Owner of construction company	Construction	49	male
8	Tennis	Active, youth cat.	Sport manager, sport event organizer	Sport	50	male
9	Football	Active, senior cat.	Football summer camps	Sport	38	male
10	Volleyball	Active, senior cat.	Sports expert	Sport	41	male

In terms of contents, the interviews were inquiring entrepreneurs with former/concurrent professional athlete background about the perceived intersections between the specific features of sport and entrepreneurship. In the first block of questions, the interview outline focuses on respondent's demographics and other characteristics such as previous professional business career, relationship to sport. Next block consists of questions about respondent's background in education, business experience among his/her peers or family, and popular sport activities and events in his/her setting. Third section focuses on starting an own business (first experiences, motivation, help, barriers). Lastly, the information about respondent's experience with entrepreneurship have been provided, referring to usage and commonality of personality traits, common competences and skills, perceived fostering factors, challenges, and passion. For the purpose of this study, we specifically focused on common features of sports and entrepreneurship, while the remaining items from the interviews were saved for later analyses.

The analysis of the transcribed material comprised of a content analysis. Content analysis is a research method used to identify patterns in recorded communication. To conduct content analysis, you systematically collect data from a set of texts, which can be written, oral, or visual. Content analysis can be used to quantify the occurrence of certain words, phrases, subjects or concepts in a set of historical or contemporary texts (Lou, 2019). As a support tool for our content analysis, we used the HashMaps, which are used for associating word with a value. In this case, values are numbers representing the frequency of occurrence. It means, that most frequent answers obtained through the executed interviews are bigger or more visible, compared to those with lower occurrence. They may be also displayed in an ordered rank, but in this case, we have used a graphic design where all words are mixed and sorted by size or colour. To account for many synonyms used by the respondents, some verbatim answers had to be grouped together under a single keyword.

## 4 RESULTS

The purpose of our analysis was to map the individual-level commonalities of athletes and entrepreneurs. In doing so, we performed a content analysis of the material obtained in the executed interviews. We start presenting our results with a graphical display of the most frequent answers by our respondents (Fig. 1 and Fig 2. below) related to the common features of sports and entrepreneurship. While Fig. 1 presents the frequency of occurrence in a bar chart format, Fig. 2 uses the HashMap layout to enhance the visual presentation of the frequencies. We evaluated the occurrence of respondents' answers on a scale from most relevant, through medium occurrence, to less relevant. The "most relevant" category comprised of factors that occurred 5 to 6 times in all interviews. Next, the "medium occurrence" category contained terms with occurrence of 2 to 4 times. The last category of frequency, labelled as "less relevant", included factors with single occurrence among all interviews.



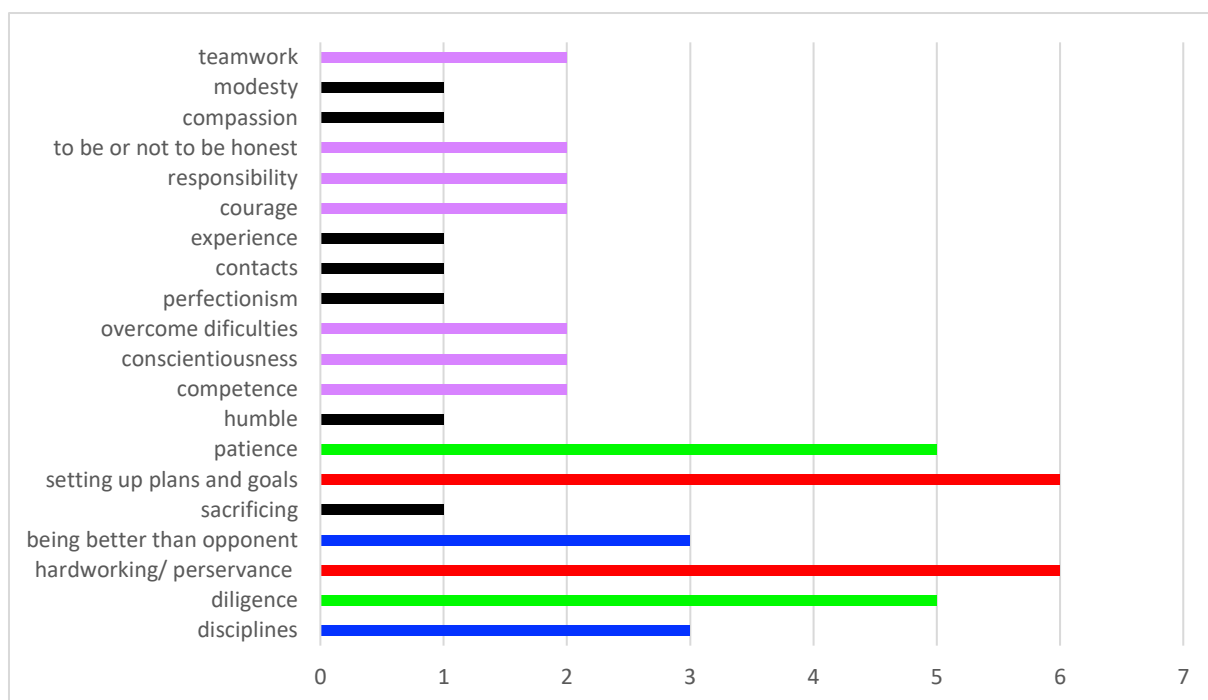


Fig. 1 – Results of questionnaires. Source: own elaboration using the Microsoft Excel



Fig. 2 – Results of questionnaires. Source: own elaboration using the online software tool on website [www.wordart.com](http://www.wordart.com)

As can be seen on Fig. 1 and Fig. 2 above, the most relevant attributes that were considered common to sports and entrepreneurship by our respondents included hardworking, perseverance, setting up plans and goals, diligence and patience. For example, when asked about commonalities of sports and entrepreneurship, the respondent no. 3 indicated “Well, definitely you need to know how to overcome sudden problems, how to adapt to environment and competition, being able to work hard for longer periods of time before taking a rest”. Subsequently, with roughly medium occurrence, respondents also indicated discipline, being better than the opponent, competence, conscientiousness, overcoming difficulties, courage, responsibility, to be or not to be honest, and teamwork as common for the both domains. For

example, as the respondent no. 1 said, "... willingness to do what others are not. Sacrificing something today for tomorrow's success. Knowing that most of the time you have to outsmart your opponent and be better." Finally, the less relevant keywords included sacrificing, humble, perfectionism, contacts, experience, compassion, modesty. This statement is supported by the idea of the respondent no. 2 – "I believe, that if the entrepreneur wants to be successful, he/she needs to be patient, disciplined, hardworking and humble, and those are all the qualities which can be learned by sport".

## **5 DISCUSSION**

Based on the review of the literature which focuses on the search for common or related characteristics between entrepreneurship and sport, the intersection between entrepreneurship and sports is considerable. Among the identified common features, we can include resilience, self-efficacy, imaginativeness, discipline, proactiveness, strategy, innovation, risk taking and also internal locus of control. But that's not all. Athletes as well as entrepreneurs have other features in common because they are opportunity driven and able to identify or recognize these opportunities. They are also goal oriented and leadership oriented. Both of them perceive and accept the existence of competition, are capable of rivalry and are also aware of the possibility of collaboration to compete. In this regard, they are also aware of the power of identifying strengths and weaknesses. Athletes and entrepreneurs know how to learn from mistakes, are able to quickly adapt to changes and resistant to stress. This overlap is also perceived as important from the point of view that entrepreneurship can become a secondary or dual career of athletes after their active sports career which has a limited duration. The former athletes typically possess resources, experience and contacts gained during professional sports career.

Comparing our findings obtained through interviewing former athletes / current entrepreneurs in Slovakia with the literature on commonalities between sports and entrepreneurship, we observed a considerable intersection (Fig. 3 below). Among the most overlapping features we can clearly include discipline and hardworking. Other characteristics with a strong overlap were ambition, perseverance, tenacity, goal orientation and need for achievement, diligence or setting up goals and plans. Also we saw an intermediate level of overlap in case of teamwork, collaboration to compete, contacts, being better than opponent and acceptance of competition. However, we also observed some discrepancies, as the responses did not contain some of the literature-based common features between sport and entrepreneurship, such as resilience, opportunity recognition and opportunity-based drive, risk taking, internal locus of control or proactivity. Thus, we might hypothesize that the former athletes-current entrepreneurs in Slovakia do not recognize these attributes or realize their relevance. Yet, considering our research design, such statements would be premature, so we invite further research to address them specifically.



Fig. 3 – Intersection of common features for Sports and Entrepreneurship based on literature and interviews.

Source: own elaboration using the online software tool on website [www.wordart.com](http://www.wordart.com)

Our findings yield several implications for further research as well as towards entrepreneurship practice. As for the first, future research could focus on a more diverse research sample, as the subject of our research were respondents mainly from the territory of the Slovak Republic and all were male. Therefore, we think that it would be appropriate to focus on the female gender, which could perceive the issue differently and highlight other common features. Also, further research could address the factors within sporting that support the development of entrepreneurship-relevant characteristics, and deeper understanding of those factors.

As for the latter, we consider our findings to be especially relevant for education and training as well as entrepreneurship support offerings aimed at young athletes, sports professionals and potential sports entrepreneurs. It seems, that despite insufficient support in practice and in academic sector, sport and business have a lot in common and it is important to spread these ideas and their mutual prosperity. More particularly, the teachers, lecturers or mentors of sportsmen and sportswomen potentially interested in entrepreneurship career should be aware of qualities developed in sports that are potentially useful for entrepreneurship, and help their audience to leverage these qualities for building an entrepreneurial self-confidence and for their application in entrepreneurship context.

Finally, like any other research, also our study is subject to limitations. Due to the current pandemic situation, it was necessary to conduct some of the interviews online, which sets some limitations to immediate personal interactions with interviewees. Next, due to convenience sampling and a limited sample size, some perspectives might have been underrepresented in our study. However, on contrary, the varied character of our sample represents a precondition for our findings to be reasonably robust. Finally, the scope of our interview might not have been able to cover all nuances (which was not our ambition neither), leaving space for future research. Some of its potential directions were offered above.

## 6 CONCLUSION

The presented paper focused on finding the individual-level commonalities between sport and entrepreneurship. Thanks to studying the literature and especially after executing the qualitative survey based on semi-structured interviews among former athletes / current entrepreneurs, we were able to draw valuable conclusions. These show certain overlaps between the domains of sports and entrepreneurship. Especially, the most relevant common characteristics are discipline, hard work, ambition, perseverance, tenacity, goal orientation and need for achievement, diligence or setting up goals and plans. On the other hand, some features that are underlined in the literature were not identified in our interviews, and it seems that the respondents have not experienced their importance. From this we conclude that there is room for further awareness raising and education in this area.

### Acknowledgement

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## Contact information

### Mgr. Oskar Karlík

Comenius University in Bratislava, Faculty of Management  
 Odbojárov 10, 820 05 Bratislava, Slovakia  
 E-mail: karlik7@uniba.sk  
 ORCID: 0000-0002-0476-7650

### doc. PhDr. Marian Holienka, PhD.

Comenius University in Bratislava, Faculty of Management  
 Odbojárov 10, 820 05 Bratislava, Slovakia  
 E-mail: marian.holienka@fm.uniba.sk  
 ORCID: 0000-0002-8975-6116

**Mgr. Slavomír Abrahamovský**

Súkromná stredná športová škola (Private Secondary Sports School)

M.C.Sklodowskej 1, 851 04 Bratislava, Slovakia

E-mail: sabrahamovsky@yahoo.com

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# SLOVAK POPULATION MORTALITY MODELLING AND FORECASTING USING CAIRNS-BLAKE-DOWD MODEL

*Jana Kútiková*

## **Abstract**

The aim of this paper is to use Cairns-Blake-Dowd (CBD) stochastic mortality model for fitting and forecasting mortality pattern of population in Slovak republic. We have modelled age-specific mortality rates, transformed to logit form of probability of death, for males and females separately as well as by excluding sex as mortality factor due to Gender directive on data from 1993 to 2017 through the age interval from 30 to 100 years. Linear regression methods are used for estimation of model parameters. Auto regressive integrated moving average (ARIMA) model is applied to forecast values of time dependent parameters of the CBD model for the following three years to obtain expected values of mortality rates at different ages along with 95% confidence intervals. In the future, we expect the mortality of Slovak population to improve. Mortality at younger ages will decrease more rapidly than at older ages. Overall, we can say that the CBD model is eligible for modelling mortality for insurance companies because of its forecasting possibilities. Therefore, the model is a useful tool for many actuarial calculations such as premiums, technical provision, Minimum Capital Requirement, Solvency Capital Requirement etc.

*Keywords:* Age-specific mortality rates, Probability of death, CBD model, Least Squares method, ARIMA

## **1 INTRODUCTION**

The mortality behaviour of the population is constantly evolving. The quality of life is increasing every year, and this is, of course, reflected in the development of mortality which has improved significantly in recent decades. Among other things, it is caused by technical progress in medicine, sociology, pharmacy, and other sciences directly or indirectly related to death. Mortality is an important assumption of the actuarial base. The dramatic decline in mortality poses very serious financial risks for life insurance companies for which knowledge of mortality behaviour of the population depending on age is a key factor of many actuarial calculations, such as the calculation of premiums and technical provisions. Expectations about the mortality behaviour of the insurance portfolio are closely related to the type of life insurance product. Underestimation of mortality has a negative effect on term life products and, conversely, in the case of annuity insurance products, overestimation of mortality can lead to high losses of the insurance company. The more accurately policyholders' probability of death can be estimated, the lower risk of incorrect valuation of insurance contracts is borne. Insurance companies rely on long-term observations, the source of which are mortality tables. These mortality tables can be created by the insurance company itself based on mortality information in the insurance portfolio or, for more accurate values, the company can use information on the mortality behaviour of the population in each country.

The first attempts to model mortality were based on deterministic scenarios. This led to formation of the mortality laws which describe mortality at a fixed point in time, hence underestimating the improvement in mortality because the actual mortality is stochastic. There were few attempts to make stochastic models from deterministic mortality laws. Effort of



(McNown and Rogers, 1989) was successful, and they extended the Heligman-Pollard deterministic mortality model from (Heligman and Pollard, 1980) by stochastic assumptions and therefore created one of the stochastic mortality models. There are multiple stochastic mortality models but in general, we can sectionalise them into three classes. First is the Lee-Carter class of models, the main representative of which is the Lee-Carter model. The advantage of this model is simplicity thanks to which it has become very popular. It is used to model and predict mortality in many countries such as the United States (Lee and Carter, 1992), China (Lin, 1995), Japan (Wilmoth, 1996), India (Singh and Ram, 2004 and Yadav et al. 2012), Scandinavian countries (Kossi et al., 2006) and many others. Drawbacks of this class of models are that there is no functional form used for age effects and no smoothness across ages or years. Second class of models is P-spline, which is commonly used in the United Kingdom but not as much in other parts of the world. Last is Cairns-Blake-Dowd (CBD) class of models with leading CBD model, which is the subject of this paper. Compared to the Lee-Carter class they contain specific functional form for each age effect and besides that there is smoothness across ages in the same year. Analysis of qualitative and quantitative characteristics of all three classes of models was done by (Cairns et al., 2011). For instance, (Safitri et al., 2019) did a comparison of the Lee-Carter and the Cairns-Blake-Dowd models on Italian population. The aim of this paper is to apply the CBD model to the mortality behaviour of the Slovak republic population and to prognose mortality for the following years. Similar goal had for example (Nocino, 2015), who tried to forecast Indonesian mortality rates by taking into consideration the impact of grouping age into intervals.

## 2 THEORETICAL BACKGROUND

Our study is based on data on the mortality of the population of the Slovak Republic in the years 1993 to 2017 obtained from the website mortality.org. The Human Mortality Database (HMD) provides open, international access to detailed population and mortality data for 41 countries. From this database, we obtained data on the number of deaths at specified age in Slovakia during a certain time and the corresponding population at risk of the same age in the same geographic area during the specified period of study which are needed to calculate age-specific mortality rates. The formula for calculating age-specific mortality rates is as follows:

$$m_{x,t} = \frac{D_{x,t}}{L_{x,t}} \quad (1)$$

where  $D_{x,t}$  represents the number of deaths at age  $x$  and at time  $t$  and  $L_{x,t}$  denotes the mid-year population at age  $x$  and at time  $t$ .  $m_{x,t}$  is also known as the central mortality rate or full name, the age-specific central mortality rate of persons at age  $x$  and at time  $t$ . According to (Šoltésová, 2019), there are two approximations to the central death rate  $m_{x,t}$  with the mortality rate of an individual aged  $x$  at time  $t$ , which we refer to  $q_{x,t}$ .

$$q_{x,t} = 1 - e^{-m_{x,t}} \quad (2)$$

$$q_{x,t} = \frac{m_{x,t}}{1 + 0,5m_{x,t}} \quad (3)$$

The first approach (Equation 2) is based on the assumption of a constant mortality at each integer age. The second approach (Equation 3) assumes that deaths are evenly distributed between the two ages. In this paper, the former approximation is adopted for the data transformation between  $m_{x,t}$  and  $q_{x,t}$ .

We apply the Cairns-Blake-Dowd model to the Slovak population taking into consideration gender, separately for men and women. We also omit the gender factor in modelling due to

insurance legislation – Gender Directive (Council Directive 2004/113/EC of 13th December 2004 implementing the principle of equal treatment between men and women in the access to and supply of goods and services). An example of age-specific central mortality rate data is provided in Fig. 1. Graph contains the natural logarithm of mortality rate of men and women in 1993 and 2017.

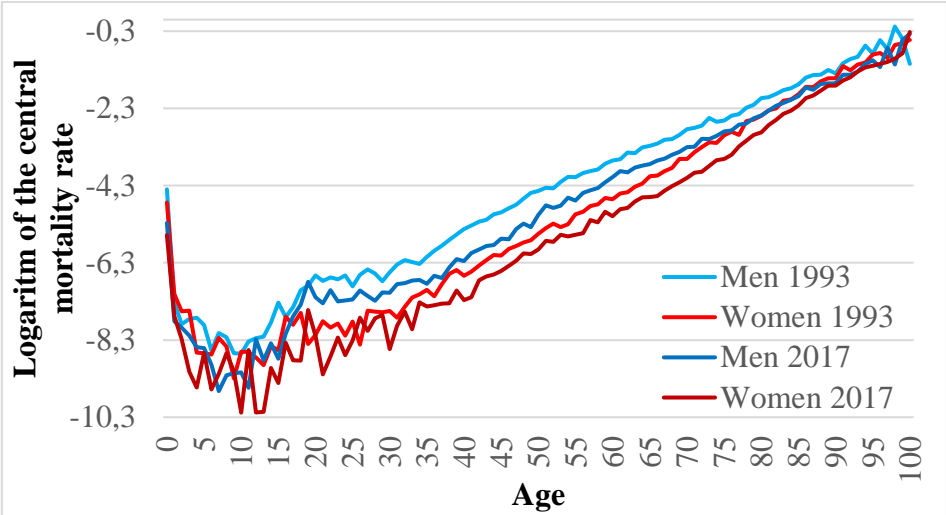


Fig. 1 - Age-specific central mortality rate of men and women in 1993 and 2017. Source: own research

From Fig. 1, we want to highlight two facts. First, the improvement of mortality mentioned above is evident. Besides that, throughout the whole age range, the mortality rate for women is lower than the mortality rate for men. However, the differences between the mortality rates of the male and female population are constantly decreasing. While in 1993 there were up to 1 200 men died per 1 000 women who died, currently it is only 1 040 men per 1 000 women. This can be also confirmed by synthetic indicator of life expectancy at birth whose value increases from year to year.

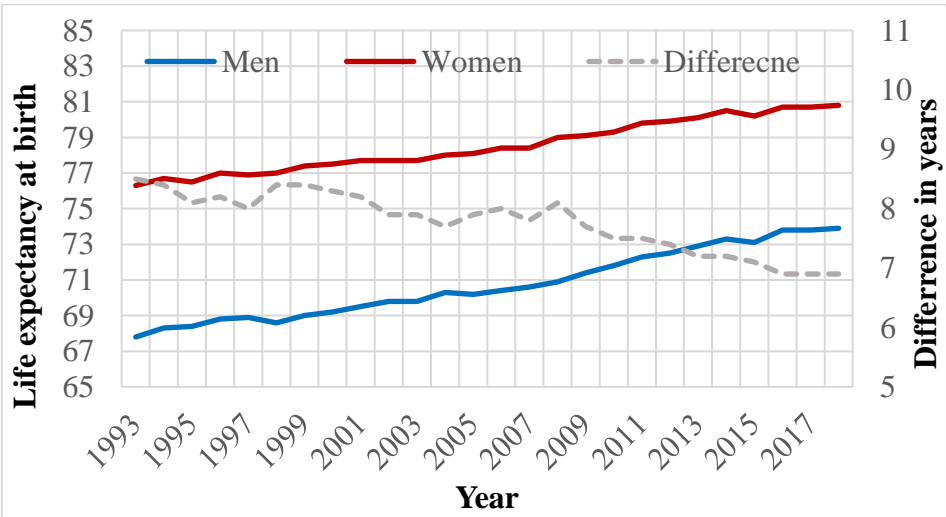


Fig. 2 - Life expectancy at birth and its difference between men and women. Source: own research

In 2017, the life expectancy of women at birth was 80,7 years and the life expectancy of men at birth was 73,8 years. Compared to the previous year the life expectancy for women decreased by 0,1 year and for men on the other hand it increased by 0,1 year. During the observed period of 25 years, women's life expectancy at birth increased by 4,4 years, while men's life expectancy

at birth increased by 6 years. An important trend is the decrease in difference in the life expectancy at birth between the sexes shown in Fig. 2. In 1993, the gender gap was 8,5 years, by 2017 it had dropped to 6,9 years.

### 3 METHODOLOGY

In 2006 Cairns et al. introduced a stochastic model that contains two time-dependent parameters. It uses relative simplicity (i.e. almost linearity of the logarithm  $q_{x,t}$ ) of the mortality curve at older ages. The main disadvantage of the CBD model arises from the fact that it was designed for higher ages and so ignored the modelling of mortality at the lower ages (for example the accident hump or infant mortality). (Cairns et al., 2009) argue that the significant cost associated with mortality is at the older ages and thus their modelling focused on those ages. The model directly uses the probability of death  $q_{x,t}$  instead of central mortality rate  $m_{x,t}$ . The CBD model can be expressed as:

$$\text{logit}(q_{x,t}) = \log\left(\frac{q_{x,t}}{1-q_{x,t}}\right) = \kappa_t^{(1)} + \kappa_t^{(2)}(x - \bar{x}) + \varepsilon_{x,t} \quad (4)$$

where

- $x$  is the age group ( $x = x_1, x_2, \dots, x_p$ ),
- $t$  is the period ( $t = t_1, t_2, \dots, t_q$ ),
- $q_{x,t}$  is the mortality rate, which is the probability an individual at age  $x$  in time  $t$  will die at intervals of time  $t$  and  $t + 1$ ,
- $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  are two stochastic processes and represent the two time-indexes of the model,
- $\bar{x}$  is the average of the age group,
- $\varepsilon_{x,t}$  reflects a random component caused by historical influences that the model did not capture.

Furthermore, the time index  $\kappa_t^{(1)}$  is the intercept of the model, which represents the level of mortality at time  $t$  and affects every age in the same way. More precisely, if it declines over time, it means that the mortality rate has been decreasing over time at all ages. The time index  $\kappa_t^{(2)}$  represents the slope of the model. Every age is differently affected by this parameter. The model does not require additional constraints.

Since the logarithm of  $q_{x,t}$  is almost linear, the parameters of the CBD model can be estimated using the Least Squares Method. Note that in this case the pair  $(\kappa_t^{(1)}, \kappa_t^{(2)})$  is estimated for each period  $t$  separately, whereas the accuracy of the estimated parameters grows with increasing the range of input data (with increasing analyse period).

Afterwards, the estimation results of parameters will be substituted to Equation 4 to calculate the estimated mortality rate. Then, the estimated mortality rate will be compared to the actual mortality rate to see the suitability of the model. The error of the estimation process can be calculated with the Mean Square Error or the Root Mean Square Error as follows:

$$MSE = \frac{1}{n} \sum_{i=1}^n (\hat{y}_i - y_i)^2 \quad (5)$$

$$RMSE = \sqrt{MSE} \quad (6)$$

where  $\hat{y}_i$  is the estimated value,  $y_i$  is the actual value, and  $n$  is sample size. If the error is small enough, then forecasting the estimated value of parameters can be processed.

## 4 RESULTS AND DISCUSSION

### 4.1 Fitting of model to Slovak mortality data

In the CBD model, the value of  $(x - \bar{x})$  has a significant impact on  $logit(q_{x,t})$ , so that the age group used in the parameter estimation process will influence the mortality rates. The simulation in the parameter estimation process is done on an age interval from 30 to 100 years to get the best-estimated results. For analysis as well as estimation of parameters we used SAS Enterprise Guide software.

The Fig. 3 and 4 below, show the trends of the estimated parameters of CBD model  $\kappa_t^{(1)}$ ,  $\kappa_t^{(2)}$  over time, for men (blue curve) and women (red curve) separately and also without taking into consideration sex as mortality factor (grey curve). Graphic analysis is completed with estimated values of parameters in Tables 1 and 2.

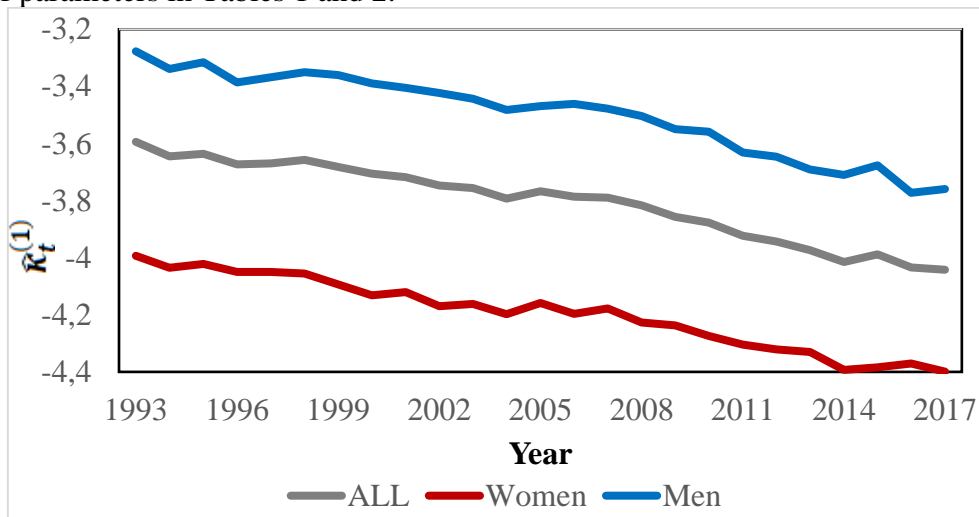


Fig. 3 - Parameter  $\hat{\kappa}_t^{(1)}$  of the CBD model for Slovak republic. Source: own research

Tab. 1 - Estimated values of time-dependent parameter  $\hat{\kappa}_t^{(1)}$  of the CBD model. Source: own research

Year	$\kappa_t^{(1)}$	Men	Women	Year	$\kappa_t^{(1)}$	Men	Women
1993	-3,594	-3,277	-3,993	2006	-3,786	-3,461	-4,197
1994	-3,645	-3,338	-4,035	2007	-3,790	-3,478	-4,177
1995	-3,636	-3,316	-4,022	2008	-3,816	-3,504	-4,227
1996	-3,674	-3,387	-4,050	2009	-3,857	-3,549	-4,238
1997	-3,669	-3,368	-4,050	2010	-3,877	-3,559	-4,274
1998	-3,657	-3,350	-4,056	2011	-3,923	-3,632	-4,305

1999	-3,682	-3,360	-4,093	2012	-3,943	-3,646	-4,321
2000	-3,706	-3,389	-4,132	2013	-3,974	-3,691	-4,330
2001	-3,718	-3,406	-4,121	2014	-4,015	-3,710	-4,393
2002	-3,747	-3,423	-4,169	2015	-3,988	-3,677	-4,384
2003	-3,756	-3,443	-4,162	2016	-4,034	-3,773	-4,371
2004	-3,793	-3,483	-4,198	2017	-4,042	-3,759	-4,399
2005	-3,768	-3,469	-4,159				

As shown in the Fig. 3 above, the trend of the estimated parameter  $\kappa_t^{(1)}$  is decreasing from year to year, which corroborates the idea that the overall level of mortality has been improving over the considered time interval (between years 1993 and 2017).

On the other hand, the trend of the parameter  $\kappa_t^{(2)}$  had been quite stable until 2006, when it increased. Stability of parameter is more visible for the female population and can be considered stable throughout the whole interval. For male population, this parameter started to have an increasing trend around 2005. The change in  $\kappa_t^{(2)}$  represents the change in steepness of the mortality curve. The authors of the model proposed following interpretation of the increasing tendency of the  $\kappa_t^{(2)}$ : it shows that the mortality improvements - in absolute terms - have been greater at lower ages than at higher ones (Pitacco et al., 2009). This means that mortality has improved more for ages from 30 to 60 than at higher ages (in absolute terms).

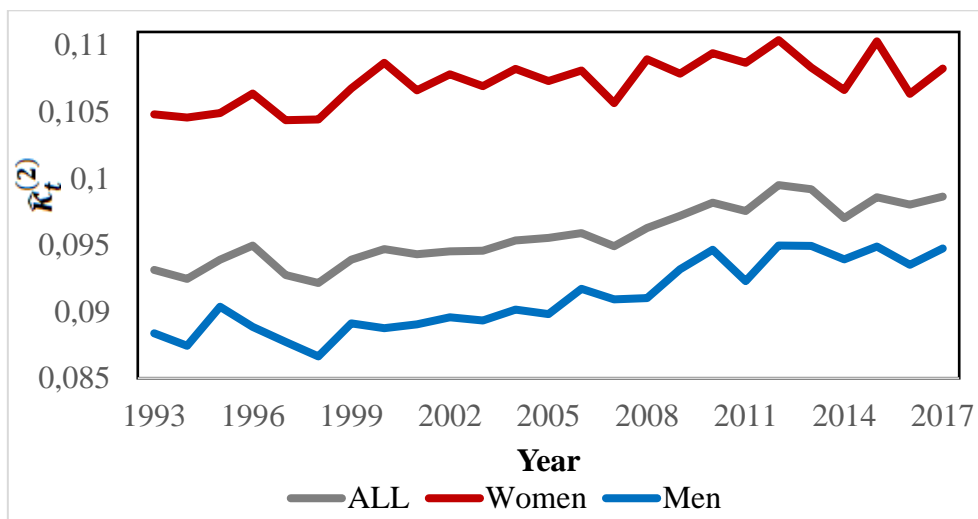


Fig. 4 - Parameter  $\hat{\kappa}_t^{(2)}$  of the CBD model for Slovak republic. Source: own research

Tab. 2 - Estimated values of time-dependent parameter  $\hat{\kappa}_t^{(2)}$  of the CBD model. Source: own research

Year	$\kappa_t^{(2)}$	Men	Women	Year	$\kappa_t^{(2)}$	Men	Women
1993	0,093	0,088	0,105	2006	0,096	0,092	0,108
1994	0,092	0,087	0,105	2007	0,095	0,091	0,106

1995	0,094	0,090	0,105	2008	0,096	0,091	0,109
1996	0,095	0,089	0,106	2009	0,097	0,093	0,108
1997	0,093	0,088	0,104	2010	0,098	0,095	0,109
1998	0,092	0,087	0,104	2011	0,098	0,092	0,109
1999	0,094	0,089	0,107	2012	0,100	0,095	0,110
2000	0,095	0,089	0,109	2013	0,099	0,095	0,108
2001	0,094	0,089	0,107	2014	0,097	0,094	0,107
2002	0,095	0,090	0,108	2015	0,099	0,095	0,110
2003	0,095	0,089	0,107	2016	0,098	0,094	0,106
2004	0,095	0,090	0,108	2017	0,099	0,095	0,108
2005	0,096	0,090	0,107				

The estimated results of  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  in Tab. 1 and Tab. 2 will be substituted to Equation 4 to obtain an estimated value of  $\text{logit}(q_{x,t})$ . The estimated value of  $\text{logit}(q_{x,t})$  will be compared to the actual value to identify the suitability of the model. In Fig. 5, we have plotted observed and fitted mortality rates ( $\text{logit}(q_{x,t})$ ) for 1993 (start of projection) and 2017 (end of projection) for ages from 30 to 100 years. We observed that the fitted mortality rates are very close to observed (actual) mortality rates except actual rates have unsystematic volatility mentioned before.

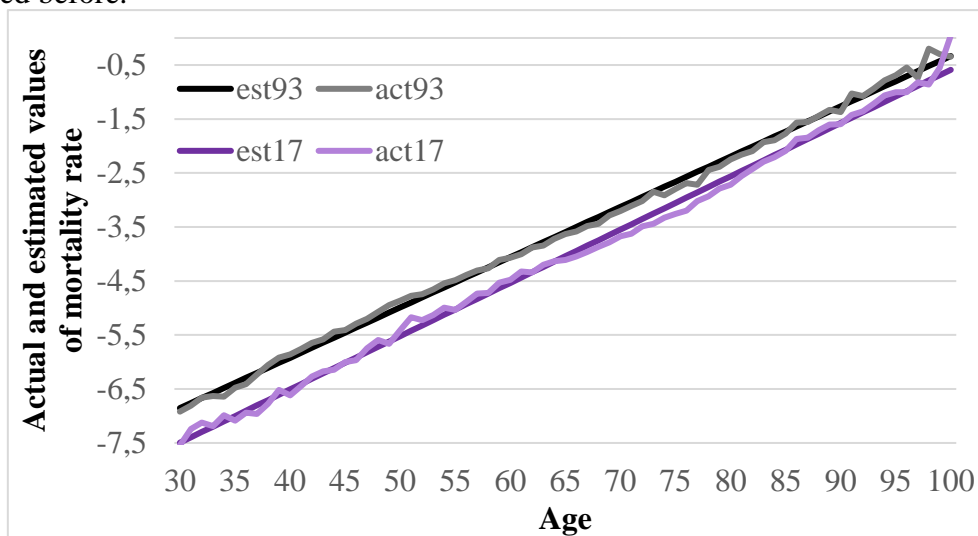


Fig. 5 - Actual and fitted mortality rate in 1993 and 2017. Source: own research

Then the MSE and RMSE calculation was done by using Equations 5 and 6 to find the error from the estimated results of  $\text{logit}(q_{x,t})$ . Value of the MSE for all ages throughout analysed period is 0,012462. Square root of this number represents RMSE with value equal 0,111631. Based on the graph and also RMSE, we can say that there are some differences between actual and estimated values. These differences are not significant, but for more accurate results, we recommend dividing the age intervals into smaller parts as in (Nocito, 2015).

## 4.2 Forecasting

Forecasting is one of the fundamental features of stochastic modelling. The CBD model consists of two time-dependent parameters that need to be predicted. There is an implicit assumption in the forecasting element of the model that the drift is not going to change direction in the future.

There are several methods of prediction, such as using regression curves or one of the most popular methods is ARIMA (autoregressive integrated moving-average) modelling. The ARIMA approach was first popularized by Box and Jenkins and ARIMA models are often referred to as Box-Jenkins models. According to SAS User's Guide: An ARIMA model predicts a value in a response time series as a linear combination of its own past values, past errors (also called shocks or innovations) and current and past values of other time series.

The order of an ARIMA model is usually denoted by the notation  $ARIMA(p,d,q)$ , where  $p$  is the order of the autoregressive part,  $d$  is the order of the differencing,  $q$  is the order of the moving-average process.

We have considered some possible choices of ARIMA models for modelling parameters  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  of the CBD model. We used Akaike information criterion (AIC) to identify the most suitable model. In general, when you are comparing candidate models, smaller AIC indicate the better fitting model.

According to AIC, ARIMA (0,1,1) is the best fitted model for both parameters of the CBD model estimated for population of Slovak republic without sex as mortality factor with different values of AIC. AIC of parameter  $\kappa_t^{(1)}$ , that corresponds to the intercept of the model, was equal to  $-114,8$ . On the other hand, AIC of  $\kappa_t^{(2)}$  (slope of the model) was even smaller, with a value of  $-262$ .

Tab. 3 - Forecasted values of parameters  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  with 95% confidence limits. Source: own research based on results from SAS Enterprise Guide

Year	Forecast $\kappa_t^{(1)}$	95% Confidence Limits	
2021	-4,0994	-4,1574	-4,0414
2022	-4,1179	-4,1825	-4,0533
2023	-4,1364	-4,207	-4,0657
Year	Forecast $\kappa_t^{(2)}$	95% Confidence Limits	
2021	0,099622	0,097638	0,101605
2022	0,099871	0,097867	0,101875
2023	0,10012	0,098096	0,102144

When we performed ARIMA modelling for women and men separately, the results were different. For men most appropriate model of parameter  $\kappa_t^{(1)}$  with AIC equals to  $-97,86$  was ARIMA (1,1,0) and for second parameter  $\kappa_t^{(2)}$  it was ARIMA (0,1,1) with  $AIC = -251,59$ . For women was estimation more difficult but leading model for  $\kappa_t^{(1)}$  was ARIMA (0,2,2) with corresponding AIC equals to  $-105,83$  and best fitted ARIMA model for parameter  $\kappa_t^{(2)}$  was the same as for men with  $AIC = -242,58$ . Results are obtained by the SAS Enterprise Guide

software. We have used the best fitted ARIMA models for forecasting future values of the time-dependent parameters.

Tab. 4 - Forecasted values of parameters  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  with 95% confidence limits for women. Source: own research

Year	Forecast $\kappa_t^{(1)}$	95% Confidence Limits	
2021	-4,4516	-4,4972	-4,406
2022	-4,4465	-4,4921	-4,4009
2023	-4,4839	-4,5296	-4,4383
Year	Forecast $\kappa_t^{(2)}$	95% Confidence Limits	
2021	0,1081	0,1048	0,1114
2022	0,1081	0,1046	0,1115
2023	0,1081	0,1045	0,1117

Tab. 5 - Forecasted values of parameters  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  with 95% confidence limits for men. Source: own research

Year	Forecast $\kappa_t^{(1)}$	95% Confidence Limits	
2021	-3,8317	-3,9122	-3,7511
2022	-3,8502	-3,9394	-3,7610
2023	-3,8711	-3,9695	-3,7728
Year	Forecast $\kappa_t^{(2)}$	95% Confidence Limits	
2021	0,0956	0,0929	0,0983
2022	0,0959	0,0931	0,0987
2023	0,0962	0,0933	0,0991

In the Tab. 3, 4 and 5, we have given the forecasted values of the CBD model parameters  $\kappa_t^{(1)}$  and  $\kappa_t^{(2)}$  along with its 95% confidence intervals for the next three years. We observed that in the following years mortality rates are expected to decline for the population of Slovakia. This is due to decreasing nature of parameter  $\kappa_t^{(1)}$ . Second parameter  $\kappa_t^{(2)}$  has however increasing trend (except for the female population), so we assume that in the future mortality at younger ages will decrease more rapidly than at older ages. Graphic output of forecast from SAS Enterprise Guide is displayed in Fig. 6 and 7.



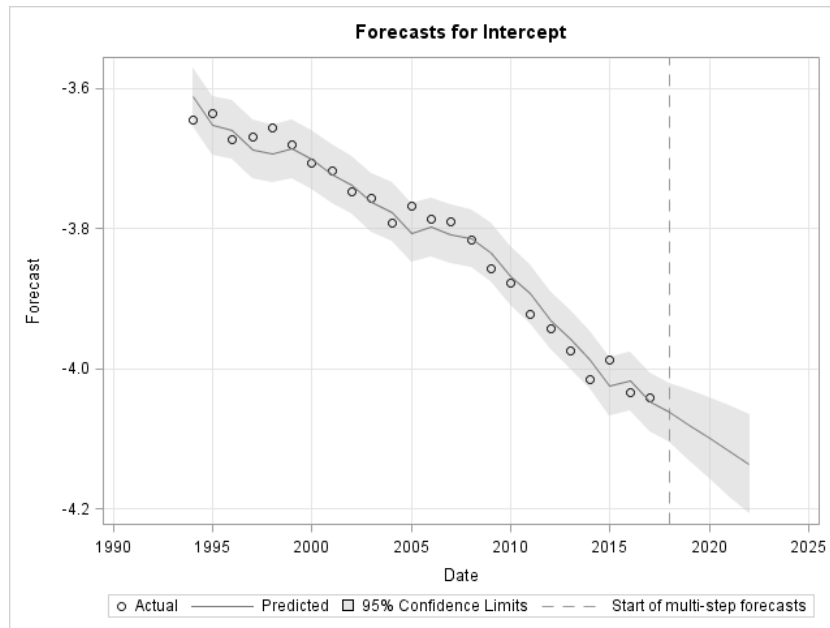


Fig. 6 - Forecast of  $\kappa_t^{(1)}$  using ARIMA modelling in SAS Enterprise Guide. Source: output of SAS Enterprise Guide

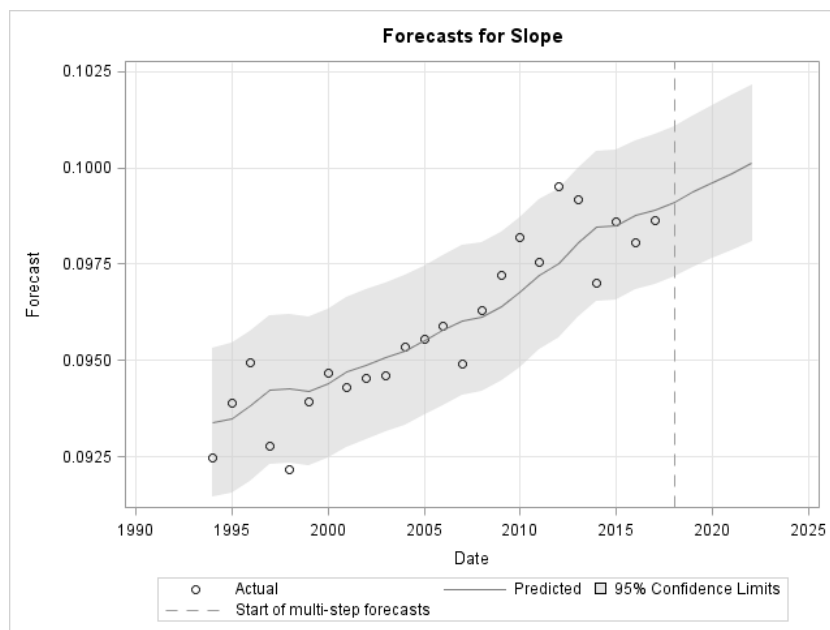


Fig. 7 - Forecast of  $\kappa_t^{(2)}$  using ARIMA modelling in SAS Enterprise Guide. Source: output of SAS Enterprise Guide

We have forecasted values of probability of death  $q_{x,t}$  by using estimated parameters. From the prognose we can say that in following years we do not expect for mortality rates to change drastically. In Fig. 8 we can see estimated values of probability of death  $q_{x,t}$  along with a 95% confidence interval for men and women. Since the predicted values of probability of death are very similar in the next three years, we decided to plot only values for the year 2023. Estimated values without gender as modelling factor is somewhere in the middle of male and female population forecast.

We obtained a useful tool for actuarial calculation. We choose to estimate parameters of the CBD model that are dependent on time only for three years for multiple reasons. Firstly, by the prognose for shorter period we obtain more accurate results and also we assumed that life insurance companies recalculate their mortality assumptions at least every couple years which is recommended even with stochastic CBD model due to possibility of change in mortality pattern of population as seen between 1993 and 2017 in Fig. 1.

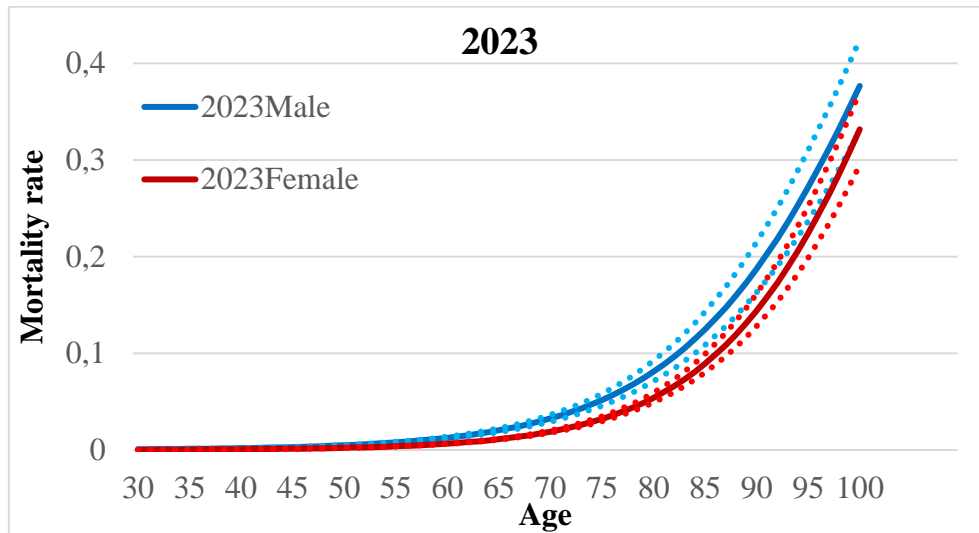


Fig. 8 - Prognose of mortality rate  $q_{x,t}$  along with 95% confidence interval. Source: own research

## 5 CONCLUSION

We modelled the mortality rates of Slovakia population by using the Cairns-Blake-Dowd model for the age interval from 30 to 100 years based on mortality data from 1993 to 2017. We can say that the CBD model is eligible for modelling mortality for insurance companies because of its accuracy and forecasting possibilities. Based on parameters of CBD model we identify following:

- Parameter  $\kappa_t^{(1)}$  (intercept of CBD model) demonstrates a decreasing trend from year to year, which indicates that the overall level of mortality has been improving over analysed time and will continue to improve in the future.
- The change in  $\kappa_t^{(2)}$  represents the change in steepness of the mortality curve. For the female population, this parameter can be considered stable throughout the whole interval. For the male population, on the other hand, it has a more growing trend from 2005. Male population have bigger impact on parameter  $\kappa_t^{(2)}$  without sex as modelling factor, because in this case parameter has slightly increasing trend also. Increasing trend signals that mortality at younger ages has been and will decrease more rapidly than at older ages.

Gender differences in mortality are still significant so the question about relevance of Gender directive in insurance remains. Future research will attempt to back-test the results of this CBD model and to analyse the impact of the Covid-19 pandemic on stochastic models.

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### Contact information

#### Ing. Jana Kútiková

University of Economic in Bratislava, Faculty of Economic Informatics  
Dolnozemska cesta 1, Bratislava 852 35, Slovakia  
E-mail: jana.kutikova@euba.sk  
ORCID: 0000-0002-3821-1992

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# BEHAVIOR OF E-BOOK READERS IN THE DIGITAL SPACE DURING THE COVID-19 PANDEMIC

*Miriama Koliščáková, Jana Paveleková*

## **Abstract**

Under the influence of the Covid-19 pandemic, our common activities are more digitized and their realization has been moved to the digital environment. During the first wave of the pandemic, the demand for e-book readers went up, while many book e-shops have also offered their current and potential customers significant discounts on e-books. For that, we can for sure claim that the current situation also affects the shopping behavior of e-book readers. The main aim of this submission is to map opinions and current attitudes of e-book readers based on theory and to bring results for practice, which can help companies on Slovak book market to communicate better with them. Based on the research, authors answer the following question. "Does digital environment affect e-book readers more significantly during the Covid-19 pandemic?" As a research technique, the authors have chosen the option of a focus group. The results were collected during the months of February and March, whereas the authors assembled 6 groups with 5 members each. All 30 respondents live in Slovakia. Their common sign was that they are all e-book readers. Individual focus groups were realized with online calls and they took an hour. From the research, it is obvious that the Covid-19 pandemic has influenced shopping behavior of respondents.

*Keywords: E-book, e-reader, digital marketing communication, consumer behavior, the Covid-19 pandemic, focus group*

## **1 INTRODUCTION**

There are many factors which influence shopping behaviour of a customer while choosing and buying a product. Customers, who in the past were afraid to shop through the internet have gotten used to it and started to use modern internet systems to realize the purchase online. The book market is no different. The topic of using e-books is becoming more actual every year and the purchase of e-books is becoming more popular among the readers thanks to digitalization. E-books pose as one of the fastest developing segments and thanks to the high expansion of the internet and the need for a higher comfort of the readers, they have become more searched. Sophistication of reading devices that provide almost the same experience to that of reading an actual book, and technical development is the key factor driving the global e-book market. Multilingual features of e-books and the rising adoption of smartphones is an advantage, which is expected to drive the global demand for e-books. (Research and Markets, 2021) The purchase of e-books through the internet presents many advantages for the customer, including a low price, overall convenience and the speed of e-book delivery. E-books have been present for several years and yet, there are many readers who haven't had the courage to use their potential and try an e-book themselves. E-book is a digital version of a work, which has a similar form of a computer file consisting of text, pictures, many times hypertext links and other hypertext objects. Opposite of common electronic documents, e-book is adapted to reading on multiple electronic devices, like e-book readers, smartphones or tablets. Not only do they open new options for readers, but they can enhance education, awareness and share information among the readers very easily. (Zbínová, 2016) E-books also contain some of the attributes that paper

books do not have. They are more social, they allow fast sharing, discussion, commenting, plus they can measure and compare dynamics of reading. (Kováč, M. et. al.) The question is, whether e-books will one day replace traditional printed books. Marketing manager of the Slovart publisher states that the number of people who buy e-book and audio books is rising every year. However, she states that in the book market, there are still marginal formats and most of the readers still prefer printed books. Despite the popularity of e-books, readers do not want to get rid of traditional printed books completely. Book publisher Ikar doesn't hide the fact that since 2011, they have released over 1300 e-books. "People increasingly buy e-books and audiobooks over the past few years. They realize their advantages mostly during travelling, since in comparison to printed books, they are much more compact." E-books are mostly used on the road, thanks to the easier transfer. We cannot state that they are threatening standard printed books, but they are more of an alternative accessory. On the first side, the disadvantage may seem to be harder manipulation with the device. Also, many readers prefer highlighting their favorite parts of the book with a pencil, or sticky paper. Many readers who haven't tried e-books yet may not know that highlighting text is an option for the reader. All notes are sorted in one file with their respective date and time. Also, the e-book remembers where the reader has stopped reading, which represents the role of bookmarks in common printed books. (Dvořáková, 2020) During the pandemic COVID-19, people all around the world were forced even more to adapt and become more digitally aware. Consumers have reviewed their shopping habits but they also discovered benefits from services they had never used before. For example, some consumers are switching to online purchases, discovering the safety and benefits of home deliveries, store pick-up, and cashless payment. (Pantano, et. al., 2020) In the presented article are authors questioning whether the digital environment affects e-book readers more during the COVID-19 pandemic. Authors address the issue of theoretical background of e-book market, new trends and future of e-books. In the second part of the article, authors are describing methodology of their own research, which was focused on the shopping behavior of e-book readers during the COVID-19 pandemic.

## 2 THEORETICAL BACKGROUND

Statistics from 2019 show that paper books still remain to be the most popular option among the readers. On picture 1, we can see that 63 % of Slovaks prefer to buy paper books. 7 % of Slovaks buy e-books online. People most often buy books based on their own decision (54 %). Another significant aspect is a recommendation from friends (43 %), also various awards (18 %) or books, that became the core of a movie adaptation (14 %). Since the internet is more popular by the day, social networks, media and reviews of bloggers are important for book buyers (29 %). (Picodi, 2019)



Fig. 1 – E-book Consumer behavior in Slovakia. Source: Picodi (2019)

Who are e-book readers and what are their customs? From the survey of bookstore Martinus, the typical e-book readers are women in the age of 31 to 45. E-books today don't only appeal as technological enthusiasts. Based on the surveys, Slovaks most often download e-book on Android devices, iPads and iPhones. There are still a great number of people who prefer to read an e-book on a computer or a laptop. The research shows that almost 80 % of people pay for e-books via text messages or through a bank transfer. (Buno, 2014) Another research shows that the most favorite device to read an e-book on is an e-book reader, which is preferred by 50 % of readers. (Bórik, 2014) The fact remains, that we read from e-readers for only about a decade. For older readers, there can be a problem using an e-reader because of their custom to read from paper. While the British survey from National Literacy Trust came up with an interesting statistic, which shows the reality, that younger generations are better equipped, when it comes to handling technologies. Only 32 % of the kids from ages 8 to 16 prefer to read from paper, rather than reading from a screen. (Čupka, 2016) National Endowment for the Arts states in their research, that readers, who read e-book and listen to audiobooks consume more books compared to readers, who read classic printed books. 44,5 % of the survey participants admitted that they read or use the option of audiobooks, while 25,1 % of the surveyed prefer printed books. The survey was done on a sample of 1500 respondents in 2017. When we focus on the respondents, who read or listen to audiobooks exclusively in digital form, 50,6 % of surveyed read only from an e-book reader, while 35,6 % respondents stated, that they use e-books and listen to audiobooks and 13,8 % answered, that they listen only to audiobooks. An interesting fact is that the share of adults who use audiobooks grew up to 6% in 2018. (Kozłowski, 2020) We can state that gradually, e-books and audiobooks are on the rise. Readers older than 65 prefer printed versions of books and readers in the age from 18 to 24 are more inclined to use e-book readers and audiobooks.

### **The future of e-books**

E-books have many advantages over printed books. They usually contain a table of content right in the beginning, in which you can easily click through chapters. They also allow searching for specific phrases in the entire file. If we compare paper books to their electronic version, they have several specific properties that allow more practical use of an e-book. Also, material released books can swiftly sell out, while their reprint takes some time compared to e-books that don't have to deal with this issue, since they appear on the internet in unlimited quantities. (Kraviarová, 2015) The biggest disadvantage of e-books is generally considered to be their intangibility. In her publication, Sigmund describes that the rustle of the paper, smell of the book, also the ability to touch the book and their distinctive cover can help the reader to create a special emotional bond to the book. E-books, in this sense, are more known as "non personal files", which are stored in some cold technical device, which can obstruct the ability to create a personal feeling towards the book. (Sigmundová, 2015) E-books present certain properties, which material printed books don't dispose of. More and more stand-alone research is being done regarding the reading of e-books. One of these researches is focused on maintaining the focus of the reader. Neurologist Martin Stránský claims that during reading the paper and via screen, we use different brain mechanisms. If a person holds something in their hands physically, they receive information better and they create more neurological pathways towards it. Based on several experts, the key factor could be the basic page rotation in physical books, because they can then divide the text into some imaginary parts. (Ciborová, 2014) The future form of e-books could be that the traditional publishers won't be the only ones developing them, but they could also be assisted by developers from the game industry. E-books could in the future be more social with the possibility to communicate with the author himself, or with the possibility to show comments to the separate parts in the book from influential personalities, or

people, who the reader believes in. E-books then maybe won't change the book market but provide an entirely new alternative of reading experience.

**New trends**

In the year 2020, the global market with e-books had the value of 18,13 billion USD. It is expected that until the year 2026, this market will reach 23,12 billion USD of worth. Technological progress and development of reading devices is a key factor, which drives forward the global market with e-books. Thanks to simple access to e-books via the internet and apps online, the e-book market appears to be a great and low cost alternative to traditional methods of book delivery. No to mention the campaigns to protect the environment, which especially focus on saving the trees and creating an effort to lower the consumption of paper and support the idea of electronic books.

As we can see on Picture 1, Global market with e-books is fragmented by many independent authors and publishers. The dominant share on the global market with e-books has the Kindle Direct Publishing platform on Amazon. (Modor Intelligence, 2020)



Fig. 2 – E-book Market – Growth rate by region (2020 – 2025). Source: Modor Intelligence (2020)

It is expected that digitization of books and their availability through the internet will create an innovative environment, which will offer the readers an authentic experience. While it's more expected that USA consumers will master digital technologies for reading activities, the German population is also expected to rise in digital reading literacy. The German population also uses electronic devices to read more and more often. In picture 2, we can see the number of people in the millions who read e-books on electronic devices in Germany from 2015 through 2019.





Fig. 3 – Number of people who read books on electronic devices, in millions, Germany, 2015 – 2019. Source: Modor Intelligence (2020)

### Covid-19 and e-books

Because of the corona crisis caused by the COVID-19 virus, many bookstores and libraries were forced to close their shops for a certain time. The market with e-books has gone down over the years, however, now it is one of the simplest ways to reach new books during the pandemic, and according to libraries and publishers the interest in e-books has gone up. OverDrive – American digital distributor of e-books, audiobooks, magazines and streaming video titles states that children's e-books have become the most popular. The interest in factual literature for young people has gone up by 122%, while fiction for young people has gone up by 93 %. System also registered since the beginning of march 343 000 new members with requests of licences to the digital library, which is more than double the memberships for the past year. (Pressman, 2020)

The interest in e-books has also gone up in Slovakia. According to the Ministry of Education, thanks to the pandemic, the interest has gone up mainly in virtual study rooms and online access to e-books, mostly in students. Virtual study rooms provide employees and students the access to more than 400-thousand pages of study and scientific research titles, which the universities singled out. The goal of this virtual study room project is to mainly secure simple and immediate virtual access to e-books that can support education, science and research for students on Slovak schools. Regarding the Covid-19 pandemic, the Ministry states that they have noted a massive growth of unique users of these virtual study rooms. According to the Ministry of Education, before the pandemic, virtual study rooms had had 573 users, while in april 2020, this number has grown to 1525 users. This number went down during the summer, most probably because of the end of the summer semester at universities. The highest gain in access to digitized documents was noted immediately after closing the university libraries. The statistics from summer semester, month of March till June 2020 tell us about 3447 users, while during the same period in 2019, virtual study rooms had only 860 users. It's a percentual increase of 300,81 %. (MINEDU, 2020)

### 3 METHODOLOGY

The aim of this submission is to find out the shopping behaviour of e-book readers during the Covid-19 pandemic. We determined the research question to be: "Does digital environment affect e-book readers more significantly during the Covid-19 pandemic?". To research the answer, we have used a focus group, which is a standard qualitative research method. For a deeper understanding of the respondents, we chose the target group. We needed to know the answers not only to the question "what" but also "why". A questionnaire survey or other method could be counterproductive to the results we wanted to obtain. Therefore, we chose a qualitative survey.

We have chosen this technique, to gain information from diverse respondents from different parts of Slovakia, while the only sign connecting them is that they regularly or irregularly read e-books. The aim of this work was to find out, what is the attitude itself to e-books, which do they read the most often, what is their stance to buying e-books, which factors can affect them, how do they perceive digital marketing communication of e-books in the space of Slovak internet and more. We realized the Focus group via online meetings during the months of February and March, where we have involved 30 respondents. Together, we have led 6 groups with 5 members each. Each of the group calls lasted for an hour, while the discussion was led by the researcher. The researcher not only monitored the answers of the respondents, but also their mutual reaction on individual answers and non-verbal communication.

### 4 RESULTS

30 respondents have participated in the focus group, consisting of ages 20 to 32. There were 21 women and 9 men. We can assume that from the addressed sample, generation Y and Z are the most interested in reading e-books. All of the participants came from Slovakia, most of them from West Slovakia, while they were mostly working university students or employed young adults. The results of the focus group conversations are:

#### 1. Question: What social networks do you use?

Respondents most often answered Facebook, Instagram and Youtube. In Slovakia, these are the most used social networks, where the users can find content which is most appealing to them and besides the legislature regulation, they are not limited by anything. Algorithms of the above mentioned social networks show them content, which interests them the most, or can possibly interest them. Readers also have different social networks available to them, which are more focused on books. We can mention, In Slovakia, e.g. Goodreads, Books database or ČBDB. Only 3 respondents noted that they actively use Goodreads. In our opinion, the reason for respondents not using this social network is that it's in English and of little knowledge on Slovak book market. For this reason, we think that Slovak firms should communicate e-books mainly on Facebook, Instagram and Youtube, because most of their target or potential audience is focused there.

#### 2. Question: What content interests you the most?

We believe that during the Covid-19 pandemic, it is even more difficult to interest social network users with our content. People have moved from an offline environment to digital online space, thus the posting of information has grown, which has created an interesting competitive environment. If the users aren't interested in content, or they don't search it targetly, it is not always shown to them due to the social networks algorithm always changing. For that, if firms don't pay for ads of their content, many will be forgotten. Respondents most often answered that they are interested in creative content, in that case, they don't care about its format. If the information is regarding something, they are interested in, it's funny and fresh,

they even like to read a longer text or they click on an external link, or they research the information elsewhere. They most often noted that when it comes to format, they are most interested in picture or text. Video, due to its lengths, does not suit their needs, because they most often don't have the sound on while searching social networks. In that case, they cannot get the information from the video. For consideration, the firms could start to add subtitles or comments directly to the video.

### **3. Question: What is the most important thing when choosing an e-book?**

Here the answers of the respondents most often parted. We could generalize their answers to: references from friends and social networks, annotations, cover and the author. Most often however, they mentioned the price. Although it's known that e-books are cheaper than paper books, despite that, respondents look on their price and it can affect their decision making. From their discussion, it turned out that if the price of an e-book and paper book differs minimally (difference of a 1 or 2 Euros), they would rather choose the paper book. We believe, that despite the advantages, that e-book provide to their readers, paper books are more valuable to the respondents. So, when looking on the pricing of their purchase, they are more likely to pay more for a material product, rather than its electronic version.

### **4. Question: Do you read e-books in foreign languages?**

E-book market isn't centered around a certain place. Because of that, the product is able to be bought and downloaded to the device electronically, readers don't have to choose from the current offer of available Slovak bookstores. Therefore, we were interested in what other language they read e-books most often in. This can create an image, which book markets most often interest the readers. They mostly answered that they read e-books in Czech and English language. They can purchase Czech e-books on a Slovak e-shop, if they are included in their portfolio. They purchase English e-books in foreign e-shops, while 1 respondent stated that she buys e-books directly through her Kindle reader on Amazon, where books are most often in discounts. The advantage is, that she doesn't have to wait for a Slovak translation, which isn't automatically happening every time, but also, e-books in English are cheaper than the same title in Slovak language.

### **5. Question: In which formats do you read e-books?**

The answers from respondents parted here again. They either stated that they don't care about the format, if their device can read them. The second group of respondents leaned towards PDF and EPUB. 3 respondents have stated that they favor EPUB, mostly because of the options provided, where the reader can adjust page view and size of the text on the page. One respondent noted the AZW format, mainly because of Amazon e-books, which she buys directly from Kindle. It's their specific format.

### **6. Question: What device do you use to read e-books?**

We expected that most of the respondents will mention an e-book reader. However, only 4 respondents mentioned these answers. 20 respondents stated that they read e-books mostly by their smartphones, where they have a mobile app, which fully suits their needs and fully replaces another device, an e-book reader. 6 respondents even noted that they use a computer to read e-books. However, the genre is school and professional literature.

### **7. Question: Where do you buy e-books?**

Knihy Dobrovsky, Martinus, Amazon, Ibux. These were the most mentioned bookstores. Respondents most often prefer their sales on e-books. Given that the price is a fundamental factor when it comes to e-book purchasing, for readers it is immensely important that bookstores constantly inform the targeted or potential audience about sales and e-book titles

that are about to be released. Respondents in this question also answered that they illegally download their e-books. It happens when they can find an e-book for free on a site. In this case, even though they are aware of their wrongdoings, they decide to illegally download the e-book. Their motivation remains to be pricing, or if the title isn't available in a printed version - e.g. professional literature.

**8. Question: If the e-book was at a big discount, would you rather buy it? For example, for a single Euro. Or would you rather still download it from the internet?**

The respondents in this question all answered that they would rather buy the book, given that they would know about the discount. They would like to support the author/publisher/bookstore, but the pricing of e-books on Slovak market is, in their opinion, excessively high. With that in mind, we have asked a complementary question, for how much are they willing to pay for an e-book in maximum, or what is the meaning of a "cheap book", when they would rather buy it, than download it for free. In all of the groups, the respondents have agreed on the price of 5 €. This price seems adequate to them for an electronic product. However, for an e-book, they are willing to pay a maximum of 10 to 20 Euros. In that case, they would think about the purchase and other factors would have to interfere into their decision making.

**9. Question: Do you perceive marketing communication of bookstores on chosen e-books on the internet?**

Respondents are aware of marketing communication of e-books on the internet and they even often search for it willingly. However, the respondents feel that marketing communication focused on e-books is given minimal space. They most often notice that a certain title is being promoted, or a specific author, but only after they themselves search for it, they find out that the book is also available in electronic format. They believe this is a big negative on Slovak book market. Actually, even if they noticed a campaign in digital space for an e-book, they cannot remember what title or genre it was, or who was the author. They cannot remember any other information or specifics.

**10. Question: What can persuade you the best to buy an e-book?**

The respondents answered that either the motivation to own a paper or electronic book, place in the room or the price.

**11. Question: Do you prefer e-books as a format to classic books?**

Even though all the respondents were readers of e-books, if they would have to choose between electronic or printed format, they would always choose the paper format of the book. Here, we asked a complementary question, whether they prefer e-books to audiobooks. Surprisingly for us, from these two options, the respondents stated that they would rather choose audiobooks. They explained that during the Covid-19 pandemic, they can multitask while listening to an audiobook and do other activities, e.g. cleaning, cooking, exercising, painting etc.

**12. Question: During the Covid-19 pandemic, do you read e-books more often, the same, or less often?**

Respondents answered, that they either read e-book more, because they have more time for this hobby, or less often. 5 of the respondents stated, that they read e-book less often mainly because they were struck by "reading crisis" and that's why they choose other activities, rather than reading books at all. This occurrence could be caused by social isolation and the change of lifestyle in almost all areas that the respondents were used to.

**13. Question: An author offers a novel for free in the PDF format and news about her and her work for subscribing to a newsletter. Would you?**

23 respondents stated that they would. The rest would require more information. They wouldn't have a problem subscribing to a newsletter, but it would have to be their favorite author. They don't want their inbox filled with unknown authors or texts. They would however be happy that they supported the author in her work and could always learn something interesting from her life.

**14. Question: The publisher offers e-books from authors, who you don't know, but it's your favorite genre for 1€. Would you buy their e-books?**

Respondents stated that it would matter which publisher is offering. If they have a good experience with its products, they would most surely support their authors by buying their e-books, even if they wouldn't know the authors. They would rely on their experience, that whatever they read from that publisher, they always liked it. They even wouldn't have an issue, if it were unknown authors. Quite the opposite, they can only become known, if someone supports them and the book world gets to know them. That is why we would evaluate this as an interesting and positive concept of propagation.

**15. Question: The publisher offers a free e-book to a printed book. Would you buy the book combined with the e-book in this sale?**

The respondents displayed interest in such a combination. They would use it in casem when e.g. they wouldn't be in the right mood for an e-book. They would choose the paper version, or they can imagine that if they liked the e-book, they would give the printed version to someone, who they know would like that sort of book. One respondent stated that he alone has bought such a combination in the past. It was professional literature and authors he wanted to support, but he also offered an audiobook, which seemed convenient for him.

**16. Question: A bookstore shares on their social networks that they offer more than 50% discount on e-books that aren't new, but you haven't read them. The genre is in sync with your favorite and you have heard about the author. Would you click through to their e-shop, or would you buy this e-book, if you were interested in the cover and the annotation.**

Respondents have again stated that they most definitely would. They would buy this e-book, because they can discover a new author, whose style is in their liking and later could buy other books from their production. The release date isn't substantial for them, quite the opposite, they like to give life to books that have gradually fallen to oblivion. Here, most of them went into discussion, that firms on Slovak book market minimally promote e-books through social media or networks, which they believe is a huge native, because if they walk around a bookstore and see a title, that interests them, they don't wait to order it from the internet or and especially in electronic form. If there wasn't a pandemic raging in the world, they would most immediately buy the book, even if they would prefer an e-book. During the pandemic, they first look on the internet, if the book isn't free on some internet storage, or if the book isn't available in any form on sale. They believe that if stores would push for the electronic form more, they would be more motivated to buy it.

## **5 DISCUSSION**

The results of the realized focus group have brought us interesting conclusions. The respondents have agreed on almost everything in their respective groups, but also across other groups. Their

attitudes and ideas are stable, they haven't influenced each other, only complemented each other.

They most often use smartphones to read e-books. If the literature is for studying, they also read e-books through the computer. This result has surprised us, since in the research "Digitálna gramotnosť a čítanosť e-knžíh na Slovensku" has led to a different conclusion, that the respondents use mostly an e-book reader rather than a smartphone, tablet or computer. (Čábyová, Krajčovič, Paveleková, 2020). However, the research was done before lockdown and the measures taken to fight the coronavirus weren't that strict. We believe that it was the pandemic that could have influenced the usage of other different e-book devices, in regards to the financial possibilities of the respondents. For companies, it isn't defining, what device the e-readers use, if their device supports the used format. That is why it's more convenient for them to release e-books in the most common formats - EPUB, PDF, which the Slovak publisher already uses. (Paveleková, 2020).

Respondents most often use Facebook, Instagram and Youtube. They use more specific social networks for the book community far less, however Goodreads has found itself some users. We can read from the statistics that the most used social network in Slovakia is Facebook (2,6 million) followed by Instagram (1,10 million). 85% of the population has access to internet connection (Tamajková, 2019). So, if companies want to reach out to e-book readers through social networks, it could be useful for them, if they only focus on the most used sites.

When it comes to choosing an e-book, the most important attributes are - cover, annotation, author, genre, but most importantly, the price. It can affect their shopping behaviour so much that they can decide to either buy a paper version of the book, or they illegally download the e-book from the internet. Our respondents also stated that they do so, if they find the book free of charge in some internet storage. Even though they are willing to pay 5€ for an e-book, if they can, they are trying to find a way to save their finances. Illegal downloads of e-book is a global problem that is very complicated to fix. The loss in the Slovak market isn't possible to exactly enumerate. The readers decide to illegally download the book either because they think the price is too high, or the paper version is no longer accessible (Paveleková 2020). Even though publishers try to protect e-books, the protection they use isn't sufficient. Social DRM, that they choose, does not stop people from loading the book in storage and sharing it forward. Often publishers in Slovakia are considering whether this type of protection even makes any sense. So, sometimes it happens that the books are without any protection at all (Paveleková, 2020).

Respondents research information about e-books themselves. They are interested in digital marketing communication and about news, or older titles, but they just can't see it anywhere on social networks. Even though the companies do communicate the titles, they most often focus on paper versions. Only after looking up the information themselves, do they get to know whether the books come out with a digital version or not. We believe this to be a huge negative and disrespect to the needs of their targeted audience. Publishers in Slovakia have themselves stated that they primarily present information about paper titles and rely on the fact that if a potential reader has an interest in the e-book version, they can look it up themselves in the e-shop (Paveleková, 2020). If the companies will continue to believe this is the right strategy till the end, they can lose many readers or profits. Respondents like to support known or an unknown author, and get to know new information, only do the companies need to create them. That is why not only communicating on social networks, we recommend the publishers to build effective content marketing and focus on several other target audiences of their current or potential customers.

The Covid-19 pandemic has influenced e-book readers. Even though, if they do have the option to choose, they would still prefer the paper version of the book, they do like to read e-books.

Actually, many of them started to read more e-books thanks to the pandemic. These times show that readers like to use multitasking, thus audiobooks have found themselves an enlarged audience. This doesn't change the fact that e-books have their irreplaceable position on Slovak market and with the correct usage of especially digital marketing communication tools, they look to a bright future. It is necessary to work not only with the price, but also with publishing information. We believe that if the price was lower, more people could buy an e-book. Thus, less people would actually decide to illegally download it from the internet and the publishers would have their investments returned, possibly even achieve profit. It is necessary that they start to promote in digital space certain e-books, not only paper books and titles themselves. Only after inserting initial costs can they start building a double sided relationship with e-readers and only after they can achieve required results. However, it is in the long run that can bring the results.

## **6 CONCLUSION**

Thanks to quick technological developments, reading of e-books is becoming more and more popular and electronic books are more searched year by year. With the arrival of the Covid-19 pandemic, when the whole world shifted to an online environment, electronic books were at an advantage, mainly because of their easy availability. It's not a surprise that the ongoing pandemic has also had influence on this particular type of segment. The aim of our submission, based on theory and primary data from our own analysis, was to map the opinions and attitude of readers to e-books. Firstly, this study was focused on analysing the theory and understanding of the problematics, that concerned consumer shopping behaviour of e-book readers during the Covid-19 pandemic. In the theoretical part, we defined theoretical terms and statistics of shopping behaviour of Slovak and foreign e-book readers. The limit in the research was the Covid-19 pandemic itself, as we only had the opportunity to make an online call. However, because e-book readers were more digitally skilled, making an online call was not a big hurdle. In the future, we would like to focus on other target groups, not only Slovak e-book readers.

### **Practical Implications**

Primary source of information was a focus group that we realized of 30 respondents aged 20-32, who come from Slovakia. We asked about their attitude towards e-books, how and where they most often buy e-books, or how much they are willing to pay for an e-book. Respondents in this matter have agreed on 5€ for an e-book. E-readers would very happily support publishers and book authors, however prices of some e-books seem too high for them. Furthermore, based on our research, we can state that even though e-books are favored for their inseparable advantages, e-readers would still prefer classic books compared to the electronic form, which corresponds with our secondary statistics in the theoretical part of this study. The Situation seems to be that even though e-readers see many technological advantages in e-books, society will have to wait some time for e-books to be more popular.

### **Limitations and Future research agenda**

In this research, we have come across the boundary of national borders. It would be interesting to realize this research after the Covid-19 pandemic, or to compare Slovak e-reader to a foreign reader.

### **Acknowledgement**

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## Contact information

### **Mgr. Jana Paveleková**

University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication  
Adress of University: Nám. J. Herdu 2, 917 01 Trnava, Slovakia  
E-mail: [jana.paveleova@gmail.com](mailto:jana.paveleova@gmail.com)  
ORCID: 0000-0002-3281-6106

### **Mgr. Miriama Koliščáková**

University of Ss. Cyril and Methodius in Trnava  
Adress of University: Nám. J. Herdu 2, 917 01 Trnava, Slovakia  
E-mail: [miriama.koliscakova@fmk.sk](mailto:miriama.koliscakova@fmk.sk)  
ORCID: 0000-0001-8192-5678

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# DIGITIZATION, DIGITALIZATION AND DIGITAL TRANSFORMATION IN INDUSTRY - A SYSTEMATIC LITERATURE REVIEW

*Laura Lachvajderová, Jaroslava Kádárová*

## **Abstract**

The digital transformation of society is a highly topical issue. Technology can be noticed everywhere, for example with a digital watch connected to our smartphones. It connects us to a world that makes our lives easier and creates connections between people and businesses. This new world, created by us and created for us, uses our data to make our daily lives easier. This paper provides a research agenda for digital transformation with new perspectives, based on a systematic review of the literature, which will allow examining all aspects of the existing literature and empirical evidence. The literature review offers an internal overview of the scientific outputs, which can be useful for further research and ultimately save the scientist's time in finding appropriate sources for the selected topic. The review of the literature is based on five scientific research questions that indicate the direction of the review. The purpose of this study is to provide a basis for future studies that can help future studies to better understand the digital transformation and its characteristics. The output of the article is an explanation of the procedure of performing this literature review and also an evaluation of the available sources in the scientific database Scopus using the software Publish or Perish.

*Keywords: Digitization, Digitalization, Digital Transformation, Literature Review*

## **1 INTRODUCTION**

The rapid development of technology, as well as many changes in the global market, have led to the emergence of a new trend - digital transformation (DT). The idea of digital transformation is divided into the words "digital" and "transformation". The term "digital" is used in the same way as "information technology". Today, the term "digital" is synonymous with the speed of change that is taking place in today's world with the rapid acceptance of technology. The term "transformation" means that digital use integrally enables new types of innovation and creativity in a particular field. Today, companies are changing thanks to new information and communication technologies, but few have understood how to take advantage of this phenomenon. DT is essential for all businesses, regardless of their size and sector of activity.

In addition to dematerializing work processes, it allows you to optimize your operations and increase performance, efficiency, and competitiveness by adopting new management methods, new tools and new working methods. DT has become an important topic of interest and a strategic issue for all companies. It offers them new opportunities that go beyond their traditional activities, by accelerating their growth and creating sustainable competitive advantages and operational safety (Arribas & Jose, 2018).

In recent years, many studies have attempted to define a solution for the successful management of DT. However, there is still a lack of guidance for businesses on how to deal with these radical changes. For example, Henriette et al. (2015) showed a systematic review of the literature on the weaknesses and opportunities of digital transformation, such as digital capabilities, business models, customer experiences and operational processes. A few years later, Joao Reis et al.

(2018) provided a review of the literature and guidelines for future research to define the concept of digital transformation, which provides a general overview of the literature, together with suggestions for future research.

## 2 THEORETICAL BACKGROUND

DT is a relatively new concept and has gained great popularity among researchers and practitioners over the last few years. In constant development, we are witnessing a real revolution instituted by organizations. To understand the term digital transformation, it is necessary to first define and distinguish the terms "digitalization, digitization and digital transformation". The use of these terms currently creates some ambiguity in the scientific community, as most researchers use these terms interchangeably, when in fact there is a significant difference between these terms that need to be able to distinguish.

The term "digitization" means the conversion from analogue to digital format; it is a representation of information in the binary language (0 and 1). It is also a representation of information in any computer system. For example, it is possible to scan a photo using a scanner and save it on another medium, e.g. CD-ROM. The term "digitalization" means the use of digital data and technologies to automate data processing and process optimization, as well as the use of a computer system to automate or semi-automated processes. From this point of view, informatization is a term close to the term "digitalization" and it is sometimes considered as a synonym. The term "digital transformation" is a new concept that is often used by academics and practitioners but changes very often depending on the context in which it is used. During the proceeding of a systematic literature review, it was found that this term is used very often, sometimes incorrectly, because there are no formal definitions in the academic literature. Many authors have tried to define them and discuss the concept. Figure 1 shows the differences between the terms and Table 1 interprets some unique definitions of digital transformation.

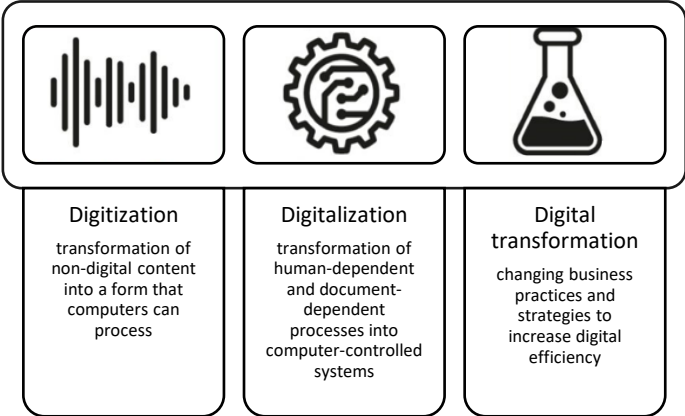


Fig. 1 - Differences between selected terms. Source: own research

Tab. 3 - Selected definitions of the term digital transformation from a systematic literature review. Source: own research

Definition	Source
The Digital Transformation Strategy is a proposal that supports businesses in managing the transformations that result from the integration of digital technologies, as well as in their post-transformation operations.	Matt et al. (2015)

<p>Digital transformation refers to the changes that digital technologies can bring to a company's business model, resulting in changed products, organizational structures, or process automation. These changes can be observed with the increasing demand for online media, which has led to changes in entire business models (for example in the music industry).</p>	<p>Hess et al. (2016)</p>
<p>Using new digital technologies (social media, mobile devices, analytical devices, or embedded devices) to enable significant business improvements (such as improving the customer experience, simplifying operations or creating new business models).</p>	<p>Liere-Netheler et al. (2018)</p>
<p>Digital transformation involves the digitalization of sales and communication channels and the digitalization of corporate offerings (products and services) that replace or expand physical offerings. Digital transformation further defines tactical and strategic business movements, which are triggered by knowledge gained from data and the launch of digital business models.</p>	<p>Horlach et al. (2017)</p>

According to Fors & Stolterman (2004), the first definition of DT appears, where they identified DT as the changes that digital technologies bring or that affect all aspects of human life. Other scientists, such as Westerman et al. (2011), define DT as the application of technology to radically improve the performance or create new business opportunities through digital data and technology. The change will no longer affect only business processes or macro processes, but all business processes, support processes and the organizational design itself. Enterprises are encouraged to review their activities and how they interact with stakeholders, adapt to new market behaviours or to take advantage of technological tools in the field of innovation or productivity. DT is a process of disruptive or gradual change. It starts with the acceptance and use of digital technologies that will evolve into an implicit holistic transformation of the business (Henriette & Boughzala, 2015). Different definitions of digital transformation can be divided into three different parts:

- technological - DT is based on the use of new digital technologies, such as social media, mobile devices, analytics, or embedded devices,
- organizational - DT requires a change in organizational processes or the creation of new business models,
- social - DT is a phenomenon that affects all aspects of human life, for example by increasing the customer experience (Reis, 2018).

Furthermore, transformational changes are needed for the implementation of DT, which is related to strategy, leadership, and organizational culture. The effects of DT in any business can be divided into three different levels:

- transformation of customer experience,
- transformation of business processes,
- business model transformation (Shwertner, 2017).

### 3 METHODOLOGY

Awareness of systematic literature review (see Fig. 2) has a growing nature, as it brings relevant data sources providing space for future research (Bennett, 2005).

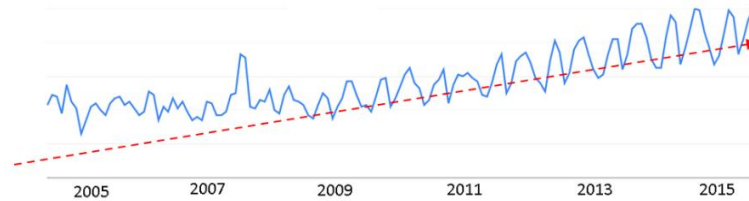


Fig. 2 - Awareness of the methodology of systematic literature review according to the previous years. Source: Google Trends

The aim of this article is to review the literature on digitalization and DT. A systematic method, following the Okoli & Schabram protocol (2010) (see Fig. 3), was used to examine a large number of peer-reviewed papers published between 2015 and 2020, from which a large number of documents related to digitalization and DT could be extracted, and these were selected for analysis. A systematic review has helped to gather all relevant information on DT and digitization through a consistent and well-defined approach. Its aim is to reduce systematic errors (commitment), mainly by trying to identify, evaluate and synthesize all relevant studies using a specific methodology.

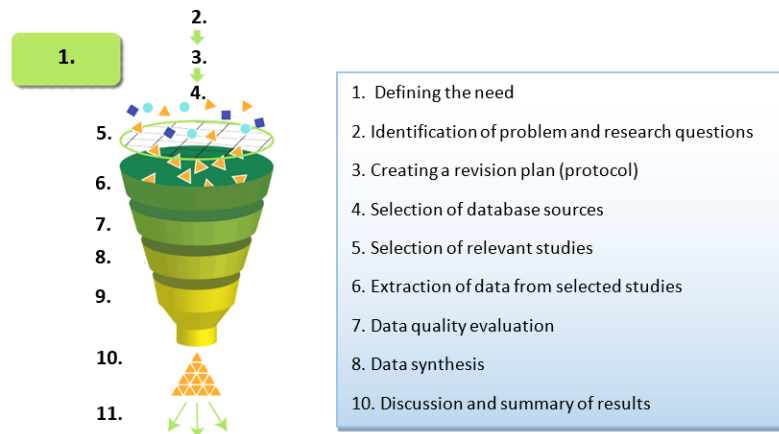


Fig. 3 - Systematic revision process. Source: Own research

The concept used in this research consists of both quantitative and qualitative analysis to reduce potential commitment. The qualitative concept focuses on the content of the literature and the quantitative concept is based on a bibliometric review using the free analytical software program "Publish or Perish". The Scopus digital scientific database was used to obtain citations, then the citations were analyzed to produce the following statistics: total number of contributions, the total number of citations, the average number of citations per contribution, the average number of citations per author, the average number of contributions per author, the average number of citations per year, Hirsch h-index and related parameters, Egghe g-index, Current h-index, age-weighted citation rate. Both concepts complemented each other in this study.

#### 3.1 Research question - research identification

The concept of systematic literature review has been applied to achieve the objectives. Before proceeding with the protocol, the first step in this study was to specify the problem and

reformulate the goal in the form of clear, structured, and unambiguous questions. The following research questions were examined:

RQ1: Which publishing databases are the primary target for DT?

RQ2: How has the frequency of publications on DT changed over time?

RQ3: What is the most common type of paper (conference/journal)?

RQ4: How can we define DT in the context of an industrial enterprise?

RQ5: How does DT affect industrial enterprises?

### 3.2 Research strategy

The search method used in the study is called a logical search (AND/OR). The literature search focused on scientific articles published in English between 2015 and 2020. A set of relevant keywords was selected through previous articles and articles in the same field or with a similar scope. The keywords used in this literature review are listed in Table 1. Keywords, abstracts, and titles were searched in different word combinations. The search chain which was used: [(“Digital transformation” OR “Industry 4.0” OR “Industry 4.0” OR “Smart Factory” OR “Digitalization”) AND (“transformation” OR “management” OR “change” OR “strategy”)].

Tab. 2 - Searched terms and keywords. Source: Own research

„OR“		„OR“
„Digital“ „Industry 4.0“ „Industrie 4.0“ „Smart factory“ „Digitalization“	„AND“	„transformation“ „management“ „change“ „strategy“

Using the Scopus digital library, the survey was performed using various methods with a specific search chain configuration. Scopus is one of the largest databases of citations and abstracts from peer-reviewed bibliographies and quality websites and has a wide coverage of various disciplines and topics. Scopus includes intelligent analysis tools.

Tab. 3 - Systematic research process. Source: Own research

SCOPUS	
Criteria	Filters
Definition	Topic (title, abstract, keywords)
Document type	Articles and proceedings from conferences
Language	English
Year	2015-2020

### 3.3 Quality assessment

The initial selection of contributions was not limited and a contribution from other research areas was included in the results, as we did not apply any restrictions. As the aim of this survey is to provide a comprehensive overview of areas of research that address issues related to DT contexts and digitalization and to examine their impact on industrial enterprises, the research results have been refined according to some qualitative measures. First, a manual check of the

content of entire articles, abstracts and title was performed. After that, the selection criteria for which studies are included or excluded were defined.

### Inclusion criteria

- The article should cover DT or digitalization and must answer research questions.
- The publication must have a transparent methodology.
- Research must come from credible sources and journals.
- The year of publication must be between 2015 and 2020.
- The paper must be written in English.

### Exclusion criteria

- The study is an editorial, consulting, workshop, summary report, poster or unpublished articles, diploma theses and books. Such documents were excluded because these articles are not usually reviewed.
- Articles whose entire text is not available.

The Scopus database search chain application made it possible to generate 245 articles. The article filtering phase started by applying the inclusion criteria. The research focused on journal articles and conference papers published in 2015-2020 in English. Then, based on their title, keywords, abstract, and the full text, we were able to select articles that would allow them to respond to the RQ.

## 4 RESULTS

### Occurrence of articles by year of publication

From 2015 to 2020, many articles about DT and digitalization will appear annually. From 2016 to 2018, the number of articles increased significantly with an increase of more than 20 articles per year. The number of papers published after 2018 has doubled, which only proves that digitalization has become an important area of scientific research. 52% of the total number of publications are articles in journals and 48% are conference proceedings. This data is demonstrated in Figure 3, which illustrates 207 works published over the years. Figure 3 also shows that the highest percentage of published articles (14%) in 2020 and the lowest (6%) in 2015.

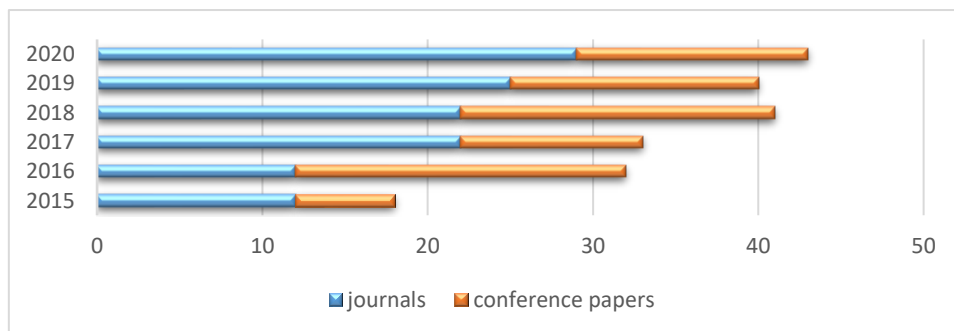


Fig. 4 - Occurrence of articles by year of publication (n = 207). Source: own research

### Publication of articles according to country

It should be noted that the countries that contributed the most are the so-called industrialized countries such as Germany, the USA, Russia with 34%, 18% and 7%. Not surprisingly, the USA and Germany are at the top of the rankings. These countries, influenced mainly by the size of their markets, also have a strong education and research system as well as a business-friendly environment. These giants are followed by Russia, the United Kingdom and Australia. Although the results of digitalization are less visible in these countries than in the United States and Germany, these countries have a fundamentally robust infrastructure, interconnections, and development expertise.

Tab. 4 Percentage of articles publication according to country. Source: own research

Country	Classification
Germany	34%
USA	18%
Russia	7%
Great Britain	7%
Australia	6%

### Top 5 authors according to citation number

One of the next tasks was to extract top 5 authors according to their citation number (see Table 5). To be more specific, the "Publish or Perish" software shows the results of the Scopus database in order of overall impact and influence. It considers various metrics, including the total number of citations. The most influential contributions focused on the digital transformation strategy and sought to help, guide, and help businesses meet the challenges and risks of the DT and digitalization.

Tab. 5 - Top 5 authors according to number of citations. Source: Own research

Author	Publication	Title of article	Number of citations	Citations/year
C.Matt et al. (2015)	Business and information systems Engineering	Digital Transformation Strategies	372	62,00
B. Chen et al. (2017)	IEEE Access	Smart Factory of Industry 4.0	262	65,5
T. Hess et al. (2016)	MIS Quarterly Executive	Options for formulating a digital transformation strategy	252	50,40
A.G. Frank et al. (2019)	International Journal of Production Economics	Industry 4.0 technologies: Implementation patterns in manufacturing companies	250	125,00
L.S. Dalenogare et al. (2018)	International Journal of Production Economics	The expected contribution of Industry 4.0 technologies for industrial performance	216	72,00

### Publication of articles according to the journals

The journal with the largest number of publications in the field of digital transformation and digitalization was the MIS Quarterly Executive, a journal that supports practical research in the field of IS and shares the results of this research in a much more relevant way for practitioners.



Tab. 6 - Top 5 journals with the largest number of publications. Source: own research

Name of journal	Number	% of 207
MIS Quarterly Executive	15	7,24
International Journal of Production Research	8	3,86
Procedia Manufacturing	7	3,38
Technological Forecasting and Social Change	6	2,9
Computers in Industry	5	2,41

A similar research was performed in the Scopus database with a different term but the same filters. The result was many articles (approx. 40,000), so the Publish or Perish software is the right choice for this study, which is highly sensitive in research and reduces the number of articles.

## 5 DISCUSSION

DT is one of the topics that will cover the study agenda and management of many companies in the long run. It is a trend that is constantly renewed by new generations of digital technologies. DT can be characterized by three characteristics.

The first characteristic indicates that the DT is irreversible. New digital technologies or concepts for introducing new technologies may be less effective than existing technologies at the beginning of their launch. However, the situation improves when a transformation matures that removes predetermined solutions from their dominant market position. The user of digital innovation thus does not want to give up the comfort provided by its use. Renouncing the use of new technologies is unthinkable for many people. Second, DT is necessary. The current social and economic context requires the innovative use of digital technologies to address the challenges of urbanization and the globalization of economic activities. Nowadays, all businesses are being called upon to carry out this transformation to better integrate the new digital ecosystem and achieve this leap towards modernization. Advances in digital technology now allow companies to develop solutions to complex challenges. DT has reached the limit of maturity, which helps solve many unsolvable problems. The third characteristic states that DT processes are still uncertain but necessary and extremely fast. The rapid pace of digital technology development and its effects in many industries are making it difficult to predict which companies will succeed in the transformation. Acceleration of innovation and change can also be seen. Competitiveness has ceased to rely solely on the physical product but rather relies on its integration into the ecosystem of intelligent services.

DT is necessary, irreversible, and extremely fast. These three characteristics illustrate the fact that DT's economy and business is a process that cannot be stopped, and it is in full expansion. Although it is in the process of a profound general adjustment of the economy, digitalization is accompanied by profound and rapid changes in trade unions. The opportunities offered by new digital technologies are putting pressure on companies to constantly evaluate their potential for the development of existing business models.

## 6 CONCLUSION

DT is the field in which the academic literature is most interested, but it still requires a deeper definition of the concept, a better understanding of the requirements, but also a strategic orientation in the long run. A systematic literature review was performed to provide better characteristics for both research and practice, and to structure the field of DT. The results of this study show that there are still many documents trying to examine it. The resources found

contribute to ongoing research and focus on better characterization, analysis of the field and make it possible to emphasize the understanding of DT in enterprises and to identify useful research guidelines for future academic projects.

Over the selected number of years (2015-2020), many articles were published in various digital libraries, but only 207 articles belonging to the Scopus digital library were used for quality assessment. Through this study, interesting new research opportunities for future research have been identified. Ultimately, this review of the literature has generated a great deal of interest in supporting further work that could provide experts with valuable information and support new research to gain further academic knowledge.

### **Acknowledgement**

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## Contact information

### Ing. Laura Lachvajderová

Institute of Management, Industrial and Digital Engineering, Technical University in Košice,  
 Faculty of Mechanical Engineering  
 Park Komenského 9, 042 00, Košice, Slovak Republic  
 E-mail: [laura.lachvajderova@tuke.sk](mailto:laura.lachvajderova@tuke.sk)  
 ORCID: 0000-0003-3956-1852

**prof. Ing. Jaroslava Kádárová, PhD.**

Institute of Management, Industrial and Digital Engineering, Technical University in Košice,  
Faculty of Mechanical Engineering  
Park Komenského 9, 042 00 Košice, Slovak Republic  
E-mail: jaroslava.kadarova@tuke.sk  
ORCID: 0000-0002-5101-0773

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# TERRITORIAL ANALYSIS OF UNEMPLOYMENT WITH REGARD TO SCHOOL CLOSURES DUE COVID-19 PANDEMIC IN SLOVAK REPUBLIC

*Patrik Mihalech*

## **Abstract**

In year 2020, many spheres of life changed significantly. This was a result of major outbreak of Covid-19 disease into the entire world. Countries throughout the world undertaken measures which were up to now completely unprecedented, in hope to stop spreading of the disease. All these measures are having serious impact on world economy and unemployment rate. In many countries, including Slovak Republic, educational institutions were from day to day closed with intention to continue educational process online. Ability of distance teaching allowed many students to continue their education. On the other hand, not all students have the same conditions to educate from home and indeed, many of them could not participate in education process at all. In this paper we focused on districts of Slovak Republic with respect to their unemployment rate and availability of online education during the first wave of coronavirus pandemic. The aim of this paper is to study relationship between district's unemployment rate and ratio of students who did not participate in online education process. Second part of this paper focuses on relationship of education unavailability exclusively to unemployment of young people up to 25 years old. Study of these relationships is established on correlation metrics. Based on results of the research, steps are proposed to mitigate negative impacts of pandemic on education and related future development of districts which were affected the most.

**Keywords:** *covid pandemic, unemployment rate, online education, correlation, districts of Slovak Republic, youth unemployment*

## **1 INTRODUCTION**

Year 2020 will always be remembered as a year when coronavirus crisis influenced entire world and countries had to conduct formerly unimaginable measures to slow spreading of disease to avoid collapse of healthcare system. Among closing of retail stores and most of social services and basically all public events, also education system has changed considerably. Attendance teaching had to switch to online space. Platforms such as MS Teams or Zoom all of sudden became core tools for online education process. Teaching had undertaken one of the greatest changes in the past decades. According to United Nations (2020) Covid-19 pandemic influenced operation of 95 percent of schools throughout the world. Accessibility of online communication allowed students to continue in education process. However, not all children have the same equipment and possibilities to educate from home. This development made education process for teachers much harder and brought increased demands on parents who are bound to work from home and help their children with education as well. All these changes happen at once during one of the biggest crises in recent history.

One of another major problems related to economy is unemployment. In Slovak Republic after 7 years of decreasing trend, unemployment rate again quite significantly increased. Even though numbers are yet not as alarming as it was during financial crisis, many employees still have their position only due to state intervention and aid scheme for support of employment.

Moreover, this increase is not evenly distributed. In this paper we analysed unemployment rate as of December 2020 in all districts of Slovak Republic. Further on we analysed hypothesis, that children who could not attend online education process at all (due to financial or familial constraints), were located predominately in districts with high total unemployment rate and high youth unemployment rate respectively. We might suggest that pupils who could not educate properly, will tend to have bigger problems to find employment once they enter labour market. Additional problem might emerge if this happens to pupils in districts with already high unemployment rate. Education unavailability might bring further challenges for their labour career.

## **2 THEORETICAL BACKGROUND**

Closing of teaching facilities seems a good measure to stop spreading of coronavirus. Unlike closing of retail stores or factories, it is often considered as being not as bad for economy. Making less people unemployed and does not affect GDP. However, in the long run this might be a spurious assumption. UNICEF (2020) says that the benefits of keeping schools open outweigh the costs of closing them and suggests that nationwide closures of schools should be avoided at all costs. According to Hanushek & Woessmann (2020) even though precise learning losses are not known, existing research suggests that primary and high school students affected by the closures might expect some 3 % lower income over their lifetime and lower long-term growth related to such losses might yield an average of 1,5 % lower annual GDP for the rest of the century. Hallebrandt (2020) estimates that actual measures in education process, even after incorporation of distance education, might decrease current pupils net income by 0,3 to 0,9 percent. Given these assumptions pupil, who will earn average wage, will lose by estimate 2 510 to 8 048 € in constant prices. In terms of Slovak Republic this would mean overall loss of 0,4 to 1,4 bln. € what represents 0,45 % to 1,45 % of Slovak GDP.

Gardoňová & Rybanská (2020) point out that distance education emerges a lot of new problems and gains from this type of education is not equal to standard teaching. In terms of Slovakia, the problem is also that not all families have required technology at disposal. And if they do, in case of two parents on home office and two children on distance education, demand for technology is often unmanageable (Cedzová & Rybanská, 2020).

Extensive survey was conducted by Education Policy Institute (Ostertágová & Čokyna, 2020). In this survey participated 2 194 school directors and 15 645 class teachers from different districts of Slovak Republic. In total, data from 66,5 % schools in Slovak Republic were provided and class teachers answers covers 40,5 % of all classes in the country. This survey was aimed on primary schools and high schools. Results of this research are that during first wave of coronavirus crisis almost 52-thousand primary and high school students lost access to education. This makes 8,2 % of total primary school students and 5 % of high school students in Slovak Republic. Results were even worse in case of schools with high number of students from socially disadvantaged environment. Quarter of all students attending these schools did not participate in online education. We will work with this survey further on in this paper.

## **3 METHODOLOGY**

In analysis of unemployment as a starting point we worked with data provided by Central Office of Labour, Social Affairs and Family (ÚPSVAR, 2021) under Ministry of Labour, Social Affairs and Family of the Slovak Republic. Unemployment data are disclosed monthly. As an unemployed person we considered person that is registered in ÚPSVAR as applicant for employment. Data are available for all districts in Slovak Republic. As unemployment rate we considered ratio of applicants for job employment to total labour force in given district (1).

Therefore, as unemployed persons we assumed all applicants, unlike in rate of registered unemployment calculated by ÚPSVAR where certain applicants are excluded, such as persons with temporary incapacity for work or persons on sick leave.

$$\text{Unemployment rate} = \frac{\text{Number of applicants for employment}}{\text{Total labour force}} \quad (1)$$

With respect to analysis of students who did not attend online education process we took as basis survey conducted by Education Policy Institute by Ministry of Education, Science, Research and Sport of the Slovak Republic (Ostertágová & Čokyna, 2020) (this survey was described in preceding chapter). Extended report related to this survey was created by political party SPOLU presented by its chairman Juraj Hipš (SPOLU, 2021). This report also included information regarding number of students without online education with respect to territorial basis. Regarding this information we estimated strength of relationship between unemployment rate and students without online teaching in districts of Slovak Republic based on correlation metrics.

We used two types of coefficients to measure statistical relationship between our two given sets of data. Pearson correlation coefficient measures linear correlation between two variables and consists of covariance of variables divided by the products of their standard deviation (Pacáková et al., 2009) and represents normalised measurement of the covariance.

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sqrt{(x_i - \bar{x})^2} \cdot \sqrt{(y_i - \bar{y})^2}} = \frac{\text{cov } xy}{s_x \cdot s_y} \quad (2)$$

Relationship between rank of districts in unemployment rate and pupils without online education rate among all districts of Slovakia we measured through Spearman's rank correlation coefficient. Spearman's coefficient is a nonparametric measure of statistical dependence between ranking of two variables (Pacáková et al., 2015) and assesses how well can be described relationship between two variables by usage of monotonic function.

$$r_s = \frac{\text{cov } r_x r_y}{\sqrt{s_{r_x}^2 \cdot s_{r_y}^2}} \quad (3)$$

Both coefficients can gain values from interval  $\langle -1; 1 \rangle$ . Value close to 1 means strong direct relationship between examined variables, whereas value close to -1 stands for strong indirect relationship and value close to 0 means no significant relationship.

## 4 RESULTS

### 4.1 School closures related to Covid-19

When coronavirus pandemic started to cause worldwide concern, one of the first measures that countries have undertaken, was to close schools. Either partially, or fully. Among these countries is Slovak Republic as well. In Slovakia, schools were partially closed since 9<sup>th</sup> of March 2020, firstly in Bratislava Region by its governor Juraj Droba and on 16<sup>th</sup> of March by decree of Central crisis staff established by new Slovak Prime minister Igor Matovič, schools were closed in entire Slovak Republic. It was one of the fastest reactions among all countries in Europe. This decision rescued Slovakia from severe collapse of healthcare system on the one side. On the other side, it sent tens of thousands of students' home with purpose to educate from their homes. This decision had impact on students regardless of their age and type of school. Primary schools, high schools, universities, and infant schools all were closed. Schools were fully closed to 31<sup>st</sup> of May (Fig. 1). Even though through second wave in autumn and winter 2020, school status of Slovak Republic is officially partially closed, most of the students were



learning exclusively online. However, many students cannot attend online school education due to their family conditions or financial situation of their parents. Online education requires adequate equipment, which is serious issue for many families, especially for families with multiple children.

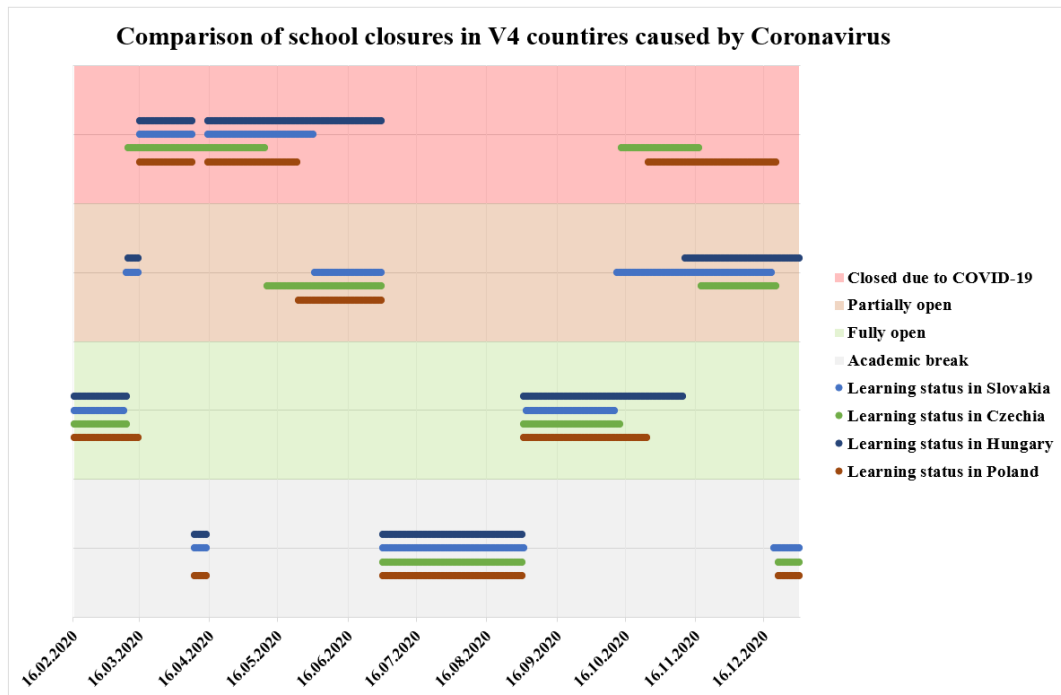


Fig. 1 – Timeline of learning status in V4 countries during 2020. Source: own creation, data from HDX (2021)

Fig. 1 shows that schools in Slovakia were closed 2<sup>nd</sup> longest among V4 countries through first wave of covid in spring 2020. All of V4 countries performed rather poor in this comparison being among the worst in entire EU. School were closed the longest in Hungary during the 1<sup>st</sup> wave of covid pandemic.

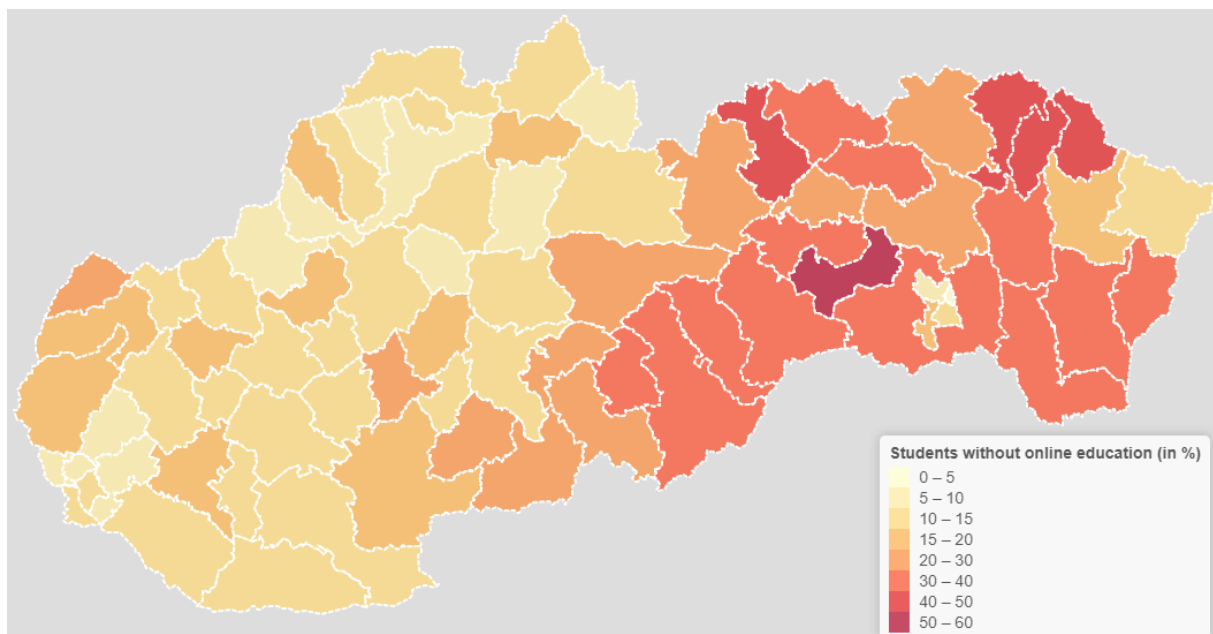


Fig. 2 – Students without online education during first wave of coronavirus crisis. Own creation. Data source: Ostertágová & Čokyna, 2020, SPOLU (2021)

In Slovakia, there were attempts to reopen schools in half of June, however, nearly all schools were essentially closed to summer holidays. Fig. 2 is based on survey conducted by Ostertágová & Čokyna (2020), which is described in preceding sections of this paper. We can conclude that there are huge discrepancies among districts of Slovakia.

Based on this survey, among best districts we can include Košice III with 3 % of students without online education, Bratislava I with 5 %, Trenčín and Bratislava III both with 7 % and Žilina and Turčianske Teplice with 8 %. On the other side of this ladder is to be found Gelnica with 58 % of students not attending online education, being the single district, where according to survey's results more students did not educate at all than students who participated in online education. Following districts are Kežmarok with 44 %, Svidník and Stropkov with 42 % and Medzilaborce with 41 % of students not attending online lessons. Another thing that we can observe from choropleth map on Fig. 2 is that students in western parts of the country had in general less problems in attending online lessons than students in eastern parts of Slovakia. This analysis concerns with first wave of pandemic, however, we expect that patterns in regional disparities were carried forward to next school year. Next part aims on development of unemployment rate in districts of Slovak Republic, and study of relationship with number of students not attending online lessons.

#### 4.2 Unemployment rate in Slovak Republic

Since 2012 to 2019 unemployment rate in Slovak Republic was systematically decreasing and reached 6.01 % as of December 2019. There were significant differences among Regions (Fig. 3) and even bigger discrepancies were recorded among districts. Lowest unemployment rate was in Bratislava Region where it reached 3,10 % and highest was 9,96 % in Prešov Region. In general, the worst situation was in Regions of eastern Slovakia – Prešov and Košice and in Region of Banská Bystrica in middle Slovakia, however, notable decreasing trend over past years was visible in these Regions as well.

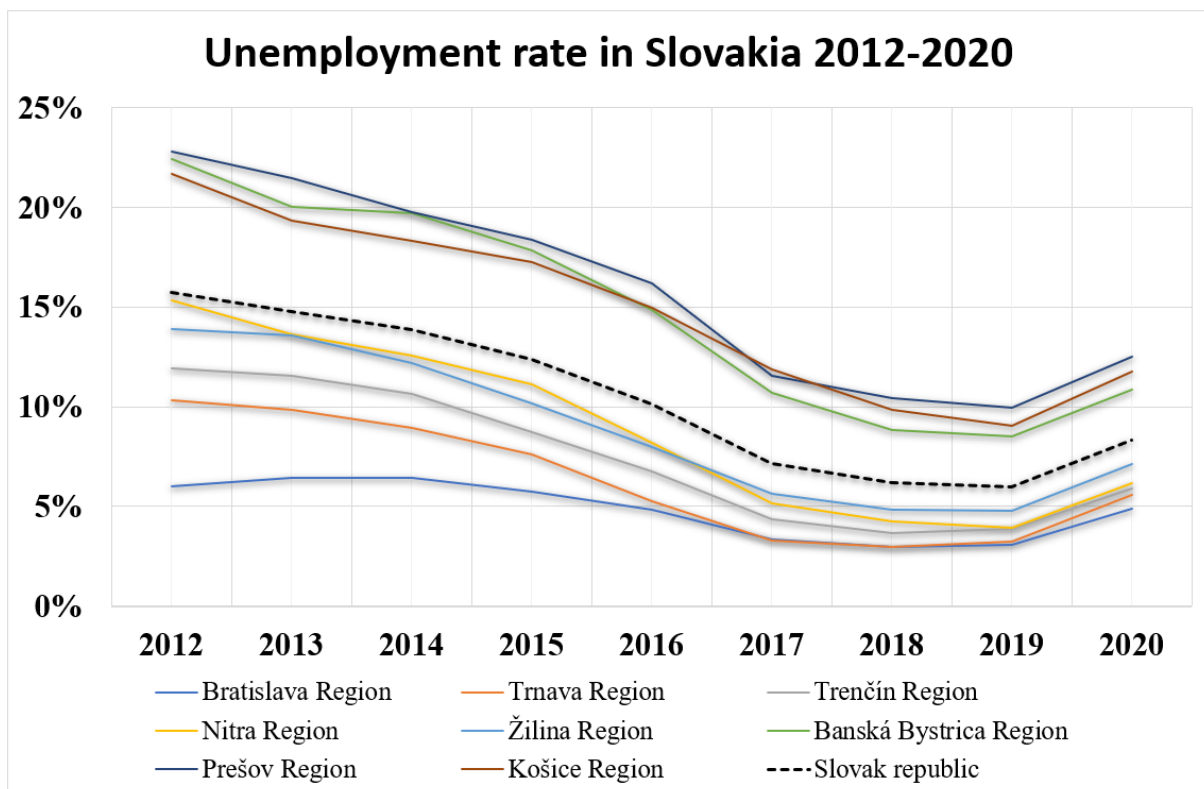


Fig. 3 – Unemployment rate in Slovak Republic. Own creation. Data source: ÚPSVAR (2021)

This all have changed since coronavirus crisis in 2020 emerged. After 7 years of decrease, unemployment rate again severely increased and reached overall value of 8.3 %. However, not all regions and districts were affected equally. The most affected were districts in Regions with already highest unemployment rate.

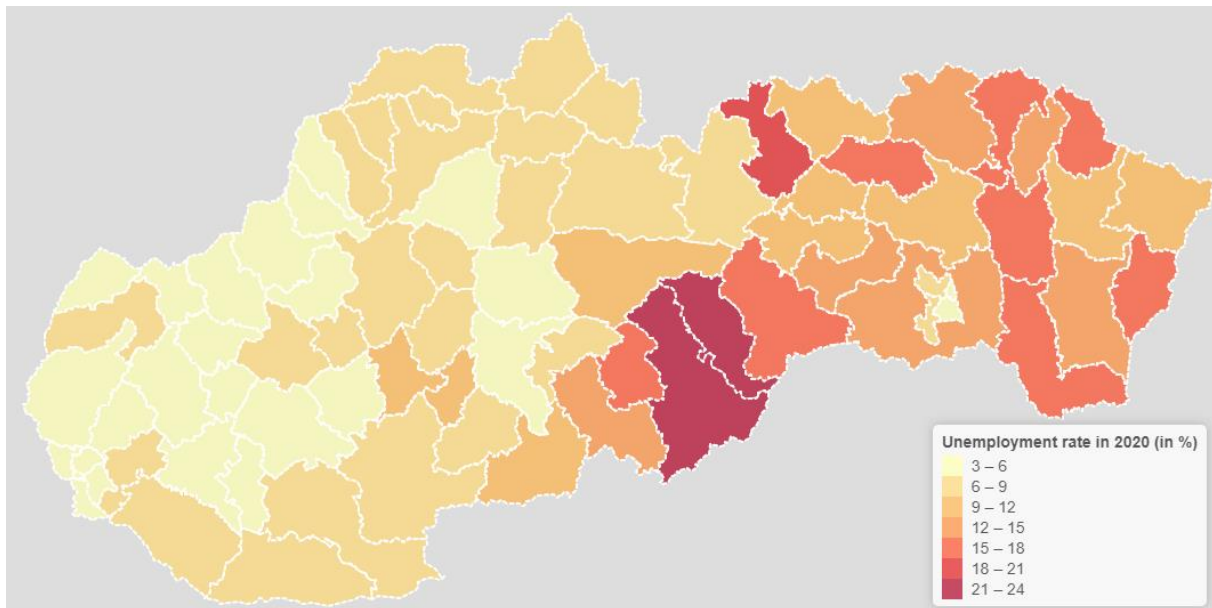


Fig. 4 – Unemployment rate as of December 2020 in districts of Slovak Republic. Own creation. Data source: ÚPSVAR (2021)

Unemployment rate exceeded 20% in two districts. Rimavská Sobota with 21.65 % and Revúca with 21.55 %. These districts had also one of the biggest ratios of students who did not participate in online education process. Rimavská Sobota was 12<sup>th</sup> worst with 35 % of pupils without online education and Revúca was 8<sup>th</sup> with 38 %. In top 5 districts with highest unemployment rate at the end of 2020 were also Kežmarok – 19.63 % (with 44 % of pupils without online education being 2<sup>nd</sup> worst in Slovakia), Rožňava – 17.80 % (with 35 % of students without education placed on 11<sup>th</sup> place) and Sobrance – 17.26 % (34 % of students without education being 14<sup>th</sup> worst district).

Fig. 5 shows calculated correlation coefficients for relationship between ratio of pupils who could not attend online lessons and unemployment rate in particular districts. Pearson correlation coefficient is equal to 0.84 with 95 percent confidence interval being in range from 0.76 to 0.89 and Spearman rank correlation of districts ranks in both measures was estimated at 0.75. Given both measures, we conclude that there is fairly strong direct relationship between ratio of pupils who did not participate in online education and unemployment rate. This introduces high challenge for future, because children raised in poorer districts with higher unemployment rate also receives worse education (based on material or family constraints) and we might expect they will have bigger problems with integration to labour market.

```

Pearson's product-moment correlation

t = 13.522, df = 77, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.7584042 0.8941186
sample estimates:
 cor
0.8388474

Spearman's rank correlation rho

s = 20937, p-value = 3.404e-15
alternative hypothesis: true rho is not equal to 0
sample estimates:
 rho
0.7451723

```

Fig. 5 – Correlation between ratio of pupils without online education and unemployment rate in districts of Slovak Republic. Own research. Data source: ÚPSVAR, SPOLU (2021).

Relationship between unemployment rate and ratio of students who did not participate in online education process related to districts is shown on Fig. 6. We conclude that problems related to unemployment and availability of online education are the most evident in Regions of Košice, Prešov and Banská Bystrica.

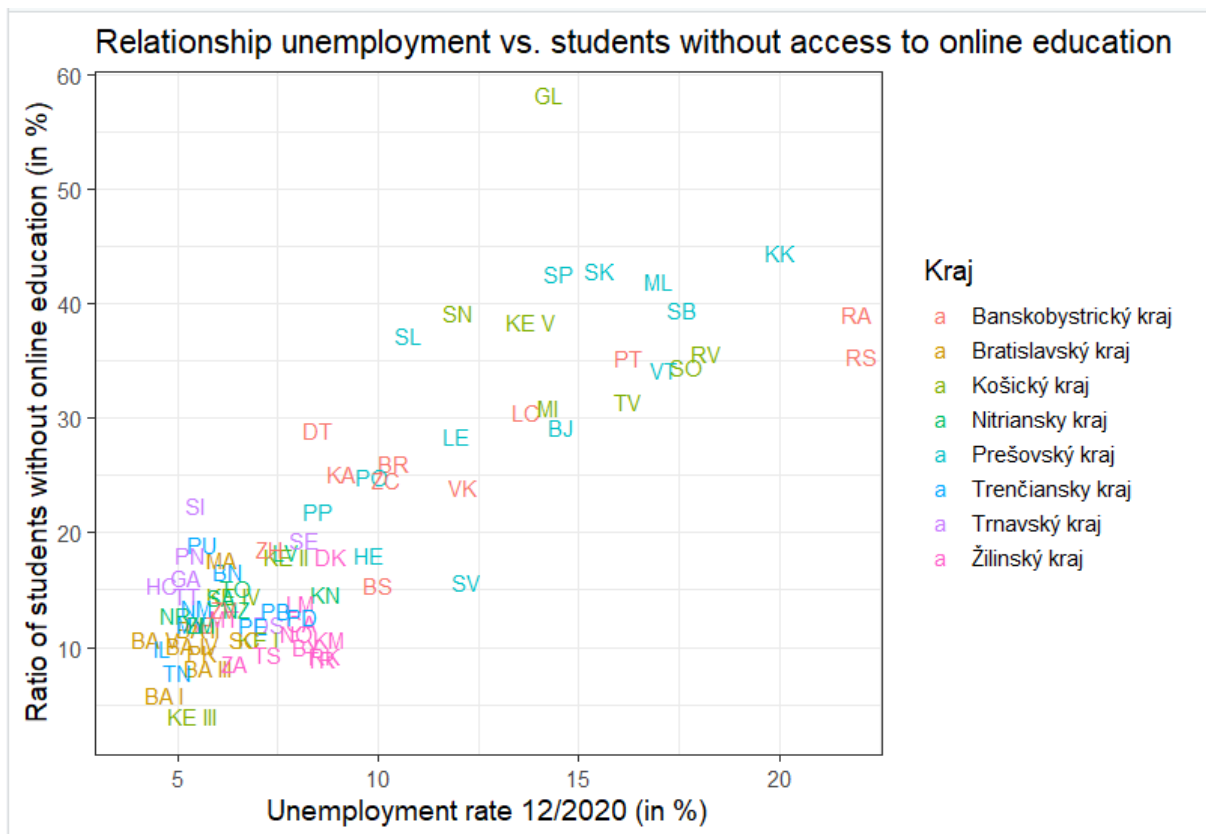


Fig. 6 – Relationship between unemployment rate and pupils without access to online education. Own research. Data source: ÚPSVAR, SPOLU (2021).

In the next part we focused more precisely on unemployment of young people. Specifically, on ratio of unemployed persons up to 25 years to total labour force in given districts. When current students will end their education process, they will compete mostly with these, also young people for graduate positions on labour market. Given fact, that they could not educate properly and in eyes of future employers they might be considered less skilled, already high amount of unemployed young persons might emerge additional difficulties in their integration to labour process. Results are that highest ratio is in Kežmarok (KK), where young unemployed people

include 3.45 % of total labour force. Prospect of finding a new job for young graduates in this district is very limited. Out of 6 365 unemployed persons, 1 118 have 25 years or less, which makes 17.56 % of total unemployed persons within given region. Other districts with very poor youth unemployment rate are Sabinov (SB) – 2.92 % of total labour force, Rimavská Sobota (RS) – 2.86 %, Vranov nad Topľou (VT) – 2.67 % and Bardejov (BJ) with 2.56 % unemployed persons below 26 years from total labour force. In 4 of these 5 districts young unemployed persons contribute to more than 15 % of overall unemployment rate. In this metric, the worst district is Stará Ľubovňa (SL) where at the end of year 2020 – 20.49 % of all unemployed persons were in age of 25 or less. Many of these districts ranked very bad in overall unemployment analysis earlier and we can expect that current students will face big challenge to take place in labour market in their respective districts.

Correlation metrics were computed for relationship between youth unemployment rate and online lessons unavailability as well. Results are that there is a strong direct linear correlation with Pearson's coefficient of 0.84 and direct rank correlation between district's ranking in both measures at value of 0.75. Given these results we conclude that correlation with youth employment instead of overall unemployment stands at quite similar level.

```

Pearson's product-moment correlation

t = 13.42, df = 77, p-value < 2.2e-16
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.7557088 0.8928450
sample estimates:
      cor
0.8369663

Spearman's rank correlation rho

s = 20787, p-value = 2.681e-15
alternative hypothesis: true rho is not equal to 0
sample estimates:
      rho
0.7469981

```

Fig. 7 – Correlation between ratio of pupils without online education and youth unemployment rate in districts of Slovakia. Own research. Data source: ÚPSVAR, SPOLU (2021).

Fig. 8 shows several differences from total unemployment ratios. For example, district Revúca (RV), which is 2<sup>nd</sup> worst in overall unemployment placed 8<sup>th</sup> worst in youth unemployment. However, overall patterns are quite similar. Given current results we suggest that the worst situation is in district Kežmarok (KK), which is 3<sup>rd</sup> in overall unemployment and worst in youth unemployment as being single district with youth unemployment rate over 3 %.

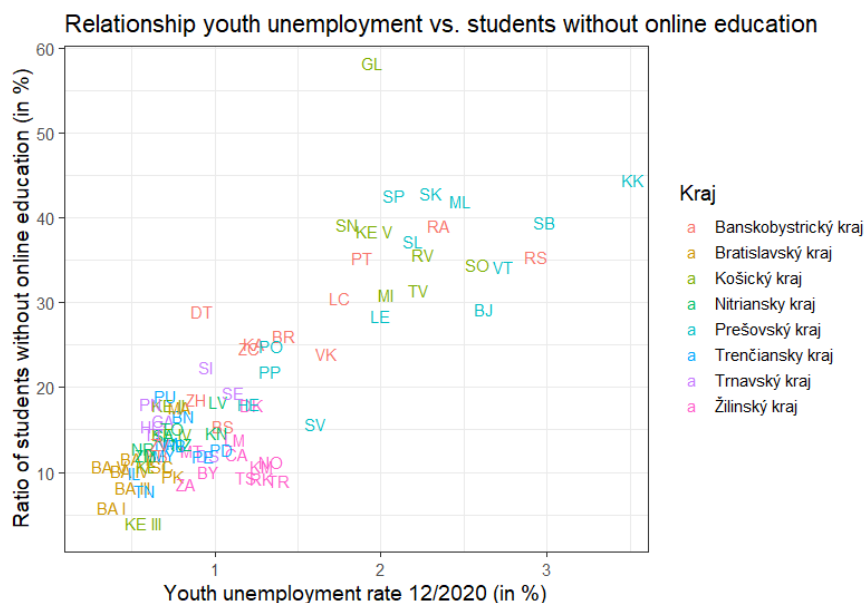


Fig. 8 – Relationship between unemployment rate up to 25 years and pupils’ access to online education. Own research. Data source: ÚPSVAR, SPOLU (2021).

## 5 DISCUSSION

In this paper, we focused on unemployment rate in Slovak republic and its districts. Increase in unemployment was undoubtedly driven mostly by spreading of coronavirus and its subsequent global crisis. Due to pandemic precautions many people lost their jobs, especially in service sector. Some of these job losses may be temporary if pandemic situation will get stabilised. Many people will however loose their jobs permanently. We have linked unemployment rate to availability of online education for children during first coronavirus wave in Slovak Republic and results are, that we have found a strong direct relationship between them.

Based on our study we can conclude that situation strongly varies among different districts and Regions. Situation is much better in western parts of the country with still relatively low level of unemployment and many pupils capable of attend online education process. Much worse situation is in eastern Regions. Some of districts exceeded unemployment rate of 20 % and given fact, that crisis is still not over, more will probably follow. These districts also have many pupils who could not attend online education. For online learning, material entries are needed, such as a computer and internet connection. Availability of these possessions might be obvious in well secured families but in low-income families from poorer districts in might represent serious problems. This problem is even more evident in families with multiple children, which tend to have bigger financial problems. In this case they have to invest even more resources to their children’s equipment, because if they have lessons at the same time, they cannot share one device but each of them needs one for his own.

Current research from the point of education availability was limited on the first wave of coronavirus crisis. For further research of covid pandemic impact on education and unemployment should be taken in scope. Especially, with regard to school closures we suggest orientation on following topics to be beneficial for full understanding of impact on quality of education process:

- Did number of premature school leavers increase during/after pandemic? If it did, do these young people face problems with finding a job?

- Monitoring of effectivity of different kind of online education techniques and finding the most beneficial ones.
- Was there sufficient support for teachers with respect to online teaching and/or teaching of pupils who could not attend online education?
- Is there any impact on mental health of current pupils? Will they tend to have bigger difficulties on labour market due to losing social contacts and own time management?

## 6 CONCLUSION

Current pandemic situation represents huge challenge for upcoming years. In Slovakia there are tens of thousands of students who could not educate properly or could not join teaching process at all. Slovakia belongs among countries, that do not offer students possibilities and support related to catching up missed lectures (World Bank, 2020).

What is even bigger issue, problems related to education system in coronavirus times are not evenly distributed. In this paper we stressed out, that situation in several districts is quite alarming. These districts have usually one thing in common – their unemployment rate is very high. In the past years, many funds were used to decrease disparities among districts in Slovak Republic which are in the long run big problem of eastern part of the country. Current crisis caused, that this effort might end up in vain, because young people, currently in education process, have much worse access to education than students in other districts.

Also given fact, that in 2021 education in Slovakia is still mostly online, big effort will have to be taken in force to mitigate these discrepancies in upcoming years. We suggest that following actions should be considered by institutions to mitigate these discrepancies in the future when online education will be needed:

- Adopt measures which increase number of pupils with access to online education with emphasis on lower developed regions.
- Support possibilities of present education for children from lower income families.
- Support education process for children from lower income families if online education is necessary.
- Allow schools to continue present education as long as it is possible (with respect to epidemiology situation).

### Acknowledgement

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### **Contact information**

#### **Ing. Patrik Mihalech**

University of Economics in Bratislava, Faculty of Economics Informatics

Dolnozemska cesta 1, Bratislava, Slovakia

E-mail: [patrik.mihalech@euba.sk](mailto:patrik.mihalech@euba.sk)

ORCID: 0000-0002-1161-5874

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# **BARRIERS TO ENTREPRENEURSHIP IN DEVELOPING COUNTRIES: CAUSES AND RECOMMENDATIONS**

*Vy Nguyen*

## **Abstract**

The article aims to address the main barriers to entrepreneurship activity and analyze in depth the causes of these barriers, using the desk research methodology. First, for the barrier caused by the lack of preparation of the founder, the root cause is the lack of founders in: (i) knowledge and skills in entrepreneurship; (ii) cultivating reality experience; and (iii) willingness to suffer failure. Second, for financial barriers, the reasons are that the founders are often young people with little capital, and as the nature of entrepreneurship is risky, it is difficult for new-born business to get loans from banks while other venture capital channels are not easily accessible due to problems with strict mechanisms and policies. Finally, for barriers in administrative - legal procedures, the main reason is that many governments have not yet developed and completed the legal system and enforcement mechanisms to meet the needs of businesses and investors. Thereby, the author suggests recommendations to overcome the mentioned barriers, contributing to promoting entrepreneurship activities.

*Keywords:* entrepreneurship, barriers, financial constraints, administrative – legal obstacles, founder’s weakness.

## **1 INTRODUCTION**

Entrepreneurship is considered as one of the central driving forces of creating jobs and economic development (Erken et al., 2018; Holden, 2012). Jean-Baptiste Say’s theory of entrepreneurship referred entrepreneurs as a group of businesses that put the use of economic resources on the higher levels of efficiency (Koolman, 1971). In a country’s development process, when the natural resources and conditions is about to reach the limit, it will be difficult for the economy to continue growing without innovation and breakthrough in production and trading methods. Entrepreneurship has a particularly important role in promoting the discovery of such new things. Entrepreneurship contributes to sustainable economic growth on three dimensions: increasing innovation and knowledge transfer, increasing competition, and increasing the level of diversification within the industry and within the enterprise (Van Stel, Carree and Thurik, 2005). Together with influence on economic development, entrepreneurship also has a special meaning to the labor market. Compared to traditional businesses, entrepreneurs create more jobs, especially in periods of economic turmoil (Kelley et al., 2011).

However, it is not easy to successfully pursue entrepreneurship and develop a stable and sustainable business, especially in developing countries. Taking Vietnam as a dynamic example in promoting entrepreneurship, in 2016, the Vietnamese government issued a decision approving The National Program 844 for "Supporting the National Innovation Initiative to 2025", aiming to create a favorable environment to promote and support the formation and development of entrepreneurs. The Program is expected to support the development of 2,000 creative entrepreneurship projects; 600 innovation start-ups; and promote 100 enterprises participating in the Project to call for investment capital from venture capitalists, making mergers and acquisitions, with a total estimated value of about VND2,000 billion. However,

despite being reported by Global Entrepreneurship Monitor (GEM, 2019) as a country in the Top 20's highest entrepreneurial spirit, Vietnam is actually in the group of the 20 weakest countries when considering about the ability to implement entrepreneurship projects. The situation is similar in some other developing countries. This failure is attributed to many barriers in the implementation of these projects.

Under this context, it is crucial to identify and analyze in depth the barriers and their causes that hinder entrepreneurship especially in the developing countries – which, in literature, are reviewed to have less favorable environment for entrepreneurship projects (Aparicio et al., 2021). Accordingly, recommendations can be suggested to entrepreneurs to overcome these barriers, contributing to not only promoting entrepreneurship activities. but also all economic agents that interacting to promote the economics progress of nations.

## **2 THEORETICAL BACKGROUND**

The concept of entrepreneurship is associated with the role of entrepreneurs in economic theories. Entrepreneurship refers to the characteristics of the subject and the process of creating new value in a new environment (Zahra, 2007). It has been growing many different approaches about entrepreneurship and its impacts (Begley and Tan, 2001; Krasniqi, 2007; Welter, 2011). However, there is a fundamental consensus, that is, the direct result of entrepreneurship is to create a landmark or breakthrough process of pro-activeness, innovation while the entrepreneurs are aware of and willing for risk taking. This definition emphasizes the type of entrepreneurship driven not by necessity but by opportunity, which often links with the economic growth (Ács et al., 2020; Trang and Tien, 2019; and Miller and Friesen, 1982).

Entrepreneurship often goes through different stages of development. Based on studies by Marmer, Hermann and Berman (2011), the author summarizes the life cycle of an entrepreneurship project with the following major developmental stages:

*The first stage - Discovery/Seed:* check if it is plausible to solve the problem discovered in the market, and whether any interested parties will use the solutions. solutions that startups plan to develop or not.

*The second stage - Validation:* validating whether customers are interested in their product or not.

*The third stage - Efficiency:* founders develop and improve business models and seek to increase the number of users.

*The fourth stage - Scale/Expansion:* involves the expansion and growth of business, leading to an increase in the number of employees, an increase in market share or income. higher.

It can be seen that, to be able to form and develop an entrepreneurial business, founders and partners will have to go through many stages, and together with this process there are many barriers causing the high probability of failure. This paper will introduce some main barriers to entrepreneurship with an analysis of the causes of these barriers.

## **3 METHODOLOGY**

The main methodology for conducting this study is the desk research approach. In details, this study selects and analyzes a final of 24 suitable and accessible papers out of 92 relevant and unduplicated papers in high ranking, peer-reviewed journals and proceedings that can be obtained from Web of Science, Scopus, and Google scholar as well as from specialized reports (i.e., Global Entrepreneurship Monitor). The searching includes the period from January 2010

to April 2021 for the most updated articles. The main keywords “entrepreneurship” and “barriers” together with alternative terminologies such as “start-up”, “new venture”, “challenges”, “constraints” are used concerning the title, abstracts, and keywords of the papers and reports in the mentioned databases.

## **4 RESULTS**

This study identifies three main barriers to entrepreneurship, analyzes in depth the causes of these barriers, and suggests recommendations to overcome the mentioned barriers. Entrepreneurial businesses often lack too many resources to invest in innovation and breakthrough research, so they will be stuck without being able to develop initiatives. The two most common deficiencies mentioned are business founder's lack of preparation and financial constraints. Moreover, to transitioning and developing economies in particular, the macro environment also creates many obstacles, especially for small and medium entrepreneurs (Ključnikov et al., 2016). One of these most popular obstacles is barriers in administrative - legal procedures (Virglerová et al., 2020; Klapper et al.; 2004; Saka-Helmhout and Karabulut; 2006)

### **4.1 Financial constraints**

One of the most important steps to pursue the entrepreneurship is to ensure adequate funding. Financial barriers are often identified as one of the biggest obstacles that many entrepreneurs confront (Berger, Cowan and Frame, 2011). Global Entrepreneurship Monitor 2019/2020 Global Report conducted by Bosma et al. (2020) states that among reasons cited for discontinuing a business, the most common is a lack of either profitability or capital, accounting for an average 45% of exits, unweighted across the sample of 49 economies. In details, in the Middle East and Africa, lack of profitability or capital is the most common reason given, accounting for more than half of exits in Angola, Lebanon, Egypt, Iran, UAE, and Qatar; and nearly three-fourths in India. Mohammadali and Abdulkhaliq (2019) also conclude that lack of access to finance for investment, the inability to provide sufficient funds to start a business, and financial crisis in recent years are among the main anti-motivational factors of entrepreneurship in the Kurdish Region of Iraq.

The main cause for the above obstacle is that most new projects are built by young people with less capital, often from creative ideas rather than existing products and assets, which is tied to high risk of failure and low realization of products. In the first stage of a new business project (Discovery/Seed), entrepreneurs often use the capital of the founders themselves (bootstrapping) (Lahm and Little, 2005). But this resource hardly meets the requirement of the business development. As a result, it is crucial to find the appropriate investment capital as well as knowing how to attract these capital sources.

Bank loan is considered as one of the common sources of finance that many businesses can look for. However, this is not an easy access for entrepreneurs because bank loan must be based on complex procedures with information on credit records and requirement for collateral. From the banks' point of view, SMEs with small operations, often put them at a disadvantage in terms of lack of information in credit rating, leading to increased risk of bad debt. Thus, banks tend to increase loan requirements or levels of guarantees or interest rates to cover the above risk (Alvarado et al., 2017). However, most entrepreneurship projects are usually set up by young founder who do not own enough assets to pledge or mortgage, so it is difficult to get the loan (Brown et al., 2012; Barth et al., 2006). A study by Brown et al. (2012) based on a panel data of 9,715 entrepreneurship projects in the period 2007-2009 demonstrates that entrepreneurial businesses, especially in the high-tech sector, are difficult to use bank loans compared to other

types of businesses. Evidence from Bulgaria in the study of Morris et al. (2001) also shows that there is an inadequacy in the condition of bank financing to SMEs, that is, the credit can be made, however with a remarkably strict collateral terms within a rather short term of 1–2 years. This regulation would create more constraints to new SMEs for achieving their growth target with long-term projects.

Crowdfunding is also a channel to call for entrepreneurship financing by attracting the contribution of individuals through crowdfunding platforms, usually social networking sites or capital calling websites (Rey-Martí et al., 2019; Salameh and Quandah, 2018). One downside of this form of funding, however, is that entrepreneurs may face the risk of plagiarizing ideas from sponsors or large corporations and businesses, especially when founders lack of knowledge of intellectual property rights to protect their ideas; or if the incident leads to litigation, young entrepreneurs also face with insufficient financial resources to pursue the case. This risk comes from the basic characteristics of community fund-raising mechanisms: widely presenting ideas and business models on fund-raising platforms (Sullivan and Ma, 2012; Galwin, 2012; Valanciene and Jegeleviciute, 2013). On the other hand, crowdfunding will also pose a great challenge for enterprises in accounting and auditing, because the funding of these projects is based on the contributions of a large number of individuals and small shareholders, which may require time and meticulousness to determine the rate of return or reward to which each investor is entitled (Sigar, 2012).

Another source that entrepreneurs can attract to finance their business is the investment from venture capital funds. The main activity of these investors is to provide financial support to businesses which have high-risk projects yet long-term development potential and high return on investment; in return is the ownership of shares of these companies. However, because of the need to divide equity to investors in order to receive capital contribution, entrepreneurs often face the risk of being unable to fully control the company's business activities, more serious is the risk of acquisition. This is what makes businesses afraid when calling for this kind of capital (Davila et al. 2000; Sharpe et al., 2009).

#### **4.2 The founder's lack of preparation, knowledge, and skills**

To start a business, apart from preparing the financial resources, young entrepreneurs need to well-equip themselves in many aspects, from knowledge, skills to entrepreneurship experience, and especially the willingness to take risks.

To become an entrepreneur, the individual must be able to bear the risk of failure. According to report by Bosma et al. (2020), this issue occurs in many economics, both developing and developed nations. In Thailand and India, despite the survey participants confirming that they see good opportunities for entrepreneurship, more than half of them decide to be ventilated from setting up a new business due to fear of failure. In more detail, the fear of failure is likely one of the main reasons explaining why people may not pursue entrepreneurship, leading to a low proportion of opportunity-motivated entrepreneurs in India. Europe and North America regions also witness the same situation, in which high concern about failure may explain low start-up rates in Greece, Russia, Italy and Cyprus. This is a big barrier that many young entrepreneurs have confronted, even though they realize the opportunity to start a business, they do not dare to start their business plans. On another study, Nawaser et al. (2011) analyze and compare effect of legal and motivational obstacles and barriers on the development of entrepreneurship in Iran, using survey method and questionnaire. The results show that both legal and motivational factors have terminated the development of entrepreneurship in the country, and the motivational factors more than legal factors attribute to the failure. Especially, financial risk factor, which represents the fear of losing personal capital is considered as the first obstacles to the entrepreneurship of the business founder.

In addition, to be able to set up and develop a business, an entrepreneur also needs to master a lot of knowledge in areas such as business administration, finance, accounting, human resources, technology, and legalization. However, there are many young entrepreneurs with gaps in the legal knowledge of which can easily expose businesses to legal risks or disputes. In particular, entrepreneurship projects are often based on innovative ideas and products, if the founders are not aware of intellectual property rights registering or properly determining the type of business and capital contribution of the enterprise, it may result in loss of ownership of a product or property without even knowing it. Also, many founders do not have enough financial knowledge and strategic management of capital, leading to inaccurate corporate valuations, making it difficult to raise capital from investors. There are also a number of other enterprises that do not explicitly regulate the issue of capital contribution and conversion of share ratio, which also poses a disadvantage for some of the original shareholders (Nguyen Van, 2019).

Besides, an important barrier considered as a factor leading to the lack of young people in the knowledge of entrepreneurship is the lack of education at the secondary and post-secondary levels. According to a survey of experts on business conditions in Vietnam's entrepreneurship ecosystem as a demonstrative example, which is presented in the report of GEM (2019), the index of business education at the secondary level is the lowest (1.83/5) among the indicators; the assessment for business education at post-secondary level is also quite low (2.61/5). The figure shows that young entrepreneurs have not been equipped with a basic business background since they were high school students. Later, unless they attend professional training programs at a higher level, understandably, they will have large gaps in business knowledge and entrepreneurship. Jafarnejad et al. (2013) conducted the study on Iranian SMEs to identify the barriers of entrepreneurship development and determine the importance of each barrier. The research finding show that among 28 detected barriers, lack of sufficient knowledge in management skills and business management is one of the most important constraints and challenges of SMEs entrepreneurial development in Iran.

### **4.3 Administrative, legal, and institutional obstacles**

Facing the wave of entrepreneurship and innovation, besides the efforts of entrepreneurial businesses, if the governments do not make efforts to build and perfect the administrative, legal, and institutional system, it would lead to severe constraints to the development of entrepreneurship.

According to Virglerová et al (2020), for SMEs that do not have the budget for stable legal assistance, legal risk is becoming one of the most important business risks. Based on the empirical research of 1935 SMEs in V4 countries and Ukraine during 2019-2020, this paper findings different results on the impact of legal risk on SMEs in these selected countries, which in turn practically implicating for other SMEs and new entrepreneurs to be aware of legal risk and establish reasonable policies to minimize negative impacts of these risks.

Klapper et al. (2004) studied whether entry regulations influence the creation of entrepreneurs, using a cross database of European businesses. The authors found out that the regulations governing firm creation has restrained the establishment of new enterprises, particularly to the sectors that would have high access availability. In addition, the value added per employee in these sectors accordingly grows more slowly in countries with heavy governs on entry. The evidence in the studies of Estrin et al. (2005) and Djankov et al. (2002) also concluded the similar findings that institutions with heavier regulations, for example implying strict conditions for new start-up or firm creation, may hamper the establishment of new firms and lead to the higher corruption and larger unofficial economies transactions.

In addition, most of the value of entrepreneurship and innovation projects are based on intellectual property, namely intangible assets including business ideas, brands, or production formulas; however, to turn these intangible assets into a basis for negotiation with investors, the valuation of intellectual property is extremely difficult and complicated. The procedure for intellectual property registration is not simple, plus the relatively high cost, long licensing time, often greatly affecting businesses, resulting in them not paying adequate attention to registration of protection of intellectual property. This could push the entrepreneurs to the loss of copyright and intellectual property, or more seriously, allegations of competition or infringement of intellectual property rights (Baumol, 1990; Carlin et al., 2001).

Even if the legal or institutional system is suitably set up for businesses, the frequent changes in commercial laws, tax regulations, as well as the backwardness and lack of synchronization in the entrepreneurial and investment policy may lead to the investors' apprehension, and consequently entrepreneurs lose their business opportunities. The survey findings provided by Manolova and Yan (2002) show that during their business operation, managers of many SMEs in Bulgaria have rated the chaotic and unpredictable impact of the legal environment as the most significant constraint on SME development. Saka-Helmhout and Karabulut (2006) employed the exploratory survey through questionnaires and interviews to examine whether institutional context of a country can inhibit entrepreneurial activity in clusters. The research is conducted on a sample of 78 firms in the Denizli textile cluster in Turkey. The results show that the institutional lead to the limits of entrepreneurial activity in the context a transitioning nation. Furthermore, there is limited accessibility of skilled labors and modest cooperation of clustered firms in the form of joint projects and investments for innovation due to the anaemic institutional condition.

## **5 POLICY IMPLICATION**

Evaluate the above analysis of the barriers and their causes, the first and most important factor in a successful foundation for entrepreneurial spirit projects is that young people need a well-trained knowledge of entrepreneurship. To do this, the government needs to universalize the entrepreneurial education program since high school and post-high school. The educational methodology is not only theory and dogma, but also needs to give young people the opportunity to attend workshops, sharing sessions from experienced people. Besides, learning needs to go hand in hand with practice to boost the youth's entrepreneurial spirit of not to be afraid of their initial failures.

Second, policy makers need to facilitate the development of a startup and entrepreneurship ecosystem, especially technology innovation, research, and development activities, and apply advanced technology to other professions. Specifically, it is necessary to focus on building and completing tax and financial policy frameworks in order to have clear mechanisms to encourage businesses to promote scientific research and invest in innovation activities. At the same time, agencies from the governmental central to local levels need to actively follow the direction of the government orientation and coordinate to improve the business competitive environment to attract investors as well as promoting the development of businesses in each locality.

Third, on the issue of capital, understanding that the problems of poor administration and legal mechanisms and policies may make it difficult to attract foreign venture capital funds, the participation of the government to support the formation of entrepreneurship funds and incubators are very important. It is possible to learn from other countries' successes such as: the Israel's government in developing public private economic cooperation in its entrepreneurship promoting activities; Singapore government with start-up funds; or the Australian government

with start-up incubators, entrepreneurship programs and foundations specializing in certain industries such as health care and welfare.

Finally, on the issue of business founder themselves, first of all, they need to constantly improve and accumulate knowledge and skills about the entrepreneurial business. And combining with the spirit of learning and progress, entrepreneurs need to plan a clear, feasible and breakthrough business, with long-term potential to raise capital. The business plan must clearly show specific steps to penetrate and develop the market, the ability to recover capital and earn profit in short and long term vision so that investors can evaluate the feasible before funding.

## 6 DISCUSSION AND CONCLUSION

The entrepreneurial spirit of young people is higher than ever, projects and policies to encourage and support entrepreneurship are also being actively built up by governments of many countries. However, starting a business has never been easy. The article pointed three main barriers that negatively impact the entrepreneurial spirit in overall and in developing countries, particularly: (i) financial constraints; (ii) the founder's lack of preparation, knowledge; and (iii), and skills administrative, legal and institutional obstacles, then analyzing the causes and recommendations to overcome the above barriers.

Importantly, this study shows the limit research and discussion of previous studies in investigating the influence of diversities in gender, ethnicity, and skills of the entrepreneurs on the extent of these barriers. Prior studies only focus on pointing out the causes of barriers, without analyzing which cause will have stronger impact; and whether these causes, in addition to direct effects, are interrelated and increase the degree of influence or not. Besides, the differences in entrepreneurship activities between countries with different macro contexts and time periods have been under-researched. Thus, this study calls for more research to further examine the diversities of entrepreneurs in more dynamic and regional contexts.

This study has limitations of merely a literature review work and focusing most on prior quantitative studies within a period of 11 years. Under a more favorable condition of time and fund, future research should employ both quantitative and qualitative analysis, and in a broader period of time.

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### Contact information

Thi Tuong Vy Nguyen  
 Tomas Bata University in Zlin - Faculty of Management and Economics  
 nám. T. G. Masaryka 5555, 760 01 Zlín  
 E-mail: [nguyen@utb.cz](mailto:nguyen@utb.cz)  
 ORCID: 0000-0002-4964-7396

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# DO QUALITY MANAGEMENT SYSTEM STANDARDS AFFECT FIRM INNOVATION? RESULTS FROM AN EMPIRICAL RESEARCH

*Thi Anh Van Nguyen, David Tuček, Khac-Hieu Nguyen*

## **Abstract**

In the Industry 4.0, innovation is one of driving forces of economic development and competitiveness of countries. There are many factors explaining the variation of innovation. Quality management is considered a factor that affects innovation. The impact of quality management (QM) on innovation is usually studied in the context of enterprises. Few papers investigate these impacts in the context of countries. This paper aims to answer the question of whether quality management system standards affect innovation of countries. To answer this question, we collected the number of ISO 9001, ISO 14001 from the International Organization for Standardization and Innovation rate from the Global Entrepreneurship Monitor (GEM) of 100 countries during the period 2011-2017. The countries are divided into five different regions including Africa, Asia, Europe, Middle East, Americas. We use descriptive statistics and OLS regression to analyze the panel data. The results show that both ISO 9001 and ISO 14001 have positive effects on innovation of countries. If the number of ISO 9001 increases by 1%, the innovation rate will increase by an average of 1.18%. If the number of ISO 14001 increase by 1%, the innovation rate will increase by an average of 1.11%. High-income countries have higher Innovation rate about 7% compared with middle- and low-income countries. Besides, income and location of countries also affect the innovation of countries..

*Keywords: ISO 9001; ISO 14001; Innovation rate; QM, quality standards*

## **1 INTRODUCTION**

Innovation has been the fundamental driving force of economic development and national competitiveness. Especially in the industry 4.0 and uncertain environment, countries have to innovate continuously to adapt environmental change and to develop sustainably. Some previous studies showed that QM is an important approach for enterprises to gain innovative efficiency (Liao, Chang, & Wu, 2010; Ooi, Lin, Teh, & Chong, 2012; Kim, Kumar, & Kumar, 2012; Lee & Ooi, 2015; Alshourah, 2021). QM has been widely perceived as a crucial management philosophy to attracts many researchers and practitioners. Many organizations applied quality management practices, including leadership and top management support, process/product design, employee training and commitment, customer focus, supplier performance, information availability and usage, supplier quality, strategic quality planning, strategic quality management, and process monitoring and control (Parvadavardini, Vivek, & Devadasan, 2016). The empirical studies show that QM practices can enhance innovation by providing QM principles and techniques to improve continuously. Almost all previous studies focused on QM and innovation in organizations and each industry. There are few studies to investigate this relationship in macroeconomics context, specifically in the context of many countries. This research aims to fill this gap by analyzing the relationship between QM and innovation in 100 countries from 2011 to 2017. Consequently, this research addresses the following main research questions:

RQ1. Does QM application with ISO 9001 standard affect innovation rate of countries?

RQ1. Does QM application with ISO 14001 standard affect innovation rate of countries?

To answer these questions, we have to discuss the definition of some key concepts and review previous researches about this relationship. This content is presented in detail in the next section.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

### **2.1 Quality Management System Standards**

Quality Management System (QMS) is defined as a “formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives” (AQS, 2021).

QMS standards were introduced by the International Organization for Standardization (ISO). They develop and publish QMS standards related to quality management systems include the rest of the ISO 9000 series (including ISO 9000, ISO 9001, and ISO 9004), the ISO 14000 series (environmental management systems), ISO 13485 (quality management systems for medical devices), ISO 19011 (auditing management systems), and ISO/TS 16949 (quality management systems for automotive-related products) (ISO, 2020). Therein, ISO 9001 and ISO 14001 are the two most popular standards in the world.

ISO 9001:2015 is the lastest version of the ISO 9001 standard. It is the fifth edition of ISO 9001, which was published in September 2015. ISO 9001:2015 sets out the criteria for a quality management system. This standard base on seven quality management principles, including customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, relationship management (ISO, 2015).

ISO 14001: 2015 is the lastest version of the ISO 14001 standard. It has clauses to fit with ISO 9001:2015 clauses. While ISO 9001:2015 focuses on quality system, ISO 14001: 2015 gives environmental management system requirements. This standard controls the environmental responsibilities of the organization in an organized manner, which helps to enhance the environmental factors.

### **2.2 Innovation definition**

Most people think that innovation only brings technological aspects to create outstanding new products, and this concept is too limited because innovation has a much broader meaning. Innovation is understood as "a new idea, creative thought, or new imagination in the form of equipment or methods". Some studies listed many types of innovation, such as radical product, radical process, incremental product, incremental process, and administrative innovation, technological innovation (Kim et al., 2012; Rangus & Slavec, 2017). Innovation is often seen as the application of better solutions to meet new requirements and existing market needs. Such innovation takes place through the provision of new products, new processes, new services, new technologies or new efficient business models.

A fairly complete definition of the Organization for Economic Co-operation and Development (OECD)'s innovation is "implementing a new product or a significant improvement (for a particular product or service), a new process, marketing method, or a new organizational method in business practices, workplace organization, or external relations"(OECD, 2010). Therefore, we can see the concept of innovation, including technology and non-technology. In this study, the concept of innovation is the percentage of those involved in TEA (Total early-stage Entrepreneurial Activity - Rate is the percentage of 18-64 population who are either a

nascent entrepreneur or owner-manager of a new business) who indicate that their product or service is new to at least some customers.

### 2.3 The relationship between QM and innovation.

Ooi et al. (2012) conduct an empirical study within Malaysian manufacturing firms to investigate the relationship between QM practices and innovation performance. The results show that QM practices, including process management, strategic planning, people management, and customer focus have positive relationships with firms' innovation performance.

Kanapathy, Bin, Zailani, & Aghapour, (2017) examines the relationships among quality, innovation, and organizational culture under a moderation model. The research analyses data answered by senior managers of 106 ISO 9000-certified manufacturers, and the result indicates both soft QM elements and secondarily hard QM elements affect innovation.

In 2018, some researchers investigated the impact of corporate quality management on green innovation and the moderating role of environmental regulation on this relationship. They analyze data on the top 100 listed companies from 2008 to 2014 in China. The results show that quality management exerts significant negative effects on green innovation. Environmental regulation has significantly negative moderate effects of quality management on both green management innovation and green technology innovation (Li, Zhao, Zhang, Chen, & Cao, 2018a).

Recently, Alshourah (2021) explores the impact of QM dimensions on product and process innovation in Jordan. They examine the model and hypotheses by analyzing 249 randomly selected ISO 9001:2000 certified firms in different manufacturing industries. The results indicate that there is positive relationship between QM dimensions overall and product and process innovation. A similar result is provided by Marouane Saadia (2021). This study verifies ISO 9001 certification influences innovation positively.

Although there are many studies conclude that QM has positive impact on innovation (Ooi et al., 2012; Kanapathy et al., 2017; Alshourah, 2021; Marouane Saadia, 2021), some authors explore green innovation are affected negatively by quality management (Li, Zhao, Zhang, Chen, & Cao, 2018b). In this research, the author will use large data from 100 countries to find out this relationship.

## 3 METHODOLOGY

### 3.1 Research model

From the literature reviews, we can see that there are theories to support the impact of quality certificates on enterprises' innovation. They are some empirical studies to evaluate these impacts. In this paper, we investigate the effect of ISO 9001 and ISO 14001 on the innovation of enterprises by following regression model.

$$INNO_{i,t} = \beta_0 + \beta_1 * ISO_{i,t} + \beta_2 * H\_INCOME_{i,t} + \beta_3 * REGION_i + \beta_4 * TREND_t + \varepsilon_{i,t} \quad (1)$$

$\beta_0$  to  $\beta_4$  are coefficients of the regression.  $INNO_{i,t}$  is the innovation index of enterprises in country  $i$  at year  $t$ .  $ISO$  is the number certificates of ISO 9001 or ISO 14001. In regression, we use natural logarithm of the number certificates as an independent variable.  $H\_INCOME$  is a dummy variable, equal 1 if the country has high income (above 12.000 USD/year) otherwise equal 0.  $REGION_i$  is a dummy variable to check the difference in innovation between Asia, Africa, America, Europe, and other regions.  $TREND_t$  is the trend over time of the number of

ISO certificates that countries have achieved.  $\varepsilon_{i,t}$  is the error term of the regression model. To estimate equation (1), we use EViews software with Pool OLS methods. Then, we test the collinearity by VIF criteria and heteroscedasticity by White test.

### 3.2 Data collection

In this study, data is collected from 100 countries from 2011 to 2017. We choose the above period and the above countries because they have the available data for the analysis in this period. We have unbalanced panel data which have total 385 observations. In more details, INNO is Innovation rate collected from (GEM, 2021). Innovation rate is the percentage of those involved in TEA who indicate that their product or service is new to at least some customers AND that few/no businesses offer the same product. ISO is the number of ISO 9001 or 14001 certificates collected from (ISO, 2021). The data of H\_INCOME and REGION is collected from (World Bank, 2020).

## 4 RESULTS

### 4.1 Some descriptive statistics

Among 100 countries, we have 36 countries in Europe. In these countries, Enterprises achieve the highest number of ISO certificates compare with other regions. Africa and Middle East have the lowest number of ISO certificates. Details of the number, we can see in the following table.

Tab. 1 – The number of ISO certificates in Regions from 2011-2017

<b>Regions</b>	<b>Number of Countries</b>	<b>Number of ISO 9001</b>	<b>Number of ISO 14001</b>
Africa	18	61,667	9,050
Asia	16	1,395,005	479,345
Europe	36	2,394,221	669,301
Middle East	8	52,721	8,471
Americas	22	551,710	113,786
Total	100	4,455,324	1,279,953

From the data collected, we can investigate the relationship between ISO certificates and Innovation rate of countries. We used a scatter diagram to plot all data in the study used trend line to check the relationship (fig. 1). We can see that there is a positive relationship between ISO certificate and Innovation rate. The higher number ISO 9001 enterprises can achieve, the higher innovation rate is.

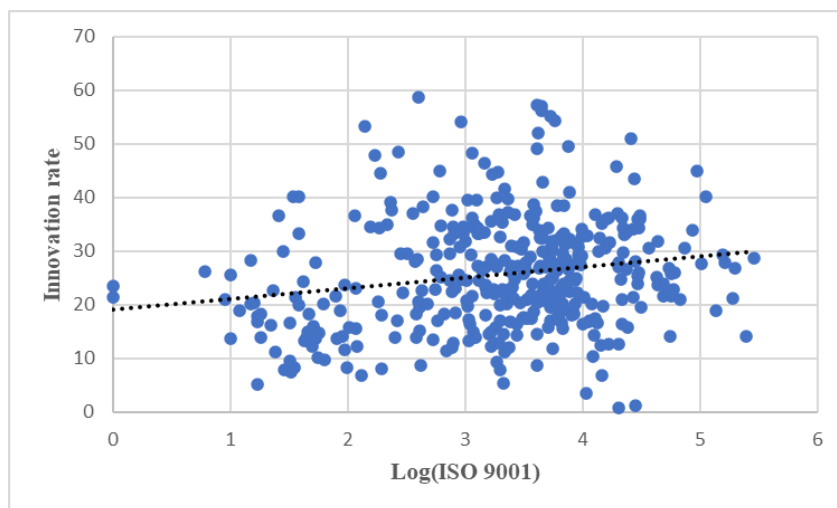


Fig. 1 – The title of the figure. Source: own research

Similarly, there is a positive relationship between ISO 14001 and Innovation rate. The trend line goes up (fig. 2). It means that countries have higher ISO 14001 certificate, the Innovation rate is also higher.

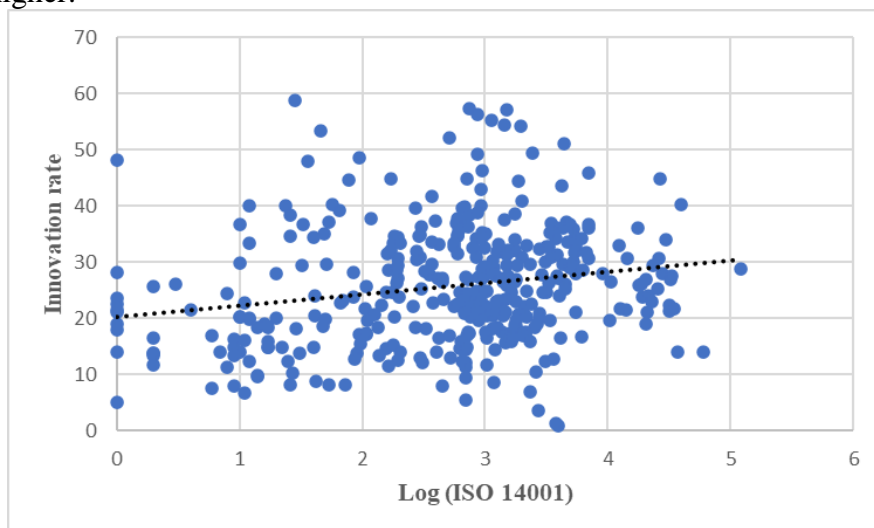


Fig. 2 – The title of the figure. Source: own research

Before running regression, we do descriptive statistics to check the distribution of variables. Details of results are presented in Table 2. Innovation rate has an average value of 26.5, a maximum value of 58.7, and a minimum value of 0.8. In the data, some countries have zero ISO certificate. In 2017, China achieved 239,260 ISO certificates, and the highest value compares with other countries. In the data, there are 60% of countries have high income.

Tab. 2 – Descriptive statistics of variables

Variable	Max	Min	Average	Std. Dev
INNO	58.7	0.8	25.6	10.4
ISO 9001	289,260.0	0.0	11,572.3	30,226.7
ISO 14001	120,829.0	0.0	3,324.6	9,200.6
H_INCOME	1.0	0.0	0.6	0.5



## 4.2 Regression results

In this study, we regress Innovation rate with other variables by Pool OLS method. To check the difference between regions, separate into four equations. After regression, we test the collinearity by VIF criteria. In four equations, we all have the values of VIF are smaller than 2. It means that there is no collinearity in these equations. We also test the heteroskedasticity by White test. The is no heteroskedasticity in the models.

In all four equations, ISO 9001 has a positive effect on Innovation rate. The p-value ranges from 1% to 10%. If the number of ISO 9001 increases by 1%, the innovation rate will increase by an average of 1.18%. H\_INCOME variable has positive effect on Innovation rate. H\_INCOME variable has positive effect on Innovation rate. It means that high-income countries have higher Innovation rate about 7% compared with middle- and low-income countries. It means that high-income countries have higher Innovation rate compare with middle- and low-income countries. Compare with other regions, Americans have higher Innovation rate, but Asia has the lower Innovation rate. In the regression, we use TREND variables to check the trend of the data. The is a positive trend in the data, but the value is insignificant. Details of regression equations are presented in table 3.

Tab. 3 – Regression results of ISO 9001 and Innovation

Variables	(1) INNO	(2) INNO	(3) INNO	(4) INNO
Log(ISO 9001)	1.038*	1.145**	1.558***	0.984*
H_INCOME	7.225***	7.362***	6.445***	6.919***
AFRICA	0.335			
AMERICANS		2.169*		
ASIA			-4.173***	
EUROPE				0.480
TREND	0.133	0.123	0.099	0.133
Constant	17.644***	16.751***	17.180***	17.824***
R-squared	0.1425	0.1502	0.1607	0.1428
F-Statistics	15.78***	16.78***	18.18***	15.82***
Observations	385	385	385	385

Note: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Similarly, we check the relationship between ISO 14001 and Innovation rate by regression equations. Details of the results are presented in Table 4. From the results, there is a positive effect of ISO 14001 on Innovation rate. The p-value ranges from 1% to 10%. If the number of ISO 14001 increased by 1%, the innovation rate will increase by an average of 1.11%. Americans have higher Innovation rate compare with other regions. Asia has the lower Innovation rate. Americans have higher Innovation rate than other regions about 2.35%. Asia has lower Innovation rate than other regions about 4.17%. Details of regression equations are presented in table 3.

Tab. 4 – Regression results of ISO 1401 and Innovation

	(1)	(2)	(3)	(4)
Variables	INNO	INNO	INNO	INNO
Log(ISO 14001)	0.941*	1.130**	1.465***	0.892*
H_INCOME	7.093***	7.200***	6.241***	6.880***
AFRICA	0.259			
AMERICANS		2.349**		
ASIA			-4.177***	
EUROPE				0.349
TREND	0.145	0.135	0.116	0.145
Constant	18.571***	17.489	18.423***	18.703***
R-squared	0.1416	0.1504	0.1597	0.1417
F-Statistics	15.671***	16.820***	18.056***	15.691***
Observations	385	385	385	385

Note: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 5 DISCUSSION

There are similarities in the effect of ISO 9001 and ISO 14001 on innovation rate. Comparing the regression equation between ISO 9001 and ISO 14001, there is not much change in the regression coefficients' significance between the two equations. This result means that countries with a great number of ISO 9001 certificates usually have many ISO 14001 certificates. In other words, there is a high correlation between the number of ISO 9001 and ISO 14001 certificates between countries. ISO 9001 has a positive effect on Innovation rate with the p-value ranges from 1% to 10%. If the number of ISO 9001 increases by 1%, the innovation rate will increase by an average of 1.18%. It is the same as many previous studies' research (Sadikoglu & Zehir, 2010; Bon & Mustafa, 2013; Kim et al., 2012; Alshourah, 2021; Marouane Saadia, 2021). There is also a positive effect of ISO 14001 on Innovation rate. The p-value ranges from 1% to 10%. If the number of ISO 14001 increased by 1%, the innovation rate will increase by an average of 1.11%. It is the same result as the research of He & Shen, (2019).

## 6 CONCLUSION

We have investigated the impact of QM on innovations of countries. QM is presented by the number of ISO 9001 and 14001, and innovation is presented by countries' innovation rate. The data are collected from 100 countries during the period 2011-2017. There are total 385 observations in the study. We use pool OLS to regress the panel data. The results show that both ISO 9001 and ISO 14001 have positive impacts on innovation rate of countries. There is little difference between ISO 9001 and ISO 14001 in regression results. Besides, high-income countries have higher innovation rate compare with middle- and low-income countries. Countries in Asia have the lowest innovation rate, and countries in the Americas have the highest innovation rate compared with other countries in other regions.

Although there are some findings in this paper, some limitations still need to do in further research. The paper needs to use difference method in analyzing the data to check the robustness of the results. The paper can also update the data to have larger observations in regression analysis. In regression model, more independent variables need to add control the impact of QM on innovation rate.

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## Contact information

### **Thi Anh Van Nguyen**

Tomas Bata University in Zlín, Faculty of Management and Economics  
 Mostní 5139, 76001, Zlín, Czech Republic  
 E-mail: t5nguyen@utb.cz  
 ORCID: 0000-0001-6950-6868

### **doc. Ing. David Tuček, Ph.D**

Tomas Bata University in Zlín, Faculty of Management and Economics  
 Mostní 5139, 76001, Zlín, Czech Republic  
 E-mail: tucek@utb.cz  
 ORCID: 0000-0002-4640-644X

**Khac-Hieu Nguyen, Ph.D.**

HCMC University of Technology and Education, Faculty of Economics  
No 1, Vo Van Ngan street, Thu Duc District, HCM City

E-mail: hieunk@hcmute.edu.vn

ORCID: 0000-0002-5138-2032

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# MARKETING ETHICS IMPLICATIONS: COMPARATIVE RESEARCH OF VR EXPERIENCE PERCEPTION BY CHILDREN AND PARENTS

*Hana Nováková, Peter Štarchoň*

## **Abstract**

The aim of this paper is to compare the perception of virtual reality (VR) experienced by children and their parents, analyze interesting or unexpected results based on primary research and outline the key differences with its implications for ethics of marketing in VR. The technical side of the virtual reality has already been subject of various researches and is changing so fast that due to the exponential technological growth the findings are often outdated short after the research is published. This is why the paper focuses on the soft elements of VR such as perception. The methodology of the research consisted of analysis of two parts: First part was based on systematic observation of researchers when child and adult VR users were experiencing the same content for the dedicated time (5 min). Second part was based on a detailed semi-structured interview consisting of respondent's grading, answers from selected options and open answers of respondents recorded by researchers. The secondary aim was to compare perceptions and reactions of children and parents with their observed behavior, in order to draw conclusions for VR experience developers. Results of the conducted research show that children need less assistance, their movements and use of space are less controlled and more spontaneous, children are accepting VR with more ease and their emotions from VR vary on larger emotional scale than in their parents. Both parents and children were positive about trying another VR experience in the future. The results also showed the vulnerability of children when estimating time spent in VR because their guesses often underestimate the time spent in digital worlds compared to their parents.

*Keywords:* virtual reality, experience, children, parents, marketing, ethics

## **1 INTRODUCTION**

Marketing ethics in information and communication technologies (ICT) have been studied by various authors among which the recent paper by Hermann (2021) shows that the new technologies (his paper focuses on artificial intelligence) bring ethical controversies in marketing automatically and suggests inspiration from bioethics, philosophy and other fields while privacy, transparency and other principles should be met on company, customer, societal and environmental level with special focus on trust. Bonnemains et al. (2018) argue that thanks to a formal model of ethical concepts such as facts, events, decisions and consequences autonomous machines would be soon able to calculate judgements and explanations about the decisions. According to Clapper (2021) the warning asking the user to stop using the tool should be inbuilt in the systems in case of possible harm and the mental models of developers should avoid thinking that the new technology is magical, and users just need to get used to it. When searching for the comparative research method, the authors focused on the recommended suggestions by Ryan (2015), Šíroký (2014), Kozel et al. (2017) and Tahal & Stritesky (2016) and advanced scientific approaches preferring experience-based research and evidence-based conclusions. According to Gobira & Silva (2019), research of advanced virtual reality (VR) experiences, especially for galleries or museum expositions, lacked sufficient financing in last decades and many original concepts have been reshaped based on new findings, while

Grudzewski et al. (2018) predict substantial potential to the VR in marketing. Analysis of human gestures in 3D spaces to control multimedia interfaces shows detailed approach to the topic based on advanced technical criteria (Soave & De Amicis, 2012). There is a specific ethical concern about children using VR technologies as Bailey & Bailenson (2017) pointed out. Probably the most informative source in VR research in children is Virtual Human Interaction Lab at Stanford University (Virtual Human Interaction Lab, 2020) that founds the extended reality XR (augmented, mixed and virtual reality) research projects since 2003 and sees the humanity at the beginning of the virtual revolution. Their mission aims to find out the answers of the willingness of using such technologies, how does it shape individuals and society, as well as the human limitations together with the seek for the positive perspectives rather than complications. The legislative of the topic is in its progressive stage and many countries struggle to keep the normative legal frame up to date with the technological progress.

## **2 LITERATURE REVIEW**

### **2.1 Legal frame and ethics of marketing in EU and the Czech Republic**

For the deeper understanding of the legal frame of the marketing practices in the European Union, there is a set of norms such as The General Data Protection Regulation 2016/679 (GDPR) (2016). The 31 marketing practices that are seen as deceptive or aggressive and thus forbidden by the European legislation are listed in the

Parliament and of the Council of 11 May 2005 (2005) concerning unfair business-to-consumer commercial practices in the internal market. Each European country then applies this legislature

Directive 2005/29/EC of the European into its legal system with own systems of punishments. In the Czech Republic, where the research was held, this would include Law no. 89/2012 Civil Code (Občanský zákoník, 2012), Law no. 634/1992 on Protection of the Consumer (Zákon o ochraně spotřebitele, 2015), Law no. 40/1995 on Regulation of Advertisement (Zákon o regulaci reklamy, 1995) and Law no. 468/1991 on operation of TV and Radio Broadcasting (Zákon o provozování rozhlasového a televizního vysílání, 1991).

Ethical codes on marketing are then often matter of the individual marketing associations such as AOP (Asociace osobního prodeje, n.d.), FEDMA (FEDMA, 2021), SELDIA (The European Direct Selling Association, n.d.) or individual institutions or associations dealing with the VR technology such as AVRAR (Association for Virtual and Augmented Reality, 2018) in the Czech Republic.

The legal background of the research requires informed consent of parents and children for their 5 minutes long virtual experience based on the §12 and 22 of the Czech Law no. 101/2000 called Law on Personal Data Protection (Zákon o ochraně osobních údajů, 2000).

### **2.2 Children and immersive media**

Even if there are various researches led by the Virtual Human Interaction Lab at Stanford (2020) that give answers for specific groups or topics such as autistic children, gaming, VR and empathy, it is not yet fully clear what age is the best for children to start using VR. The right age is probably quite dependent on individual circumstances. According to Richert et al. (2011) younger children tend to experience the content more as real even in less-immersive media like a two-dimensional TV screen. Some sources state current adult headsets are not made for children under the age of 10-12 due to their location of eyes, pupils and head size.

## **3 METHODOLOGY**

### **3.1 Place, time, experience and technology used**

Prior to the study, each group of parents with children was asked to read and sign an informed consent form. This was followed by a brief instruction and a 5-minute experience in the VR world of an as yet unpublished VR experience in the dinosaur world, licensed to the research team by a third-party development team (DIVR Labs, 2020). The research took place in two parallel stations measuring 4x4 meters each with prototype headsets and software covering hands as virtual gloves. The stand was also enriched with other technologies such as HoloLens or HTC Vive Pro headsets that were not used for the research.

### **3.2 Sections of the research**

The research was held in two parts: Part 1 was based on systematic observation of researchers and Part 2 on a semi-structured interview consisting of grading, answers from selected options and open answers of respondents recorded by researchers. The aim was to compare the perceptions and reactions of children and parents with their observed behavior, in order to capture predictable problems, prevent possible mistakes and increase user comfort in their own creation of VR experience. The researchers expected to repeat the research with international respondents and obtain a much larger sample of data from the wider population in Prague in December 2020. Unfortunately, this intention made the emergency situation impossible.

### **3.3 About the respondents**

A total of 39 respondents from the ranks of parents (18) and children (21) aged 5 to 13 took part in the research in Zlín, Czech Republic. Among the parents, women predominated, usually accompanying one or more children. Among the children were 10 girls and 11 boys, the median was 9.5 years. All respondents signed a statement and informed consent with the research, in the case of children it was the signatures of legal representatives. For this reason, many child respondents had to be rejected if they were not accompanied by parents.

## **4 RESULTS**

### **4.1 Headset Assistance**

A higher percentage of parents than children needed the assistance of researchers to use properly VR glasses. For hand controllers, this was even more intense. There was also a higher percentage of new users among parents than among children, whose answers indicated that they were new to VR in less than half of the cases.



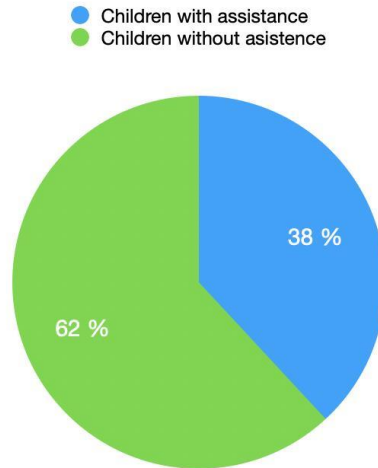


Fig. 1 – Children needing the assistance. Source: own research

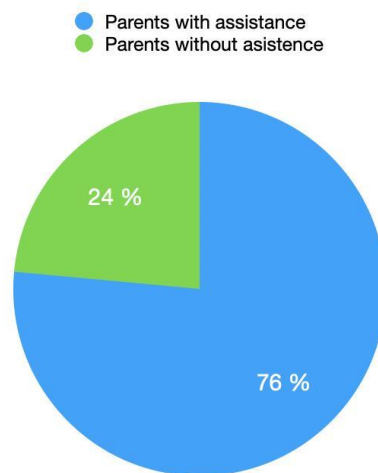


Fig. 2 – Parents needing the assistance. Source: own research

#### 4.2 The nature of movement

The movement of children in space was usually more natural and spontaneous than that of their parents, who even more often mentioned fear as their emotions.

#### 4.3 First reactions

The first reactions after using the children's headset were in all cases on a scale of neutral to positive. There were 4 negative reactions in the parents, when adult respondents began to complain about blurring and other inconveniences with the headset on.

Fig. 5 – Scheme used by the researchers. Source: Development of a Real-Time Emotion Recognition System Using Facial Expressions (Hassouneh et al., 2020).

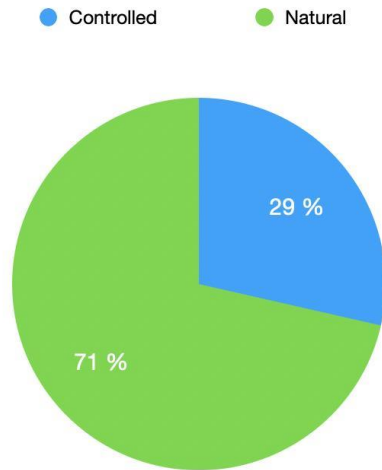


Fig. 3 – Children: spontaneity of the movement. Source: own research

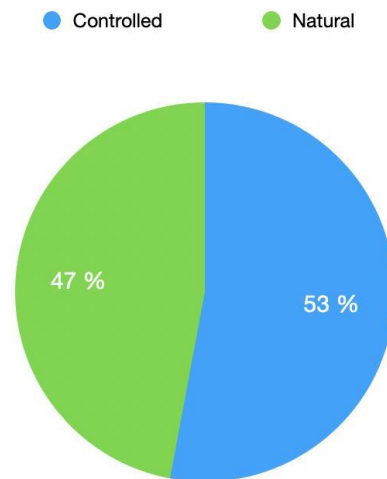


Fig. 4 – Parents: spontaneity of the movement. Source: own research



Fig. 5 – Scheme used by the researchers. Source. Development of a Real-Time Emotion Recognition System Using Facial Expressions. Source: Hassouneh et al. (2020)

#### 4.4 Technical issues

The most common technical comments for children and adults were complaints about attaching a headset, which sometimes did not fit the respondents' head, if the content was iced or chopped, it was frustrating, younger children sometimes did not use all of the functionalities of hand controls and were bothered by the weight of the headset. Child respondents complained about an internal anti-covid protection and a translucent floor at the bottom of the headset, which in some cases disturbed their experience and in one case helped with orientation. The most common complaints of parents about the technical equipment were the freezing of hand controls or turning them in the wrong grip, returning to the menu when over-squeezing, more complicated getting used to the new graphic environment offered in headset, its changes and fogging, unnatural penetrations of digital worlds, the need to use disinfection and complications in wearing the headset. But most parents overcame these difficulties: "I didn't mind the glasses; you take it as part of the experience."

#### 4.5 Content

Children talked much more spontaneously about content than their parents. One of the child respondents came up with a game he called "tease the dinosaur," girls were much more likely than boys to talk about avoiding dinosaurs. On the contrary, the boys more often appreciated these attractions and suggested that there should be more of them in the experience: "I was expecting another dinosaur and he did not come.". Several respondents wanted the digital space to be larger.

#### 4.6 Emotions

Among children, the most common emotions observed were happiness and surprise, which was confirmed by subsequent interviews. Adults often took the VR experience much more seriously and explored space or tested its boundaries. But happiness was also a frequent reaction, as well as surprise.

#### 4.7 Grading

On a scale from 1 to 5, when Czech school grades apply (1 is the best and 5 the worst), the average grade from children was 1.5 and from parents 1.6. In both groups, ones predominated, but one of them also fell due to boredom.

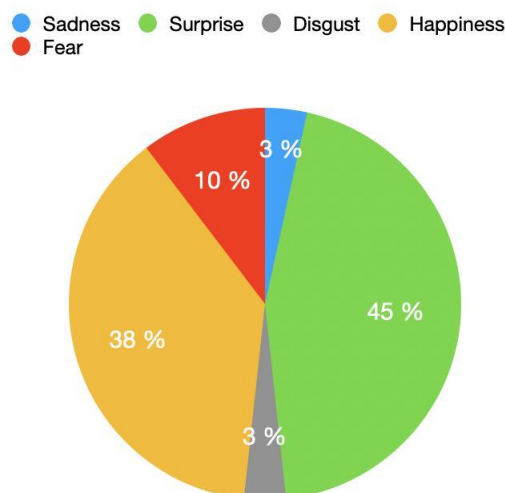


Fig. 6 – Emotions of the children in the VR experience. Source: own research

● Sadness ● Surprise ● Disgust ● Happiness  
● Fear

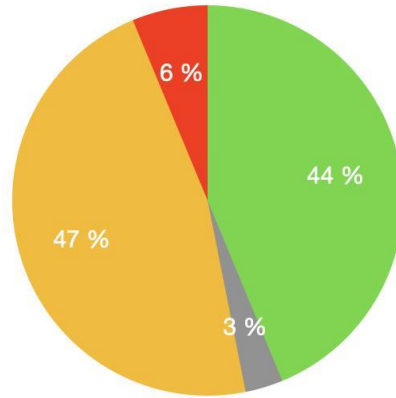


Fig. 7 – Emotions of the parents in the VR experience. Source: own research

● 1 ● 1,5 ● Other grades not given ● 2 ● 4

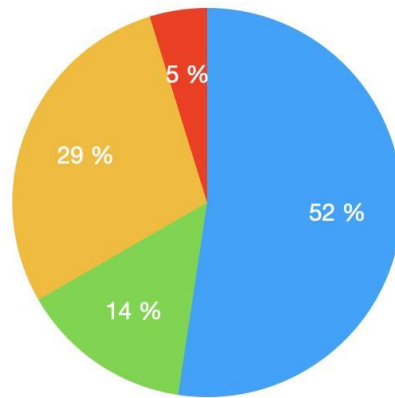


Fig. 8 – Children grading the experience on scale 1 to 5. (1 the best, 5 the worst). Source: own research

● 1 ● 1,5 ● Other grades not given ● 2 ● 3

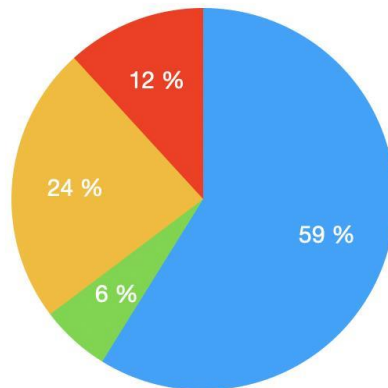


Fig. 9 – Parents grading the experience on scale 1 to 5. (1 the best, 5 the worst). Source: own research

#### 4.8 Will for repetition

The goal of this part was to find out about desire of the respondents to repeat the experience sometimes in the future. All children replied that they would like to experience similar experience sometimes in the future, and when asked if they would stay in the world of interactive dinosaurs that we offered them, only two children answered in the negative. One child respondent would choose a different environment. Parents' reactions to this question were positive (they would abstain) in less than half of the cases. The most common reasons for parents' reluctance to continue were the limitations of the vision, when they got tired of the experience and there was nowhere to continue or how to develop it. "I'm getting bored," one replied of respondents.

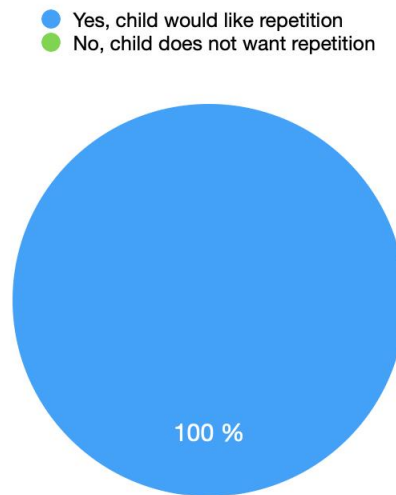


Fig. 10 – Children answering positively for the repetition of the experience in the future. Source: own research

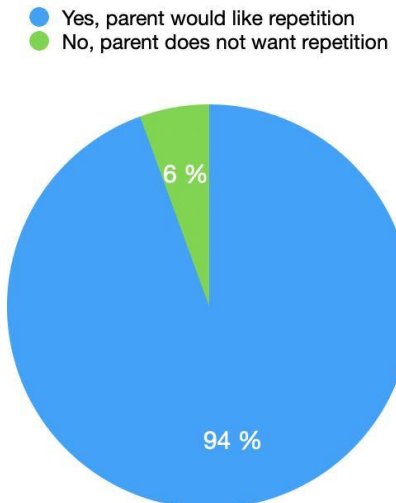


Fig. 11– Parents answering positively to the offer of repetition of the experience in the future. Source: own research

Fig. 11 – Parents answering positively to the offer of repetition of the experience in the future. Source: own research

## **4.9 Time spent in VR**

While parents sometimes underestimated and sometimes overestimated the time spent in the VR experience, the average value of all their estimates was quite accurate (with a deviation of tens of seconds). Children had deviations of 20 minutes in their estimates of time spent in the digital world, but this may also be due to their lower experience with time estimates as whole.

## **4.10 Willingness to pay for the VR experience**

With one exception, all parents said they would be willing to pay for a similar five-minute VR experience. The average price listed was 139 CZK, the most common value was 200 CZK. One sixth of the parents surveyed would not appreciate to bring home product placement such as photo of the experience. This question was not asked to children.

# **5 DISCUSSION**

From the general point of view, the rapid technological development, democratization of the VR technology and growing numbers of individually shared consumption of the digital content already seem to be in action. The research shows that children (male and female) are more open and familiar with the VR technology than their parents (usually Moms). They accept the digital worlds with less prejudice or barriers but also seem to be less aware of the risks and less critical than their parents. Children usually express natural movement in the VR which is not always valid for their parents who also show less vivid emotion when in VR. Children are ready to create their own narrative and openly express happy or loud emotions. Their parents also laugh or show fear from walking above the digital cliff, but their reactions are less vivid in general which means their immersion in the VR experience is not as profound and seamless like in the children users.

Absolute majority of the parents and children respondents would like to enjoy the VR experience in the future again, research shows. Very interesting were the data from how children and their parents perceive time spent in the digital worlds. The answers show vulnerability of the children in their estimation of the time spent in VR, which is a big issue especially with the growth of machine learning and artificial intelligence solutions.

On the other hand, there is no doubt that the financially demanding use and creation of VR content has long been a reason for its limited use. Typical example would be Microsoft HoloLens where the advanced types were only accessible on the academic soil or in the specific industries (Bennett, 2017). There is also a great need for the big data transfers and as Fuchs et al. (2011) noted already in 2011 and not all of the computers are efficient enough when developing some types of advanced VR. This limitation has been quickly erased by the technological progress and democratization of the VR industry.

Certain percentage of users suffer from the motion-sickness in new realities, others find the content unattractive, expensive or technologically far from their reach. These negative user experiences are the typical diseases of the new industries where the mass use has not yet pushed the market for the excellent solutions.

In general, there have been raised significant ethical questions to the use of VR especially when it concerned younger kids, possibly addictive content or uncontrolled time spent. Some of the ethical challenges are especially dramatic in the combination of more technologies as El-Kader & Hussein (2020) pointed out such as artificial intelligence (AI), 5G marketing, whose goal is to sell product or service and VR that enables the kind of immersion and interactivity into the artificial worlds that can potentially lead as Costello (2020) warns to the fatal or harmful environment for future generations.

## 6 CONCLUSION

On the developers' side, the researchers recommend avoiding as many technical pitfalls as possible, such as fixing headsets with an inner anti-covid protection, fogging, translucency of the floor in the headset, solving the appropriate volume of sound in the headphones. Rejecting factors are also the "chopping" or "icing" of the content, the unreasonably long or short time of the experience and how large space is allotted to it (in order to avoid the user's boredom after a while from the lack of stimuli). It is advisable to have the experience limited in time and space. In the case of public presentations of VR, it is recommended having an informed staff or operators who will lead inexperienced users through a handful of brief instructions through the digital environment and explain them the basic functionalities.

New users who wear dioptric glasses usually need more assistance as well as younger children who need to fasten their headset straps properly. It should be taken into account that the adrenaline elements that some users downright welcome, others may be directly discouraged by. That's why the researcher recommend to the developers to create two versions of the experience: one more charming and the other more adrenaline-fueled. People quite understand that the development of the VR experience is an expensive matter and are willing to pay for it, including reminder merchandising such as photography from the experience.

After considering the potential of VR and the possible risks, it turns out that it is a promising technology. Full implementation and democratization of VR is likely to bring significant risks combined with unexpected positive changes. The chances that VR technology, along with 5G (Costello, 2020) completely transforms everyday life into a safer, more fun and tolerant place, are posed by the exact opposite risks, where technology can lead to dystopia if the correct answers to the ethical questions are not recognized, answered and implemented in time. We are at a crossroads where some paths lead to unexpected potentials and others may lead to the digital exploitation driven by the marketing needs.

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### Contact information:

#### **Ing. Hana Nováková**

Tomas Bata University in Zlín

Faculty of Multimedia communication Univerzitní 2431, 760 01 Zlín, Czech Republic e-mail:

E-mail: [h1\\_novakova@utb.cz](mailto:h1_novakova@utb.cz)

ORCID: 0000-0002-0063-4746

#### **prof. Mgr. Peter Štarchoň, PhD.**

Tomas Bata University in Zlín

Fakulty of Multimedia communication Univerzitní 2431, 760 01 Zlín, Czech Republic e-mail:

E-mail: [starchon@utb.cz](mailto:starchon@utb.cz)

ORCID: 0000-0002-8806-4150

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# CZECH SERVICE QUALITY SYSTEM - A TOOL FOR IMPROVING QUALITY IN THE CZECH MARKET ENVIRONMENT

*Jana Novotná*

## **Abstract**

The present research carried out a survey of the service quality represented by the Czech Service Quality System (CSQS). The aim of this paper is to analyse the implementation this system and verify the applicability of this system in practice as well as to verify the interdependence with the values of the Tourism Satellite Account. The partial goal is to describe both stages of the system, including the specific conditions necessary for a successful certification. To fulfil the aim of this paper an inter-regional analysis was carried out to determine the degree of implementation of CSQS of territorial units of NUTS3 of the Czech Republic. Specifically, the number of certified organizations was finding out in these territorial units. Next the values of the Tourism Satellite Account (TSA) in these regions were determined, resp. the share of individual regions in the Gross Value Added (GVA) of tourism. In order to verify the influence of the number of certified organizations on the development of the region, the data obtained from the TSA in regions were cross-correlated with the data obtained by the inter-regional analysis of the Czech Service Quality System. For finding of this mutual interdependence between the determined values the Pearson correlation coefficient was used. This coefficient examines the common variability of two quantities and finds out whether there is possible to observe a linear relationship in the data. The output from the cross-correlation of these data refers to the fact that no statistically significant linear dependence was proven. This means that the linear interdependence between correlated quantities has not been demonstrated. This does not mean, however, that the compared quantities do not depend on each other.

**Keywords:** *competitiveness, Czech Service Quality System, Gross Value Added (GVA), service quality, tourism, Tourism Satellite Account (TSA)*

## **1 INTRODUCTION**

Tourism is one of the most important sectors of the national economies and represent a significant source of economic growth, because it comprises an important part of population's consumption. In most developed countries, it even holds the dominant position. Its importance lies primarily in its ability to positively influence many other sectors, especially the tertiary – services sector. However, the service sector is a highly competitive environment, so quality assurance in services is understood as the basis for the operation of service companies. As the essence of services is to provide them to guest and tourists at the highest possible level, in other words with the best quality. Because it is just quality of services what the customers will make to re-visit and maintain loyalty to a “favourite” organization. According to Cetin (2020) both quality and experience are discussed as antecedents of satisfaction and loyalty in services. Thus, the very satisfied customers will not only become returning customers but will provide positive word-of-mouth promotion improving the image of the service provider (Löke, Kovács, & Bacsı, 2018). Anderson (1998) confirmed in his study that customer satisfaction has a positive impact on the number of recommendations, and word-of-mouth promotion is strongest when customer satisfaction is very high or very low. In relation of perception of quality, it is therefore judgment of quality by consumer which should be given the highest priority and his decision regarding

the quality of service should be welcome by the suppliers (Puri & Singh, 2020). It is necessary to emphasize the ability of companies to understand their customers and ensure their satisfaction with the services received. The customer is the most important part of every activity in the service sector. Quality is the basis for the functioning of the service sector, as service is an undeniable act of the process, and is thus closely linked to client satisfaction (Meidutė-Kavaliauskienė, Aranskis, & Litvinenko, 2014). This is a particular complex as customers are constantly changing and the need to adapt to them seems to be the only way to enable companies to operate stably in a market with such a changing environment (Nowacki, Szopiński, & Bachnik, 2018). Therefore, if customer satisfaction and customer trust significantly affect customer behavior, managers should incorporate it into their marketing strategy (Paulo, Tiago, & Almira, 2019)

The above implies that service-based industries, such as tourism companies are obliged to implement appropriate tools to increase quality in their day-to-day activities, to gain a significant competitive advantage. According to Gajić, Vujko, Tretiakova, Petrović, Radovanović, Vuković (2019) the quality of business operations is seen as a significant long-term factor of stabilization in the market and providing a firm position among its competitors. Hence quality plays a crucial role in relation to tourism services and for this reason it is in the interest of tourism organizations to provide their services with the highest quality and thus ensure a sustainable competitive advantage.

This paper is focused on one of the tools for increasing competitiveness among tourism services providers. In the Czech Republic is such a tool represented by the Czech Service Quality System. It is a quality management system based on knowledge of customer needs and is focused on increasing quality and competitiveness in the field of tourism. The practical benefits of the organization's involvement in the system lie in the acquisition of professional as well as practical skills in the field of quality management. Other advantages associated with the implementation of the CSQS system are a competitive advantage, it brings higher profits, reduces costs, and it has a positive effect on employee turnover. Organizations that successfully pass the certification process at one of both levels of the system will receive the prestigious "Q" mark, which is synonymous with quality for customers, as well as rewarding the work of employees.

This system was implemented in the Czech market environment in 2010. It is therefore a sufficiently long period of time for the functioning of the system to be assessed in practice. The reason for the implementation of this system to Czech market condition was the low quality of services provided in tourism sector. That is why this article is focused on finding out to what extent organizations have taken the problem of poor quality of services seriously and whether they are approaching their service provision responsibly, with a constant effort to improve not only their services and thus their position among other companies, but also the desire to improve themselves.

The use of the Czech Service Quality System in practice is verified by performing an interregional analysis and further using the Pearson correlation coefficient.

## **2 LITERATURE REVIEW**

### **2.1 The world of services in tourism**

In the very general way, a service is an economic activity satisfying a certain need. In other words, a service can be explained as an intangible act between customer and the service provider. For example, Kotler (1992) defines services as all activities or performance that one party can offer to another, that are not materialised, and do not result in an ownership right over

anything. In addition, the provision of services may not be associated with the presence of a physical product. Rather, it is a non-physical satisfaction of need.

Besides to the non-physical form, for services is characteristic the so called HIPI principle including: Heterogeneity, Intangibility, Perishability, Inseparability. Where heterogeneity (variability) is related to the human factor - it depends on who provides the service, when and where. Intangibility refers to the non-physical essence of services, in other words it is not possible to discovered services by senses. Perishability means that services cannot be produced to stock. Demand is an important factor in perishability. If the demand is high, some demand cannot be satisfied and on contrary, with low demand, capacity is unused. Inseparability indicates relation the customer and the service provider. If the consumer pays for the service, the service provider is also part of it. Because the consumer and the provider are in mutual interaction the creation and the consumption of the service happens simultaneously. From this point of view the person of the customer (as the input of the service, that cannot be standardised) influences the final quality of the service (Löke, Kovács, & Bacsí, 2018).

Service quality is considered as a critical dimension of competitiveness (Lin, Lin, & Wang, 2020). The understanding service quality offered to guests and tourists are extremely important to the growth and competitiveness of hotel and gastronomy business (Škodová Parmová, Líšková Dvořáková, & Kain, 2018). This statement corresponds with Akbaba (2006), who says that it is vital for the hotel managers to have a good understanding on what exactly the customers want. Identifying the specific expectations of customers, the dimensions of the service quality, and their relative importance for customers for each specific segment of hotel industry would definitely help managers in the challenge of improving the service quality. Service quality is for example defined by Parasuraman, Zeithaml, and Berry (1985) as a measure of inconsistency between consumers' perceptions of services received and their expectations about the organisation offering the services. For to meet or exceed customer expectations, an organisation must fully understand everyone attributes of services that contribute to customer value and lead to satisfaction and loyalty (Evans & Lindsay, 2017). According to Kapiki (2012) the quality of the tourism and hospitality industry is consistent supply of products and services for guests according to the expected standards. In other words, quality is reached whenever customer is satisfied, when are met his/her expectations or even better the feeling he/she has won some extra value and the real enjoyment exceeded his/her expectations.

The importance of quality in relation to providing services is clear. But the same importance is effective management of quality which can be considered as a key tool of increasing competitiveness. According to Ryglová and Rašovská (2017) is quality management a long-term process and it is particularly necessary to understand the concept of customer satisfaction and to build on from the assumption a company can fulfil its goals only through satisfied customers. Authors Andreeva, Zhulina, Popova and Yashin (2018) also understand the importance of quality control. In addition of implementing quality management as the main source of growth for companies, they consider as a very important also the increased role of the process approach and the improvement of the strategy. Quality Management is not just the requirements of ISO standards and quality management, but the overall business philosophy linked to the company strategy bringing long-term competitive advantage for an enterprise. In relation to tourism and leisure a special approach is required from the nature of the leisure-time product itself, according to Williams and Buswell (2003). This particular approach is given neither by consistent fulfilment of the requirements of customers nor the ability and willingness of staff to provide quality services. It is given by providing services based on the experience, and success of such service is driven by increasing that experience and the emotional responsibility of the individual to the attributes of the service offerings. In other words, the authors are aware of the importance of the organization's employees. As well Löke, Kovács

and Bacsı (2018) believe the significant role of employees when they claim, that the staff must precisely and professionally know the provided services. With this statement agree other authors who consider employees of the organization as a key element of quality management system. According to these authors staff management and personnel policy are crucial. They believe that the person is at the heart of any process designed to provide a particular service we call business. The basic objective of enterprise then should be meeting needs of its own employees (Haedrich, Kaspar, Klemm, & Kreilkamp, 1998).

## **2.2 Czech Service Quality System**

Czech Service Quality System is a tool for raising the quality of services in organizations in the field of tourism and related services (O Českém systému kvality služeb, 2021). The main reason for the decision to implement this system to the Czech market environment was the long-term low quality of services provided in tourism. The tool is based on the Swiss Qsystem, resp. German ServiceQualität Deutschland, which have a long and successful tradition in the countries. The aim of the Czech Service Quality System standard is to address a diverse range of tourism service providers and teach these entrepreneurs to use modern management systems of service quality management so that these entrepreneurs can measure and systematically increase the quality of services provided in their companies or organizations and thus systematically approach customer expectations.

This system was primarily designed for tourism, but later the criteria were changed so that it could be used in almost all sectors of the national economy. From this reason, where a wide range of organizations can be involved in the system, including both small and medium-sized enterprises or large private sector chains, as well as public sector businesses, the system has been set up as two-tier system. High adaptability is a significant advantage of this system. Every company will determine its own vision and the measures they will take to fulfil it (Škodová Parmová, Líšková Dvořáková, & Kain, 2018). Certification in the first level of the system presupposes an awareness of the importance of providing quality services, and in particular the organization's interest in implementing quality into its day-to-day activities as well as the desire to constantly improve its performance. The second degree of the Czech Service Quality System includes the introduction of more advanced quality tools, and also verifies the achieved level of quality through a questionnaire survey and mystery shopping analysis. The system is owned by the Ministry of Regional Development of the Czech Republic and through the whole period it is operated by the CzechTourism Agency.

### **I. Level of CSQS**

This level of certification is associated with an awareness of the importance of providing high quality services, the interest of organizations in implementing quality into their own processes and the will to constantly improve it. The first step in entering the system is on-line registration on the relevant website and fill in the required data. At this point it is necessary to select one employee (the so-called quality trainer) of the organization, who is required to undergo first-degree training and will be responsible for the implementation of system elements into the organization's functioning as well as for meeting these requirements.

### **II. Level of CSQS**

This certification level involves the introduction of more advanced quality tools. At this stage there is also verified the achieved quality through a questionnaire survey and the mystery shopping method. To apply to this level the organization must hold a first level certificate for at least 6 months. Next to half year period of using the certificate it is necessary to retrain the quality trainer for the II. system level. When it is successfully complete it is possible to begin the transition process of the organization to a higher level of the CSQS system, which starts

with questionnaire survey among clients and employees of the company and mystery shopping in the company. In case of a positive evaluation of all documents, the organization will receive a quality certificate of II. level of the system.

It can be stated that the quality of services in tourism is essential. For this reason, it is appropriate to implement one of the quality management tools in the operation of companies. These systems bring benefits not only in relation to customers, for whom certification in the system is a sign of quality services as well as it shows the organizations' serious approach to providing services, but also brings benefits within the organization itself, when for employees who are key components of service provision and for whom involvement in the quality system is not only an appreciation of their work, but also a source of further motivation. Involvement in quality management systems represents for a company in such a highly competitive environment, which tourism undoubtedly is, a significant advantage.

### **3 METHODOLOGY**

#### **3.1 Objectives and Methods**

The aim of this paper is to analyse the current level of implementation of the Czech Service Quality System among tourism organizations. The project was implemented from 1<sup>st</sup> January 2010 to 31<sup>st</sup> December 2015. The following period until 31<sup>st</sup> December 2020, the project was in a period of sustainability. Considering the long period of time in which the project is implemented in the Czech market environment, it is appropriate to evaluate its current applicability and impacts of this system. The partial goal is to describe both stages of the system, including the specific conditions that must be met for successful certification at a given level. Data on the number of certified organizations in the system were obtained from the website of the Czech Service Quality System as well as from documents provided directly from the Czech Tourism Agency. These obtained data on the number of certified organizations in the analysed system were divided according to individual regions of the Czech Republic corresponding to the NUTS 3 territorial level. For to determine the influence of the number of these organizations on the development of the region, correlation was sought between the data from the inter-regional analysis and the share of Gross Value Added of tourism in these territorial units. The current value of regional satellite accounts in NUTS3 regions is available from the website of the Czech Statistical Office. Pearson's linear correlation coefficient was used to verify the statistical significance of the dependence of these quantities.

### **4 RESULTS**

#### **4.1 Inter-regional analysis**

For the purposes of this paper, an analysis of the Czech market environment was performed to determine the total number of certified organizations in the CSQS system. The obtained data were further divided into inter-regional analysis – i. e. in accordance with 14 regions of the Czech Republic (territorial units of NUTS 3). Nomenclature of Units for Territorial Statistics (NUTS) are territorial units created for statistical purposes by Eurostat for comparison and analysis of economic indicators, statistical monitoring, preparation, implementation, and evaluation of regional policy of EU member states. For to achieve comparability of individual statistical units throughout the European Union, population limits are set for individual levels of the NUTS system. In the case of the Czech Republic, there are the following NUTS levels:

- NUTS 0, NUTS 1 – the state, the territory of the Czech Republic (1);

- NUTS 2 – cohesion regions (8);
- NUTS 3 – regions (districts) (14).

The data for the CSQS inter-regional analysis are valid as of 20 November 2018. The obtained results are shown in the following Table 1.

Tab. 1 – Distribution of certified organizations by regions of the Czech Republic. Source: own research

Groups	Regions of the Czech Republic (territorial units of NUTS 3)													
	City of Prague Praha	South Bohemian	Southern Moravia	Karlovy Vary	Vysočina	Hradec Králové	Liberec	Moravian-Silesian	The Olomouc	The Pardubice	The Pilsen	Central Bohemia	The Ústí	Zlín
Acommodation	-	5	-	1	2	1	1	5	2	2	1	-	-	1
Gastronomy	-	1	-	-	-	1	-	1	-	1	1	-	1	-
Tourist Information Centers	-	6	-	3	4	7	4	3	1	3	5	3	5	-
Attractivities	1	5	1	-	7	5	-	3	1	-	4	3	2	1
Travel offices and agencies	7	2	4	1	2	1	2	12	2	-	5	2	5	1
Winter sports	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Golf	-	-	1	-	-	-	-	2	-	-	-	-	-	-
Organization of public and non-profit sector	1	13	3	2	2	6	1	1	2	6	6	-	6	-
Other services	6	-	-	-	4	2	1	1	2	2	1	1	1	1
<b>Total</b>	<b>15</b>	<b>32</b>	<b>10</b>	<b>7</b>	<b>21</b>	<b>23</b>	<b>9</b>	<b>28</b>	<b>10</b>	<b>14</b>	<b>23</b>	<b>9</b>	<b>20</b>	<b>4</b>

The inter-regional analysis showed the most numerous representations of certified organizations in the South Bohemian Region, followed by the Moravian-Silesian, Pilsen and Hradec Králové Regions. The least number of certified organization is located in the Zlín Region.

#### 4.2 Pearson linear correlation coefficient

To verify the interdependence between the total number of certified organizations and the value of the tourism satellite account in individual regions, a mutual correlation of these data was performed.

Tourism Satellite Account (TSA) is a tool that defines the share of tourism as a sector in Gross Domestic Product (GDP) of a country. In other words, the Tourism Satellite Account provides information and data on the economic position of the tourism industry. It is a globally recognized system enabling international comparison of tourism performance. It is supported

by all major international organizations in the field of tourism (eg. EUROSTAT, OECD, UNWTO).

The importance of tourism for the economy at the regional level can be expressed as a share of the total value of Gross Value Added (GVA). Gross Value Added is the indicator used to assess the performance of the entire economy. Significantly it expresses the newly created value, which is determined as the difference between total output (value of gross output) valued at basic prices and intermediate consumption (material and other intermediate inputs) valued at purchasers' prices. These values of GVA for individual regions in percentage terms for 2018 are evident from the following Table 2.

Tab. 2 – Values of GVA and number of certified org. by NUTS3 regions in 2018. Source: own research and processing

<i>NUTS3 Regions of the Czech Republic</i>	<i>Share in total GVA of tourism in %</i>	<i>Certified organizations in %</i>
City of Prague	34,9	6,7
Central Bohemia	9,4	4
South Bohemian	5,2	14,2
The Pilsen	4,3	10,2
Karlovy Vary	3,7	3,1
The Ústí	4,3	9
Liberec	2,8	4
Hradec Králové	4,2	10,2
The Pardubice	3,2	6,2
Vysočina	3	9,3
Southern Moravia	10,3	4,4
The Olomouc	3,8	4,4
Zlín	3,5	1,8
Moravian-Silesian	7,3	12,4

The Pearson linear correlation coefficient was used for correlation. The correlation coefficient takes values in the interval  $\langle -1; 1 \rangle$ , when a negative value of the correlation coefficient indicates a completely indirect dependence (the larger the value in the first group of characters, the smaller the value in the second group of characters). A positive value of the correlation coefficient indicates a completely direct dependence (the larger the value in the first group, the larger the value in the second one). The closer is the value to the limit values, the stronger the linear correlation. If the correlation coefficient is equal to 0, then there is no statistically significant linear dependence between the characters, which does not mean, however, that the quantities do not depend on each other. The correlation coefficient only means that the solved relation cannot be expressed by a linear function, not even approximately.

The calculation of the Pearson correlation coefficient is based on the realization of a two-dimensional random vector with the range  $n$ , i. e. a pair of observed values of random variable  $X$  and  $Y$  for the first to  $n^{\text{th}}$  experimental units:

$$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix}, \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}, \dots, \begin{pmatrix} x_n \\ y_n \end{pmatrix}. \quad (1)$$



The calculation is the as follows:

$$r = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}} = \frac{\sum_{i=1}^n x_i y_i - n\bar{x}\bar{y}}{(n-1)s_x s_y}, \quad (2)$$

where:

$\bar{x}$  and  $\bar{y}$  are selection averages

$s_x$  and  $s_y$  are the sample standard deviations (Výpočet Pearsonova korelačního koeficientu, 2020)

The Pearson's coefficient  $r$  reached -0,03162. This result refers to the fact that the tested quantities do not show any statistically significant correlation, i. e. that it was not possible to prove a statistically significant linear dependence. However, in making this statement, it is necessary to take into consideration not only the small size of the sample, but also the outlying value corresponding to 34,9 in the case of the share in the Gross Value Added of the City of Prague Region. This value does not completely correspond to the remaining values of the sample and this fact then could affects the resulting value of the coefficient  $r$ .

## 5 DISCUSSION

The inter-regional analysis showed that the largest number of certified organizations is int the South Bohemian Region, while the lowest number of certified organizations was in the Zlín Region. The division of certified organizations into groups the pointed to the fact that the most certified organizations are in the group of travel offices and agencies and in the group of tourist information centres.

In relation to find a correlation between the percentage of the number of certified organizations and the percentage share in the total Gross Value Added in individual territorial units of NUTS3 level. Thus, the mutual correlation between the selected quantities was determined. The Pearson coefficient was chosen for this purpose. The coefficient reached the value -0,03162 – no statistically significant linear dependence was proved. This signifies that the number of certified organizations in the region did not show a linear dependence on the value of the share in the total Gross Value Added of tourism in individual regions. But this finding does not mean, however, that the quantities do not depend on each other, it only means that the solved relation cannot be expressed by a linear function.

Limitation of this paper lies in its narrow focus on the analysis of implementation only from the point of view of service providers, while the customer's perspective is not solved by this research. This is the reason why the future research direction will be oriented towards consumers. It will be focused on the conduct a questionnaire survey among the population of the Czech Republic, for the purpose to determine the use of the system from the customer's point of view as well as finding out how the knowledge of the system interferes with consumer decision-making.

## 6 CONCLUSION

The aim of this paper was to analyse the implementation of the Czech Service Quality System and verify the applicability of this system in practice. Significantly it was to find out the number of organizations certified in this system in territorial units of NUTS3 regions of the Czech

Republic. Also, following specific objectives were expected to be achieved: first one to verify the interdependence data obtained from the inter-regional analysis with the values of the Tourism Satellite Account, second one was to describe the system, as well as both stages of the system, including the specific conditions necessary for a successful certification.

The concept of the analysed Czech Service quality System is based on principles of quality management. The main philosophy is to understand the needs and expectations of the customers (guests, visitors, tourists etc.) and constantly improve the quality of provided services, as this is a crucial discipline for every tourism company management. The participating organizations gain professional know-how in the field of quality management, focused specifically on the development of so-called soft skills, such as the ability of communication, decision making, resolve conflicts, or other competencies useful for management and staff. Every organization involved in the system receive a prestigious “Q” brand which is both guarantee of proven quality for guest and appreciation of the work of all employees and motivating them for future performance at the same time.

From the performed analysis of the use of Czech service quality system in practice, it can be stated that the system has entered the consciousness of tourism actors and is constantly building its position. It represents a solid foundation and a promising prerequisite for the introduction and provision of services in tourism.

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**Contact information**

**Ing. Jana Novotná**

University of South Bohemia, Faculty of Economics  
Studentská 13, 370 05 České Budějovice, Czech Republic  
E-mail: novotj25@jcu.cz  
ORCID: 0000-0003-1719-2646

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# ENTREPRENEURIAL ACTIVITIES AMONG UNIVERSITIES IN THE CZECH REPUBLIC

*Michael Amponsah Odei, Emad Attia Mohamed Omran*

## **Abstract**

Universities have since time immemorial contributed to their economies by way of research and quality education. However, in recent times, their role has changed since they accepted their third mission of contributing to development (social and economic) and direct engagement in the economy by collaborating with industries and government to create innovation. A crucial point in the flow of academic research results to the entrepreneurial stage is the transfer of knowledge emanating from tertiary educational institutions to the economy. Academic spin-offs play an increasingly important role in this regard. Spin-off firms transfer new research outcomes into directly commercial worth. Academic entrepreneurship has been embraced worldwide due to the contributions it can make by reducing unemployment, boosting economic growth, and impacting the knowledge-based economy. This paper aims to assess universities' entrepreneurial activities in the Czech Republic to see how they engage with industries by way of spin-off creation and technology transfer. This study adopts document analysis and a qualitative approach in its methodology to fill the literature gap. Scientific articles in the Scopus and google scholar database was used in the document analysis using keywords concerning the topic. This paper has demonstrated that the concept of universities engaging in entrepreneurial activities is novel among universities in the Czech Republic. The results of this paper have shown that universities in the Czech Republic have less engagement with industries.

**Keywords:** *Entrepreneur universities, spin-offs, Czech Republic, economy, knowledge transfer, knowledgebase*

## **1 INTRODUCTION**

Universities are undoubtedly influential when it comes to human resources development and the economic growth of countries. Universities are, in recent times, highly looked up to make a meaningful contribution or returns to communities and countries where they are located (Odei, 2017). Entrepreneurial universities have become a vital player in the knowledge-based economy and are also essential in the Triple Helix collaboration. Entrepreneurial universities play a leading role in innovation as well as socio-economic development (Etzkowitz, 2008). The standard missions of universities have been to educate the crop of researchers. However, in recent times, universities have widely accepted the third mission to contribute directly to society's socio-economic development in their catchment area (Odei, 2017). Some of the possible ways universities are expected to contribute to social or regional development have conventionally been through research publications, human resource development, and their traditional teaching role.

Recently universities have knitted their traditional and their new third mission in tandem, which has placed lots of challenges on universities and their entrepreneurial activities (Lerner, 2004). There is a growing demand for universities to transfer the knowledge generated further than their academic community to reach other users like industries (Abubakar, 2019). Most universities in recent times are trying to adjust and position themselves better to embrace their regional development role, so they are in a transition stage, i.e., changing from their traditional

role to a new role of direct engagement with other social actors like existing industries or helping in the establishment of new firms. Only when universities can contribute and get involved in the transfer of technology and tight formation can they be labeled "fully-fledged" (Etzkowitz, 2003).

The paradigm shift from a university traditional research focus to an entrepreneurial university has the impetus to contribute to regional development significantly (Etzkowitz b, 2013). Through the new entrepreneurial role of universities, they can help train the country's needed workforce base, contribute to the technology infrastructure, and help find solutions to societal problems. Well-established entrepreneur universities are actively involved in the commercialization of their academic research through various ways such as product development, establishing academic spin-offs, and patent acquisition. It can also manifest itself by academics consulting activities and signing research contracts with firms (Goldfarb and Henrekson, 2003). The success or otherwise of entrepreneurial universities are primarily measured according to the total number of spin-offs they establish, and patents licensed (Etzkowitz a, 2003; Dahlstrand, 2008). Many universities have buttressed their entrepreneur drive by setting up specialized supporting structures such as science parks within or close to their campuses, technology transfer offices (TTOs), an incubators (Kolympiris & Klein, 2017).

Although the Czech government has made an enormous contribution towards higher education in terms of budgetary allocations and infrastructure support, little is known about Czech universities' entrepreneurial initiatives and their research commercialization by way of spin-off creation. The multitude of literature reviewed has demonstrated that the concept of entrepreneur universities and their spin of creation is a novel development in the Czech Republic.

It is based on this fact that this paper has proposed a model pathway of entrepreneurial universities in the United Kingdom. UK universities have long engaged with industries and are one of the success stories in Europe. The UK is home to numerous spin-off firms through its growing entrepreneurial universities (Lockett and Wright, 2005). This paper, therefore, seeks to bring to bear the successful factors promoting entrepreneurial universities in the UK that can be emulated by universities in the Czech Republic, where the concept of entrepreneurial universities is gaining popularity but still in its early stages.

The rest of this paper is organized in the following way: In the following section, we will focus on the theoretical background presented on academic activities' commercialization and spin-offs evolution. Section 3 presents the research methodology. Section 4 presents conclusion and offers some suggestions for future research directions.

## **2 THEORETICAL BACKGROUND**

Universities have been known to perform the tasks of teaching and research. However, in recent times, they also perform specific roles such as collaborating and establishing closer links with business and industry (Rupika & Singh, 2016). Universities play a vital role in the knowledge economy; they provide the needed infrastructure to build social capacities essential for nations and regions to thrive in the knowledge-based economy (Asgary & Maccari, 2019). This expectation from universities has now led them to be academic entrepreneurs. The entrepreneurial university is becoming an important development in the academic sphere because it has metamorphosed universities' focus from teaching and researching to forming academic enterprise and knowledge and technology transfer (Etzkowitz, 2003). This transformation in universities' role or the "second academic revolution" has incorporated a new mission that has positioned the entrepreneurial university to contribute to the economic and social development (Etzkowitz, 2004).

Traditional universities have in recent times moved a step further beyond spawning profit-oriented or commercial knowledge and contributing to training a new crop of qualified research scientists. Universities are nowadays helping contribute to producing other means of knowledge transmission. They contribute to such knowledge diffusion by training and attracting skilled and talented potentials to the local economy within their catchment areas or nationwide. Notably, the recent form of modern universities' expectations is seen in how they are to collaborate with industry. They mainly collaborate with industries by assisting and providing industries with formal and informal workforce and technical support (Bramwell, & Wolfe, 2008)

As universities take up entrepreneurial roles, they flake and break the long-established image of the ivory tower and now pay attention to the creation and dissemination of essential knowledge across a more comprehensive coverage network in the socio-economic structure (Saad & Zawdie, 2011). This means that the industrial sector stands to gain because they benefit by utilizing knowledge produced by universities to generate wealth. Therefore, the entrepreneur universities' role is to put the knowledge they generate from their diverse research into commercial output. They mostly do this by the spin-off firm formation (Etzkowitz, 2003). Spin-offs from universities and other Higher Education Institutions (HEI) constitute the well-known mode of knowledge transfer. The results of research and academic knowledge are vital resources in start-ups. It is in spin-offs that knowledge can be changed into wealth and marketable.

For universities to be considered to attain the status of being referred to as entrepreneurs, it needs to have a high degree of autonomy. It should not be heavily dependent on government and industries (Etzkowitz, 2003). The independence of universities will make room for them to focus on their research-oriented and social development mission. This academic independence means that universities must not overly or heavily dependent on government as well as industries. They (universities) should take any initiative they deem essential and vital to students and the national economy. The academic autonomy being described here does not mean they should revisit their academic empire status. However, they need to forge a high sense of mutual collaboration with the other social entities (government and industries).

Research commercialization is the hallmark of entrepreneur universities. There has not been a global agreement among academia about what constitutes academic commercialization or entrepreneur universities (Pattnaik & Pandey, 2014). This lack of consensus is portrayed in the different ways authors prefer to name the concept. For instance, some authors refer to it as "academic engagement" (Cohen et al., 2002; Singh et al., 2002; Furrer & Skinner, 2003) and "entrepreneurial university" (Etzkowitz, 1998, 2003).

According to Zhao (2004), research commercialization can be defined as the process by which research findings or any idea emanating from the academic world (universities and higher educational institutions) can be transformed into commercial outputs in the form of goods and services that generate wealth. Entrepreneur universities or, in simple terms, academic engagement refers to the process through which academic knowledge is based on and made available for use in the industrial sphere; industries value their engagement with academia than licensing university patents (Cohen et al., 2002). Similarly, in the view of Rahal (2005), university commercialization is the process whereby academic research discoveries are transferred from universities to the industry in the form of valuable services, products, and practical applications.

At this point, one of the ways to assess how entrepreneur universities are performing or how best they have performed is through the number of spin-offs that have been able to establish or how far they are engaged with industries either directly or indirectly. Entrepreneur universities,

therefore, use spin-offs companies to commercialize research. According to Klofsten and Jones-Evans (2000), a "spin-off is a new organization established to show the results of university research" (p. 300). Alternatively, Zhang (2009) has also defined a university spin-off firm as companies initiated by university staff which he described as "academic entrepreneurs. Conti et al. (2011) also defined a spin-off company as "those companies that germinate from a University, where a group of researchers composes the entrepreneurial unit to exploit skills and results from the research developed within the University". So, spin-offs are new firms established by academia to transform newly generated knowledge from universities and other public research organizations into market products that can generate new value-added and offer employment opportunities. These spin-off firms transform scientific research knowledge into commercial use.

## **2.1 How entrepreneur universities create spin-off firms**

The commercialization of academic activities in the form of spin-off creation involves some stages. However, they have not been a general consensus in the academic world about the precise process that leads to the creation of spin-offs. The spin-off process or development process involves some stages or "life cycle process," the path or model that can be followed to establish spin-offs (Ndonzuau et al., 2002). The stages or the path to the spin-off creation is relative to the scholar and his opinion; for instance, the model proposed by Shane (2004) consists of five stages while (Ndonzuau et al., 2002; Pattnaik & Pandey, 2014) proposed a model that consists of four stages. Others such as (Gartner, 1985; Ndonzuau et al., 2002; Helm & Mauroner, 2007) came up with a model that consisted of three stages. This paper will adopt the multistage holistic conceptual model designed by (Pattnaik & Pandey, 2014) based on how it has been simplified, making it easy to follow and understand. They classified the stages for the spin-off creation into four stages. The first stage involved in creating spin-off involves the capabilities, which are the prerequisite for any research to be carried out. After the competence has been made known, then competence can be recognized. Through competence, one will be able to know the resources in the form of capital (finance). At this stage, the research can be financed either individually, by the university, or by public sources, as illustrated in their diagram below.



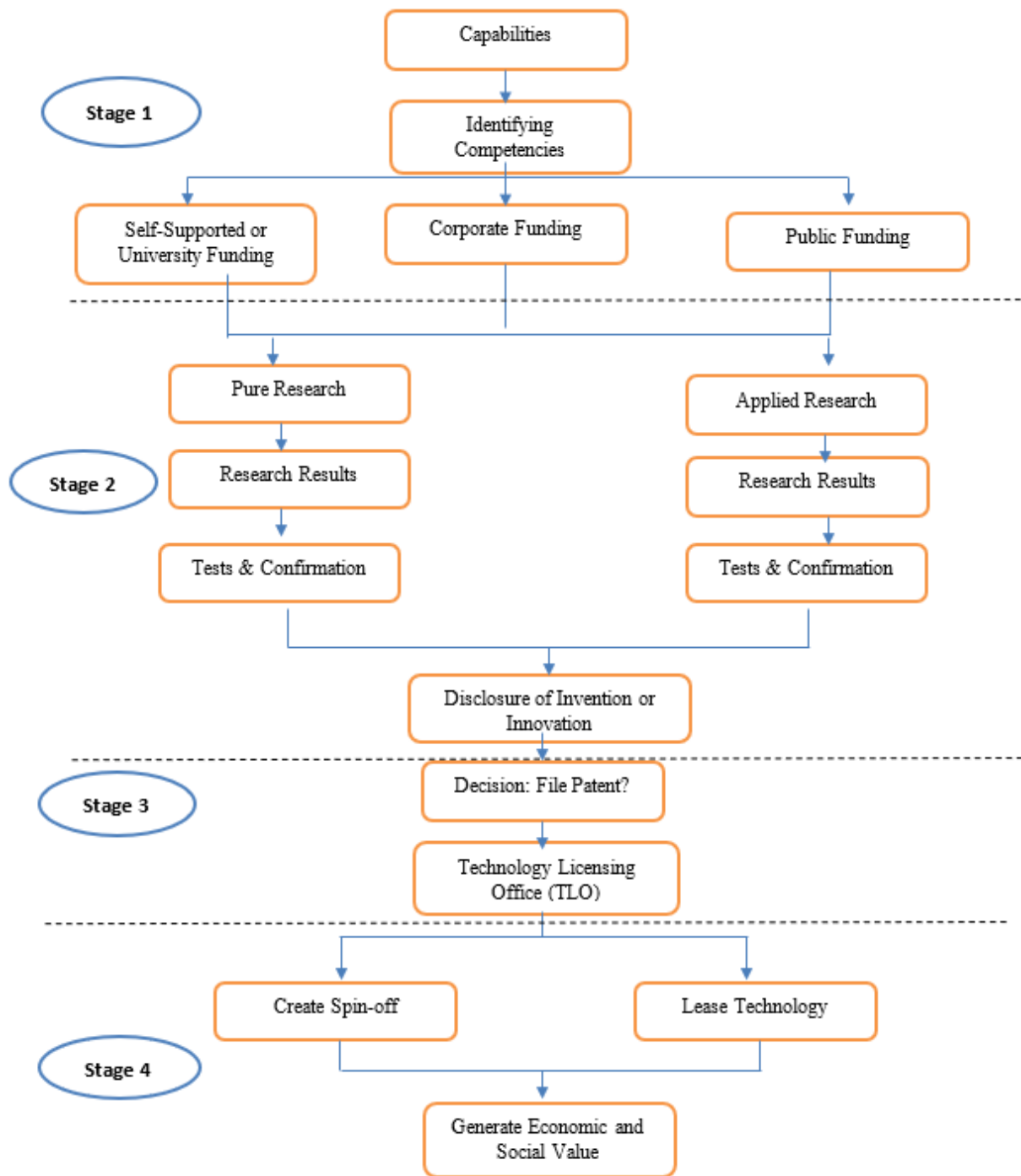


Fig. 1 - A multistage holistic model for creating university spin-offs. Source: Adapted from Pattnaik, P. N., & Pandey, S. C. (2014).

Stage two of the model is centered on the kind of research conducted, and this can either be pure or applied, and the results should be tried and must be confirmed to be viable, reliable, and valid. This forms the basis for understanding the anticipated spin-off's commercial capability, and the potential should also be evaluated and outlined in this stage. Stage three involves the outcomes of the research. If the research is corporate-funded, then patent discovery is not possible, and if it is deemed possible, it must be specified in the terms and conditions of employment. Understanding the funding makeup is vital because it is the decisive factor that can end up in a spin-off establishment. The final stage of the model is stage 4. This can be

classified as the most critical stage in the spin-off firm formation process. It is at this stage that the outcome of all the processes mentioned above becomes a reality. If all the institutional and legal arrangements are fulfilled from the previous stages and have worked out well, then the social and economic worth is established. It's manifested in the university spin-offs that consist of the commercial or the financial benefit that accrues to the academic inventor or the university or both depending on whether the university controls equity-based employment.

### **3 METHODOLOGY**

Since the concept of entrepreneur universities and their spin-offs are a novel concept in the Czech Republic, there is no database for the spin-off firms created by the few entrepreneur universities in the Czech Republic. Based on these facts, this study adopted the qualitative approach with document analysis as a key technique. According to Bowen (2009), document analysis is termed as the use of both printed and online materials for assessing and evaluating documents to make meaningful conclusion. This has given the paper enough grounds by providing sufficient information using keywords such as entrepreneurship study, university industry collaboration, spin off from database such as WoS, Scopus and google scholar to search articles from 2007 to 2021. Twenty-eight papers were reviewed, and some information was also taking from secondary sources relating to this paper. Again, we assessed the websites of 17 universities in the Czech Republic which demonstrated that they are either engaging or collaborating with industries. The success or otherwise of these entrepreneur universities were assessed based on how successful they have been in establishing spin-off companies that utilize their knowledge or the research generated from the university campuses and also how they can transfer technology from business-related courses and make it available for these academic industries to transform into wealth and consumer satisfaction. Other authors can find inspiration from research work by Kvapilová (2016) in her study on Spin-off companies in the Czech Republic.

### **4 CONCLUSION**

In as much as the concept of entrepreneurial universities or the triple helix collaborative network consisting of universities, industries and government are new to the Czech Republic, Czech universities have made great strides for sharing their academic research with industries. Although not all Czech universities have been able to collaborate with industries through technology transfers and spin-off creation, this paper has been able to demonstrate that, a significant number of universities can be classified as an entrepreneur. Some universities in the Czech Republic can be classified as entrepreneurial since they have been associated with a spin-off company, which was established through their academic staff's initiatives.

### **5 LIMITATIONS OF THE STUDY**

Therefore, this paper suggests further research to show why most universities in the Czech Republic have continued to remain in their academic empires and not collaborating with industries. This can help to understand the low rate of spin-off among universities and other higher educational institutions and come out with recommendations that can help bring non-collaborative universities out of their stagnation.

### **6 THEORETICAL AND PRACTICAL IMPLICATIONS**

This topic has both theoretical and practical implications for research activities. The adoption of spin off activities is likely to create jobs and increase collaboration between firms and

academic institutions. The theoretical implication would add to existing knowledge and fill the literature gap in academic research through the provision of relevant information on entrepreneurial activities in Czech Republic through collaboration.

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## Contact information

### Michael Amponsah Odei

Tomas Bata University in Zlín, Faculty of Management and Economics

Mostní 5139, 76001, Zlín, Czech Republic

E-mail: Odei@utb.cz

ORCID: 0000-0001-9449-5750

**Emad Attia Mohamed Omran**

Tomas Bata University in Zlín, Faculty of Management and Economics

Mostní 5139, 76001, Zlín, Czech Republic

E-mail: [omran@utb.cz](mailto:omran@utb.cz)

ORCID: 0000-0001-6275-1609

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# INTANGIBLE ASSETS AS A DRIVER OF THE POSITION AND FORWARD LINKAGES PARTICIPATION IN GLOBAL VALUE CHAINS

*Marek Pekarčík, Júlia Ďurčová*

## **Abstract**

The world economy is currently facing a number of structural changes and shocks that are changing the nature and organization of global trade. The position and role of investments in intangible assets and their impact on the country's position in global value chains (GVC) are relevant for both developing economies and for the most developed countries. Intangible assets are the main prerequisite for increasing productivity, sophistication and technological excellence of production. The aim of this article is to analyse the importance of private investment in intangible assets, mainly investment in Innovative intangible assets, Economic competencies and Computerized information, on forward linkages participation (FL participation) and the country's position in the GVC. The analysis is based on fixed effects panel regression model. The results confirm the significant positive importance of intangible assets in the field of Innovative intangible assets and Computerized information (software, databases, etc.) on the country's position in the GVC and the significant importance in forward linkages participation within the GVC.

*Keywords: global value chains, intangible assets, GVC position, forward linkages*

## **1 INTRODUCTION**

The development of global value chains (GVC) over the last two decades has been the dominant factor in deepening globalization and the growth of international fragmentation of production. The definition of GVC is based on the definitions specify by Koopman et al. (2010). He defines the GVC as a system of value- added resources from various areas in globally organized and integrated production network. Each producer adds a new value- added to an already imported product (intermediate product) and then exports it to another producer for further processing and the addition of new value- added. The global value chains accounts for more than two-thirds of world trade.

The issue of GVC is very complex and affects a large part of national economies, as well as the position and development of the world economy. Research in this area has changed the view of globalization and the consequent impact on the socio- economic area and production potential of countries. We observe a rapid increase in trade with intermediate products, which pass through individual production centers and which add value and thus contribute to the production of the final product. This is largely influenced by a number of factors. These include the liberalization of trade and capital flows, a steady decline in transaction costs, the increasing share of implementation of information and communication technologies (ICT) in production and the increase of economic competencies in individual production centers. These factors facilitate the organization of international production and gradually lead to an increase in the technological complexity of the final production, which gradually increases the degree of sophistication and thus value- added. More complex regional or even domestic supply chains are gradually emerging. However, the very concept of the rise of the GVC indicates to us a high and deep integration between the countries and the expansion of their trade relations. The

gradual trend is especially in the creation of flexible regional value chains. There is a gradual change in traditional factors of international competitiveness. The driving force is thus the tasks that are performed within the framework of globally organized production and the way of creating value-added.

Porter (1985) defined and economically interpreted innovation and knowledge components as a factor that transforms inputs into outputs and thus creates a competitive advantage through the creation of domestic value added in the production process. Value added is increasingly focused on pre-production and post-production activities. Countries characterized by participation in the GVC in these activities show a high position in the GVC and also achieve a highly competitive advantage in the knowledge economy. An important factor of this competitive advantage is the accumulation of intangible assets, which is understandably the most reported in these countries. The basic types of intangible assets defined by Corrado et al. (2017) are Innovative property, Computerized information and Economic competencies. The latter type represents a specific type of intangible assets that is not reported in traditional, conventional statistical and analytical databases or in National accounts. The reason is the complexity of their quantification. According to Corrado et al. (2017) this type of intangible assets has significant impact on business performance. Because they are interested in increasing production efficiency and allow the country to participate in technologically demanding and highly sophisticated products with a high degree of value added. These assets are primarily associated with BL participation into GVC.

The empirical literature dealing with GVC is very well documented, describing the functioning of GVC in details. The trend of knowledge development in this area encounters the problem of availability and reporting of high-quality and accurate data describing trade in value-added and intermediate product as for the countries as for the individual sectors. In the case of linking the issue of global value chains and intangible assets, the interest was primarily focused on the tangible assets. Now, the subject of research interest is to examine the impacts of intangible assets and their significance on the country's participation in the GVC. In this regard, we rely on well-designed studies by Jona-Lasinio, Manzochi and Meliciani, 2019; Jona-Lasinio and Meliciani, (2019); Corrado, Hulten, Sichel, 2004; Corrado et al., 2016a, Corrado et al., 2016b; Adarov, Stehrer, 2020; Marcolin et al., 2016; Thum-Thyssen et al., 2017; Alsamawi et al. (2016). They confirm a significant impact of labour productivity and increasing the country's participation in the GVC. The position and impact of specific types of intangible assets on various areas of the economy. However, they primarily focus on their role in global value chains. Based on the mentioned literature, we examine the roles of aggregated types of intangible assets in globally organized production.

Therefore, the main objective of this article is to investigate the impact of the accumulation of intangible assets – Innovative property, Economic competencies and Computerized information - (intangible ICT assets) on forward linkages participation in the GVC and the country's position into the GVC.

The rest of the paper is organized as follows. Section 2. provides an overview of the literature within GVC participation and intangible assets – especially economic competencies. Section 3. describes the data and methodology. Section 4. presents the results of the econometric analysis and section 5. concludes the results.

## **2 THEORETICAL BACKGROUND AND LITERATURE REVIEW**

The growing importance of the GVC in modern economic theory has focused interest on independent scientific research into global value chains as a decisive factor in international trade. Existing empirical studies in the field of global value chains focus mainly on measuring

the technical context of the GVC. Such as the position or participation of countries within the GVC, technical sophistication of production, vertical specialization etc.

Koopman (2010) present two forms of participation, namely forward and backward linkages participation. In the case of forward participation, the domestic value added is contained in foreign exports or final demand. On the other hand, backward participation monitors the foreign value added contained in domestic export or final demand. Based on the given different reporting of participation, it is possible to determine the position of the country within the GVC. In the case of a country with a higher level of forward participation in the GVC, its production of intermediate goods, is inputted in production in other countries. *Vice versa* a country with a high level of backward participation is dependent on a large volume of foreign intermediate products, ie foreign value added, in its production, which is mainly intended for export.

The benefits of participating in the GVC for countries vary depending on their position in the GVC. Hausman, Hwang, Rodrik, (2007) deal with technical sophistication and the form of export specialization and show that countries that participate in globally organized production in a higher position in the GVC, i.e., in higher stages, tend to achieve higher efficiency. So, the higher the sophistication and technical complexity of the final product is the higher the level of domestic value added. Countries thus achieve an advantageous position within the GVC. Therefore, it depends on the structure of the country's exports and thus on what the country exports. This is influenced by a number of factors that are the subject of further research. Jona-Lasinio and Meliciani (2019) examine the relationship between productivity and the country's participation in the GVC, as well as the relationship between productivity and participation into the GVC is confirmed by Battiatì, Sopranzetti, Jona-Lasinio (2020) where they econometrically confirm that the country's participation in the GVC causes productivity growth. Pilat and Criscuolo (2018) investigated the impact of digitalization on value chains. They confirm that, in case of digital sectors, there is a relationship between productivity and FL participation into the GVC.

Only participation in the GVC is a good first step for the country. In the context of international trade, productivity, industrial production and increasing economic prosperity that participation in the GVC brings. It enables the country to participate in the production of sophisticated product with high technical complexity for their production, which they would otherwise never produce in their industrial sector. Intangible assets create new expertise and knowledge and thus can have a positive effect on increasing the absorption of the company by using external inputs from the production chains. Marcolin et al. (2016).

The pressure on the competitiveness of countries is therefore increasing, especially in the area of attracting those tasks that are characterized by a high degree of value added. Therefore, an important driver of competitiveness comes to the fore, especially in countries with a high level of development. We are talking about intangible, ie knowledge capital and its key role in creating value added, which determines the country's position in the GVC. As confirmed by Baldwin, Lopez- Gonzalez (2013) and Durand and Milberg (2019). Which confirm this hypothesis within the concept of technologically and intangibly demanding economies and the so-called "*Intellectual monopoly*". This means that countries that achieve a technological and intellectual monopoly will maintain these tasks, thus maintaining a high level of productivity and thus consolidating their position in the GVC. Intangible assets play a key role in this, providing a high contribution to value added. It is primarily associated with tasks within the pre- production and post- production stages.



Tab. 4 - Forms of intangible assets, Source: Corrado et al. (2016)

<i>Intangible assets</i>	<i>Type of Intangible assets</i>	<i>Included in National Account?</i>
<b>COMPUTERISED INFORMATION</b>	• Purchased and Own-Account Software	Yes
	• Database	Yes
<b>INNOVATIVE PROPERTY</b>	• R&D	Yes
	• Design	No
	• Financial Innovation	No
	• Artistic originals	Yes
<b>ECONOMIC COMPETENCIES</b>	• Brand	No
	• Own-Account Organisational Capital	No
	• Purchased Organisational Capital	No
	• Training	No

The area of accumulation of intangible assets is very complex, as it is not precisely defined what else we can consider as an investment in intangible assets and what not. Therefore, we divide intangible assets into three areas, which are described in Tab. 1 and are based on the generally accepted division according to Corrado et al. (2016). Selected forms of intangible assets that are used in the analytical part are described in more detail in Section 3. There are several other forms and types of intangible assets in the empirical literature and their subsequent division. We use combined data from INTAN- Invest and EUKLEMS databases.

Jona-Lasinio et al. (2019) brought, to our knowledge, as the first unique view at the macroeconomic level for linking participation in the GVC, both directions and levels of accumulation of investment in intangible assets. Demonstrates that intangibles assets have a significantly positive impact on the allocation of value added within the GVC. At the same time also presents a number of other factors that have a positive effect on the allocation of value added. These are the size of public spending on education (share of GDP), the simplification of the business environment, the size of the population, but also tangible assets, which plays an irreplaceable role in the country's participation into the GVC.

Research and development are most often combined in the context of intangible resp. knowledge economy. Together with the design and innovation and other types of intangible assets, they are conceptualized as Innovative properties. Innovation is widely accepted as a factor that positively affect the whole range of the economy and has strong impact on the country's participation in the GVC in both directions. The same applies to intangible ICT assets that are included in Computerized information. Economic competencies represent the highest share of total intangible assets in the economy in many countries. Nevertheless, we assume that Innovative properties will play an important role in location within the GVC country position. We also assume a significant impact in the case of intangible ICT assets represented in the first category of intangible in Tab. 1 as a Computerized information. Despite the fact that they account for the lowest share of total intangible assets in most of the countries. We also assume that in the case of FL participation, Innovation property will play an important role together with the Computerized information. The role of intangible ICT assets is primarily associated with the country's BL participation. However, we assume a causal relationship and thus that a developed system of intangible ICT assets will be important in country that imports a large part of foreign value added, as well as in country that export this value added in intermediates.

### 3 METHODOLOGY AND DATA

Based on the theoretical background and literature review, we formulate following hypotheses:

HP. 1. *Innovative property and Computerized information have a positive impact on the country's position in the GVC*

HP. 2. *Innovative property and Computerized have a positive impact on Forward linkages participation (FL) into the GVC*

The global value chains (GVC) represent a phenomenon of the world economy and an instrument of international trade established in all developed countries. The method of measuring GVC is quite complicated. As stated in the introduction, we assume that GVC represents an international network of production stages. The way how to quantify the GVC is by monitoring value added flows across borders. We use OECD – TIVA databases for data related to global value chains. We quantify the Index of Participation according to Koopman et al. (2010) for forward linkages (FL) participation. To express the position of the country, we use the construction used by Banerjee and Zeman (2020). Where the GVC position Index was expressed as a ratio of FL / BL.

The method of reporting intangible assets is very complex, as it is not always clear what we can consider as an investment in intangible assets. Therefore, we use the assumption of Corrado et al. (2017), which, based on the OECD definition; OECD (2011); considers as an investment in intangible assets any use of resources that reduce current consumption in order to increase it in the future. Based on this, they created the INTAN- Invest database, which uses data from National Accounts but also publishes data that are not reported within the National Accounts. This is a great benefit in examining the accumulation of investments in intangible assets. These are primarily intangible assets conceptualized in category of Economic Competencies. We also use the EUKLEMS databases to supplement data on the accumulation of specific types of intangible assets in aggregate categories of Intangible assets used in our analysis.

Tab. 5 – Descriptive statistics. Source: own calculation based on OECD – TIVA, INTAN-Invest, EUKLEMS, OECD

	<i>FL</i>	<i>GVCPO</i>	<i>InovProp</i>	<i>EconComp</i>	<i>SoftDB</i>	<i>DVA/EXGR</i>	<i>CIT</i>
Mean	0,195	0,961	0,865	1,136	0,454	0,373	0,293
S.E.	0,002	0,080	0,036	0,043	0,023	0,008	0,004
Median	0,193	0,731	0,720	1,009	0,338	0,383	0,280
S.D.	0,027	1,328	0,600	0,703	0,378	0,138	0,074
Min	0,127	0,359	0,062	0,068	0,014	0,111	0,158
Max	0,268	9,395	2,568	3,014	1,740	0,799	0,568
Count	273	273	273	273	273	273	273

NOTE 1.: *FL* – Forward linkages participation into the GVC; *GVCPO* – country's GVC position; *InovProp* – Innovative property; *EconComp* – Economic Competencies; *SoftDB* – Computerized information; *DVA/EXGR* – ratio of domestic value added and gross export, *CIT* – Corporate income tax rate.

Tab. 1 describes the source of specific categories of intangible assets. We divide intangible assets into three categories: 1. Innovative property, 2. Economic competencies, 3. Computerized information. We retrieve data from the INTAN- Invest and EUKLEMS

databases. As a part of the econometric analysis, we implement aggregated data, which we express as ratio of intangible assets to total hours worked by person engaged. We use data for 13 EU countries for the period from 1995 to 2015. Countries that are not reported in EURO are converted according to the annual average exchange rate from the EUROSTAT database (CZ, DK, SE). Descriptive statistics, mean, median, standard error and count, of the variables are presented in Tab. 2.

Basic equation can be expressed as follows:

$$\ln GVC_{c,t} = \beta_0 + \beta_1 \ln INTANG_{InovProp}_{c,t-1} + \beta_2 \ln INTANG_{EconComp}_{c,t-1} + \beta_3 \ln INTANG_{SoftDB}_{c,t-1} + \beta_4 \ln DVAEXGR_{c,t} + \mu_i + \varepsilon_{i,t} \tag{1}$$

where  $GVC_{c,t}$  represents a depend variable. Moreover, In the case of model (4), the dependent variable is GVCPO, that expresses the impact of the accumulation of intangible assets on the position in the GVC. This is an expression of the Position index according to Banerjee and Zeman (2020). In the case of another model (1), (2), (3), where we express the impact of the accumulation of intangible assets on FL participation, we use a FL participation as a dependent variable. The explanatory variables are Innovative property, Economic competencies and Computerized information, the categories of intangible assets. They are lagged by one year and expressed as a ratio. The control variable is the Corporate income tax rate (CIT), as it has an impact on the accumulation of investment in the economy. The variable DVAEXGR represents the ratio of the volume of produced domestic value added to gross export. Based on this variable we can determine how the country participates in the GVC. We use a fixed effect panel regression, which we implement after the Hausman test.

### 4 RESULTS AND DISCUSSION

The figure 1 (Fig. 1) shows the state of intangible assets in selected 13 EU countries. We express three categories of intangible assets and their share in total country's intangible assets.

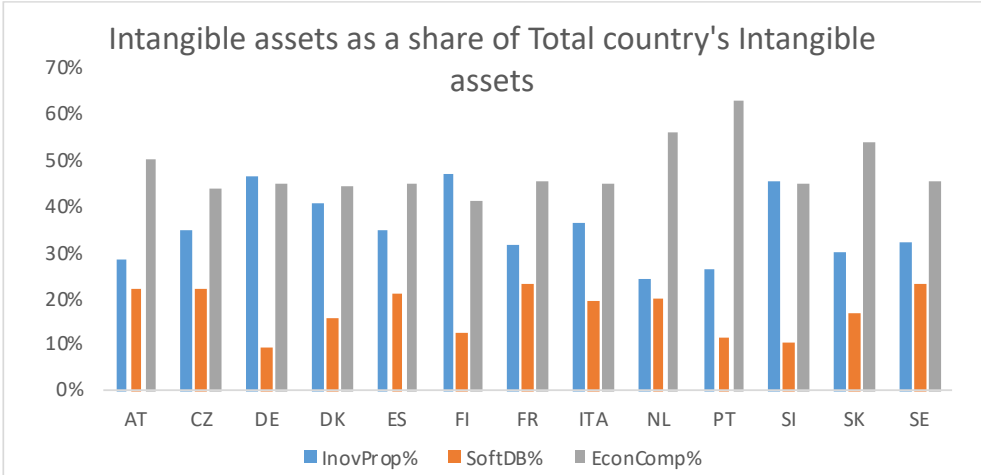


Fig. 5 - Intangible assets as a share of Total country's Intangible assets. Source: own calculation based on INTAN-Invest, EUKLEMS

We can observe that Economic competencies represent the largest part of intangible assets reaching on average almost 48 % of total country's intangible assets. The average share of Innovative properties is 35 % and Computerized information only 17 % of the total country's

intangible assets. In the case of Innovative property, Germany and France have the largest share in total intangible assets. All monitored countries reach an Innovative property of an average of EUR 16,073 million. For Computerized information, the average value in monitored countries is EUR 8,046 million.

Tab. 6 - Descriptive statistics: Average values of Intangible assets and GVC participation and position from 1995 to 2015. Source: Own calculation based on OECD- TIVA, INTAN-Invest, EUKLEMS

	<i>FL</i>	<i>GVCPO</i>	<i>TotIntg</i>	<i>InovProp</i>	<i>EconComp</i>	<i>SoftDB</i>	<i>DVA/EXGR</i>	<i>CIT</i>
<b>AT</b>	<b>21%</b>	<b>81%</b>	17 780	4 624	8 084	3 678	74%	29%
<b>CZ</b>	<b>18%</b>	<b>49%</b>	7 622	2 363	3 081	1 608	55%	27%
<b>DE</b>	<b>22%</b>	<b>112%</b>	145 863	67 502	64 945	13 415	80%	30%
<b>DK</b>	<b>20%</b>	<b>74%</b>	16 783	6 853	7 201	2 731	73%	29%
<b>ES</b>	<b>17%</b>	<b>71%</b>	38 132	13 419	16 209	8 057	76%	33%
<b>FI</b>	<b>22%</b>	<b>76%</b>	13 831	6 500	5 594	1 738	71%	26%
<b>FR</b>	<b>20%</b>	<b>93%</b>	159 46	50 111	72 222	37 128	78%	37%
<b>ITA</b>	<b>19%</b>	<b>90%</b>	86 346	31 399	38 467	16 480	79%	35%
<b>NL</b>	<b>23%</b>	<b>83%</b>	44 099	10 735	24 218	9 146	73%	30%
<b>PT</b>	<b>15%</b>	<b>52%</b>	8 287	2 218	5 096	973	71%	30%
<b>SI</b>	<b>18%</b>	<b>50%</b>	1 725	809	877	209	65%	23%
<b>SK</b>	<b>18%</b>	<b>42%</b>	2 815	764	1 593	458	56%	26%
<b>SE</b>	<b>21%</b>	<b>80%</b>	34 790	11 661	16 209	8 530	74%	29%

Regarding the country's participation in the GVC, expressed as a FL participation, Germany, the Netherlands, Finland, Sweden and France achieve the best average results from 1995 to 2015. In contrast, Spain, Slovakia, Slovenia and the Czech Republic have low average levels of FL participation. In the case of the position in the GVC, Germany maintains the highest position in the long run. The average Germany's position in the GVC expressed according to Banerjee and Zeman (2020) is 112 %. It is followed by France with an average position in the GVC of 93 % and Italy with 90 %. On the contrary, the lowest position is reached by Slovakia, the Czech Republic and Slovenia.

Countries such as Germany, France, Italy, Sweden the Netherlands show a high share of Innovative property in Total intangible assets (TotIntg – 40%). The same applies to Computerized information (20). According to the results, Innovative property and Computerized information show a positive impact on FL participation into GVC. This also applies to the impact of these intangible assets on the country's position in the GVC.

In general, the higher the country's innovation performance is, the higher the volume of domestic value added. This means that the country will achieve a higher position in the GVC. Countries characterized by a high level of domestic value added also show a higher FL GVC participation. Fig. 2 shows the result of econometric analysis. In the first model (1) we express the basic model observing the importance of Innovative property (InovProp) on FL participation. Innovative property has a positive effect on FL participation (0,063). This represents, ceteris paribus, that 10 % increase in the accumulation of intangible assets will have a positive effect of 0,6 % on the increase in FL participation. This is also the case of Computerized information (SoftDB). Assuming a ceteris paribus, a 10 % increase would mean a 0,8 % increase in FL participation. Surprisingly, Economic Competencies (EconComp) has a negative impact on FL participation.

In the second model (4) we observe the impact of intangible assets on the country's position in the GVC. We express the Position index according to Banerjee, Zeman (2020). The Innovative property (InovProp) has a significant impact on the country's position in the GVC. The model

indicates that in the case of a 10 % increase in the Innovative property, the country's position in the GVC will improve by 2,5 %. Concerning the results for Computerized information, a 10 % increase can increase a country's position in the GVC by a 1,6 %. The share of domestic value added in gross export is positive. The higher the ratio of domestic value added to gross exports is, the better the country's position in the GHR will be.

#### Results

	Dependent variable:			
	1. ln(FL)		2. ln(GVCPO)	
	FL, ln	FL, ln	GVCPO, ln	GVCPO, ln
	(1)	(2)	(3)	(4)
InovProp, lag, ln	0.063*** (0.010)	0.177*** (0.019)	0.162*** (0.019)	0.246*** (0.082)
EconComp, lag, ln		-0.140*** (0.021)	-0.218*** (0.026)	
EconComp diff, lag, ln				-0.132** (0.060)
SoftDB, lag, ln			0.084*** (0.018)	0.164* (0.085)
DVAEXGR, diff, ln				1.519*** (0.493)
CIT, diff, ln	-0.053* (0.028)	-0.060** (0.026)	-0.009* (0.027)	-0.275** (0.131)
Observations	252	252	252	231
R2	0.157	0.298	0.359	0.179
F Statistic	21.361*** (df = 2; 229)	32.314*** (df = 3; 228)	31.817*** (df = 4; 227)	8.933*** (df = 5; 205)

Fig. 6 Results of econometric analysis. Source: own calculation.

NOTE 2. \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . GVCPO = ratio of FL and BL. GVCPPPO=FL/BL (Banerjee, Zeman, 2020). Forward linkage: Ratio of domestic value added exported to third countries to the economy's total gross exports in %. Backward linkage: ratio of foreign value-added content of exports to the economy's total gross exports in %. Intangible assets - InovPror: Innovative property. EconComp: Economic competencies. SoftDB: Computerised information. DVAEXGR: ratio of domestic value added and gross export. CIT: corporate income tax rate.

The control variable, Corporate income tax rate (CIT) correctly balances the model. The basic assumption is that the increase of CIT, cause a decrease of the country's position in the GVC. On the contrary, in the case of a decrease in CIT, a higher investment activity of business entities, increase the accumulation of both tangible and intangible assets. The corporate income tax rate has a stronger significance for the country's position in the GVC than for country's FL participation. A negative coefficient confirms this assumption. We confirm the hypothesis that intangible assets Innovative property and Computerized information have a positive effect on FL participation in the GVC. We also verify the hypothesis of the impact of intangible assets on the country's position in the GVC. The intangible assets have a strong positive impact on FL GVC participation as well. The accumulation of intangible assets has the potential to improve the country's position in the GVC and could increase FL participation in the GVC i.e., to increase the domestic value added in exports.

The limitation of the research is the availability of partial data for each sector, which are reported sporadically. In the case of GVC data, this is understandable. Another limitation of the research is the availability of data for countries from the CEE region, which are not available.

## 5 CONCLUSION

Global value chains remain at the heart of future economic discussions, especially in relation to their organization. It is clear that understanding the development of the GVCs and the factors that affect it is crucial for the management of globalization processes and the future direction of world economy. It is essential to correctly define the factors that can positively influence a country's participation in the GVC, primarily country's position and forward linkages participation. We have noticed a tendency for the slow transfer of some activities (reshoring) from less developed countries to intellectual monopolies. This is mainly due to technological innovations. The main driver of new innovations is the accumulation of intangible assets.

We have shown that Innovation property and Computerized information are an important factor that has a significant positive impact on the country's position in the GVC and FL participation. Increasing the country's innovation potential results in an improvement of the country's position in the GVC. The same applies to intangible ICT assets, such as databases, software, categorized within Computerized information. In the case of Economic competencies, we observe a negative impact, meaning that increasing this category of intangible assets does not improve the country's position in the GVC or FL participation. We assume a positive impact on BL participation. However, we confirm that the accumulation of intangible assets in the economy plays an important role in the case of globally organized production within the GVC.

Today, we can only speculate about the organization of global production and the setting of global value chains in the near future, as there are a number of important factors that accelerate the process of globalization on the one hand and a clear tendency to slow down due to current pandemic situation. Therefore, it is necessary to pay attention to the GVC settings and its organization. Further research needs to investigate the role of specific types of intangible assets in the GVC on the regional and sectoral dimension.

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### **Contact information**

#### **Ing. Marek Pekarčík**

Department of economy/Technical university of Košice/Faculty of Economics  
Boženy Nemcovej 32/ Technical university of Kosice, Faculty of Economics  
E-mail: marek.pekarcik@tuke.sk  
ORCID: 0000-0002-1384-4304

#### **Assoc. prof., Júlia Ďurčová, PhD.**

Department of economy/Technical university of Košice/Faculty of Economics  
Boženy Nemcovej 32/ Technical university of Kosice, Faculty of Economics  
E-mail: Julia.durcova@tuke.sk  
ORCID: 0000-0002-9312-914X

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# FINANCIAL BENEFITS OF PREDICTIVE MAINTENANCE IN THE GERMAN MIDMARKET

*Jonas Pfeffer*

## **Abstract**

Industrialization has given rise to numerous new topics for companies. In the age of Industry 4.0, predictive maintenance represents an opportunity to reduce the downtime of machines and enable companies to gain financial advantage. For this purpose, sensors are installed in the machine and the data of many individual parts is constantly monitored and evaluated. By detecting possible failure risks of individual parts at an early stage, they can be replaced before the downtime occurs, thus preventing a long downtime. A shorter downtime can bring further positive aspects in financial terms. In the literature, a lot is written about the general advantages of predictive maintenance, but there is no special focus on the German midmarket sector. The aim of this paper is to find out how German midsize companies perceive the financial benefits of predictive maintenance. For this purpose, a standardized questionnaire with four questions is developed and answers from 104 respondents on financial added values through predictive maintenance are evaluated by using IBM SPSS. The results show that a large proportion of the respondents expect financial added value in all areas. It remains to be seen how many of these companies are already using predictive maintenance and what concrete added value is generated in numerical terms. The research in this paper shows that the financial added value generated by predictive maintenance is not limited to multinational corporations, but can also be realized in medium-sized companies. The results can also be transferred to other countries and company sizes under similar conditions.

*Keywords: Industry 4.0, Internet of Things, Predictive Maintenance, Value Generation, German Midmarket*

## **1 INTRODUCTION**

The digitization in Germany is advancing rapidly, and the Corona pandemic in particular has given companies in Germany a boost in their progress toward digitization. However, there is still considerable need for German midsize companies to catch up in some areas of digitization (Neuerer, 2021). Predictive maintenance is considered one of the drivers of digitization and is the subject of considerable discussion. The goal of predictive maintenance is to prevent machine failures and thus save costs. The subject of predictive maintenance was only made possible by the transformation of industry from Industry 1.0 to Industry 4.0 and modern technologies (Haarman et al., 2017).

However, predictive maintenance also poses a number of challenges that need to be considered in greater detail during implementation. On the one hand, the technical prerequisites for monitoring machine data must be in place, and on the other hand, contractual and legal framework conditions must also be taken into account during implementation. Even though studies on predictive maintenance show promising results, companies should always consider these scenarios on a case-by-case basis and work out the appropriate implementation methodology (Roland Berger GmbH, 2017). Modern topics such as machine learning are also being combined with predictive maintenance to achieve benefits through less frequent machine downtime and improve the prediction accuracy of the algorithms (Tessaro et al., 2020).

The following paper will show how predictive maintenance can have a financial impact on companies in the German midmarket. There is a current research gap in this field, as the studies mainly focus on large enterprises and not specifically in the German midmarket. To this end, the theoretical background and the current state of research will first be presented, followed by an explanation of the methodology used to measure the financial impact. The data basis for this measurement will be companies from German medium-sized businesses from various industries. However, the approach of this survey can also be applied to companies from other countries and of other sizes. These two aspects, among others, will be considered in more detail in a subsequent discussion followed by a conclusion at the end of this paper.

## 2 THEORETICAL BACKGROUND / LITERATURE REVIEW

Industry and production have existed for many centuries. For modern industry, however, there are mainly four revolutions relevant, which have changed the way of working decisively. While in the beginning the focus was still strongly on physical machines, the 21st century has brought data and the networking of machines to the fore (Becker et al., 2017). The following figure shows the development of the four industrial revolutions.

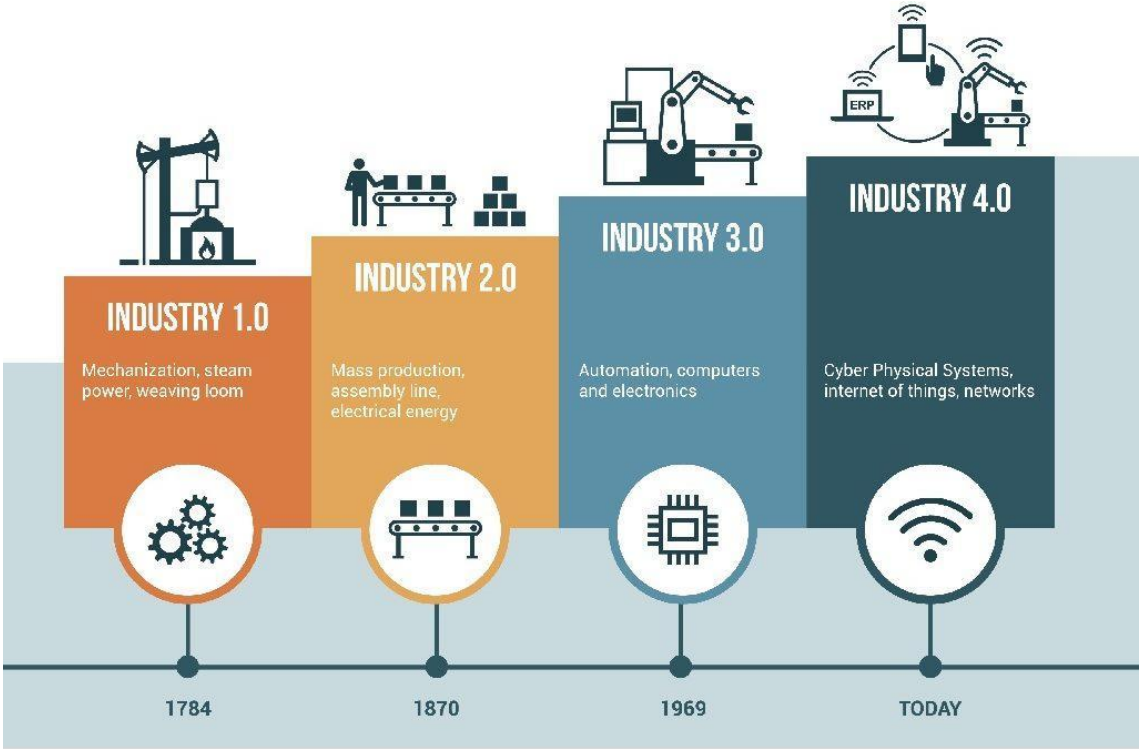


Fig. 1 – From Industry 1.0 to Industry 4.0. Source: Diaonescu, 2018

This figure shows the key points of the respective steps between Industry 1.0 and Industry 4.0. Due to the scope of this paper, the most important key points that are considered as fundamentals for the current application of predictive maintenance are going to be explained hereafter.

The mechanization and steam-powered machines were particularly important for Industry 1.0. Through them, it was possible to increase productivity enormously and generate greater output than it was the case with manual activities (Bauernhansl, 2014, p. 5). The first steam-powered loom is seen as a key innovation for the textile, steel and iron industries (Siepmann & Graef, 2016, p. 19).

The second industrial revolution was characterized by the use of electrical energy and the associated mass production based on the division of labor. The assembly line developed by Henry Ford enabled workers to specialize in individual work steps and to achieve higher productivity through the division of labor. Frederic W. Taylor's work on scientific management also helped to restructure companies. With the development and use of combustion engines, petroleum became increasingly important as a fuel for mobile systems. Machines could now be operated decentrally, and automobiles became part of logistics. The developments of Industry 2.0 were signposts for today's consumer-oriented affluent society. The further development of automobile traffic, the use of airplanes and the possibility of long-distance transportation by ship made increasing globalization possible (Bauernhansl, 2014, pp. 6–13).

The third industrial revolution was triggered by the development and use of electronics and information technology. Based on the developments of Lovelace and Babbage from the first industrial revolution, Konrad Zuse developed the world's first functional computer in 1941 (Frick, 2017). It enabled a progressive automation of production processes, which was one of the reasons for the economic miracle in Germany at that time. The use of information and communication technology led to rationalization, but it also enabled a varied series production (Bauernhansl, 2014, p. 7).

The German working group Platform Industry 4.0, consisting of the associations Bundesverband Informationswirtschaft, Telekommunikation und neue Medien, Verband Deutscher Maschinen und Anlagenbau and Zentralverband Elektrotechnik- und Elektronikindustrie, focuses in its definition of Industry 4.0 on the control of the value chain over the product life cycle, which is only possible through the availability of real-time data. This working group is an association of various German industrial societies, which publish recommendations and information for the German and international industry. The main goal is to support companies in their progress and to make modern, often not widely used technologies more tangible. They define Industry 4.0 as a term that stands for the fourth industrial revolution, a new level of organization and control of the entire value chain over the life cycle of products. This cycle is oriented towards increasingly individualized customer requirements and extends from the idea, the order, through development and production, the delivery of a product to the end customer, to recycling, including the associated services. The basis for this cycle is the availability of all relevant information in real time through networking of all instances involved in the value chain and the ability to derive the optimal value chain flow at any given time from the data. By connecting people, objects and systems, dynamic, real-time-optimized and self-organizing, cross-company value-added networks are created, which can be optimized according to various criteria such as costs, availability and resource consumption (Plattform Industrie 4.0, 2015, p. 8).

Now that the basics in industrial change have been described as a prerequisite for predictive maintenance, the topic of maintenance will be discussed in more detail next. While the maintenance of machines is about reducing wear and tear or preventing it, repair aims to eliminate the wear and tear that has occurred. A typical repair procedure includes the decommissioning of the affected plant, decoupling it from the surrounding plant, dismantling and cleaning, damage detection, replacement or repair of the affected parts, including adjustment and adjustment of the assembly as well as functional testing and recommissioning (Hölbfer, 2014, p. 16). According to Aha there are three different maintenance strategies in which the basic measures just mentioned are implemented. To it belong the failure-related maintenance strategy, the planned preventive maintenance strategy and the condition-based maintenance strategy (Aha, 2013, pp. 19–20). Predictive maintenance is a core component of Industry 4.0 and clearly distinguishes itself from conventional maintenance approaches such as reactive or preventive maintenance. This involves installing sensors on the individual parts of

a machine and monitoring whether they run faster, are noisier or get hotter than expected, for example. This data is then used to calculate the probability of a part or machine failing within a given time frame. Recognizing these patterns makes it possible to identify the faulty parts at an early stage. This can make a big difference to machine downtime, as parts that are needed can be ordered early and production can be designed to accommodate repairs. To make reliable predictions for predictive maintenance, it is necessary to collect, store and analyze a large amount of data. Due to the huge amount of data, techniques and databases from the big-data environment are used. The recorded measured values and diagnostic data are transmitted from the machines via networks to service centers or directly to the manufacturers. In many cases, the Internet of Things serves as the network technology basis (Carvalho et al., 2019). Two major challenges in the technical implementation of predictive maintenance that can be faced by companies are the quality and quantity of the data. A distinction is made between the required data, i.e. the data that would not be possible without predictive maintenance, and additional data that improves the quality of the predictions (Schleichert et al., 2017, p. 11).

In the literature, it has not been clearly worked out in which points medium-sized companies in Germany can benefit from predictive maintenance in a financial dimension. Authors like Shamayleh et al. highlight the financial benefits for specific industries like medical companies, but do not focus on the German midmarket in a cross-industry approach (Shamayleh et al., 2020). In the following, therefore, a method will be presented that is intended to make this consideration possible by using a questionnaire and conducting quantitative research.

### **3 METHODOLOGY**

By using a standardized questionnaire, results are to be obtained on a number of questions in the subject area of financial impact through predictive maintenance. The target group for the survey is defined as follows:

- Midmarket companies based in Germany. Since there is no universal definition for the term midmarket, a company size of up to 500 million euros in annual company turnover is taken as the basis for the following research
- No pre-selection based on age, gender or position in the company

To formulate the questions, a structure tree has been developed for operationalization by means of a dimension analysis. For this purpose, the construct is defined as "added value through predictive maintenance". The dimension this research focuses on is the financial dimension. Therefore, the following indicators are used:

- A1: Level of maintenance costs: What costs are incurred for the maintenance of the machines? This mainly includes costs for spare parts.
- A2: Costs due to machine downtime: What costs are associated with the downtime of machines? The focus here is primarily on opportunity costs caused by the machine downtime and a possible production standstill
- A3: Service costs: What costs are incurred by technicians who check and maintain machines?
- A4: Total cost of ownership: What are the total costs of operating the machines?

The following questions or statements were then developed to assess the financial impact of predictive maintenance at the subjects' companies:

- The use of predictive maintenance can reduce the cost of our machine maintenance
- Our machines would stop less frequently if we applied predictive maintenance

- The use of predictive maintenance would reduce the workload for service technicians
- The total cost of ownership for our machines throughout their life cycle would be reduced by using predictive maintenance

Due to the questionnaire design, primarily closed questions are asked. Mainly a verbalized ordinal scale is used to answer the question with the possibility to assign 1-5 points with the meaning “Do not agree at all”, “Do rather not agree”, “Neither agree nor disagree”, “Do rather agree” and “Agree completely”. Additionally, there is the possibility to skip the question with the answer “No answer”. This answer option can be selected if there is either no opinion on the statement or the respondent does not want to rate the statement.

The questionnaire is sent electronically via Google Forms to 192 subjects, of whom 104 participated in the survey, a rate of approximately 54%. The data is collected electronically via Google Forms. The subjects are contacted personally, but the responses are evaluated anonymously. The survey is completed using Google Forms. This ensures that the name of the respondent is not requested and that no correlation can be made on the basis of other criteria. The data is then processed via IBM SPSS.

Cronbach's alpha is used to check reliability. This measures the degree of correlation between several questions within the questionnaire in order to ensure internal consistency. Values below 0.5 are regularly considered unacceptable in science and indicate that the individual items of the questionnaire should be reviewed.

In order to check the comprehensibility and meaningfulness of the questions, a pretest was carried out in advance of the survey. For this purpose, two experts from the industry were interviewed, followed by a test subject with whom the comprehensibility of the questions was discussed. After completion of the pretest, no changes were made to the questions.

## 4 RESULTS

104 respondents took part in the survey, none of the answers were invalid or missing.

The following answers were given to the question or statement "The use of predictive maintenance can reduce the cost of our machine maintenance":

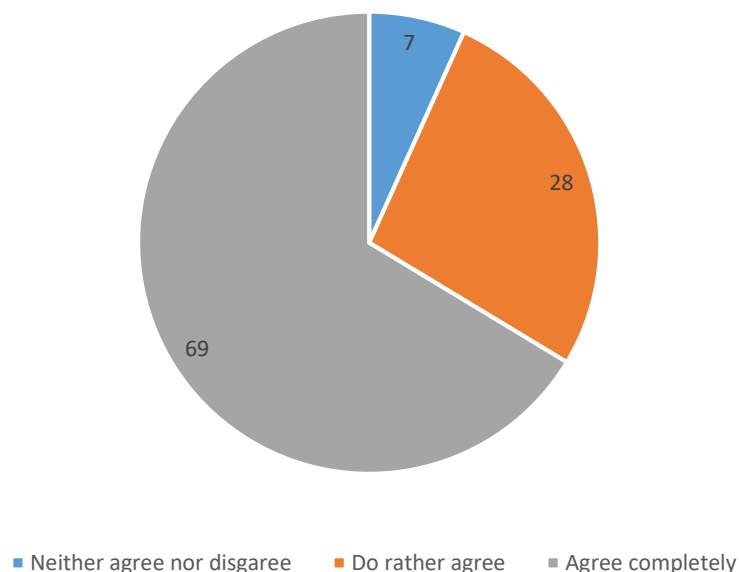


Fig. 2 - Pie Chart for Question 1. Source: own research

The following answers were given to the question or statement "Our machines would stop less frequently if we applied predictive maintenance":

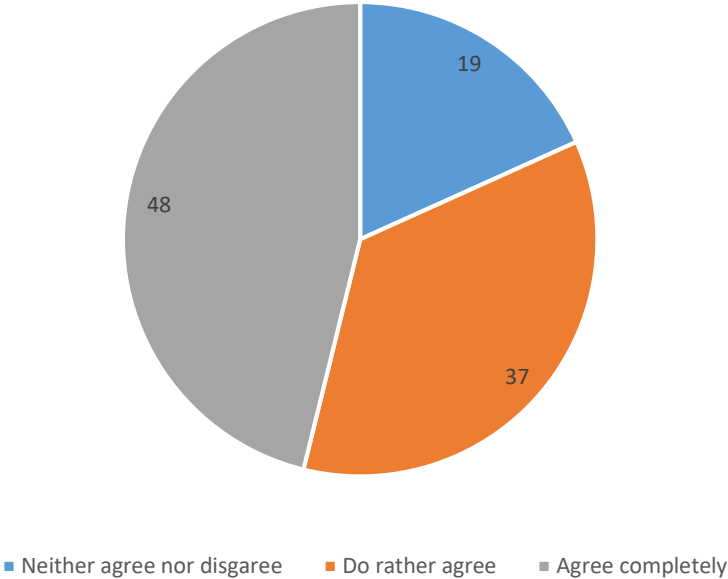


Fig. 3 - Pie Chart for Question 2. Source: own research

The following answers were given to the question or statement "The use of predictive maintenance would reduce the workload for service technicians":

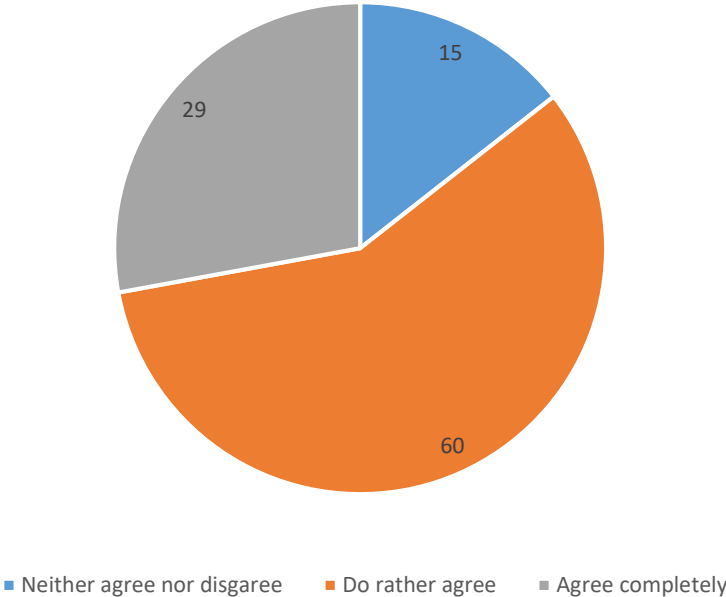


Fig. 4 - Pie Chart for Question 3. Source: own research

The following answers were given to the question or statement "The total cost of ownership for our machines throughout their life cycle would be reduced by using predictive maintenance":

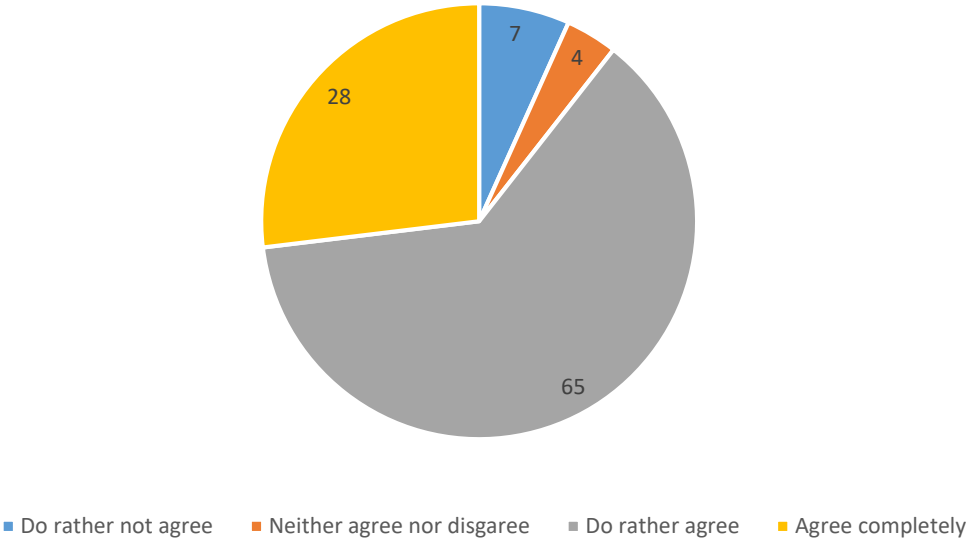


Fig. 5 - Pie Chart for Question 4. Source: own research

If we consider the two categories "Do not agree at all" and "Do rather not agree" as perceptions of no added value, the category "Neither agree nor disagree" as neutral, and the two categories "Do rather agree" and "Agree completely" as perceptions of added value, the responses reveal a clear picture. Across all four questions, an average of 1.7% see no added value, 10.8% are neutral about predictive maintenance, and 87.5% see added value.

## 5 DISCUSSION

The answers to each of the questions show that an added value of predictive maintenance is perceived by the majority of the respondents. This is consistent with the literature, which reports on the benefits and effects of predictive maintenance from a general point of view. The data collected in this study from 104 subjects came exclusively from companies belonging to the German midmarket. By combining the results of this study with the expected values through the literature research, it can be assumed that the present results can also be transferred to companies of other sizes or from other countries, provided that at least similar basic conditions exist. As identified in the literature review, there are certain prerequisites for the successful use of predictive maintenance, which can be found in the technical area, among others. Without these basic prerequisites, it is unlikely that the same added values can be achieved as expected by the subjects of this research study.

For subsequent studies, it may be interesting to specify the results for the value-added consideration of predictive maintenance even more precisely with regard to individual industries. It may also be interesting to validate the assumption of similar results through studies in other countries. This study offers an insight into the perception of added values through predictive maintenance of companies in the German midmarket, but leaves open how these added values can ultimately be implemented and used. Again, there is further potential by exploring how exactly the aforementioned issues have a financial impact. The results of the

survey may also change in combination with possible existing application scenarios using predictive maintenance.

In the following, the three quality criteria objectivity, reliability and validity are considered. Objectivity is achieved by using a standardized questionnaire in combination with an anonymous survey. The results are therefore not influenced by interpersonal interaction and should show the same results with another researcher. Reliability was calculated by Cronbach's Alpha and shows an acceptable result with a value of 0.74. Omitting individual items would not have significantly improved Cronbach's Alpha. Other methods such as a retest or a parallel test were not used due to the scope of this work. In terms of validity, content validity was ensured by pretesting with two experts in predictive maintenance. Construct validity was ensured by aligning and deriving the questions from the literature review.

## 6 CONCLUSION

Predictive maintenance is a topic that can generate a great deal of added value for many companies. Even though the topic has been discussed for several years, it has not yet been used by many companies. In the course of this paper, the basic requirements for the use of predictive maintenance and how the literature describes possible added values through the use of predictive maintenance were worked out. Due to a research gap in the area of predictive maintenance in German medium-sized businesses, this paper took a closer look at this area. The majority of the 104 participating respondents see a potential added value in their company through the use of predictive maintenance. For future research, it may be interesting to set an industry focus and to question how the added value through predictive maintenance is presented in individual sub-industries. By enriching individual metrics, the financial added value can be specified even more precisely. The research results of this work can also be generalized to other countries and company sizes under similar basic conditions and is valid not only for the German midmarket.

The first applications and results of predictive maintenance are already being implemented and realized in the industry. However, the response to these possibilities is still very restrained, especially in German medium-sized companies, even though the possible results look promising. By increasing research in these areas, it may be possible to introduce more and more companies to the topic of predictive maintenance and convince them of the potential benefits. The research in this paper provides reliable starting points that can be elaborated in more detail in more in-depth research.

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## **Contact information**

### **Jonas Pfeffer, MBA**

Comenius University Bratislava, Faculty of Management

Šafárikovo námestie 6, 814 99 Bratislava, Slovakia

E-mail: [pfeffer3@uniba.sk](mailto:pfeffer3@uniba.sk)

ORCID: 0000-0002-2562-1490

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# THE FACTORS OF FINTECH: A LITERATURE REVIEW

*Tien Phat Pham, Abdul Quddus, Arif Ibne Asad, Boris Popesko, Sarfraz Hussain*

## **Abstract**

Fintech is the most critical factor in the finance industry. The fintech research field is emerging as an exciting topic in academics. The concepts of fintech are also fragment; thus, it needs to be clarified. In this study, we aim to review the existing studies to clarify the factors of fintech. We select 42 high-quality publications from 2015 to the present for review. After reviewing and discussing, we propose that the bank fintech and the fintech-outside are the critical factors of fintech. Additionally, we also propose the components of the bank fintech and the fintech-outside. The fintech company's pressure, the bank fintech strategy, and human resource quality are the critical components of the bank fintech. The components of the fintech-outside consist of disruptive technology, fintech regulation, and business environment.

*Keywords: Fintech, Factor, Review, Technology, Bank, Digitalization*

## **1 INTRODUCTION**

Technology plays a critical role in the finance industry. Technologies support the bank to reduce operation costs, increase efficiency and performance, reduce credit risks. Besides that, the technologies facilitate the bank to connect and maintain relationships with customers (Cheng & Qu, 2020; Lee & Shin, 2018; Goldstein et al., 2019; Thakor, 2020). Under the rise of technologies in the finance industry, a new kind of company has been formulated; it is the fintech company. The technology platform facilitates the fintech company providing financial products with the same features as banking products. Additionally, the fintech company also provides new products (e.g., cryptocurrencies). New products are noticed by younger generations (e.g., millennials generations) (Jünger & Mietzner, 2020; Pu et al., 2021).

Fintech is the new word (or buzzy word), which is the mixed word of “financial” and “technology”. Since 2015, the fintech research field has attracted tremendous scholars. The topics of the fintech research field are very various. For example, the topics regard mobile payment, peer-to-peer lending, banking digitalization, technologies (cloud, artificial intelligence, learning machine, etc.), the fintech startup company, fintech business models, the fintech platforms, etc. are the “hot” sub-fields of the fintech segment.

The fintech field is an emerging field (Goldstein et al., 2019; Haddad & Hornuf, 2019; Zavolokina et al., 2016). The debates about fintech are going on, and it is an exciting topic for scholars. We are also interested in this topic. This research field seems to be a complicated issue; the existing studies are fragments. We argue that it needs to be systematized for understanding the fintech. There are some papers about fintech-systematic from various perspectives. Lee and Shin (2018) systematized ecosystem, business model, investment decisions, and challenges of fintech. Sangwan et al. (2019) reviewed previous papers and divided fintech into three related perspectives: financial industry, innovation technology, and regulation. The review paper by Milian et al. (2019) emphasized the critical role of disruptive technologies in the finance industry. We have tried to find a specific paper about the factors of fintech, but it seems to be missed by the scholars. We argue that it is a gap in the fintech research

field. To fulfill this gap, we aim to select the high-quality existing publications for reviewing and proposing the factors of fintech. We believe that understanding the factors of fintech will be meaningful for the next study of the determinant of fintech.

## **2 THEORETICAL BACKGROUND**

### **2.1 Fintech definition**

Depending on each study's aim, each study has a unique definition of fintech. For example, Vives (2017) defined "Fintech may be understood as the use of innovative information and automation technology in financial services". New digital technologies will level up the new financial products and cost-effective products. Additionally, Dhar and Stein (2017) defined fintech as "Financial sector innovations involving technology-enabled business models that can facilitate disintermediation; revolutionize how existing firms create and deliver products and services; address privacy, regulatory and law-enforcement challenges; provide new gateways for entrepreneurship; and seed opportunities for inclusive growth". Furthermore, fintech is the compound word of "finance" and "technology", it is used for indicating the technologies applicable for delivering financial products. In practice and academics, fintech is often used to indicate utilizing technologies outside the finance industry's traditional business models (Milian et al., 2019).

Based on these definitions above and through the definitions by Breidbach et al. (2019), Alt et al. (2018), and Thakor (2020), we explore that the concept of fintech can be understood from two sides. Firstly, the financial technologies are utilized by the traditional financial institutions called the bank fintech. Secondly, the non-intermediate organization uses the technologies for providing the financial products or service; we call it the fintech-outside. Therefore, we propose that there are two factors of fintech, namely the bank fintech and the fintech outside. Additionally, to clarify the critical components of fintech factors, the existing high-quality studies will be reviewed; thus, we formulate research objectives to identify components of the bank fintech and the fintech-outside.

### **2.2 History of fintech**

According to Lee and Shin (2018), in the 1990s, the internet and the world wide web had changed the finance industry's face; banking services (savings, transfers), insurance, stock trading were transacted without the physical location. The application of technologies reduced the price. Since the mid-2000s, the rise of smartphones and new generation technologies facilitated banking product development. The customer can make a transaction via a personal mobile device. Furthermore, since the post-global financial crisis 2008, the combination of mobile finance, new generation technologies, and social networking, the financial product has been personalized. There is the appearance of new players in the financial market; it is the fintech company. In this stage, we consider that fintech is not only used for indicating the utilization technologies of the conventional bank but also the new players.

Arner et al. (2015) gave that there are three stages of fintech development. The first stage (or fintech 1.0) in 1866-1987 regards the period of an international transaction with the support of analog technology (transmission cable). The second stage (or fintech 2.0) in 1987-2008 regards the digitalization banking operation. Personal computers, the internet, and technologies helped the bank reducing manual works. Most internal processes, transaction processes, managerial processes, etc., were processed by the computer. The third stage (or fintech 3.0), from 2008 to the present. The rise of smartphones and the combination between financial innovation and new technologies are the finance industry's revolution. Personalization and democratization of

banking products are going on in this stage. The presence of the fintech company with advanced technologies has created opportunities and threats for incumbents.

Consistent with Lee and Shin (2018), Arner et al. (2015), Saksonova and Kuzmina-Merlino (2017), Thakor (2020), and Alt et al. (2018) validated that the global financial crisis 2008-2009 is the milestone for developing the fintech sector. The crisis had significantly affected the finance industry. The bank must apply new technologies for leveraging performance. Besides that, in the post-crisis, the new kind of firm has been formulated, it is the fintech company.

In this study, by the globe scale, we argue that the global financial crisis 2008-2009 is the significant milestone of fintech history. Therefore, we propose that fintech history might be divided into two stages. Firstly, the pre-crisis regards the applicable technology in the internal of the bank or traditional financial institutions. Secondly, the post-crisis, from 2008 to the present, the banking product is personalization and democratization, and the products are provided by both the traditional financial institutions and the fintech company.

By exploring the fintech history, it is clear that the bank fintech associates the banking digitalization, whereas the fintech-outside regards the fintech company activities and the fintech platform. Additionally, the common point of banking digitalization and the fintech company activity is to bring the best financial products to the customer.

### 3 SELECTED PUBLICATION

We conduct the systematic literature review approach to clarify the factor of fintech. We find the high-quality existing publications as these steps:

*Step 1*, we use the Google Scholar platform for searching the related publications through keywords. Based on the results by Milian et al. (2019), the related keywords consist of fintech, finance, innovation, technology, regulation, financial market, risk, banking, financial inclusion, electronic money, blockchain, bitcoin, financial technology, cryptocurrency, big data (see detail in Fig.5 of the paper of Milian et al. (2019)). We find a huge of related publications; thus, we just priority the titles which have the occurrence of “fintech” (crucial keyword) and select from the first page to the third page of the Google Scholar with each search.

*Step 2*, according to Arner et al. (2015), since the global financial crisis 2008-2009, fintech has been developed rapidly. However, the fintech research field has attracted many scholars since 2015 (Milian et al., 2019). Therefore, we filter the publications from 2015 to the present for review. In the combination of the first and second steps, we select 343 related publications.

Tab. 1 - Summarize the selected publications. Source: own research

Year	2015	2016	2017	2018	2019	2020	2021	Total
<b>SCOPUS*</b>	-	<b>4</b>	<b>4</b>	<b>12</b>	<b>9</b>	<b>9</b>	<b>2</b>	<b>40</b>
Q1	-	3	1	6	6	6	1	23
Q2	-	-	1	3	1	2	-	7
Q3	-	-	2	3	2	1	1	9
Q4	-	1	-	-	-	-	-	1
<b>Web of Science*</b>	-	<b>3</b>	<b>1</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>1</b>	<b>31</b>
SCIE	-	1	1	2	1	2	-	7
SSCI	-	2	-	5	5	5	-	17
ESCI	-	-	-	4	1	1	1	7
<b>Citation*</b>	<b>727</b>	<b>392</b>	<b>654</b>	<b>1684</b>	<b>543</b>	<b>179</b>	-	<b>4179</b>

(\* ) accessed on Google Scholar, Scopus, and Web of Science on 9 March 2021

Source: The Author

*Step 3*, we extract and inquire about the journal's name with the Scopus and Web of Science database. If the journal belongs to the Scopus or Web of Science database, it is validated on the

high-quality journal. Besides that, we argue that the number of citations might reflect the publication's quality; thus, throughout the Google Scholar tools, we determine the citation number of the publications. We propose that the publication that has more than 15 citations per year is a high-quality publication. In this step, we select 104 related publications.

*Step 4*, we read the title, keywords, and abstract of the publication for choosing or not. If the publication is chosen for the review, we call it is “selected publication”. In this study, we choose 42 selected publications for review.

The selected publications are summarized in table 1. Two publications do not belong to Scopus or Web of Science, but they meet the number of citations. They are the study by Arner et al. (2015) with 727 citations and by Vives (2017) with 79 citations. There are 31 publications in Web of Science (SSCI, SCIE, ESCI) and 40 publications in Scopus. The study by Pu et al. (2021) and by Zarrouk et al. (2021) do not have any citations.

## **4 RESULTS AND DISCUSSION**

The study aims to review the factors of fintech. Based on the fintech definition and review of the selected publications, we determined two main factors of fintech: the bank fintech and the fintech-outside. We give that the bank fintech means the bank or the traditional financial institutions (intermediations) apply the new digital technologies for enhancing bank performance (reducing cost and increasing profit). The fintech-outside regards the fintech platform and the fintech company activities. Today, most fintech companies are startup and young, and they are not an intermediation institution. Besides that, the fintech company is a bank competitor in serving banking products (the same products of the bank) and provides new financial products (e.g., cryptocurrency).

In the below content, we present the criteria of the bank fintech and the fintech-outside.

### **4.1 The bank fintech**

We explore that there are three factors of the bank fintech as below:

#### **Pressure of the fintech company**

We discuss that the primary factor of the bank fintech is the pressure of the fintech company. The fintech company is a competitor of the bank in the banking market. The fintech company is penetrating the banking market, especially in individual and SME customers (Ozili, 2018; Gomber et al., 2017). LendingClub (P2P lendings platform) in the US with small loans, Alipay and M-PESA (mobile payments platforms) in China, and Keyna with small routine transactions have been significant proof of the fintech company's success in the niche banking market.

Besides that, the fintech company's products are more advanced than the bank by transaction speed, convenience (transaction via mobile device), and lower cost. The best-advanced fintech company is to does not need physical transaction offices to provide the products. All transaction products are compliant via mobile devices (e.g., smartphone and laptop) and computers with an internet connection. Therefore, the fintech company is more competitive than the bank in the operation cost (Ozili, 2018; Breidbach et al., 2019; Lee & Shin, 2018).

Today, the customer requires the banking transaction to be safe, fast, convenient, and suitable price (Saksonova & Kuzmina-Merlino, 2017). There is a trend of using advanced technologies products of the young generation, namely Y-generation (born after 1990) and Z-generation (born after 2000), instead of using traditional banking products. The fintech products are easy to use and accept to use by young customers rather than the bank (Jünger & Mietzner, 2020;

Agarwal & Chua, 2020). Therefore, we consider that it is an advanced point of the fintech company compared with the bank.

Based on these reasons above, for remaining in the position and increasing competitive capability in fintech rise, banking digitalization is a mandatory emergency requirement in the digital era. We explore that there is a positive effect of banking digitalization and bank performance. Banking digitalization increasing competition (Hadad & Bratianu, 2019), increasing efficiency (Quaranta et al., 2018), increasing risk management capability (Wang et al., 2021), enhancing customer satisfaction (Romānova & Kudinska, 2016). Consequently, the fintech company's pressure is the critical factor of the bank digitalization or the bank fintech. The procedure and result of banking digitalization are more beneficial for the bank in the future.

### **Bank fintech strategy**

Bank digitalization is derived initially from banker awareness, represented by the bank's fintech strategy. The bank fintech strategy regards the bank goals (e.g., reduce operation cost, enhance customer experience, etc.) and bank resources (e.g., capital, human, or even experience). We explore that there are two kinds of bank fintech strategy. Firstly, the bank invests in upgrading and innovating the existing technologies aim to reach the goals. We argue it regards the bank's R&D activities and IT investment; we call the bank IT investment. Secondly, the bank will collaborate or acquisitive the fintech company and utilize the existing technology of the fintech company. We consider it might call the bank-fintech alliance.

The increase in IT investment helped the bank to achieve the business goals, namely reducing the operation cost and launch more new products (e.g., e-broking, call center, online debit, consumer banking, corporate e-banking, credit cards, text message alerts, and mobile payment) (Parameswar et al., 2017), enhanced customer experiences (Rodrigues et al., 2020), and increased bank efficiency (Paulet & Mavoori, 2019). Therefore, we propose that the bank's IT investment is the main factor of the bank fintech strategy.

The large bank is not ready to ally with the fintech company in the short-term because the bank is in a better position than the fintech company in the finance market (Hung & Luo, 2016). Banks' advanced points are experience, full-banking license, the large scale of size, and customer database (Hornuf et al., 2020; Buchak et al., 2018). We argue that they might explain why the bank is not ready to ally with the fintech company. However, most scholars agree that the strategy to ally with the fintech company is the best choice for the bank to adapt to the rise of fintech in the digital era (Anagnostopoulos, 2018; Gomber et al., 2017; Thakor, 2020). Although the bank-fintech alliance's effect on the bank is heterogeneous, we believe that making an alliance or orientation of allying is the critical component of the bank fintech strategy.

### **Human resource quality**

We also discuss that the bank's human resource quality is also the critical factor of the bank fintech. The employee quality is presented by the knowledge, skills, adaptation with the new technologies, and employee satisfaction. In the future, with the advanced technologies, the workforce in the bank is going to be replaced by the machine with artificial intelligence (Jagtiani & John, 2018; Meena & Parimalarani, 2020; Das, 2019; Alt et al., 2018). Although the workforce will be reduced, the bank also needs employees who possess the new skills for working with machines. The employees must be the experts in the specific major, such as cybersecurity specialists, credit analysts, robot programmers, blockchain architects, and process modelers (Jagtiani & John, 2018; Meena & Parimalarani, 2020). Moreover, Umans et al. (2018) gave that life balance and life satisfaction are positive with bank digitalization procedure

success. Therefore, regarding the bank fintech, we proposed two criteria of human resource quality: the new skill and satisfaction of the bank workforce.

## **4.2 The fintech-outside**

As we mentioned above, the fintech-outside is used to indicate the fintech company and the fintech platform. The fintech is always agile in applying the latest technologies for formulating the platform and bringing the best products to customers. However, we also explore that because the fast-maturing of the fintech has facing more challenges from the business environment, especially from the fintech regulations. Based on the existing publications, we will discuss the factors of the fintech-outside as below.

### **Disruptive technology**

The disruptive technologies consist of artificial intelligence, machine learning, big data, cloud computing, blockchain, cryptographic methods, etc. (Vives, 2019; Das, 2019; Lee & Shin, 2018; Milian et al., 2019). The latest technologies that have been applied for the fintech platform are different from the fintech segments or fintech business models. The success of the fintech company shows the role of disruptive technologies in the fintech-outside. For example, under the rise of smartphone and internet infrastructure, in the mobile payment business model (the largest segment of the fintech), the customers can easily use the mobile application of the fintech company. The transfer transaction has become more than advanced and convenient with the near field communication and barcode or QR code. The popularity of PayPal, Apple Pay, Samsung Pay on the global, and the success of TCASH in Indonesia, M-PESA in Kenya are significant proof (Lee & Shin, 2018; Iman, 2018).

The second-largest segment is the P2P lending technologies of crawling and analysis with huge data in the various resources, which helps the customers make the suitable financial decision (Liu et al., 2020; Thakor, 2020). Besides that, the technologies are helpful in risk-management (Jagtiani & John, 2018). LendingClub and Prosper are the proof of the P2P lendings' success in the technological aspects.

Additionally, the link between disruptive technologies and the fintech business models are given by the association between cryptocurrencies (e.g., Bitcoin, Ethereum, etc.) and blockchain technology, insurtech and intelligent contract (e-financial contract), and automatic risk management (Thakor, 2020; Jagtiani & John, 2018; Radziwill, 2018; Vives, 2019).

Consequently, we propose that disruptive technology is the most critical factor of the fintech-outside. It is consistent with most existing publications.

### **Fintech regulation**

The fintech company is not an intermediate financial institution because the fintech company provides financial solutions for connecting peer-to-peer customers (Van Loo, 2018). For example, the P2P lending company provides the platform for lenders and borrowers to connect directly to a decentralized exchange market of cryptocurrencies and mobile money. The peer-to-peer transaction and the decentralized exchange market without authorities' monitoring create new risks and threaten the finance industry's sustainability (Jagtiani & John, 2018). We explore that there is a difference from the national regulations or policies for the fintech company development. It is the critical factor of the fintech-outside (Van Loo, 2018; Ozili, 2018; You, 2018; Buchak et al., 2018; Haddad & Hornuf, 2019).

Hong Kong, the UK, and Singapore are pioneering regulations to facilitate fintech companies' development called the "regulatory sandbox" (Gomber et al., 2017). However, in developing countries, the "specified sandbox" has not yet attracted policymakers' attendance. Sangwan et



al. (2019) indicated the lower regulatory is the cause of the P2P lendings development and the credit risk increasing. Moreover, there is a difference in mobile payment development between countries because of the national regulatory factor's impact (Miao & Jayakar, 2016).

Furthermore, we explore that the license and other legal requirements for the fintech company operation are also the vital components of the fintech regulator. The bank faces more regulatory burden than the fintech company; thus, the fintech company has the condition for growing (e.g., the regulation of issuing loans, capital requirements, mortgage servicing rights, mortgage-related lawsuits, and the transfer channel - the transfer money of the bank must be monitored by the central bank, but there are not any rules applicable for the fintech companies) (Buchak et al., 2018). Therefore, the price of products of the fintech company is more competitive than of the conventional bank. We consider that it is a positive factor of the fintech platform.

Consequently, we propose that the fintech regulation consists of a “regulatory sandbox”, national regulation, license, and other legal requirements, crucial for the fintech-outside.

### **Business environment**

Haddad and Hornuf (2019) stated the macroeconomic condition, internet service infrastructure, smartphone, and venture capital witness the fintech startup formulation. Zarrouk et al. (2021) and Saksonova and Kuzmina-Merlino (2017) explored the critical role of the economic component and venture capital in the fintech company's success. Jagtiani and John (2018) gave about 3 billion unbanked customers are the chance of the fintech development. Additionally, customer behavior changes to accept new technological products/services, which is also the critical contribution of the fintech company's success (Jünger & Mietzner, 2020).

Consequently, the study considers that the macroeconomic condition, IT infrastructure, venture capital, and customer behavior change could be called the business environment in general. We propose the business environment is the critical factor of the fintech-outside.

## **5 CONCLUSION**

Fintech is an emerging field in academics. The number of publications has been increasing dramatically. The debate regards the fintech research fields is going on. For example, the debate about fintech definition, fintech business models, and history of fintech, etc. have attracted many scholars. In this study, we aim to contribute to understanding the factors of fintech, which is meaningful for the next studies. The review study is conducted to indicating the factors of fintech. The database of existing publications is formulated by selecting the high-quality papers published. The scope of time for selected publication is from 2015 to the present. The milestone of 2015 is chosen because, since 2015, the number of fintech publications has been rising rapidly.

Based on the discussion of fintech definition and fintech history, we propose that the bank fintech and the fintech-outside are the factors of fintech. Additionally, through the review of the selected publication, we explore that the bank fintech is structured by three factors: the pressure of the fintech company, the bank fintech strategy, and the human resource quality. The components of the fintech out-side are disruptive technology, fintech regulation, and business environment.

We propose that the study has two limitations, which the next study could solve. Firstly, since 2015, the number of publications about the fintech emerging field has rapidly risen. However, in this study, we selected only 42 publications for review; thus, we might miss some other factors of fintech. We propose that this limitation could be solved by expanding the scope time and collecting more than publications. Secondly, the factors of fintech are proposed by

reviewing existing publications and the authors' experience; based on the database of selected papers, other methods could be applied to determine the factors of fintech. For example, scraping keywords for fintech dominant and analyzing the network of selected publications.

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## **Contact information**

### **Tien Phat Pham**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: tien@utb.cz  
ORCID: 0000-0001-9472-5878

### **Abdul Quddus**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: quddus@utb.cz  
ORCID: 0000-0003-3914-6755

### **Arif Ibne Asad**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: asad@utb.cz  
ORCID: 0000-0001-8622-0941

### **prof. Ing. Boris Popesko, Ph.D.**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: popesko@utb.cz  
ORCID: 0000-0002-3590-7070

### **Sarfraz Hussain**

Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia  
Govt. Imamia College Sahiwal, Pakistan  
E-mail: mianfraz1@gmail.com  
ORCID: 0000-0001-9449-1047

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# METHODS OF MOTIVATING SALES MANAGERS TO ACT IN FAVOUR OF OWNERS

*Gabriela Polakova*

## **Abstract**

Labour-law relationships between managers and company owners use to be a conflict of different interests. Both parties are motivated by their own welfare and want to maximize their own benefits. This paper is focused on motivational methods to harmonize interests of both parties in one common goal. Research question is: “What are managers’ preferences in reward methods with focus on their biggest utility and which one is the most motivational for them?” In the analysed company there is a gap in monitoring of motivational incentives for managers. The aim of this paper is to summarise and describe possible reward methods motivating managers to act in favour of owners and determine manager’s preferences. Methods are summarized from the perspective of risk accepting and all involve managers in profit sharing. Alternatives in rewarding systems are compared using multi attribute decision making method. The weighted sum approach was used to create linear utility function. The total utilities of individual variants are calculated and sorted. Managers’ preferences are determined by values of utilities of individual variants. Adoption of research results could help to improve current rewarding system to motivate managers really act in favour of owners.

*Keywords:* Moral hazard, asymmetric information, motivation, reward, profit sharing, risk sharing

## **1 INTRODUCTION**

Managers’ motivation can play an important role in addressing the issue of company performance. A key aspect of increasing business performance is to motivate managers to act for owner’s benefit and increase the market value of the company. Based on the analysis by Insan et al. (2021), it is known that motivation has a significant effect on employee performance. This means that the higher the motivation is, the higher is employee's performance (Insan et al. 2021). In general, in any life situation, everyone pragmatically acts in their own interest. A rational person strives to maximize his benefit or at least he tries about it hard. In life, there are many situations when the rational-minding person reduces the benefit of other participants in the market transaction while maximizing his own benefit. This situation can be an employment relationship between a manager and a company owner. The issue is that both are motivated by their own interests. Both want to maximize their own benefits. The assumption that their interests are the same is not usually true. In real situations, we often encounter the fact that these interests go against each other. It is practically a situation about which we are speaking as a moral hazard. Horejsi et al. (2006) identifies managers’ and owners’ different interests as one of several causes of moral hazard. An owner hires a manager to act for him, to perform certain tasks and services. A manager is responsible for everyday decisions in a company instead of an owner. Thanks to this situation, a manager can be much more informed, can have more knowledge in the field and can have a much deeper overview of what happens inside the company and in the market. Managers influence contracts and make decisions. The existence of this asymmetric information causes the problem of so-called moral hazard. One person reduces the benefit of the other person and there is not generally any responsibility for

this activity because this action is not clearly observable and verifiable (Horejsi et al, 2006). An owner delegates some of decision-making competencies to a manager. A manager performs certain tasks and makes decisions in certain matters on behalf of an owner of the company and shares the consequences of these actions with him. According to Horejsi et al. (2006), there is no interconnectedness between the utility of an owner and a manager. Decision-makings take place under uncertainty. The result of manager's activity cannot be clearly determined in advance because it depends only partly on manager's efforts and partly on exogenous random factors in the market. This is the most problematic issue in performance related pay. A manager tends to act for his own interest which allows him to have a secret activity or secret information. Lack of manager's motivation to act in favour of owners has existed as a performance problem. Because manager's interest often used to be different than owner's interest. After that each owner must solve the question how manager can be motivated to act for owner's profit. Waseem et al. (2021) identify six key drivers that motivate employees to facilitate value co-creation: rewards and recognition, opportunities for life-long learning, interpersonal engagement, role responsibility and accountability, organisational vision, and social purpose. The motivation and work environment lead to one's performance (Porter & Lawler, 1968) that a person will make choices with various alternative behaviours and business levels based on the attractiveness that will be obtained as a result. Motivation is related to employee performance. Employee performance is a function of ability, motivation, and opportunity (Robbins, 2003). Robbins (1993) states that employee performance is a function of the interaction between ability and motivation. If employee's ability is low, it will affect the employee's performance (Insan et al. 2021).

## **2 THEORETICAL BACKGROUND**

There is a large volume of published studies describing the role of rewards on motivation. In the professional literature, the issue of employee rewards is solved, for example, by Armstrong and Stephens, who state: "Financial incentives and rewards can motivate. People need money and therefore want money. It can motivate but it is not the only motivator." According to Gupta and Shaw (1998), employees will do the things for which they are rewarded; it also means that they ignore the things for which they are not rewarded. In 2019, Polakova reported a procedure to coordinate individual activities in implementing new employees' performance evaluation and rewarding in a manufacturing company on the Balanced Scorecard principles. Rewards management plays a critical role in the motivation and retention of high-quality staff and can play an important role in addressing the issue of supporting employee performance. There is evidence that adequate rewards play a crucial role in regulating employee turnover (Polakova, 2021). As Lawler (1990) points out, people's feelings about the adequacy of their pay are based upon comparisons they make between their own and others'. External market comparisons are the most critical because they are the ones that strongly influence whether individuals want to stay with the organization. Money is the number one stressor in human lives (Lawler, 1990), money fights are qualitatively worse than other kinds of fights (Klontz et al., 2008), financial stress is related to poor mental health (Dew et al., 2012), and financial stress affects our physical health (Sweet et al., 2012). The consequences of low sales executives' financial well-being can be a significant reduction or lost productivity and motivation to achieve business goals when there is no individual performance-related pay (Polakova, 2021). In her survey, Polakova (2021) reports that reward attitudes and financial well-being can be key drivers to attract and retain the sales executives the organization needs. Simplified there are two basic methods which provides motivation for managers to act in favour of owners. One of them is to involve managers in profit sharing. This enables a solution of motivation issue. This motivates managers to choose activities which maximize benefits also for owners at the same time. And

the second basic way how is possible to force a manager to act as much as possible in the interest of an owner is observing their activities and controlling. This includes additional costs, and sometimes observation can be enough difficult or almost impossible. In certain situations, a manager may wish that his/her activities be observed so that his/her reward is protected from external market influences on the outcome of his/her activities. The rewarding system shall be a tool by which an owner seeks to engage a manager to act in his interest. This system must unite interests of both parties. Horejsi et al. (2006) highlights the need to harmonize manager's and owner's interests. Increasing owner's utility must be in manager's own interest. A satisfied manager should have a feeling that his/her pay reflects his/her sales performance. If we have one owner and one manager, we can express the profit function as:

$$X = x(\alpha, \varphi) \quad (1)$$

where  $\alpha$  is manager's level of effort and

$\varphi$  is an objective market situation - exogenous random factors.

Manager's reward can be expressed as:

$$Y_{Manager} = [x(\alpha, \varphi)] \quad (2)$$

Owner's reward can be expressed as:

$$Y_{Owner} = X - Y_{Manager} \quad (3)$$

Each manager seeks to maximize his utility  $U_{Manager}$ . Therefore,  $U_{Manager}$  is an increasing function of  $Y_{Manager}$  and a decreasing function of  $\alpha$ .

$$U_{Manager} = f(Y_{Manager}) - v(\alpha) \quad (4)$$

It follows from the above that a manager considers how much effort he/she will make because the increasing effort increases the profit/turnover and thus the reward and the utility but at the same time reduces the utility just due the increased effort and work. Owner's utility function is:

$$U_{Owner} = g(X - Y_{Manager}) \quad (5)$$

An owner seeks to maximize his utility which is dependent on a net profit after deducting manager's reward. Owner's utility is an increasing function of profit and a decreasing function of manager's reward. Manager's efforts are increased by the reward but the larger part of the reward which the manager gets, the smaller part an owner receives. An owner should motivate a manager so that a manager maximizes owner's utility while maximizing his own utility. At the same time, an owner should ensure that a manager achieves a certain minimum level of utility if he/she is to remain his/her employee. This confirms what Lawler (1990) points out that a manager must therefore receive at least his transfer earnings. The rewarding system has its own bottleneck which relates with the uncertainty on the market. Company revenues depend not only on manager's efforts but also partly on objective situation in the market. They are exogenous random factors which commonly appears in the market and bear uncertainty in revenues. Managers' and owners' attitudes to the risk is crucial for the optimal choice of reward system. Following alternatives can occur - both have negative attitude to the risk; both have a neutral attitude to the risk, or one has negative attitude to the risk and the other is indifferent. The following reward methods are summarized from the perspective of risk. The assumption of this paper is that the manager has a negative attitude to risk and the owner has a neutral attitude to risk. The justification is that an owner has or can probably have a portfolio of shares, stocks, and business activities so he/she can reduce the risk by diversification. But a manager has only one source of income and that is his human capital. A manager can hardly even out an



income fluctuation. That is why in my opinion a manager rather avoids taking the risk. The reward system is a tool of motivating a manager, to involve him in the result and influence his activities (Horejsi et al, 2006). Based on upper mentioned assumptions, these reward systems may be considered (all involve profit sharing between an owner and a manager). Horejsi et al. (2006) uses examples of these various methods.:

a) Manager accepts all risks.

$$\begin{aligned} Y_{Owner} &= Y_{Owner} \\ Y_{Manager} &= X - Y_{Owner} \end{aligned} \quad (6)$$

An owner receives a fixed amount paid from the achieved profit (X) and a manager receives the remaining part of the profit. An owner practically gets the contracted amount of income which is the same regardless of the market situation. Manager accepts all risk which is enough high. The earning (X) depends on random factors as well as on manager's efforts. Due to the assumed negative manager's attitude to the risk, it is quite unrealistic to get a manager with such a contract at all. In general, therefore, it can be stated that this contract is not optimal from manager's point of view and his/her assumed attitude to the risk.

b) Owner accepts all risks.

$$\begin{aligned} Y_{Manager} &= Y_{Manager} \\ Y_{Owner} &= X - Y_{Manager} \end{aligned} \quad (7)$$

This model is exactly the opposite of the previous one. A manager receives a contracted fixed reward because he/she rejects the risk and an owner bears all the risk. This model is optimal from the risk-sharing perspective in favour of a manager but on the other hand it is not motivating which is a big weakness. The reward is fixed and guaranteed for a manager. A manager has no incentive to increase efforts because he/she would not receive a higher reward and, moreover, increased effort would mean more work for him/her which would ultimately reduce his/her utility. I do not see much benefit for an owner either, because he/she should expect to get a lower turnover. In addition, it can be assumed that if a manager does not have to accept any risk, it can also affect his/her decision-making. He/she may behave riskier because if he/she does not bear any consequences of his/her behaviour then he/she can ignore the risk in his/her negotiations and decision-makings.

c) System reflecting manager's efforts.

The purpose is to reflect manager's efforts and at the same time ensure that he/she does not have a fixed income.

$$\begin{aligned} Y_{Manager} &= kX \\ Y_{Owner} &= X - Y_{Manager} \end{aligned} \quad (8)$$

Manager's reward is a share of the achieved turnover. Here, a manager does not have a certain fixed income and has an incentive to increase his/her own work effort to increase a probability of a higher turnover.

d) Forcing Contract

This type of the contract allows a manager to receive a fixed reward as long as a level of his efforts is at least of a certain value  $\alpha^*$ .

$$\begin{aligned} Y_{Manager} &= Y_{Manager} \quad s.t. \quad \alpha = \alpha^* \\ Y_{Owner} &= X - Y_{Manager} \end{aligned} \quad (9)$$

### e) Linear Contract

This type of the contract is a compromise between the risk sharing and motivation needs. Fixed income provides a certain income sureness to a manager. In addition, a manager receives additional reward based on either the amount of revenue or the effort performed.

$$\begin{aligned} Y_{Manager} &= F + k \cdot X \\ Y_{Owner} &= X - Y_{Manager} \end{aligned} \quad (10)$$

A manager receives a salary and in addition a bonus to put it simply.

Polakova (2020) states that the driving force that will affect employees' future results must be individualized to needs of a concrete employee to make an effect. Polakova (2018) argues that well skilled sales managers can leave the company due to improperly set of remuneration system and due to a feeling to not be rewarded fairly. There is a link to the need for a minimum transfer salary.

## 3 METHODOLOGY

Jablonsky (2007) provides in-depth examples of multi-attribute decision making methods showing their relevance in practice. The Weighted Sum Approach is based on the construction of a linear utility function on a scale from 0 to 1. The worst variant according to a given criterion has the utility 0, the best variant has the utility 1 and the other variants have utilities between these two extreme values. This means that when applying this method, the elements of  $y_{ij}$  of the input criterion matrix should be replaced by values  $y_{ij}$  which will represent the utility  $X_i$  in the criterion  $Y_j$ . The values  $y_{ij}$  can be obtained for maximization criteria by the following relationship:

$$y_{ij} = \frac{y_{ij} - D_j}{H_j + D_j} \quad (11)$$

Where  $D_j$  is the lowest (in maximizing criterion the worst) and  $H_j$  the highest (in maximizing criterion the best) criterion value  $Y_j$ . It is clear from the above equation that the utility  $y_{ij}$  for the worst criterion value  $y_{ij} = D_j$  is equal to 0 and for the best criterion value  $y_{ij} = H_j$  is equal to 1. It is necessary to modify the above relationship for the minimization criteria as follows.

$$y_{ij} = \frac{H_j - y_{ij}}{H_j + D_j} \quad (12)$$

The total utility of the variant  $X_i$  is then calculated as the weighted sum of the partial utilities according to individual criteria.

$$u(X_i) = \sum_{j=1}^k v_j y_{ij} \quad (13)$$

The variants can then be ordered by decreasing utility values  $u(X_i)$ .

## 4 RESULTS

The purpose of survey was to determine what are managers' preferences in reward methods with focus on risk sharing and what is the most motivational one with respect to managers' utility. The survey was conducted in March 2021. Twelve managers working in the business department of the analysed company were included and recruited for this study and represent the basic. A total of 10 respondents (approx. 83 %) answered and represent the sample from

which the obtained results are used to make a judgment about the basic. In the task of multi-criterial evaluation of variants there is defined a set of reward methods  $X = \{ X_1, X_2, \dots, X_n \}$  which are evaluated according to criteria  $Y_1, Y_2, \dots, Y_k$  and according to these criteria each variant  $X_i, i = 1, 2, \dots, n$  is described by a vector of so-called criteria values  $(y_{i1}, y_{i2}, \dots, y_{ik})$ . Variants here are reward methods and criteria characterize these individual options. In this experiment criteria are cardinal and there are also several different criteria which are non-additive, (they are not in the same units of measure). The decision problem is an evaluation of reward methods, determination of their preferential order and identifying the most appropriate one from the managers' point of view. Evaluators assigned individual variants by numbers 0-10 or by probability value according to their subjective evaluation. The final criterial matrix includes always average values from the sample of respondents. The criterial matrix with achieved results of individual variants is shown in the Table 1. The Table 1 shows an overview of reward methods characterized according to following criteria: 1) manager's attitude to the risk, 2) his subjective calculation of probability of higher rewards, 3) his subjective evaluation of performed efforts and 4) his opinion on income assurance. The criterial matrix was normalized by weighted sum approach and then the utility of each variant was calculated. The total utility of the reward variant is calculated as the weighted sum of the partial utilities according to individual criteria.

Tab. 1 – The criterial matrix – Manager's preferences in motivation methods. Source: own research

Criteria	Risk for manager	Probability of higher rewards	Rate of efforts	Income assurance
MIN/MAX	MIN	MAX	MIN	MAX
Manager bears all risks	10	0,8	10	0,00
Owner bears all risk	0	0	1	10,00
System reflecting managers' efforts	5	0,6	10	0,00
Force contract	7	0,5	10	0,00
Linear contract	3	0,7	5	10,00
H <sub>j</sub>	10,00	0,80	10,00	10,00
D <sub>j</sub>	0,00	0,00	1,00	0,00

Criteria	1	2	3	4	Score
Absolute weight	10	5	5	10	30
Relative weight	0,33	0,17	0,17	0,33	1,00
Manager bears all risks	0,0000	1,0000	0,0000	0,0000	0,1667
Owner bears all risk	1,0000	0,0000	1,0000	1,0000	0,8333
System reflecting managers' efforts	0,5000	0,7500	0,0000	0,0000	0,2917
Force contract	0,3000	0,6250	0,0000	0,0000	0,2042
Linear contract	0,7000	0,8750	0,5556	1,0000	0,8051

Tab. 2 – Sorting variants according to utility. Source: own research

Variant	u(X <sub>i</sub> )
Owner bears all risk	0,8333
Linear contract	0,8051
System reflecting managers' efforts	0,2917
Force contract	0,2042
Manager bears all risks	0,1667

The Table 2 provides the sorting of variants from the highest utility values to the lowest utility values  $u(X_i)$ . It can be seen that the biggest utility value has the variant when Owner bears all risk,  $u(\text{Owner bears all risk})=0,8333$ . This is an evidence of manager's negative attitude to the risk in this sample of respondents. Manager's income is fixed and guaranteed in such a contract. But there is a lack of motivation. The manager is not interested in increasing efforts. He/she has no incentive to do it. He/she would not receive a higher income and, moreover, increased effort would ultimately reduce his/her utility. From the owner point of view, he/she should expect to get a lower turnover. Another weakness is manager's behaviour which can be influenced by the

fact that he/she does not bear any consequences of his/her decision-making. Manager's decision and behaviour can be riskier when consequences of the risk are borne by the owner.

Closer inspection of the Table 2 shows that the Linear contract is almost equally attractive for the manager,  $u(\text{Linear contract})=0,8051$ . This contract has not such a high-income assurance but there is a possibility to increase income, and this enables to reflect efforts he performed. If the owner decides between these two variants, he/she shall probably choose the Linear contract to stimulate the manager to make greater efforts in achieving a higher turnover.

The lowest utility has the variant when Manager bears all risk,  $u(\text{Manager bears all risks})=0,1667$ . This is not something unexpected. It would be rather surprised to recruit a manager who accepts the risk of all random factors in the current global, highly competitive, and turbulent market. But on the other hand, it can be a big challenge for a manager because more risk means a bigger probability to have more profit. The owner practically gets the contracted amount of income which is fixed and is the same regardless of the market situation. And the manager has a possibility to gain all the rest of earnings. It can be very lucrative for him if he succeeds in the market and is willing to accept the risk.

The other two reward methods do not differ significantly in the values of utility. In any case, the utility values are quite low:  $u(\text{System reflecting manager's efforts})=0,2917$  and  $u(\text{Forcing contract})=0,2042$ . So, it can be concluded that they are not preferred for the group of managers in the sample. The system reflecting manager's efforts gives a high incentives for owners to motivate managers. A manager has no fixed income, and his/her reward is a share of the achieved turnover or net profit. This increases the probability of a higher turnover for the owner. From managers' point of views the forcing contract was not also so much attractive. This type of contract allows the manager to receive a fixed reward as long as the level of his/her efforts is at least of a certain agreed value  $\alpha^*$ .

## 5 DISCUSSION

In a labour-law relationship between a manager and an owner there exists asymmetric information and a related problem of moral hazard. Managers and owners use to have different interests. There is no reason to assume that interests of both parties are identical. Managers tend to act rather in favour of their own interest just thanks to the existence of their secret information or secret activities. A manager is responsible for everyday decisions in the company instead of an owner and thanks to this situation, a manager can be much more informed and can have more knowledge in the field. It uses to be a manager who is a decision-maker about contracts and can use it in his/her advantage and benefits. A manager is usually more informed about what happens inside the company and in the market. The main issue emerging from upper mentioned rewarding options is the inability to perfectly observe sales managers' activities. Therefore, it is not easy to separate the effects of the effort and the objective market situation from the amount of turnover. Sales manager's activity is often not verifiable.

## 6 CONCLUSION

This study has focused on methods of sales managers' motivation to act in favour of owners. The purpose of the current study was to determine rewards as motivational methods to harmonize managers' and owner's interests in one common goal. Rewarding methods are summarized from the perspective of risk sharing.

Alternatives in rewarding systems are compared using multi attribute decision making method. The weighted sum approach was used to create linear utility function. Managers' preferences are determined by values of utilities of individual variants.

This research has shown that the reward is a principal determining factor of employee's performance. This is expected result that everybody in the sample is motivated by his own welfare and wants to maximize his own benefit. The research has also confirmed managers' negative attitude to the risk in the sample. The variant when the Owner accepts all risks has reached the biggest utility value. The reason may be a manager's fixed and guaranteed income. The disadvantage is a lack of motivation to increase managers' efforts to make bigger turnover because they have no incentives in profit sharing in this rewarding system. That is why a lower turnover may be expected. But on the other hand, managers have income security in this case. This way of rewarding can also significantly influence manager's behaviour and attitude in decision-making. A manager can behave and decide riskier when he is not responsible for any consequences of negotiations and dealings. The rewarding method when the Manager accepts all risk has reached the lowest utility value. Incentives are very high as well as the risk for the manager. Results show that these two extreme examples of rewarding systems create a fundamental tension between risk-sharing and incentives. If the manager is protected from income uncertainty, then the owner has no tools to motivate him, and a moral hazard problem may arise. The solution to the motivation issue could be proposed by the remaining three mentioned systems – the System reflecting manager's efforts, the Linear contract, and the Forcing contract. Interestingly, there was almost no difference in the utility values of the Linear contract and the winning variant when the Owner bears all risk. The Linear contract has reached the second highest position in the utility score. The Linear contract has not such a high-income assurance but there is a possibility to increase income, and this enables to reflect efforts the manager performed. The Linear contract seems to be a good stimulator for managers in the sample to make greater efforts in achieving higher turnover and seems to be also attractive in perspective of risk-sharing, profit-sharing and income assurance. Managers' salaries are always determined individually. Also rewarding system can differ for individuals. However, the unified rewarding system is recommended for simplification. Taken together this research has shown that the optimal choice of rewarding is a principal determining motivation driver of sales manager's performance but not only one.

The first limitation in the present research is the size of the sample. The results cannot be generalized. Furthermore, results are influenced by managers' subjective evaluation of individual rewarding methods. That is why outputs comparing with similar studies can differ. The major limitation of upper mentioned rewarding systems is the fact that managers' performance does not depend only on their own efforts but also on random exogenous factors objectively appearing in the market which very significantly may influence the turnover. An additional very badly controlled factor is the possibility to observe and verify sales managers' activities.

Further research could usefully explore how improve controlling, observation and verifying sales managers' activities. Also, a greater focus on all sales managers' motivation drivers as well as the identification of demotivating factors could bring interesting findings and would be a fruitful in the further work.

Ensuring appropriate rewarding systems should be a priority for owners. Because the level of managers' motivation may have important implications for future business performance. Adoption of research results may help to improve current rewarding system to motivate managers really act in favour of owners.

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### **Contact information**

#### **Ing. Gabriela Polakova**

VSB-TUO, Faculty of Economics  
Sokolska trida 33, OSTRAVA  
E-mail: gabriela.polakova@post.cz  
ORCID: 0000-0002-8219-8078

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# EFFECT OF CURRENT ASSETS ON COMPANY LIQUIDITY BEFORE AND DURING THE COVID PANDEMIC - 19

*Radoslav Potoma, Janka Kopčáková*

## **Abstract**

The structure of assets is different in each company. At present, every company must have certain non-current and at the same time current assets at its disposal, in order to ensure the smooth running of its business activities. The contribution describes not only the breakdown of assets, but also the subsequent use of this breakdown of assets to calculate the liquidity ratios of the selected company. Every company should monitor its financial situation on the basis of ratios, because in the event of negative results, the company's management would be able to respond to the negative development of the company and prevent the demise of the company. However, not every negative impact result in the immediate demise of the business. A practical example reveals to us that even if a company does not reach the optimal recommended value of liquidity coefficients, it can repay its liabilities on time. The basic aim of the paper was to point out the simplicity of monitoring the solvency or insolvency in the company on the basis of the calculation of liquidity indicators from the financial statements.

*Keywords: assets, non - current assets, current assets, liquidity, insolvency*

## **1 INTRODUCTION**

The balance sheet is characterized by two parties. The side of the assets, which indicates the assets of the company and the side of the liabilities, which expresses the sources of coverage of the assets. In companies, assets vary depending on the type of activities that companies can perform. However, each company has the same basic asset structure. It is represented by non-current assets and current assets. Current assets are kept in the company for less than 1 year. We can talk about this property as the most liquid. The company needs to know the results of its liquidity, which need to monitor the values of current assets for the calculation, as the individual liquidity indicators are determined from the values of the company's current assets. Depending on the COVID - 19 pandemic, the individual results of liquidity ratios may differ from previous periods. At the same time, these results are important for the company's internal entities, such as partners, managers and managers of the company, to be able to determine the proper progress of the company and avoid possible negative results of the company's financial situation, which could lead to termination of the business. This information on the financial situation and liquidity of the company is an integral part necessary to inform external entities, such as suppliers, banks, employees and the state, so that they can determine in advance the company's ability to repay liabilities to them.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

Assets are a very important source of coverage for the company. Each company has different assets depending on the activities of the company. The breakdown of assets in enterprises is specific based on the classification of the enterprise into the industry. However, the structure of asset allocation is the same in all companies (Baštincová, 2009). The company has non-current



assets and current assets at its disposal, which in the company's accounting represent the assets side (Manová, 2011). The company classifies it as non-current assets (Vadinová, 2009):

- Intangible fixed assets - the acquisition price of which must be € 2,400. Such assets have an intangible character and have been operating in the company for more than 1 year. At the same time, the accounting entity is obliged to depreciate assets of this nature as they are depreciated, and the assets thus directly transfer their input value to individual products that the company produces (Cenigová, 2012). Intangible fixed assets may include, for example, software, valuable rights, capitalized development costs, goodwill and other intangible fixed assets (Hajdúková, 2012).
- Tangible fixed assets - the acquisition price of which must be higher than € 1,700. Such assets have a tangible character and have been operating in the company for more than 1 year. At the same time, the entity is obliged to depreciate assets of this nature. An entity can decide for itself and choose to depreciate property, plant and equipment using either the straight-line method (each year the company depreciates the same amount) or the accelerated depreciation method (using the accelerated depreciation coefficient). The accelerated depreciation method can only be used for tangible fixed assets. The input value of tangible fixed assets is thus directly valued in the company's products through the transformation process, because only through tangible fixed assets can the company produce products that it resells. Tangible fixed assets may include, for example, buildings, separate movables and sets of movables, permanent crops, basic herds and draft animals, other tangible fixed assets (Cenigová, 2012).
- Long-term financial assets - their nature is financial. The company does not purchase such assets in order to transform value into products (Rappaport, 1998). The company buys assets for the purpose of depositing free funds and subsequent appreciation of these funds (Hajdúková a kol., 2014). Long-term financial assets include, for example, works of art and collections, land, equity securities and shares in a subsidiary, equity securities and shares in companies with significant influence, available-for-sale securities and shares, debt securities held to maturity, other loans and other long-term financial assets. As it is a long-term asset, this long-term financial asset also has been in the company for more than one year (Mukherjee, Hanif, 2006).

In the article, however, we will take a closer look at current assets, among which the company advises:

- Inventories - have a material character. These assets are classified as short-term assets, so they do not stay in the company for more than 1 year. Inventories thus directly enter the transformation process of production, where they change their shape and character. At the same time, new products are processed and created in the transformation process, which the company produces for the purpose of their resale (Inegbedion, Eze, Asaleye, Lawal, 2019). Inventories also have a significant impact on the amount of costs in the company (Farkaš, 2013). Inventories include material in stock, work in progress, semi-finished products of our own production, products, animals, goods and real estate for sale (Kontu, 2012).
  - Material - is further processed in the company and undergoes a transformation process as it results in the company's finished products (Kočner, 2010).
  - Unfinished products - presents products in the company that go through several stages of production during the transformation process (Nobanee, Abraham,

- 2015). Such work in progress is no longer a material for the enterprise but does not constitute finished products that the enterprise can resell (Máziková, 2006).
- Semi-finished products of own production - represent products in the company, which go through several stages of production during the transformation process (Drozd, 2014). Such unfinished products is no longer a material for the company, but it is not hot products either. However, the difference from unfinished products is such that the company can sell the semi-finished products individually without further processing. (Šostroneková, 2005).
  - Products - are the end product of the transformation process. The company can resell the products in-house or through intermediaries (retail chains) (Färe, Grosskopf, Lovell, 2013).
  - Animals - among the animals as a type of stock, the holding includes young breeding animals and animals for fattening, such as bees, chickens, turkeys, ducks, geese, etc.
  - Goods - this is a type of property that the company procures for the purpose of its resale. This type of asset is not further processed in the company and does not go through the transformation process but is further sold directly to final consumers. (Janoušková, Blechová, 2012).
- Short-term receivables - have a short-term character. Based on this knowledge, we can say that they have been working in the company for less than 1 year. For the company, they represent funds that the company does not currently have, but after the repayment of short-term receivables, it reaches the given funds (Valach, 1993). However, short-term receivables do not directly belong to the financial assets of the company but represent current assets. Receivables of this nature include receivables from customers (for the purchase of goods and services from the company), employees (for example, for business trips, purchase of goods and services from the company in which they work), the state or the partners of the company (Majtán, 2009).
  - Short-term financial assets - has a financial character. These assets have been in the company for less than one year. It acts as the most liquid asset in the company. It is such short-term financial assets that ensure the continuous operation and security of the company's core business (Arbidan, 2015). The company advises among short-term financial assets cash in the treasury, securities (checks, stamps, vouchers, meal vouchers), cash in bank accounts (Sedlák, 2007). At the same time, the short-term financial assets of the company can also include securities with a maturity of less than 1 year and the company did not buy them for the purpose of investing its free funds, but for the purpose of their resale (Šlosárová, 2009). Short-term securities include equity securities for trading, treasury shares and treasury shares, debt securities for trading, treasury bonds, debt securities with a maturity of up to one year held to maturity and other available-for-sale securities.
    - Equity securities - represent shares that the company acquires for the purpose of resale and trading in shares (Walton, Aerts, 2006). It can trade in such securities on the domestic as well as foreign stock exchanges. The company procures equity securities in order to make a profit within 1 year (Beňová a kol, 2005).
    - Own shares and own business shares - the company may hold for a certain period of time. Own shares (traded by a joint stock company) and own shares (traded by a limited liability company) the company is obliged to sell securities at a predetermined time (Levin, McEwan, McEwan, 2000). If the company fails to

sell the securities within the set deadline, it is necessary to withdraw them from circulation and reduce the share capital by the nominal value to which they relate. (Smith, 1997).

- Debt securities for trading - represent securities that the company acquires for the purpose of resale and trading in these shares (Landa, 2005). It can trade in such securities on both domestic and foreign stock exchanges. The company procures debt securities in order to achieve a profit of up to 1 year.
- Own bonds - the company holds its own bonds.
- Debt securities with a maturity of up to one year held to maturity - the securities have a maturity of up to one year, while the company wants to hold such securities until their maturity.
- Other available-for-sale securities - are intended for the company in order to achieve a profit from the securities. We can advise equity securities and debt securities here (Hudáková Stašová, Andrejovská, 2008).

The above-mentioned property of the company thus characterizes a part of the assets in the company in more detail, and thus also describes the individual types of non-current and current assets in the company.

The more detailed components of current assets from the general chart of accounts will help us in the calculation of liquidity ratios. The above-characterized components of current assets, such as short-term financial assets, short-term receivables, inventories and short-term liabilities, are used to calculate liquidity. Liquidity ratios are considered to be the most widely used solvency or insolvency ratios of a company, as the simplicity of the calculation can be applied by each company from the values obtained from the financial statements. Through the calculation of liquidity, the company is able to determine the solvency or inability to repay its obligations, which can create a good reputation for its suppliers and at the same time market position.

### 3 METHODOLOGY

One of the most important parts of a company is the company's current assets. Current assets describe the company's ability to repay its obligations, for example, to suppliers, employees, financial authorities (tax office), social and health insurance authorities, or to the company's own partners (Sedláček, 2011). Based on this, we can state that current assets express the solvency or insolvency of the company. Through current assets, a company can also express its liquidity, as this type of asset is the most liquid (Zalai a kol., 2010).

We will monitor the company's liquidity on the basis of 3 liquidity indicators, which express the financial performance of companies. Table 1 shows the individual indicators that were used during the survey.

Tab. 1 - Liquidity calculation. Source: Autors processing according to Scholleová, 2008

Ready liquidity (1st degree)	SFA/SL
Current liquidity (2nd degree)	(SFA + SR)/SL
Total liquidity (3rd degree)	(SFA+SR+I)/SL

In the Table 1 provides information: SFA – short-term financial assets, SL- short-term liabilities, SR – short - term receivables, I – inventories.

We applied selected liquidity indicators to a company operating in the gastronomy industry. It was this sector that was most affected during the COVID - 19 pandemic, as regulations of the Government of the Slovak Republic restricted the provision of gastronomic services, and thus the closure of individual gastronomic establishments. The company selected by us also found itself in a difficult financial situation, to which the COVID - 19 pandemic contributed. We applied the monitoring of the financial performance of the selected company during 2018, 2019 and 2020, as we point out that even though the company was affected by the COVID - 19 pandemic, it was able to repay its liabilities from funds already obtained in 2018 and 2019.

#### 4 RESULTS AND DISCUSSION

The selected company, whose data obtained from the submitted balance sheets for the years 2018 and 2019, will be further monitored and processed, is dedicated to its business activities in the field of gastronomy under SK NACE 56.10.1. The business activity of a given company is focused on brokerage activity and subsequent sale of goods. At the same time, however, the company also focuses on its own production of goods in the food industry. For the accounting periods of 2018 and 2019, the company declared the following types in the current assets item in the balance sheet.

Tab. 2 - Current assets of the selected company. Source: Author calculation.

Type of current assets	Accounting period (year)	
	2019	2018
Stocks	10,635 €	4,956 €
Short - term receivables	71,256 €	53,626 €
Short - term financial assets	927 €	4,256 €

Based on a deeper analysis of Table 2, we can state that the stocks of the selected company in 2019 represent a higher value by € 5,679. At the same time, short-term receivables also represent a higher value, increasing by € 17,630 compared to the previous year. Short-term financial assets, including cash on hand, cash in bank accounts and various types of valuables in the company, fell by as much as € 3,299.

Based on the previous data, the company can determine its liquidity and thus inform, for example, partners, suppliers, the state, banks and the like about its solvency or insolvency.

To determine the liquidity ratios of the first degree it is important to start from the state of short-term financial accounts, to determine the degree of liquidity of the second degree it is necessary to start from the state of short-term financial accounts and short-term receivables and for the third-degree liquidity it is important to know the level of short-term assets. When calculating all levels of liquidity, the above-mentioned assets are put into proportion according to individual levels of liquidity with short-term liabilities.

Tab. 3 - Liquidity ratios. Source: Own processing according to the company's financial statements

Ratio indicator	Year 2019	Year 2018
1st level liquidity	0,01	0,044344
2nd level liquidity	0,81401748	0,603088
3rd level liquidity	0,93394982	0,654726

Table 3 above gives us a liquidity ratio. As can be stated, the liquidity ratio of the 1st degree decreased in 2019, which is significantly caused by the decrease in short-term financial assets in the company. The value of the coefficient is below the recommended value of the coefficient of several domestic and foreign authors. At the same time, however, the liquidity of the 2nd and 3rd degree increased during 2019, which was caused by higher short-term receivables and at the same time higher inventories of the company. However, even these values are below the recommended limit. The recommended limit for the Level 2 liquidity ratio is in the range (1.0 - 1.5) and the optimal value of the Level 3 liquidity ratio coefficient is in the range (2.0 - 2.5).

Chart 1 shows that the level 3 liquidity in the company is the highest, as it includes all types of current assets such as short-term financial assets, inventories and short-term receivables.

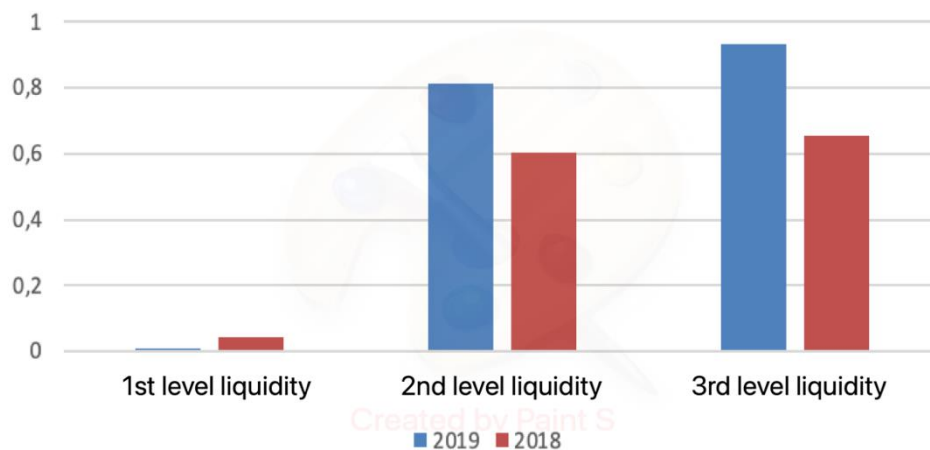


Fig. 2 - Liquidity ratios. Source: Own processing according to the company's financial statements

Even if the company does not reach the optimal recommended value of the coefficients of individual liquidity ratios, it is able to pay its liabilities. This growing trend suggests and the correct progress of the company in the next accounting periods.

The situation in 2020 was very challenging for the Slovak economy, mainly due to the recession triggered in March by a pandemic associated with the COVID - 19 virus. This challenging situation affected mainly business entities whose business is related to gastronomy. It also affected the business environment of our selected company, whose activities were marked by a decline in sales.

In order to graphically display the development of liquidity during 2020, which was affected by the COVID-19 virus, the accounting software KROS (OMEGA) was subsequently used. This accounting software is used in the selected company to record business activities throughout the year, so the data selected from the company's financial statements show the direct impact of the COVID-19 virus on solvency or insolvency of the selected company.

The following table 3 shows the liquidity during 2020 in the selected company during individual months.

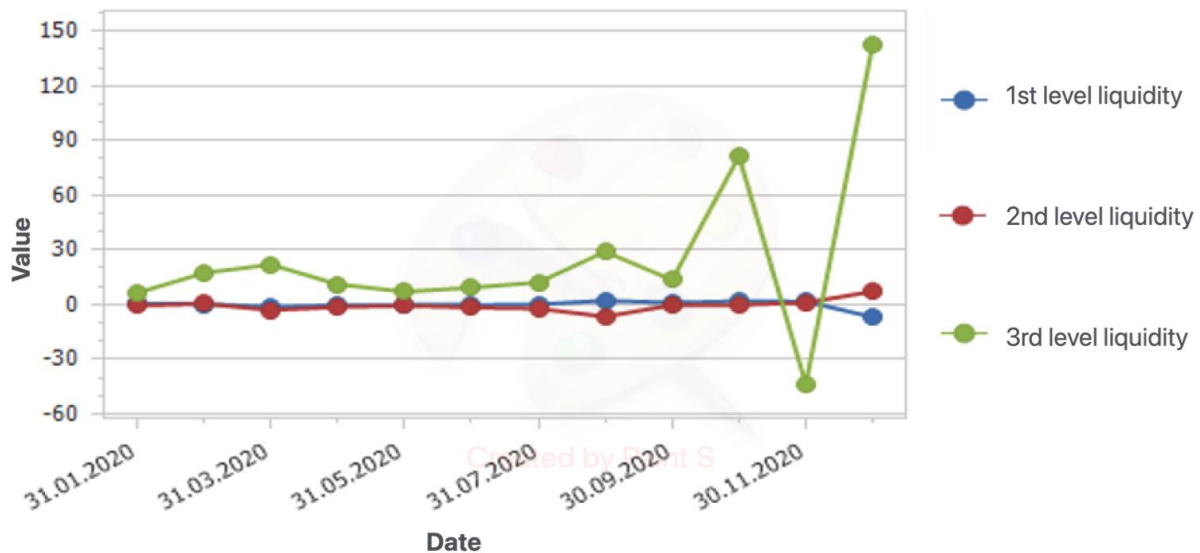


Fig. 3 - Liquidity indicators for 2020. Source: Own processing according to the company's financial statements using accounting software KROS (OMEGA)

It is clear from Table 3 that the liquidity of the first and second degree was in the range (0 - 0.3). The highest decline was in liquidity of the 3rd degree, which also includes inventories. The company had this decline especially during the second wave of the pandemic, in November 2020. The sudden decline in liquidity of the 3rd degree indicates that the impact of the second wave of the pandemic was also recorded by companies, which represent customers the sales of the selected company's stocks were reduced, which caused stocks in the warehouse.

Subsequent research during 2021 would point even better to the development of the COVID - 19 pandemic and its impact on the business environment.

## 5 CONCLUSION

The subject of the article was to approach the issue of the division of assets in companies, which is located on the assets side of the balance sheet. The paper presents a more detailed breakdown of non-current and current assets. At the same time, the paper also presents a detailed breakdown of current assets in the selected company. Subsequently, on the basis of the underlying data obtained from the financial statements (balance sheet) of the selected company, the liquidity ratios are recalculated in the contribution.

The results obtained by conversion suggest that the selected company does not achieve the optimal results recommended by many domestic and foreign authors, but the value of these indicators is growing compared to 2018, which indicates a positive development of the company and its subsequent progress. Further examination of data from the financial statements for the accounting period of 2020 would be interesting based on determining the consequences of the COVID - 19 pandemic. At the same time, the research could also focus on a larger sample of companies operating mainly in the most affected gastronomic sector. Research focused on the development of liquidity indicators, which would be applied only to a selected sector of gastronomy, could also be examined in the comparison of gastronomy of individual countries, such as the Slovak Republic and the Czech Republic, which would clarify the view pandemic COVID - 19.

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## Contact information

### **Ing. Radoslav Potoma (with titles)**

University of Economics in Bratislava, Faculty of Business Economy in Košice  
Tajovského 13, 041 30 Košice, Slovak Republic  
E-mail: radoslav.potoma@euba.sk  
ORCID: 0000-0001-5631-8294

### **Ing. Janka Kopčáková (with titles)**

University of Economics in Bratislava, Faculty of Business Economy in Košice  
Tajovského 13, 041 30 Košice, Slovak Republic  
E-mail: janka.kopcakova@euba.sk  
ORCID: 0000-0002-0778-6769

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# RISK CORRELATION BASED SYSTEM FOR THE ASSESSMENT OF ECONOMIC SECURITY OF ENTERPRISE

*Pavol Prievoznik, Stanislava Strelcova*

## **Abstract**

Assessment of economic security of enterprise is a relatively new approach to evaluate the level of the stability of enterprise as an organized system. The stability of enterprise is maintained by utilizing sources of economic security of the enterprise, which include financial sources, and non-financial sources, such as innovation, human resources, or some external factors. On one hand, researchers build models for the assessment of economic security of enterprise based on the set of indicators which provide management with information about deviations from the stable level of the sources of economic security. On the other hand, there have been developed models which assess economic security of enterprise through expert opinion based calculation of aggregated risk evaluation. There is still missing any integrated approach which would connect the selection of indicators with a set of identified risks, and vice versa, there is still missing any risk-based indicator which would connect identified risks to quantitative and qualitative enterprise indicators. Using Ishikawa diagram, we connect identified enterprise risks with economic security indicators by deriving both, risk, and indicator, from identified sources and factors of economic security. Moreover, in the case of public transport provider, we apply Qualitative Risk Analysis Correlation principles to create a hierarchical structure of enterprise risks which are connected to enterprise non-financial performance indicators. Pandemic risk development scenario within the enterprise is presented.

*Keywords: security, economy, enterprise, domino effect, public transport, covid-19*

## **1 INTRODUCTION**

Research on the assessment of economic security of enterprise is current and gradually developing beside the traditional approaches to assessment of the enterprise value, and financial health, and beside enterprise risk management methods. Zubko (2019), Gribina and Savchenko (2021), Avanesova and Chuprin (2017), Shutyak et al. (2015), Illiashenko (2016), and Rudnichenko (2014) describe economic security of enterprise as a complex interdisciplinary concept. Zigunova et al. (2020) defines anti-crisis procedures for ensuring economic safety of enterprise. Gozora (2011, and 2015) considers implementation of the indicators of economic security within enterprise management to ensure economically secure market environment. Skachko et al. (2020) develop a methodology for assessment of economic security of enterprise. Dadalko (2017) brings threats analysis in the construction of a system of economic security of enterprise. Similarly, Chunaev (2018) discusses benefits of diagnostics of threats for economic security of enterprise. Gozora (2000), Baganova et al. (2012), Baganova et al. (2013), Neumannova et al. (2012), Kasik, Michalko et al. (1998), Simak (2016), and Hudakova et al. (2019) study the process of crisis development as a threat which distorts economic security of enterprise. They emphasize the importance of risk management, and the use of enterprise indicators as preventing tools against crisis development. Hudakova et al. (2018) consider risk management as a tool to avoid negative effects on enterprises.

Concerning approaches to the assessment of economic security of enterprise, Shatokhin (2015, p. 464) states that there does not exist any generally accepted approach due to the variety of

criteria and mathematical methods, which have been identified in the literature so far, in Baranowski (2004), Bendikov (2002), Dovbnya and Gichova (2008), Goryacheva (2006), Iermoshenko (2001), Kozachenko and Ponomarev (2001), or Kozachenko et al. (2003). Shatokhin (2015) uses Harrington's desirability function to create a general indicator for the assessment of economic security of enterprise. Shashlo (2017) suggests risk assessment method to define a criterion for assessment of economic security of enterprise. However, this criterion does not allow for hierarchical decomposition, and therefore it is a very limited tool for any specific analysis of crisis scenario. Ianioglo (2016) uses only four production related indicators which also do not allow for any hierarchical decomposition and for any detailed view on crisis development. On the other hand, Strelcová (2015) decomposes a set of financial and non-financial indicators into their sub-elements. Similarly, Cherchyk et al. (2019) suggest two-level sector specific indicators from forest harvesting enterprise. Illiashenko et al. (2020) also construct a two-level assessment system through management type specific indicators. Shynkar et al. (2020) define indicators of economic security of enterprise based on the type of security of industrial enterprise. They create integrated indicator through weights, which are calculated from expert opinion estimates, to aggregate detailed information on eventual crisis development. The role of assessment of economic security of enterprise rests in preventing crisis phase in the life cycle of an enterprise. Any significant imbalance between the levels of the sources of economic security should be identified as crisis symptom. Identified symptoms should be analyzed through a decomposed system of properly selected indicators.

The aim of this paper is to present a generally applicable system for the assessment of economic security of enterprise. The system is described on a case of public transport provider facing covid-19 pandemic consequences. However, this system is adaptable also to other enterprises, and it is based on risk correlation analysis in connection with commonly used enterprise performance indicators. Enterprise indicators reflect the state of the sources and factors of economic security of enterprise, while enterprise risks are identified as the risks to the same sources and factors. The risks and related indicators form bundles which are connected to the same source of economic security or its sub-element. The sources and factors together with their specific sub-elements are identified through Ishikawa diagram cause and effect analysis. The identified elements are the nodes of hierarchical system. Qualitative Risk Analysis Correlation (QRAC) method then defines the causal risk sequence which consists of activating and activated risks. The causal dependence of risks, in the form of domino effect, is used to build a hierarchical system of risks which can be monitored through signals from related indicators. Hierarchical structure of the risks and indicators couples can be used for detailed analysis of the crisis development scenarios, and hence, for the assessment of economic security of enterprise.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

Several theoretical fields were analyzed in the process of the development of the presented risk-correlation based system for assessment of economic security of enterprise. We analyzed literature on the sources of economic security, which form the nodes of our system as risk-indicator bundles. Indicators display the effect of risk consequences on the sources of economic security. Further, we analyzed research on assessment of economic security of enterprises to present the variability of indicators which are used among researchers. Finally, enterprise risk assessment methods were used to model the domino effect of activating risks.

### **2.1 Sources and factors of economic security of enterprise**

Researchers have identified various categories of the sources of economic security. The work of Strelcova (2015), Karanina et al. (2018), and Zigunova et al. (2020) illustrate the variability

of categorization of the sources of economic security of enterprise (Tab. 1). Any selected set of economic security indicators should reliably reflect the state of the sources of economic security of enterprise. The indicators could be quantitative, e.g. financial value of costs, or qualitative, scalable expression of the quality of psychological climate. Based on the values of monitored indicators, it is possible to compare the states of the sources of economic security of enterprise over time, or between enterprises. At the same time, the deviations of the values of indicators can be presented as the consequences of risks and threats to the sources of economic security of enterprise. The consequences of risks are the symptoms of crisis development, and the changes in the values of indicators are quantified signals of the symptoms.

Tab. 1 – Selected sources and factors of economic security of enterprise. Source: own research

Author	Categories of the sources of economic security of enterprise	Subcategories
Strelcova (2015)	Financial resources	<ul style="list-style-type: none"> <li>• Internal (profit, depreciation, long-term reserves)</li> <li>• External (share issue, credits, bonds, leasing)</li> </ul>
	Material resources	<ul style="list-style-type: none"> <li>• Fixed assets (movables, real estate)</li> <li>• Current assets (inventory)</li> </ul>
	Non-material resources	<ul style="list-style-type: none"> <li>• Human resources</li> <li>• Information</li> <li>• Intangible assets</li> </ul>
Karanina et al. (2018)	Factors of the internal environment (financial)	<ul style="list-style-type: none"> <li>• Liquidity and solvency, Financial stability, Business activity, Profitability, Credibility, Labor productivity, Investment activity</li> </ul>
	Factors of the internal environment (non-financial)	<ul style="list-style-type: none"> <li>• Human resources of managers and staff, The psychological climate in the team, Responsibility of management, Composition and structure of costs, Trustworthiness, Competitiveness</li> </ul>
	Environmental factors	<ul style="list-style-type: none"> <li>• State of economic environment, Legislative restrictions, Geographical differences, Corruption-prone factors, Infrastructure restrictions, Availability of credit, Information support for business</li> </ul>
Zigunova et al. (2020)	Capital resources	<ul style="list-style-type: none"> <li>• Own, borrowed, and attracted capital</li> </ul>
	Technical and technological resources	<ul style="list-style-type: none"> <li>• Quality, Competitiveness, Technology, Property potential, Structure and level of fixed assets</li> </ul>
	Intellectual and human resources	<ul style="list-style-type: none"> <li>• Knowledge and skills of managers, specialists, employees, and workers</li> </ul>
	Information resources	<ul style="list-style-type: none"> <li>• Market assessment, Financial, scientific, technological information</li> </ul>
	Innovation resources	<ul style="list-style-type: none"> <li>• New features and innovations</li> </ul>
	Legal resources	<ul style="list-style-type: none"> <li>• Legal regulation, intangible assets</li> </ul>

In practice, it is important to select the most appropriate set of the sources of economic security of enterprise, and their subcategories, based on the size of the enterprise, its business mission, or type of the business. Different sources should be selected for industrial enterprise, and different sources for a service provider, or a technologically progressive firm. However, there should be always a subset of all the considered sources which consists of universally applicable sources of economic security of enterprise, e.g. some financial indicators. The selection of the sources of economic security of enterprise can be processed through cause and effect analysis using Ishikawa diagram method. The nodes of Ishikawa diagram should be identified as the sources or factors of economic security of enterprise and the as the sub-elements of the sources.

## 2.2 Methods of assessment of enterprise indicators

Beside the traditional financial indicators of the economic health and beside the methods of valuation of enterprise, the current research on assessment of economic security of enterprise introduce various quantitative and qualitative indicators to compare the levels of economic security of enterprises. Strelcova (2015) suggests indicators of fixed and current assets utilization, financial analysis (ex post, and ex ante), and utilization of human resources. Ianioglo

(2016) uses indicators of operational activity, break-even point, financial safety margin, and operating leverage. Cherchyk et al. (2019) assess the performance of forest enterprise with integrating economic security and ecological impact. The authors use sector specific indicators beside traditional financial and non-financial indicators: financial security (liquidity and stability), technical and technological security (fixed assets suitability ratio, return on assets), social security (personnel stability factor), forest resources recovery indicators (reforestation and forest care indicators), forest resources use indicators (actual use of forest sector, output of harvested wood), and indicators of forest-protective activity (loss due to illegal logging, loss due to fires, and indicator of forest revitalization). Illiashenko et al. (2020) assess economic security of enterprise by assessing the performance of various types of management by assessing indicators of strategic management (achievement of goals, protection expenses, legal security), operational management (fixed assets depreciation, production program performance, dependence on suppliers), financial management (financial reserve, return on assets, independence), innovation management (share of research work, intellectual armament, level of technology progressiveness), investment management, personnel management (growth rate of revenue and payroll, work experience, staff aging), and marketing management (competitive advantage, compliance with the quality of products). Generally, the methods of assessment of economic security of enterprise do not decompose the integrated indicator into sub-elements based on any exact analytical calculations like in the case of Du Pont diagram. The hierarchy is basically accomplished by aggregating several indicators from a given category through weighted average calculation. Then, the top integrated indicator is calculated as a weighted average of each category's indicator. Weights are usually assigned by experts. Shynkar et al. (2020) evaluate the integral indicator of economic security of industrial enterprise based on the calculated values of indicators of specific fields of enterprise security (Fig. 1).

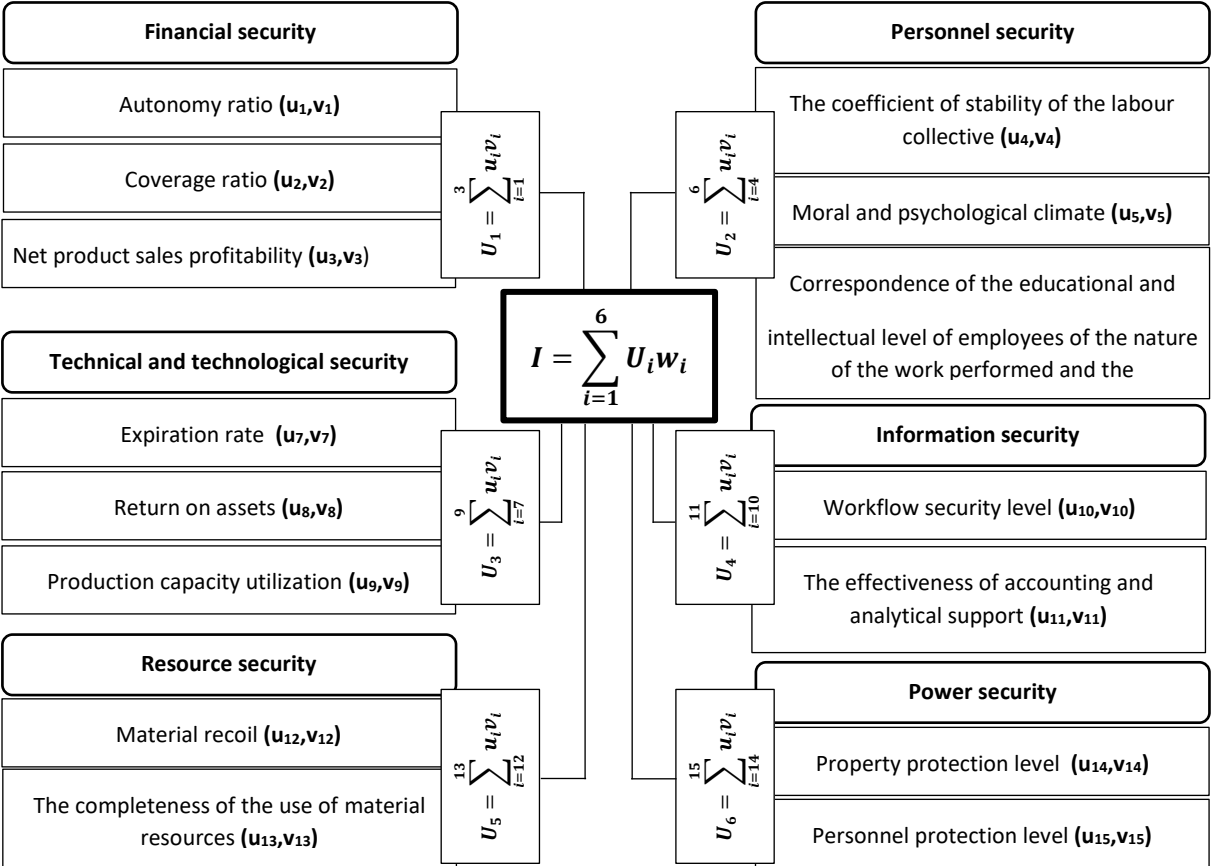


Fig. 1 – System of indicators of economic security assessment of industrial enterprises. Source: according to Shynkar et al. (2020)

In addition, some researchers use risk evaluation method to construct integral criterion for assessment of economic security of enterprises, which also lacks deeper hierarchical structure. The risk evaluation method does not decompose considered elements into sub-elements, which prevent management to analyze crisis development in a reasonable detail. Hierarchical structure of the criterion is usually constructed based on the expert opinion estimates of weights. Shashlo (2017) describes the cumulative expected criterion of the threat influence on economic security as:

$$I = \frac{K_{e1}(P_1 \times D_1) + K_{e2}(P_2 \times D_2) + \dots + K_{en}(P_n \times D_n)}{G} \tag{1}$$

where  $K_{ei}$  is weight coefficient of the expert opinion from 0 to 1, and  $\sum_{i=1}^n K_{ei} = 1$ . The value of the criterion represents threats from improbable threat to dangerous threat.  $P_i$  is the probability of threat,  $D_i$  is possible destabilization influence, and  $G$  is the number of experts.

Podgorski (2015) uses advanced method of system analysis, Analytical Hierarchy Process (AHP), for selection of leading key performance indicators in the field of occupational safety and health management systems. Considering the aggregation of indicators, the author states that the integrated indicator in the management research is usually calculated as an arithmetic (linear) mean. Podgorski describes the shortcomings of the linear construction of weighted average (mean), which rest in the subjective character of assigned weights. Instead of calculating weights for indicators, we build the hierarchy of indicators based on the related enterprise risks. The hierarchy of risks is constructed by utilizing the outcomes of Qualitative Risk Analysis Correlation as a risk analysis method in the enterprise risk management process.

**2.3 Methods of assessment of enterprise risks**

The enterprise risk management processes and their implementation are very important tool for preventing enterprise crisis development. Enterprise risk management process helps to maintain desirable level of economic security of enterprise.

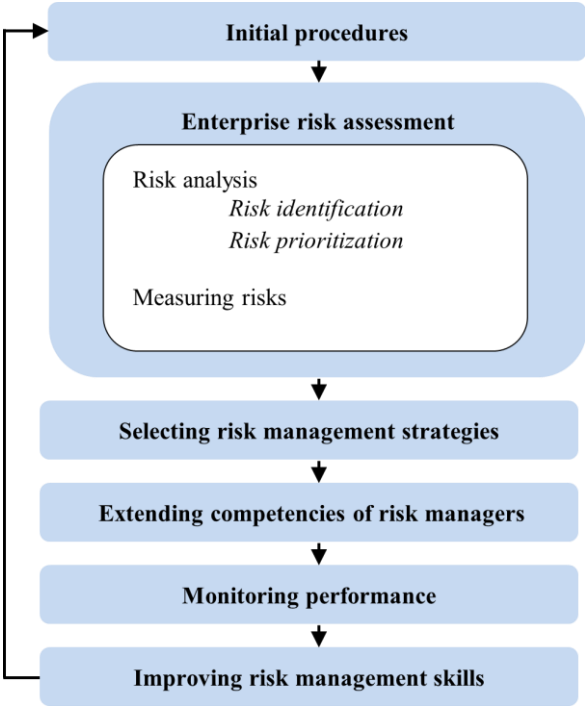


Fig. 2 – Enterprise Wide Risk Management process. Source: according to Varcholova and Dubovicka (2008)

There are several international standards for enterprise risk management, which share some common stages of the risk management process, e.g. risk assessment, risk identification, risk analysis, risk evaluation or risk monitoring (Fig. 2). The enterprise risk assessment phase together with risk monitoring and reporting is an analogical process to the assessment of economic security of enterprise. The risks and threats to economic security of enterprise can be connected to the sources of economic security of the enterprise.

Risk identification step of the risk assessment stage can begin by constructing risk matrix which displays correlation of risk sources with their effect on enterprise assets and resources, and their subcategories. These dependencies can be used also in the next steps of risk analysis and risk evaluation. It is possible to use more methods for risk identification: brainstorming, control lists, Ishikawa diagram, structured interviews, or scenario analysis.

Next, in the risk analysis step of the risk assessment stage, we can use methods: financial and non-financial impacts analysis, failure mode and effect analysis, event tree analysis, failure tree analysis, or bow tie analysis. We perform qualitative risk analysis correlation (QRAC) to assign priority of enterprise risks, and to identify correlation of analyzed risks. QRAC assigns pairs of risks in which one of the risks is activating risk and the other risk is activated by the activating risk. In other words, activating risk can cause activation of the activated risk. Given a set of identified risks, we can assign to each of the risks coefficient of risk activity (CAR) according to the share of all identified risks which can be activated by the risk, and coefficient of risk passivity (CPR) according to the share of all identified risks which can activate the risk. For the construction of the system for assessment of economic security of enterprise, we use the information on causality between pairs of identified risks to design a hierarchical structure of identified risks. Risks at the lower level of the hierarchy activate risks at upper levels, and hence, risk spreading scenarios are identified.

### 3 METHODOLOGY

The risk correlation based system for assessment of economic security of enterprise is constructed in 4 methodological steps: conceptually defining risk-indicator bundle as a node of the system, identifying the nodes of the system using Ishikawa diagram analysis, assigning causal conditionality to each node of the system through QRAC, and constructing hierarchical system of identified nodes.

#### 3.1 Risk-indicator bundle

There are, in principle, two different approaches to the assessment of economic security of enterprise in the research literature (Fig. 3).

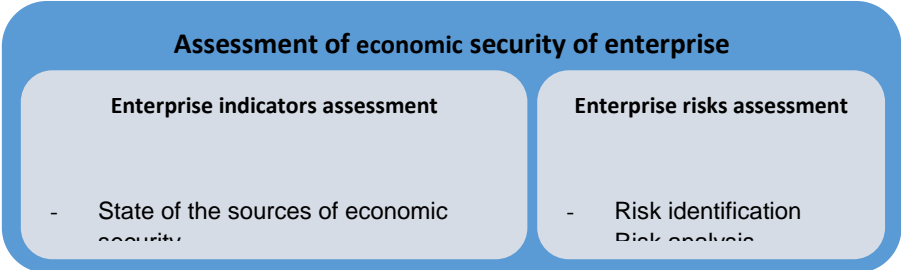


Fig. 3 – Two approaches to the assessment of economic security of enterprise. Source: own research

One of the approaches rests in assessing the values of enterprise indicators which reflect the state of the sources of economic security of enterprise, and the performance of business processes. Integral assessment is calculated either as a weighted average of sub-indicators or as

analytically decomposed integral indicator, e.g. Du Pont diagram. The main shortcoming of the approach is the absence of enterprise risk identification and analysis, which would extend the possibility to analyze the sources of threats which influence the changes in the values of assessed indicators. The other approach rests in risk assessment and risk monitoring stages of the enterprise risk management process. The risk management process is very precise in risk identification and in its adaptability to any type and any size of enterprise. The main shortcoming of this approach is the predominance of expert based calculations and estimates over exact calculation methods and raw data processing.

The analysis of methods for assessment of economic security of enterprise implies that there could arise considerable benefits from integrating risk management methods to the indicator-based assessment of the state of the sources of economic security of enterprise. It is possible to create risk-indicator bundle by deriving both the risk, and the indicator, from a source of economic security of enterprise.

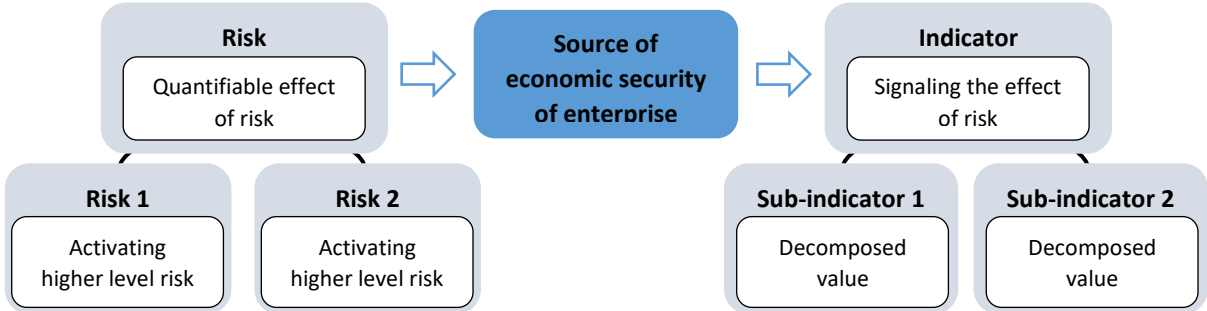


Fig. 4 – Risk-Indicator bundle. Source: own research

Figure 4 shows the scheme of the identified connection between effect of risk on the source of economic security and indicator of the state of the source of economic security. As an example, consider as the source of economic security the seniority of managers. It is possible to derive the risks to the seniority of managers such as absence of management training during a given period. The indicator of the seniority of managers can be derived as the expenditure on management training and schooling during a given period. When the indicator signals a substantial decrease in the expenditure on management training and schooling during a given period, then the state of the source of economic security is distorted. The distortion origins in the effect of the identified risk, absence of management training during a given period.



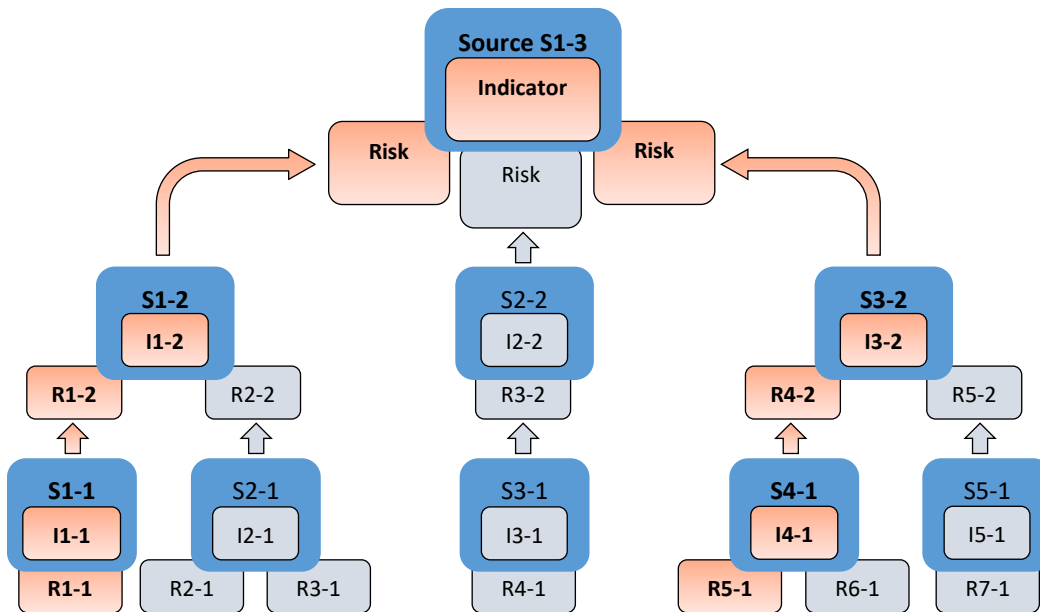


Fig. 5 – Transmission of risk activation within the system for assessment of economic security of enterprise.

Source: own research

Both the risk, and the indicator can be further decomposed into detailed sub-elements, e.g. based on the type or level of management. Figure 5 displays the scheme of the hierarchical system for assessment of economic security of enterprise. Two scenarios of risk dissemination within the system are displayed. The visualization of the scenarios enables managers to identify causes, and combinations of causes, of the enterprise crisis development, and hence, causes of the distortion of economic security of enterprise.

### 3.2 Ishikawa diagram cause and effect analysis

Ishikawa diagram is a tool which serves for identifying causes of a selected problem of an organization. Ilie and Ciocoiu (2010) identify causes to an organizational problem, and then assess risks to the causes of the problem. Kamsu-Foguem and Tiako (2017) create formalized structures of the sources of production logistics risks in manufacturing. Dobrynin et al. (2018) identify and systematize factors that could negatively affect information security.

### 3.3 Risk correlation based hierarchical system

When applying QRAC method on a set of identified risks, each risk is assigned a subset of risks which activate the risk (Tab. 2). Causal relation between activating and activated risks is defined. Therefore, it is possible to decompose any activated risk into subset of risks which activate the risk. Applying this decomposition further, to the next level, it brings hierarchical system of causal relations between the identified enterprise risks. Hence, the hierarchical system of enterprise indicators is constructed based on the risk correlation, and therefore the hierarchical structure differs from the hierarchical structure of Ishikawa diagram, e.g. risks from the Human resources branch of Ishikawa diagram can activate risks from the Operations branch of Ishikawa diagram. The indicators within the system can signal effects of activated risks. Any risk can activate other risks at a higher level of the system. When an initial risk is activated at the bottom level of the system, it is possible to simulate scenarios of risk dissemination within the system for assessment of economic security of enterprise.

## 4 RESULTS

Ishikawa diagram analysis was applied on a virtual public transport provider to identify risk-indicator bundles as sub-elements of causes of distortion of economic security of enterprise (Fig. 6).

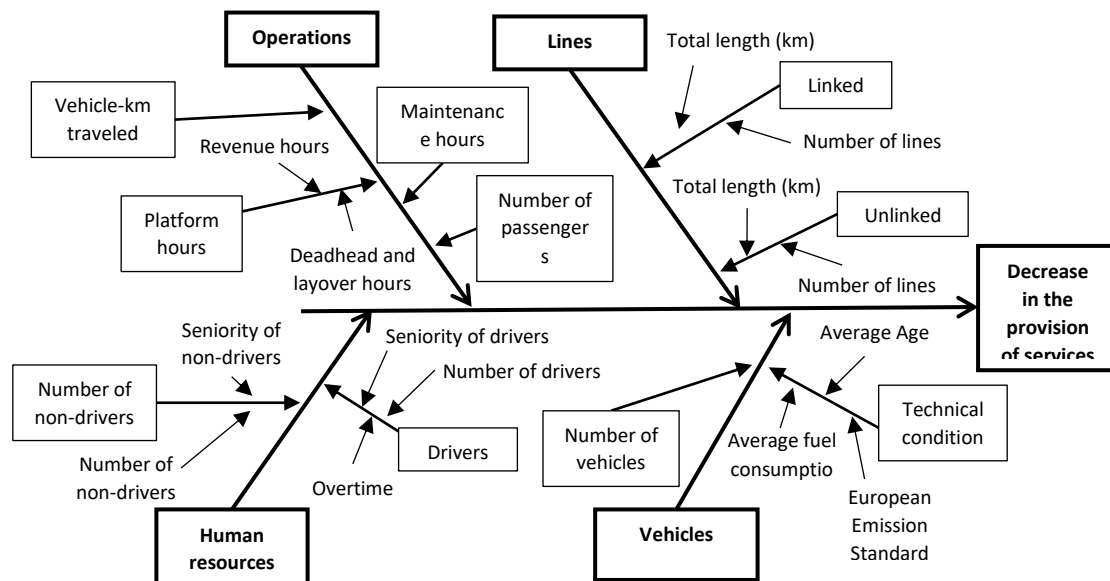


Fig. 6. Elements and sub-elements of the operational performance business view. Source: own research

Particularly, in the operational performance business view, identified risk-indicator bundles were inspired by the indicators which are reported by the Association of Public Transport Providers in Urban Agglomerations of Slovak Republic (Association). The Association reports statistics on 27 Slovak public transport providers operating in Slovakia in 2015 (Passenger Urban Transport 2015, 2016). The identified elements and sub-elements are quantifiable indicators, and quantifiable enterprise risk effects on operational performance. Due to dichotomic nature of the risk-indicator bundles, the nodes of the constructed system for assessment of economic security of enterprise will be denoted from C01 to C21 as they represent causes of the distortion of economic security as identified in Ishikawa diagram (Tab. 2).

Table 2 lists identified causes of the distortion of economic security of enterprise. Each cause is interpreted as the effect of risk which is quantified in the change of the value of related indicator. Some elements were added compared to Ishikawa diagram. Effect of covid-19 pandemic as an external risk was expressed in terms of increased number of affected people, and increased extent of pandemic area. QRAC matrix, coefficients of passivity of risks (CPR), and conditional bounds between identified risks were calculated and modeled in MS Excel program.

Tab. 2 – Risk-Indicator bundles, risk decomposition, and coefficient of passivity. Source: own research

CATEGORY	INDICATOR	EFFECT OF RISK	CODE	DECOMPOSITION (Activating risks)	CPR
Operations	Vehicle-km traveled	Decrease	C01	C02, C05	9,09%
	Platform hours	Decrease	C02	C03, C05	9,09%
	Revenue hours	Decrease	C03	C09, C14, C18, C19	18,18%

	Deadhead and layover hours	Increase	C04	C07, C10, C13	13,64%
	Maintenance hours	Increase	C05	C06, C07	9,09%
	<b>Number of traffic accidents</b>	<b>Increase</b>	<b>C06</b>	C07, C10, C11, C15	<b>18,18%</b>
	Number of breakdowns	Increase	C07	C10, C15	9,09%
	<b>Number of transported passengers</b>	<b>Decrease</b>	<b>C08</b>	C03, C04, C05, C20	<b>18,18%</b>
<b>Human resources</b>	Number of drivers	Decrease	C09	C20	4,55%
	Seniority of drivers	Decrease	C10	C09	4,55%
	Overtime hours	Increase	C11	C09, C10, C13	13,64%
	Number of non-drivers	Decrease	C12	C20	4,55%
	Seniority of non-drivers	Decrease	C13	C12	4,55%
<b>Vehicles</b>	Number of vehicles	Decrease	C14	C05	4,55%
	Average age of vehicles	Increase	C15		4,55%
	Average fuel consumption	Increase	C16	C15	4,55%
	<b>European Emission Standard</b>	<b>Decrease</b>	<b>C17</b>	C06, C07, C15, C16	<b>18,18%</b>
<b>Lines</b>	Number of regular lines	Decrease	C18	C17, C20, C21	13,64%
	Number of ordered trips	Decrease	C19	C17, C20, C21	13,64%
<b>External environment</b>	Pandemic affected people	Increase	C20	C21	4,55%
	Pandemic area	Increase	C21		0,00%

For each risk, the higher is the value of the coefficient of passivity of the risk, the higher is the number of risks which activate the risk. The risks with the highest CPR value should be placed at the top of the hierarchy of the system for assessment of economic security of enterprise. Each lower level of the system is constructed according to the list of activating risks. For example, the risk to economic security of enterprise, C06 – Increase in the number of traffic accidents, is decomposed, and activated by risks to economic security of enterprise, C07 – Increase in the number of breakdowns, C10 – Decrease in seniority of drivers, C11 – Increase in overtime hours, and C15 – Average age of vehicles. At the third level of the system there are risks which activate each of the risks C07, C10, C11, and C15.

The hierarchical system of risk-indicator bundles reflects higher number of risk effect transmissions based on the number of levels of the hierarchy, which are constructed. If the initial risk comes from the set of all identified risks, the first activation of risks generates the set of second level activated risks. If the simulations are extended to another activation of the set of activated risks, the new set of the activated risks forms the third level of the system for assessment of economic security of enterprise.

Table 3 reports on the results of the three-level simulation (two transmissions of risk effect) of risk dissemination within the public transport provider's operational performance. In particular, the dissemination of the effect of the external risk activation, covid-19 pandemic outbreak, is reported by signaling primarily, and secondarily activated risks. The report shows that C20 – increase in the number of people who are affected by the pandemic situation (contagious people,

ill people, people in quarantine) transmits primarily to C08 – Decrease in the number of transported passengers, C09 – Decrease in the number of drivers, C12 – Decrease in the number of non-drivers (including managers), C18 – Decrease in the number of ordered regular lines, and C19 – Decrease in the number of ordered irregular trips.

Tab. 3 – Results of a three-level simulation of risk dissemination. Source: own research

CATEGORY	INDICATOR	EFFECT OF RISK	Secondarily activated		Primarily activated		Initial risk	
Operations	Vehicle-km traveled	Decrease	C01	0	C01	0	C01	
	Platform hours	Decrease	C02	0	C02	0	C02	
	<b>Revenue hours</b>	<b>Decrease</b>	<b>C03</b>	<b>x</b>	<b>C03</b>	<b>0</b>	<b>C03</b>	
	Deadhead and layover hours	Increase	C04	0	C04	0	C04	
	Maintenance hours	Increase	C05	0	C05	0	C05	
	<b>Number of traffic accidents</b>	<b>Increase</b>	<b>C06</b>	<b>0</b>	<b>C06</b>	<b>0</b>	<b>C06</b>	
	Number of breakdowns	Increase	C07	0	C07	0	C07	
	<b>Number of transported passengers</b>	<b>Decrease</b>	<b>C08</b>	<b>0</b>	<b>C08</b>	<b>x</b>	<b>C08</b>	
Human resources	Number of drivers	Decrease	C09	0	C09	x	C09	
	Seniority of drivers	Decrease	C10	x	C10	0	C10	
	Overtime hours	Increase	C11	x	C11	0	C11	
	Number of non-drivers	Decrease	C12	0	C12	x	C12	
	Seniority of non-drivers	Decrease	C13	x	C13	0	C13	
Vehicles	Number of vehicles	Decrease	C14	0	C14	0	C14	
	Average age of vehicles	Increase	C15	0	C15	0	C15	
	Average fuel consumption	Increase	C16	0	C16	0	C16	
	<b>European Emission Standard</b>	<b>Decrease</b>	<b>C17</b>	<b>0</b>	<b>C17</b>	<b>0</b>	<b>C17</b>	
Lines	Number of regular lines	Decrease	C18	0	C18	x	C18	
	Number of ordered trips	Decrease	C19	0	C19	x	C19	
External environment	Pandemic affected people	Increase	C20	0	C20	0	C20	x
	Pandemic area	Increase	C21	0	C21	0	C21	

Secondarily, the activated risk effects transmit to C03 – Decrease in revenue hours (hours of revenue generating drives), C10 – Decrease in seniority of drivers (due to staff sickness, due to senior drivers’ preventive isolation), C11 – Increase in overtime hours (due to decreased number of employees), and C13 – Decrease in the seniority of non-drivers (including managers and dispatchers, the same reasons as for drivers). The results change depending on the number of risk effect transmission which are incorporated to the simulation.

## 5 DISCUSSION

Analysis of the covid-19 pandemic risk effect dissemination offers more scenarios when the number of risk effect transmissions is extended from two to three. Four-level simulation (three transmissions of risk effect) of risk dissemination within the public transport provider’s operational performance extends the set of activated risks. Hierarchical representation of the risk dissemination scenarios serves as a strong analytical tool for assessment of economic security of enterprise because it shows combinations of effects as they develop within the enterprise. Figure 7 represents hierarchy of only one out of four top risk-indicator bundles which are selected based on their highest coefficient of passivity. Similar hierarchical structure can be displayed for the other three top level risk-indicator bundles: C03 – Revenue hours, C06 – Number of accidents, and C17 – European Emission Standard (C17 is the only top-level indicator which is not affected by covid-19 pandemic risk in the system).

Assessment of the effect of C20 – Increase in the number of the pandemic affected people naturally results in considerations about C08 – Decrease in the number of transported passengers as it is directly implied by lockdown, isolation, and quarantine measures which are imposed on potential customers. However, there is still a part of the population left, which consists of critical infrastructure workers, and employees of very important enterprises which are excepted from lockdown measures. In other words, there persists part of the demand for the public transport provider’s operations. Operating business in crisis situation requires even deeper analysis of risk effects on the enterprise. Hierarchical system for the assessment of economic security of the public transport provider helps to identify those risks which can even worsen the state of economic security. Preventive measures need to be adopted to eliminate or reduce secondarily activated risks.

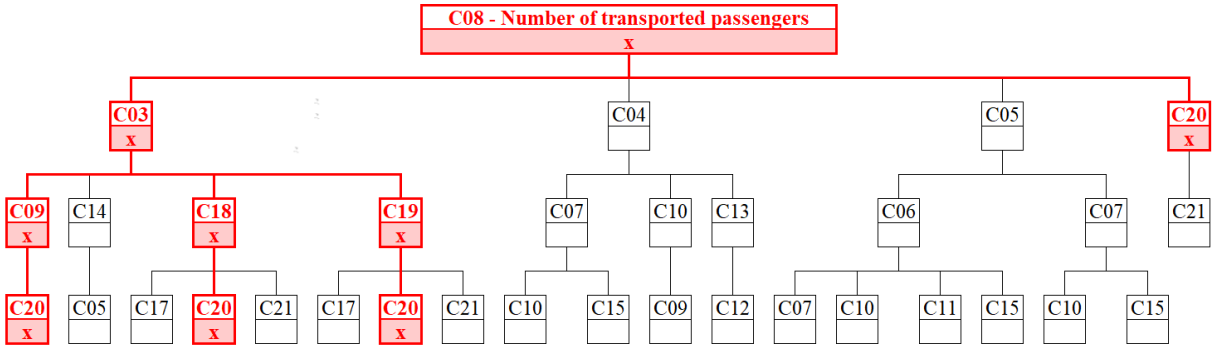


Fig. 7. Transmission channels of covid-19 risk effect dissemination, decomposition of C08 – Decrease in the number of transported passengers. Source: own research

On the left side of the hierarchy (Fig. 7), we can observe three more transmission channels of the effect of C20 – Increase in the number of the pandemic affected people. First, the public transport provider should consider that his drivers could be affected by the pandemic or by the anti-pandemic measures, which could result in C09 – Decrease in the number of drivers. Without taking preventive measures, part of the contracted drives would be cancelled, and contractors could switch to some competitor. Consequently, C03 – Decrease in revenue hours would be activated, which implies that also C08 – Decrease in the number of transported passengers would be activated. The analysis of this scenario suggests adoption of some anti-crisis measures. Managers should create and keep up to date a list of available substitutes for the pandemic affected drivers. Often retired drivers serve as substitutes for public transport providers. The list of substitutes could contain also responsible workers who have lost their jobs.

Second and third transmission channels are similar in the sense that the public transport provider faces a substantial decrease in demand for its service. C20 – Increase in the number of the pandemic affected people can activate C18 – Decrease in the number of ordered regular lines, and C19 – Decrease in the number of ordered irregular trips. Municipalities, as well as important industrial employers could cancel part of the ordered fulfillment of long-term contracts due to decrease in the demand for traveling of population. In addition, the number of ordered irregular trips could decrease compared to the planned figures. Both transmission channels result in C03 – Decrease in revenue hours, and consequently also C08 – Decrease in the number of transported passengers. The recommendations for preventive measures should include intensifying marketing operations to reduce the risk of decrease in demand. Information about public anti-pandemic measures should be processed and analyzed frequently. Information on competitors' operations could help to overtake them in applying for orders with special allowances or in applying for special-purpose orders from public authorities.

Finally, the risk-correlation based system for assessment of economic security of enterprise helps in prioritizing of risks as some risks, and whole risk transmission channels are left unaffected, and therefore should not be treated primarily. Public transport provider would not need to concern primarily on C10 – Decrease in seniority of drivers, and C15 – Increase in average age of vehicles, which would activate the risk C07 – Increased number of breakdowns, and consequently C04 – Increase in deadhead and layover hours. C10 – Decrease in seniority of drivers could be analyzed in the branch of C06 – Increase in the number of accidents, which is activated by C10, and C11 – Increase in overtime hours.

## 6 CONCLUSION

Risk-correlation based system for assessment of economic security of enterprise was presented in the paper to provide managers with risk analysis methods in assessment of enterprise indicators. Risk-indicator bundles were introduced to relate each indicator to the risks which can impose negative effects on economic security of enterprise. Analyzing operational performance indicators of public transport provider by cause and effect analysis (Ishikawa diagram) generated a set of risk-indicator bundles. Using QRAC analysis risk-indicators bundles were reorganized based on the correlations between pairs of identified risks. Hierarchical structure of the risk-indicator bundles can be constructed individually for any enterprise as risk-correlation based system for assessment of economic security of enterprise. The system serves as an analytical tool for management decisions under conditions of uncertainty. Covid-19 pandemic risk effect on public transport provider was partially analyzed. Risk effect dissemination transmission channels were identified and discussed. Finally, we formulated recommendations for preventing measures against the effects of dissemination of covid-19 pandemic risk to public transport provider.

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## Contact information

### **Mgr. Pavol Prievoznik**

University of Zilina in Zilina, Faculty of Security Engineering  
Ul. 1. maja 32, 010 26 Zilina, Slovak Republic  
E-mail: pavol.prievoznik@fbi.uniza.sk  
ORCID: 0000-0002-4671-1620

### **doc. Ing. Stanislava Strelcova, PhD.**

University of Zilina in Zilina, Faculty of Security Engineering  
Ul. 1. maja 32, 010 26 Zilina, Slovak Republic  
E-mail: stanislava.strelcova@fbi.uniza.sk  
ORCID: 0000-0002-4497-4013

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# INVESTMENT DECISIONS AND FIRM PERFORMANCE UNDER ECONOMIC POLICY UNCERTAINTY

*Abdul Quddus, Drahomíra Pavelková, Sarfraz Hussain, Tien Phat Pham, Arif Ibne Asad*

## Abstract

This study explores the relationship between firm's investment decision and performance employing moderating role of economic policy uncertainty. The study's sample consists of 23 chemical firms, and data were obtained from the annual reports of the company's websites from 2014 to 2019. This study employed Linear and Non-linear regression methods with the panel data methodology to achieve the study aims. The study's overall findings indicate that corporate investment decisions have a significant and positive influence on the firm's performance. Furthermore, the overall moderated regression findings suggest that economic policy uncertainty moderates the relationship between investment decisions and firm performance negatively and significantly. The study results reveal that investment decisions have a more significant impact on a firm's market base performance. In addition, our paper provides policy implications for relevant stakeholders.

*Keywords: Investment, economic policy uncertainty, firm performance, Debt Ratio*

## 1 INTRODUCTION

The current political and global economic environment has formed the most eminent degree of uncertainty in recent times (PWC, 2019). The influence of policymakers' decisions on firm performance and investment is also a source of concern. When uncertainty arises, businesses can be limited to reduce production, employee benefits, and, in some cases, firm investments (IMF, 2012). In this scenario, an earlier contemporary body of literature explores how uncertainty influences financial corporate decisions like investment decisions, mergers and acquisitions, capital structure, and cost of capital. The vital issue is determining how to quantify uncertainty and determining an efficient measure for it. Some uncertainty indexes, such as economic growth, stock market volatility, political risk volatility index (VIX), and geopolitical risk threats have been employed in former studies. The Economic Policy Uncertainty (EPU) index, developed by Baker, Bloom, and Davis (2016), is a relatively new measure of uncertainty. The EPU varies from previous arbitrations that consider the plenty of newspaper articles that mention terms like economy, policy, and uncertainty. From a financial viewpoint, chemical businesses require frequent investments in fixed assets because their operations are heavily reliant on assets such as buildings, property, and equipment. Likewise, a decrease in the performance of companies can be caused by a lack of investment in fixed assets (Sharma and Upneja, 2005). Some sectors are classified as capital-intensive since their businesses maintain a high level of investment in fixed assets (Jiang and Dalbor, 2017). Capital expenditures are more than the market average in businesses (Damodaran, 2019). Despite the existence of there is a substantial body of knowledge on the factors that influence corporate investment, Jang and Park (2011) demonstrate that there are only several studies on investment decisions. Liquidity has a positive influence on capital expenditure investment in the lodging and restaurant industries (Moon and Sharma, 2014). Investment is affected by financial debt and liquidity ratios in both positive and negative ways for lodging companies, respectively.

Hatem (2015) has explored the link between investment and profitability of a firm and provides evidence that investment and firm performance positively correlate. Zhang and Yang (2018) examined the elements that influences business investment and concluded that profitability has a substantial influence on business investment. Zhang and Yang (2018) examined the determinants that affects business investment and revealed that growth and profitability has a significant influence on business investment. According to Bai & Zhang (2014), the investment rate has a significant negative impact on profitability.

In developed economies, there are a growing studies examining the link among investment and economic policy uncertainty (Demir and Ersan, 2018; Demir and Gozgor, 2018; Ersan, Akron, & Demir, 2019). The inconsistent outcomes of the earlier studies call for further empirical investigation in order to contribute further evidence-based results. In the best of our knowledge, this is the first novel study in terms of analyzing the investment decisions and firm performance under economic policy uncertainty of Pakistani chemical companies. The following is a sequence of the paper's structure. The theoretical background / literature review is the subject of Section 2. The data and methods are presented in Section 3. The results are summarized in section 4, and the discussion is described in section 5. The paper conclusion presents in the final segment.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

### **The relationship between investment and firm performance**

The word "investing " could refer to a number of pursuit, but the utmost aim of this activity is to use funds to increase the wealth of investors over time (Reilly & Brown, 2012). The performance of the firm and the company's growth are inextricably linked. Firm efficiency (profitability) is widely regarded as a key criterion for an organization's growth sustainability and performance. (Fareed et al, 2016). Da Silva et al. (2013) examine the relationship between corporate investment and firm profitability and finds a positive relationship between profitability and current investment, but a negative correlation between profitability past investment. The researchers observed a positive association between profitability and past investment once they used Tobin's Q. These relationships are weakening to some degree, implying that the profitability of investments is decreasing over time. Hatem (2015) focus on four countries and found that there is a positive and significant relationship between profitability and corporate investment in Romanian and Moldovan economies, as well as many other countries within certain circumstances. The success of a company and its investment decisions are inextricably linked (Mukhtar, Hashmi, & Asad, 2016; Sajid et al., 2016). Gabow (2017) investigated the relationship between financial or investment decisions and the firm performance. The outcomes of their research show that investment decision and performance of a firm have a strong and positive relationship. As a result, the researcher finds that businesses that invest comprehensively in land, equipment and plant perform better. Akron et al. (2020) aimed to investigate the relationship between EPU and firm investment, using firm performance such as control variable. The findings of their research revealed a positive linkage together investment and company performance. Besides that, Bzeouich, Lakhel, and Dammak (2019) focused on corporate investment performance and earnings management: the analysis used company performance as a predictor variable and establish a positive significant association between performance of firm and investment decision. As a result, the investment decision has a significant effect on the company's profitability. In general, previous research has revealed a positive association among investment and firm performance. Thus, the hypothesis is as follows:

*H1*: There is a positive relationship between firm investment and performance.

### **Moderating impact of Economic Policy Uncertainty (EPU) on the relationship between investment Decision and performance**

Liu, Hee, Liang, Yang, and Xia (2020) examine economic policy uncertainty on the investment of cultural and renewable energy companies. Their study revealed that variations in economic policy influence cultural energy companies and investment, but not renewable energy companies. Liu et al. (2020) explore the effect of economic policy, financing decisions and firm level investment in China. They utilized the two different contrast of time and the effects of transition using the master plan of difference. Their findings indicate that economic policy uncertainty has a positive influence on the investment of a firm by lowering debt ratios for specific companies. The study of Guo, Wei, Zhong, Liu, & Huang (2020) suggest policy uncertainty, firm investment, and firm profitability all play a role in the firm's long-term viability. Firm profitability and investment are increasing in China due to a large region. Luo & Zhang (2020) studied the economic policy uncertainty's influence on the stock price. They concluded in their study that businesses are more successful in the face of economic policy uncertainty. Their outcomes indicate that economic policy instability has a substantial effect on the risk of a stock price strike at the local level. Demir & Ersan, 2017; Nagar, Schoenfeld, & Wellman, (2019) investigated the effects of EPU on firm investment in the US market, claiming that the US market is volatile in both short- and long-term investments. When economic policy uncertainty is strong, long-term and short-term firm investments are reduced. The effect of economic policy instability on Turkey's economic activities, in which they addressed Turkey's economic activities in a crisis situation (Chi & Li, 2017; Li, 2019; Shahzad, Raza, Balcilar, Ali, & Shahbaz, 2017). They also proffered comparisons between these practices and previous economic activities. The study also revealed the influence of economic policy uncertainty on Turkey's economic development, utilization, and investment during the high economic policy instability (Sahinoz & Erdogan Cosar, 2018).

The study of Pastor and Veronesi (2012) show that political uncertainty boosted financing cost, reduced investment, and accelerated economic contraction. Driver et al. (2004) explores the uncertainty variable based on the cross-sectional dispersion of belief across firms in a sector to optimism for the business and suggested a negative effect on investment. According to (Patnaik, 2016) firms in competitive business environments boost their short-term investments due to rising uncertainty, as delaying investments is inclined to make them less competitive in the longer term. Overall, EPU is anticipated to have an moderating impact on the investment and firm performance. Therefore, the study's second hypothesis would be:

*H2*: EPU has a negative moderating impact on the relationship between investment and firm performance.

From discussed above, the following conceptual model is specified: Fig. 1:

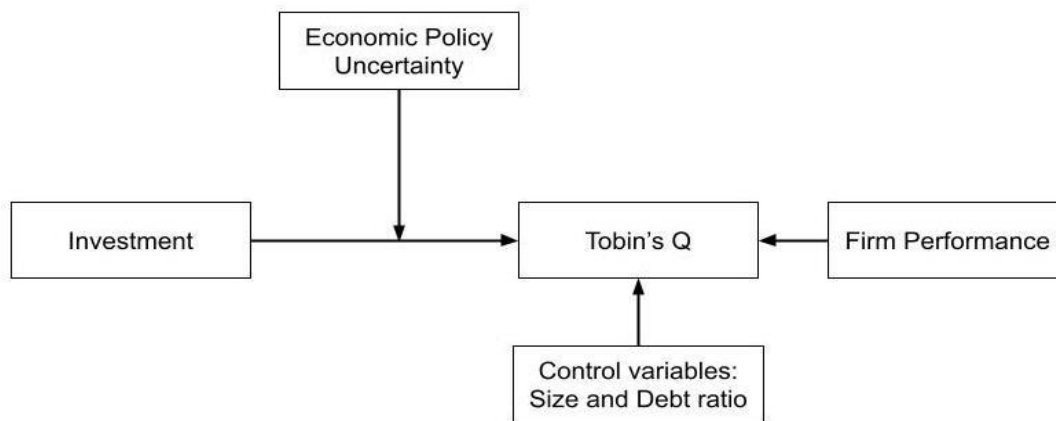


Fig. 1 - Conceptual Framework. Source: Authors

### 3 METHODOLOGY

#### Sample and data collection

A total of 23 registered Pakistani chemical companies included in the study sample. The first chemical sector was intended to prevent skewed results or specific circumstances, such as the effect of investment decisions on firm output in the face of economic policy uncertainty. The study's primary focus is on the economic policy uncertainty's moderating impact on the relationship of investment decisions and performance of firm; all of the corporations studied are trading on the Pakistan Stock Exchange (PSX). The data were collected from the Department of Statistics covers six years from 2014 to 2019.

In this research, the Tobin's Q has used as the firm performance variable; as a consequence, it is referred to as the dependent variable. The study sought to link the organization's performance, so this variable was included. The primary aim of this research is to find profoundly impact of investment decisions and firm performance under EPU in the context of chemical sector. Predictor or regressor variables are investment per total assets, while firm size, and debt ratio are control variable and EPU is a moderator variable for the study.

Tab. 1 - Descriptions of study variables. Source: Authors

Variable of the study		Measures
Firm Performance	TOBIN'S Q	The market value of equity to total assets value.
Investment per total assets	IPA	Capital expenditure to total assets.
Logarithm of total assets	SIZE	The natural logarithm of total assets is used to calculate firm size.
Liability per equity	Debt Ratio	Total liabilities to total assets.
Economic Policy Uncertainty	EPU	EPU is measured through EPU Index. <a href="http://www.policyuncertainty.com">www.policyuncertainty.com</a>

#### Research models

The paper investigates how variables influence performance of a firm using panel data analysis of cross-sectional time-series from 2014 to 2019. Tobin's Q will be used as a dependent variable alongside several other variables, so it can be described as follows:

$$\text{Tobin's } Q = F(\text{"investment per total assets, EPU, Debt ratio, Size"}) \quad (1)$$

A regression equation are as follows:

$$\text{Tobin's } Q_{it} = \beta_{it} + \beta_1 (\text{"IP" "A" }_{it}) + \beta_2 (\text{"DEB" "T" }_{it}) + \beta_3 (\text{SIZE}_{it}) + \varepsilon_{it} \quad (1)$$

$$\text{Tobin's } Q_{it} = \beta_{it} + \beta_1 (\text{"IP" "A" }_{it}) + \beta_2 (\text{"EP" U}_{it}) + \beta_3 (\text{"DEB" "T" }_{it}) + \beta_4 (\text{SIZE}_{it}) + \varepsilon_{it} \quad (1)$$

$$\text{Tobin's } Q_{it} = \beta_{it} + \beta_1 (\text{"IP" "A" }_{it}) + \beta_2 (\text{"EP" U}_{it}) + \beta_3 (\text{"EP" U}_{it} * \text{IPA}) + \beta_4 (\text{"DEB" "T" }_{it}) + \beta_5 (\text{SIZE}_{it}) + \mu_{it} \quad (1)$$

where  $i$  ( $i = 1 \dots 23$ ) is the intercept for each entity,  $t$  ( $t = 2014 - 2019$ ),  $\beta$  are the coefficients for each regressor variable, which describe the years studied, including  $\varepsilon_{it}$  as the disturbance term and  $(EPU_{it} * IPA)$  is the interaction term between investment and firm performance of firms. The  $\mu_{it}$  goes when a one-way disturbance ingredient models  $\mu_{it} = \lambda_i + \varepsilon_{it}$  the error term  $\mu_{it}$  is de-integrated into  $\lambda_i$  and  $\varepsilon_{it}$ . The  $\lambda_i$  individual-specific effect comprises the individual heterogeneity and  $\varepsilon_{it}$  is the error term.

### Processing of model

The descriptive statistics are presented in (Tab. 2). The correlation of the study variables and variance influence factors has been used to assess variables' appropriateness in the empirical models. Finally, to ensure consistency and reliability for evaluating two hypotheses, the panel data is processed using four methods: pooled, fixed effects (FE), random effects (RE), and generalized least squares (GLS). According to Wooldridge (2001), Hansen (1982), and Arellano and Bond (1991), we apply the Pooled, Fixed-effect approach (FE) and the Random-effect approach (RE) to estimate the regression model (1). The Pooled approach considers all observation as cross-section data, while both time-series and cross-section components are considered simultaneously by FE and RE. The Hausman test is used for choosing a suitable estimation result between FE and RE. Gujarati and Porter (2009) gave that the estimation result of the FE or RE might have the heteroskedasticity and/or autocorrelation issues, thus, we strategy to use the Wald test for investigating the heteroskedasticity, and Wooldridge test, and the Breusch and Lagrangian test for investigating the autocorrelation. If the estimation result of FE or RE has the heteroskedasticity or/and the autocorrelation issue, we will use the Generalized Least Square (GLS) to overcome the issues, it is suitable to the suggestion of Gujarati and Porter (2009) and Kamarudin et al. (2019).

results

The descriptive statistics shown below for individual variable are provided in Table 2. The mean ratio of Tobin's Q among the companies in our sample is 2.381252, Nonetheless, it grows to 0.1896801 in light of IPA. The data indicate that the EPU index, on average, presents a punctuation of 93.2511 and of 15.65767 when considering the natural logarithm of size. On the other hand, standard deviation and maximum value of IPA is 0.2179937 and 0.8385806 respectively. Tobin's Q 2.64566 is reasonably high in our sample of companies (proxy by performance). Size and debt are control variables which shows moderate trends in the sample.

Tab. 2 Descriptive Statistics-Source: Authors

<b>Var.</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Mix</b>	<b>Max</b>
<b>TOBIN</b>	138	2.381252	2.64566	-0.6172797	17.91824
<b>IPA</b>	137	0.1896801	0.2179937	1.421406	0.8385806
<b>SIZE</b>	138	15.65767	2.126366	10.00762	19.03796
<b>DEBT</b>	138	1.002199	1.941377	-2.648348	13.28095
<b>EPU</b>	138	93.2511	22.89301	62.45566	129.6692

Table 3 displays the Pearson correlations between the variables. The firm performance (Tobin's q) variable is positively correlated with both IPA and DEBT. As can be shown, the coefficient values amongst these control variables support the theory that size confers a reputation on a firm, enabling it to access highly portion long-term investments. Tobin's Q, on the other hand, is negatively associated with EPU. There, multi-collinearity among variables has existed. The variance inflation factor value (VIF) in Tab. 3 has been employed to assess the degree of multi-collinearity among all variables in a regression model. The peak VIF value is 1.09 (<4.00), which is less than the VIF threshold for models' ten response variables (Salmerón Gómez et al., 2020).

Tab. 3 Correlation and Variance Influence Factor Matrix. Source: Authors

<b>Var.</b>	<b>VIF</b>	<b>TOBIN</b>	<b>IPA</b>	<b>SIZE</b>	<b>LEV</b>	<b>EPU</b>
<b>TOBIN</b>	-	1.0000				
<b>IPA</b>	1.04	0.1898	1.0000			
<b>SIZE</b>	1.05	0.1447	-0.0257	1.0000		
<b>DEBT</b>	1.09	0.3639	0.1929	0.1953	1.0000	
<b>EPU</b>	1.00	-0.1304	0.0028	0.0585	-0.0237	1.0000

Tab. 4 indicates the relationship of investment with firm performance using four different methods (Pooled, FE, RE, and GLS). The authors will address some common findings in Tab. 4 before presenting the two hypotheses' estimation outcomes. The Fixed effects Hausman test value and the Random-effects Wald-test value (the Stat. Value rows on Tab. 4) indicate that all regression results are significant at 1%. Secondly, each model's independent variables explain the change in the firm's performance from 0.1542, 0.3984, and 0.3766, the R2 value of the pooled, FE, and RE outcomes imply from 0.1542 0.3984, and 0.3766 the change in the value of a company. Finally, the GLS processing findings indicate that, apart from the control variable, the regression models' association is not statistically significant, suggesting that four models do not correlate with the others. As a result, the two control variables in the models are discussed. The coefficient of DEBT is a significant positive sign to the performance of a firm. Finally, the results of FE model are consistent and significant.

Tab. 4 - The estimation results of model 2. Source: Authors

Variables		Pooled	FE	RE	GLS
Investment	<b>IPA</b>	1.57643 [1.59]	3.526806* [1.77]	2.235607 [1.49]	-0.0140162 [-0.02]
Control	<b>SIZE</b>	0.1059067 [1.04]	-1.064719** [-2.19]	-0.1068468 [-0.53]	0.0570361 [0.85]
	<b>DEBT</b>	0.4378932*** [3.88]	0.757402*** [8.11]	0.7057372*** [7.69]	0.5706829*** [6.30]
	<b>Cons</b>	-0.0000535 [-0.00]	17.65363** [2.32]	2.956261 [0.93]	0.0818586 [0.07]
Model statistic	<b>N</b>	137	137	137	137
	<b>Statistic</b>	8.08***	24.50***	64.58***	81.52***
	<b>R-squared</b>	0.1542	0.3984	0.3766	
	<b>Hausman test</b>	-	11.85***		-
Autocorrelation test	<b>Wooldridge test</b>	-	5.840**		-
Heteroskedasticity test	<b>Wald test</b>	-	78394.18***		-
	<b>Breusch and Pagan Lagrangian test</b>	-	-	-	-

Note: \*, \*\*, and \*\*\* are significant level at 10%, 5%, and 1%, respectively

Tab. 5 indicates the investment in the relationship between performance and EPU for using four methods (Pooled, FE, RE, and GLS). First, the Wooldridge test of the FE and RE reveals that all regression results are significant at 1%. Furthermore, the value of R2 from 0.1707, 0.4132 to 0.4053. The fixed effects estimation provides significant results for IPA and EPU negatively significant. As far as control variables, all estimations method provides significant results for Debt but insignificant for size.

Tab. 5 -The estimation results of model 3. Source: Authors

Variables		Pooled	FE	RE	GLS
Investment	<b>IPA</b>	1.59529 [1.62]	3.483111* [1.76]	2.28028 [1.56]	0.2813039 [0.49]
Control	<b>SIZE</b>	0.1165363 [1.15]	-0.6194311 [-1.12]	-0.008167 [-0.04]	0.0762601 [1.13]
	<b>DEBT</b>	0.4310678*** [3.84]	0.7444076*** [8.01]	0.6926076*** [7.67]	0.569082*** [5.97]
EPU	<b>EPU</b>	-0.0148327 [-1.62]	-0.0101355* [-1.66]	-0.0134633** [-2.45]	-0.0024724 [-1.05]
	<b>Cons</b>	1.219211 [0.69]	11.64167 [1.39]	2.670209 [0.86]	0.057178 [0.05]
Model statistic	<b>N</b>	137	137	137	137
	<b>Statistic</b>	6.79***	19.36***	72.76***	86.54***
	<b>R-squared</b>	0.1707	0.4132	0.4053	-
	<b>Hausman test</b>	-	6.38		-
Autocorrelation test		-	5.855**		-
Heteroskedasticity test	<b>Wald test</b>	-	-		-
	<b>Breusch and Pagan Lagrangian test</b>	-	-	127.88***	-

Note: \*, \*\*, and \*\*\* are significant level at 10%, 5%, and 1%, respectively

The findings in tab. 6 are also largely in line with the second hypothesis, economic policy uncertainty has a moderating influence on the association between investment decisions and firm performance. Further outcomes show that IPA has positive and significant coefficients but EPU is negative and insignificant in the estimation of GLS. The interaction term between



IPA\*EPU shows a negative and significant impact on performance at 10%. Moreover, other three estimations i.e. pooled, FE and RE shows the impact of IPA is significant and positive but IPA\*EPU are insignificants. Besides that, the control variables Debt and size show positive behaviour with performance of a firm. Our findings suggest that the EPU impacts investment and firm performance negatively and significantly. When the economy's EPU grows, companies' corporate investments decline. The benefit (loss) of those investments is related to a firm's performance. Our findings also to be in line with Gulen and Ion (2016) and Sahinoz and Cosar (2018).

Table 6. The estimation results of model 4 (Moderated EPU\*Investment). Source: Authors

Variables		Pooled	FE	RE	GLS
Investment	IPA	7.73715* [1.89]	7.474409** [2.29]	6.371044** [2.20]	3.268846** [1.98]
Control	SIZE	0.1192078 [1.19]	-0.5628974 [-1.02]	0.0050636 [0.03]	0.0822173 [1.51]
	DEBT	0.4144505*** [3.70]	0.720791*** [7.69]	0.6688211*** [7.36]	0.5521378*** [7.85]
EPU	EPU	-0.0026448 [-0.22]	-0.0032573 [-0.43]	-0.0058154 [-0.81]	-0.0000189 [-0.01]
Interaction between investment and EPU	IPA*EPU	-0.0648474 [-1.54]	-0.038378 [-1.53]	-0.0412111 [-1.64]	-0.0252759* [-1.66]
	Cons	0.0404428 [0.02]	10.06034 [1.20]	1.726853 [0.56]	-0.286467 [-0.31]
Model statistic	N	137	137	137	137
	Statistic	5.97***	16.15***	75.98***	175.95***
	R-squared	0.1855	0.4255	0.4178	
	Hausman test	-	6.52		-
Autocorrelation test	Wooldridge test	-	6.287**		-
Heteroskedasticity test	Wald test	-	-	-	-
	Breusch and Pagan Lagrangian test	-	-	128.12***	-

Note: \*, \*\*, and \*\*\* are significant level at 10%, 5%, and 1%, respectively

## 4 DISCUSSION

This paper examines whether EPU moderates the relationship of investment and firm performance of 23 chemical firms on the Pakistani Stock Exchange from 2014 to 2019. Two hypotheses were developed based on the literature review to investigate the direct and indirect effects on the relationship between firm investment and results. The three quantitative models have used to approximate two hypotheses through four-panel data processing methods (Pooled, FE, RE, and GLS methods). When the EPU rises in the economy, firms' corporate investments fall. The benefit (loss) of those investments is attributed to a firm's performance. As EPU grows, investors and corporate executives become more concerned about risk, and firm performance suffers as a result. We find that EPU has a significant adverse moderating impact on firm performance using a proxy of Tobin's Q as a firm performance in the Pakistani Chemical firms. Since it reflects a firm's market performance over assets, the EPU coefficient is higher on Tobin's q ratio. As a result, stock market investors respond more rapidly when EPU increases. Corporate policymakers, venture capitalists, investment firms, and business managers all use the EPU index to evaluate overall uncertainty. Our findings suggest that all participants in a company would take all reasonable precautions to avoid losses caused by uncertainty. Regulatory authorities, for example, are one of the most key stakeholders in companies, and

they should be conscious that uncertainty about regulator decisions will harm company performance if the decision is made improperly.

### **Limitation and Future Research**

- There can be some limitations of the study like the results of few listed firms will not be integrated.
- The study can also be expanded in the other or same sector by collection of primary data unswervingly from the managers of listed companies by means of questionnaires. This will include a better understanding of how the management of corporations approaches financial issues and plans for external environmental management.

## **5 CONCLUSION**

The several studies have been carried out to establish what distinguishes an investment and firm's performance under economic policy uncertainty. We examined whether investment and firm's performance moderated by economic policy uncertainty of 23 chemical companies on the Pakistan Stock Exchange from 2014 to 2019. This study employed four techniques to analyze the cross sectional and time series of panel data, which are the Pooled, fixed effects (FE), random effects (RE), and the Generalized Least Square (GLS). Chemical sector is the produce potential growth in the non-financial distributions in Pakistan. Our result showed that economic policy uncertainty moderates the relationship between corporate investment decisions and performance of the firm significantly but negatively of the firm. The Correlation tests on the sample data from Pakistan show no correlation consistencies between the independent variables. Using the VIF test, we reported that its value is 1.09, which is less than the threshold value, indicating that there is no multicollinearity in the model. Therefore, our findings show that EPU moderates the relationship between firm investment decisions and Pakistan's chemical sector's output in a negative and significant.

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### **Contact information**

#### **Abdul Quddus (Ph.D. student)**

FAME, Tomas Bata University in Zlín, The Czech Republic

Email: quddus@utb.cz

ORCID: 0000-0003-3914-6755

#### **Drahomíra Pavelková, prof. Dr. Ing.**

Head of Department of Finance and Accounting, FAME, Tomas Bata University in Zlín, The Czech Republic.

E-mail: pavelkova@utb.cz

ORCID: 0000-0003-1399-6129

#### **Sarfraz Hussain**

Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

Govt. Imamia College Sahiwal, Pakistan

Email: mianfraz1@gmail.com

ORCID: 0000-0001-9449-1047

#### **Tien Phat Pham (Ph.D. student)**

FAME, Tomas Bata University in Zlín, The Czech Republic

Email: tien@utb.cz

ORCID: 0000-0001-9472-5878

#### **Arif Ibne Asad (Ph.D. student)**

FAME, Tomas Bata University in Zlín, The Czech Republic

Email: asad@utb.cz

ORCID: 0000-0001-8622-0941

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# CIVIC ASSOCIATIONS IN SLOVAKIA – A BRIEF ANALYSIS OF THE PIEŠŤANY DISTRICT

*León Richvalský*

## **Abstract**

Development in the areas of civil society and associating of citizens in the Slovak Republic must be examined with emphasis on the historical facts. Apart from the short period between the years 1918 and 1938, we can again talk about free associating in the democratic conditions only after the 1989 democratic transition. However, the civic association in Slovakia have undergone extensive development over the last thirty years, transforming its functioning to current form, where it not only fulfills the role of a leisure platform for citizens, but acts a partner of the government in the decision-making process as well. We analyse the dynamics of this topic within the Piešťany district from the year 1990 to current situation, using the data about the establishing of civic associations from the Register of Non-Governmental Organizations. We analyse the development of civic association in our territory in terms of historical development as well, based on scholarly literature and past social and political situation. We also compare the current distribution of civic associations in the Piešťany district with public opinion about the usefulness of non-governmental organizations. Our objective was to analyze and identify the possible factors influencing the establishment of civic associations during the period examined. The growing trend in the establishing of civic associations in the district of Piešťany, together with the support of these activities by the government, are positive indicators of the development of civic associating in the Slovak Republic.

*Keywords: association, citizens, civil society, NGO, Slovak Republic*

## **1 INTRODUCTION**

From the historical point of view, association of individuals is a phenomenon which has accompanied the humanity since its beginnings. As we focus on the association of citizens, i.e. members of organized society living within mutual space, the most mentioned period is ancient Greece and Rome. In scholarly discourse, this historical period is considered to be the birthplace of the ideas of democracy - the government of citizens in direct form, elements of which we find in many modern establishments as well. (Miller et al., 2000) In the medieval era, the brotherhoods and guilds were the most common forms of association. In the later period, the so-called scholarly societies started to operate. Within the scholarly societies, the national and linguistic self-determination efforts of Slovaks began to take place during the eighteenth century. An important role in this context was held by the association based in Trnava, the Slovak educated brotherhood (Slovenské učené tovarišstvo), which published literature in Bernolák's language, as well as spread new knowledge. (Dudeková, 1998) In the nineteenth century, these efforts continued in emerging townsmen societies, where the emancipatory endeavours were multiplied by the wave of nationalism and revolution which spread across the European continent. During this period, the Society of St. Adalbert (Spolok svätého Vojtecha) was also established in Trnava, spreading Štúr's language as part of its publishing activities. The founder of this Trnava institution (which is still active), Andrej Radlinský, was also a co-founder of the Slovak Matica (Matica slovenská).

During the twentieth century, fundamental changes in the association happened. Association in the first Czechoslovak Republic took place in conditions of democracy for the first time, but this situation was limited during the emergence of Slovak state during WW2. After the war, during the socialism under the rule of communist party, i.e. from 1948 until the 1989, association of citizens operated in a limited and controlled form. Even in this period, the association of citizens had an important role. By civic activities - illegal and persecuted at the time, it helped to eliminate the totalitarian regime and accelerate the democratic transition. From the background of dissident groups and civic activism, critical statements by environmentalists or non-communist intellectuals are important in this context, as well as student's and religious demonstrations, which culminated in the Candle Manifestation. (Katrebová-Blehová, 2014) Associating at non-political levels, however, was legal and present in this period in the form of mass organizations of the National Front, which covered leisure time and cultural development of all age groups and categories of interest. Thus, our objective was to analyze the civic associations after this political and cultural change, after the freedom and independence was their basis again. Because despite of democratic regime and no control by mass organisations of National Front, there were still some external factors influencing the establishment of civic associations after the year 1990.

## **2 THEORETICAL BACKGROUND**

From a theoretical point of view, the issue of association, civil society and overall functioning of the third sector is connected with the quality of democracy, i.e. with the degree of democratization of a particular regime. This close link between civic activity and the government emerges not only from the nature of democracy as such, but also from the importance of the functions provided by the third sector. Bútorá (1998) defines ten basic functions of the non-governmental sphere, which are provided through non-profit organizations and association of citizens within given society.

- Formulation and interpretation of civic requirements
- Preservation of plurality
- Opinion-forming function
- Social integration
- Political socialization
- Control function
- Provision of services and public goods
- Terrain for social experiments and innovation
- Conflict prevention and resolution
- Reproduction of social wealth

Macháček (2015) also emphasizes the function of youth education, which is essential in every country undergoing modernization processes. In this context, he mentions the civic participation of young people in their leisure time, where the space is open for several forms of association. Examples of such association are civic associations involving children and young people, associations specifically created for young people, informal civic initiatives and movements, but also local youth parliaments. The author emphasizes the importance of this area, because educating a democratic citizen within the family and school without the practical experiences is effective just partially.

At present, it is possible to associate in several ways in Slovakia, primarily within non-governmental non-profit organizations. Association also takes place at levels other than civic, e.g. in political parties and movements, in the business matters, to ensure the proper exercise of certain professions, in churches and religious societies and within the exercise of hunting rights. (Act No. 83/1990 Coll.) However, the subject of our interest are organizations acting primarily as an expression of civil society, where every citizen can freely participate, hence does not become a member or supporter because of some external influences, but solely on the basis of his free will and persuasion. This argument is intensified from a normative political point of view, as political parties focus primarily on political competition – which is against the definition of third sector, churches have different conditions within the voluntariness and management - despite their common features, and business associations of legal entities differ mainly in the issue of financial profit. (Strečanský - Murray Svidroňová - Andrejkovič, 2017) Thus, among the NGOs (non-governmental non-profit organizations) supporting civil society and its development at the most, we include following:

Tab. 1 - Entities of civic association and their number within the Slovak Republic as of the 31st of August 2020.

Source: Register mimovládnych neziskových organizácií, 2021

Type of NGO	Number
Foundations	750
Non-investment funds	584
Non-profit organizations providing services of general interest	3 362
Civic associations	53 133
Trade unions and employers' organizations	3 008
Organizations with an international element	120
<b>Together</b>	<b>60 957</b>

When comparing the examined entities of the third sector within the Slovak Republic, we notice a significant predominance of civic associations. As they represent the most widespread way of civic association and the largest part of the citizens are organized within them, we have chosen them as the main subject of our research. We have chosen the Piešťany district for a detailed analysis for several reasons. In terms of the number of civic associations in the districts of the Trnava region per 1,000 inhabitants, the Piešťany district is the second largest, after the Trnava district itself. (Register mimovládnych neziskových organizácií, 2021). The district town of Piešťany is the spa site, which has a positive effect on tourism within the district. The city of Piešťany is also the base of several sports, including not only ice hockey, football, basketball, tennis and swimming, but also water polo, kayaking, water skiing and golf. (Športové kluby a združenia, 2021).

### 3 MATERIALS AND METHODS

As of the 31st August 2020, 650 civic associations were registered in the Piešťany district. We divided the associations into four categories according to the main focus of their activities. We have included all civic associations with a focus on sports into the category A - "Sports clubs and teams". The associations providing assistance to people in need, offering healthcare and assistance services, rehabilitation and charitable services were included into the category B - "Health and social care, charity, assistance". The associations focused on hobbies, developing new skills, leisure activities, together with children and senior associations, are included within



the category C - "Interests, leisure time, children and senior associations". Entities providing educational and awareness-raising services, protection of the animals or environment, preserving monuments but also offering legal aid for example, were listed under the joint group D - "Development of society, professional interests, protection of nature and animals". The following table shows how many associations in which category were active in the Piešťany district as of the 31st August 2020. We created these groups to generalize the scope of activities of civic associations, hence making it easier to apply our findings to existing researches - which also group civic associations by their main activities (Bútorová, 2017). Since many civic associations have wide range of activities, it is necessary to extract their main and most significant focus.

Tab. 2 - Number of civic associations active in the Piešťany district as of 31 August 2020 in four specified categories. Source: Register mimovládnych neziskových organizácií, 2021

<b>Towns and municipalities</b>	<b>A*</b>	<b>B*</b>	<b>C*</b>	<b>D*</b>
Piešťany (Town)	140	32	161	100
Vrbové (Town)	8	3	17	5
Banka	6	0	7	4
Bašovce	1	0	0	0
Borovce	3	1	2	0
Dolný Lopašov	2	0	2	3
Drahovce	2	1	7	3
Dubovany	2	0	1	0
Ducové	0	0	0	0
Hubina	1	0	2	1
Chtelnica	3	0	4	2
Kočín-Lančár	1	0	2	1
Krakovany	3	0	8	3
Moravany nad Váhom	7	1	8	1
Nižná	3	0	1	0
Ostrov	4	0	5	0
Pečeňady	3	1	1	1
Prašník	3	0	3	0
Rakovice	1	0	2	1
Ratnovce	2	0	3	2
Sokolovce	3	0	3	0

Šípkové	1	0	0	0
Šterusy	1	0	1	1
Trebatice	4	1	7	1
Veľké Kostoľany	3	0	3	8
Veľké Orvište	3	1	4	3
Veselé	1	0	3	1
<b>Together</b>	<b>211</b>	<b>41</b>	<b>257</b>	<b>141</b>

\* Legend

A - Sports clubs and teams

B - Health and social care, charity, assistance

C - Interests, leisure time, children and senior associations

D - Development of society, professional interests, protection of nature and animals

After the counting of all 2 towns and 25 municipalities, we state that most civic associations are active in the category " Interests, leisure time, children and senior associations " and the least number is active within the field of "Health and social care, charity, assistance". The situation is currently interesting in the municipality of Ducové, which has no civic associations, despite the fact, that with a population of 459 citizens it is not the smallest municipality in the district of Piešťany. The smallest municipality is Šípkové with 297 inhabitants, which houses one active civic association.

In this paper, we use several methodological approaches based on the fundamental principles of logic, primarily analysis and synthesis. Analysis is a method, which we used during a detailed examination of our topic, as the process of unfolding the phenomenon into its individual components. Only then we could examine them separately. (Ochrana, 2019) We applied the analysis to our sources of information - the publications, legal Acts and articles related to the issues of civic association listed in the paper references. The method of synthesis presents the opposite process as analysis, the assembly of partial knowledge into whole information, leading to the formulation of a new idea. (Pružinský, Mihalčová, Jeleňová, 2011) Through the synthesis of information gathered from the analysed sources, we obtained an overview of the current state of civic association, its importance in modern society, but also the factors that have influenced its development in the Slovak Republic.

We referenced scientific monographs, anthologies, journals and textbooks, we also used legislative sources in the form of Acts relating to the issue of civic association and its various forms. We also utilized the available data from Slovak institutions, namely the public registers of the Ministry of the Interior of the Slovak Republic, as well as the data from the Statistical Office of the Slovak Republic. We also relied on the source data of the register of civic associations provided by the press department of the Ministry of the Interior of the Slovak Republic, according to Act no. 211/2000 Coll. on free access to information.

## 4 RESULTS AND DISCUSSION

When we analyse our result from the point of view of public opinion about the usefulness of NGOs activities, our results from the Piešťany district does not correspond to the opinion of Slovak public. As was found by Bútorová (2017) in the 2016 research, the first five places of usefulness were stated (in this order):

- to help with solving health problems
- to provide social services to people in need
- to help the problematic youth and children
- to defend civic interests in social conflicts
- to support the development and protection of the environment

The first three functions, identified by the public as the most useful, belong to the category with the smallest representation of civic associations in our research, i.e. "Health and social care, charity, assistance". The fourth and fifth functions on the utility scale fall under the category "Development of society, professional interests, protection of nature and animals" where the number of associations is in the penultimate position - the third out of four.

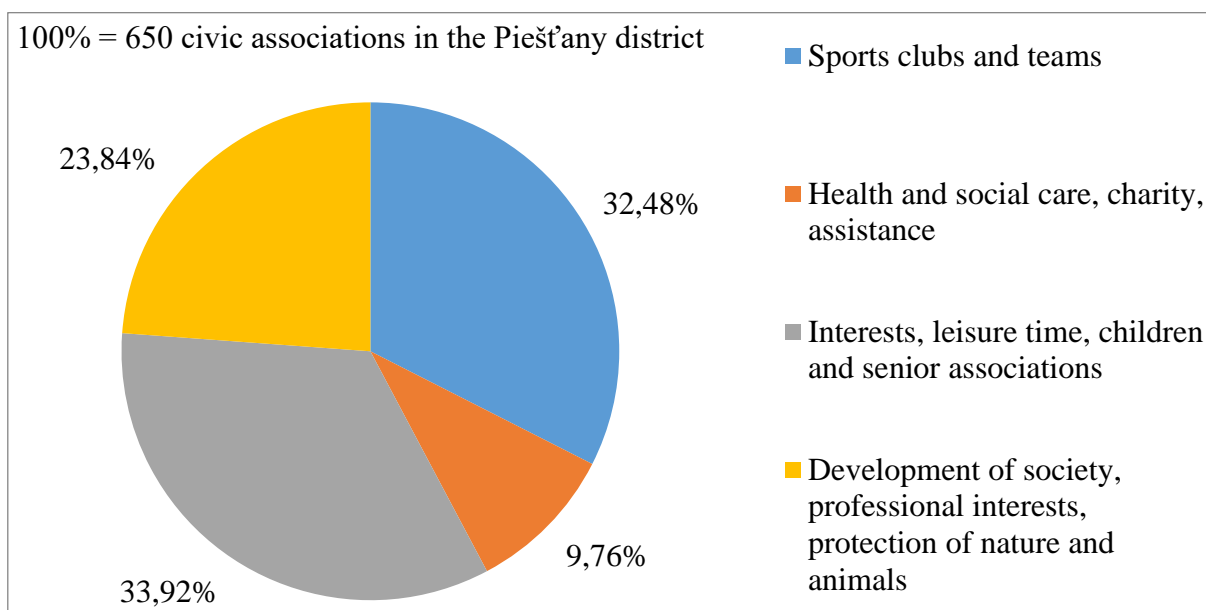


Fig. 1 - Percentual distribution of civic associations in the Piešťany district in four categories. Source: Register mimovládnych neziskových organizácií, 2021

Despite our initial assumption according to this public opinion research, where NGOs providing health services and social assistance are identified as the most important, civic associations oriented to the leisure time are the largest group in the Piešťany district, i.e. our research category "Interests, leisure time, children and senior associations". NGOs providing services in the area identified as the most important by the public in 2016 Bútorová's research, are paradoxically the least numerous in the Piešťany district. In our research, it is the category "Health and social care, charity, assistance".

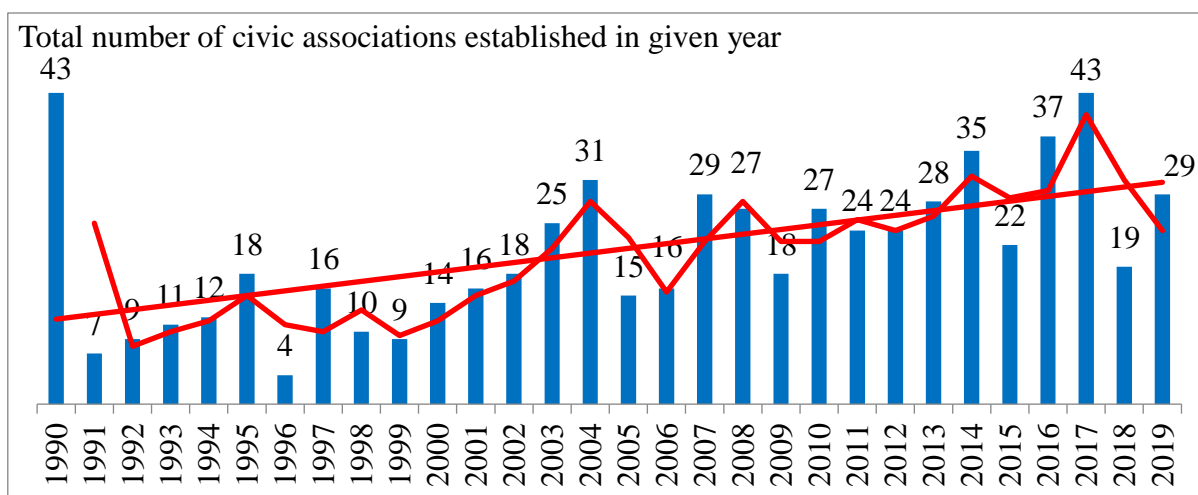


Fig. 2 – Established civic associations active in the Piešťany district as of 31st August 2020. Source: Register mimovládnych neziskových organizácií, 2021.

The district of Piešťany shows several characteristics in terms of the establishment of civic associations, which can be explained in the context of the period. In this context, the year 1990 has brought the mass establishment of civic associations, which took place as a result of a change in the political regime, when mass social organizations with centralized management subject to the totalitarian regime were abolished. In the following years, the political situation changed diametrically, and until the 1997 the establishment of new civic associations was reduced. The period of the 1990s, namely the period between 1991 and 1999, can therefore be described as the least active in this context. The government acting in this period considered the third sector and NGOs more as a competition and lobbying platforms of the opposition - which became somewhat true in the second half of this period, as the government pushed many experts and opposition leaders into NGOs through its authoritarian approach. (Bútora, 2010) This antagonism culminated in the 1998 parliamentary elections, preceded by a campaign by several NGOs to promote the voter attendance, as well as the public interest in controversial political situation. This situation could be positively reflected in the number of civic associations established in 1995 and 1997 to some extent, which was significantly higher than in previous and subsequent years.

In contrast to the situation in the previous period, we can speak of a significant increase in the number of established civic associations in the years 2002 - 2004, during which the numbers increased or even doubled. This development can be ascribed to the position of the non-profit sector, which has improved under the influence of a new government (Bútora, 2010), but also to the introduction of a tax assignment mechanism, which created another source of funding for civic associations. In 2004, the tax assignments were extended from physical to legal persons as well, and the Slovak Republic joined the EU - which significantly expanded the possibility of financial support for NGOs and increased the motivation to establish new such entities.

After a decline in 2005 and 2009, there was a renewed increase and culmination in the years 2014 and 2016 and 2017, and the number of newly established civic associations repeated the situation from 1990 again. This development could be ascribed to legislative development to some extent, as during this period several amendments to the Act on association of citizens (Act 83/1990 Coll.) were made, e.g. the Hunting Act (2009), Volunteering Act (2011), Voluntary Fire Service Act (2014) or Sport Act (2015). The development of associations and civil society was also in the interest of the government, which developed several activities in this area and is continually expanding cooperation with NGOs. In 2011, the position of the Plenipotentiary

of the Government for the Development of Civil Society was established, and in 2012 also the Council of the Government for Non-Governmental Non-Profit Organizations. (Rozvoj občianskej spoločnosti, 2020)

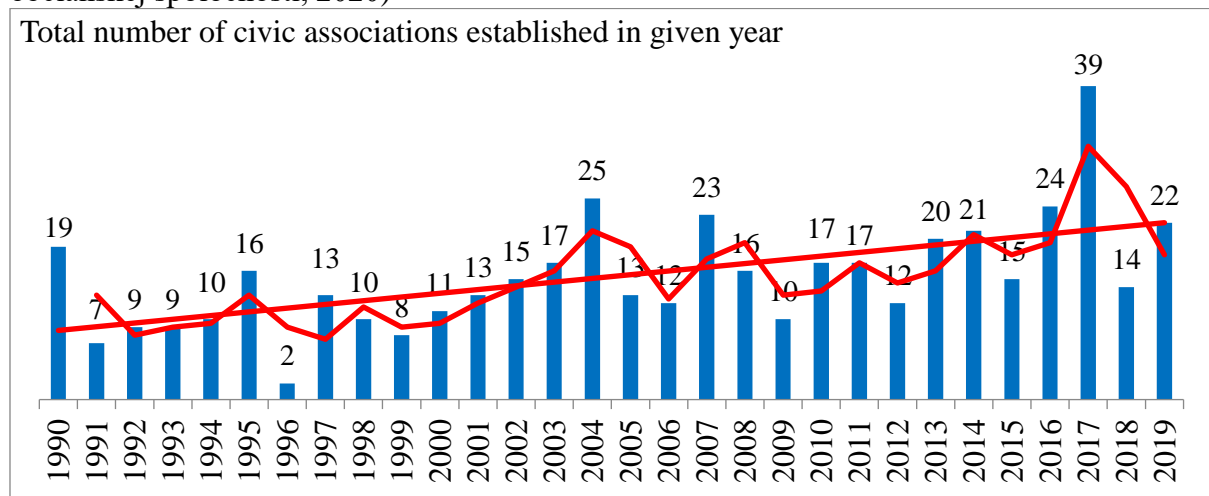


Fig. 3 - Established civic associations active in 2 towns of Piešťany district as of 31st August 2020. Source: Register mimovládnych neziskových organizácií, 2021.

A comparison of trends in the chronological aspect of establishment of civic associations in the towns and municipalities of the Piešťany district shows a different progress. While in 2 examined towns the character has a significantly growing trend, in 25 examined municipalities the character is growing only slightly in the long run.

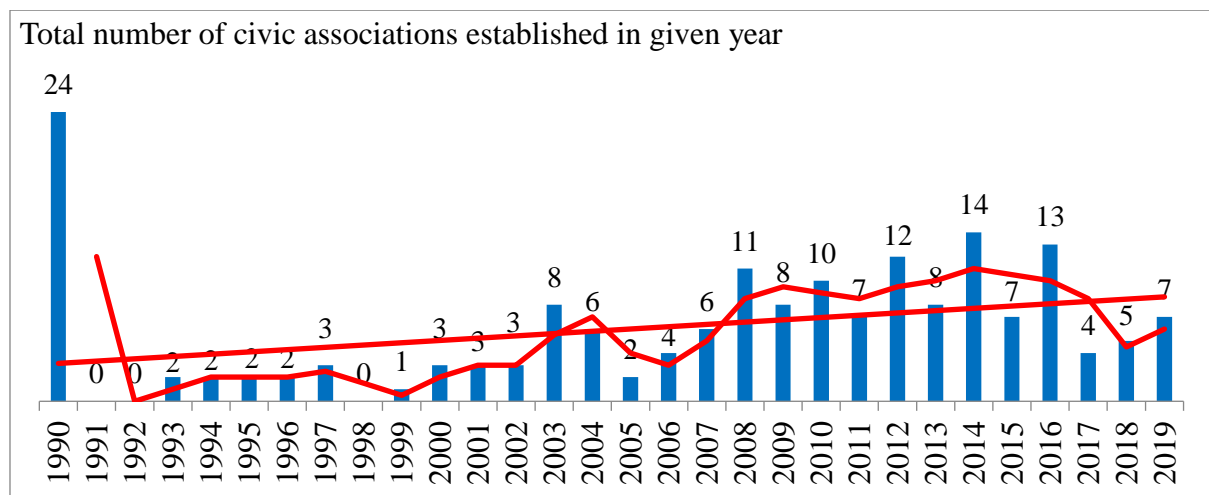


Fig. 4 - Established civic associations active in 25 municipalities of Piešťany district as of 31st August 2020. Source: Register mimovládnych neziskových organizácií, 2021.

In addition to this difference, municipalities show a lower number of established civic associations every year compared to towns, and in certain years not a single civic association was established in the municipalities examined. In the case of municipalities, we can also speak of a significantly more reduced activity in the nineties, when there was a massive decline in the establishment of new civic associations.

In 2020 (as of 31st August 2020), 14 new civic associations have been established in the Piešťany district so far, one of which is also focused on the current issues of the crisis associated with the COVID-19 pandemic: the Initiative of Slovak Retailers (Iniciatíva slovenských maloobchodníkov). (Register mimovládnych neziskových organizácií, 2021) This civic association defends the interests of entrepreneurs in retail, gastronomy and services. It was established as a reaction to the pandemic and the problems and limitations caused by it, it currently functions as a civic association with a membership base of more than 100 members with almost 1,000 businesses throughout the Slovak Republic. (Hlavné ciele združenia, 2020) Their primary goal is to formulate and protect the interests of retail businesses, to be a communication platform for sharing practical experience, for mutual cooperation, to support medial presentation of this issue, but also to conduct a constructive dialogue with the Slovak government. For example, at the end of May 2020 a meeting of representatives of this association, Minister of Finance Richard Sulík and representatives of business space providers took place. (Iniciatíva slovenských maloobchodníkov víta, že vláda..., 2020) The establishment of this NGO reflects that it is possible to connect individuals with businesses at the national level through a civic association, and directly enter the creation of government regulations, constructively criticize them and offer alternative solutions. At the same time, the current government has shown a positive attitude in the form of a meeting and ongoing communication with this civic association, thus proving the importance of these entities for society.

## 5 CONCLUSION

In the conditions of the Slovak Republic, civic association is a dynamic part of the political system, which has undergone several significant changes in the last thirty years of the democratic regime. In August 2020, almost 61,000 organizations based on the principle of civil society and voluntariness were active within non-governmental organizations. Most of these NGOs were civic associations with 53,133 individual entities active. All in all, civic association is not just some kind of activity within the leisure time spending - it is an important element in any democratic regime. The importance of associations, civil society and NGOs is captured not only in the scholarly literature, but especially in the practical experiences. These organizations (and essentially the whole third sector) have the task of complementing the government and the market in areas, which are insufficiently covered. Activities and services that do not bring financial profit, services for benefit of the public, philanthropy or protection of the interests of various groups – those are the areas, which could be used to assess the level of maturity of the given society.

However, civic association can also take the form of a protective layer of society against political decisions, in the form of constructive criticism of the government, the development of alternative political solutions, or political and social think-tanks acting as the watchdogs of democracy. Schneider (2003) and Vašečka (2004) also ascribe importance to this function. At the level of these associations and entities, citizens can directly intervene in the political decision-making process, which they would not be able to formulate or articulate in any other way. It is therefore also in the interest of the government to support this area and prepare the suitable conditions for its development. From 2011, the issue of association and civil society has been emphasized by the state, as evidenced by the creation of the previously mentioned institutions of Plenipotentiary and Council. The current government elected in the 2020 parliamentary elections showed its responsiveness to cooperation with the civic sector and associations, which is currently gaining a growing trend in Slovakia - which could also be observed in notable high voter turnout recorded in these elections (Horváth, Urc, 2020). According to its program statement, the current government has the same tendency to continue and further expand this trend, which together with the long-term growing number of newly

established civic associations creates a good prediction for further development of civil society - not only in the Piešťany district.

### Acknowledgement

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## Contact information

### **PhDr. León Richvalský, PhD.**

University of Saints Cyril and Methodius in Trnava, Faculty of Social Sciences

Bučianska 4/A, 917 01, Trnava, Slovak Republic

E-mail: [leon.richvalsky@ucm.sk](mailto:leon.richvalsky@ucm.sk)

ORCID: 0000-0003-3592-5495

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# THE POSITION OF WOMEN IN MANAGEMENT IN FAMILY AND NON-FAMILY BUSINESSES

*Boris Rumanko*

## **Abstract**

We learn from history that men have always had a higher social status than women. Women were perceived only as a complement to men and their main task was to take care of the household. Due to globalization, the issue of women in business management comes to the fore. Many studies have found that women in CEOs have a positive impact on society, but their representation is still low. The main goal of the paper was to reveal the differences in the perspective of women in management between family and non-family multinational corporations operating in Slovakia from the perspective of employees. We chose a structured interview as a data collection tool. We chose the Text Mining method for statistical evaluation. We found that in family businesses there is a higher representation of women in management than in non-family ones, stakeholders also take women in management more positively in family businesses.

*Keywords: family business, non-family business, women, MTC*

## **1 INTRODUCTION**

Family business has an irreplaceable position in every economy, as family businesses are called the skeleton of the economy. They account for 3/4 of world GDP and have the largest representation of all businesses in the European Union (Súkeník & Súkeníková, 2016), account for approximately 60 to 80% of all (Mucha et al., 2016). There are family businesses in Europe that have been operating continuously for more than 100 years (Ansari et al., 2014).

A family business is an enterprise run by family members or their descendants (Zellweger, 2017). A family business is also considered to be a business in which the members of the family that owns the business have the ownership right (Poza & Daugherty, 2014). Family businesses are not just small businesses, many of them multinationals that are well known to the media, e.g. Walmart (USA), Samsung Group (Korea), Tata Group (India) (Poza & Daugherty, 2014). Other major international family businesses are McDonald's, IKEA, Nutella, Bosch, Dolce & Gabbana, Versace, Baťa, Henkel, C&A atď. Slovak international native enterprises are e.g. Lunter or Minit (Šétaffy, 2018). According to Zhou et al. (2016), the world's largest family businesses from Asia are controlled by Indian families.

Despite globalization, the position of women in management is less outdated than that of men (Ubrežiová et al., 2018). According to research, Furik (2017) claims that in the world, men hold 65% of managerial positions and women only 35%. Some research has revealed the positive effects of women in management (Carter et al., 2010; Liu et al., 2014; Nguyen et al., 2015), but we also encounter claims that the gender issue has no effect on management (Hussein & Kiwiwa, 2009; Farrell & Hersch, 2005).

Many studies that address diversity in management omit family businesses from their research because they have concentrated ownership and leadership in the hands of the family. (Sarkar & Selarka, 2021). For this reason, we decided to focus our study on family and non-family

international companies operating in Slovakia, where we focus on the view of internal business stakeholders on women in management.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

The position of women in society was influenced by gender stereotypes and developed only as a supplement to traditional masculine political history (Dudeková et al., 2011). In the past, they believed that men had economic and political strength in society, with women engaging in complementary activities. Their task was to take care of the children and create a family background (Letovancová, 2010). The main point in the history of feminism was the acquisition of the right to vote (Ubrežiová et al., 2018).

Gender barriers also affect the position of women in management, when there is an unnecessary loss of extraordinary talent in management. (Hewlett, 2002). The main reason for women leaving managerial positions is the extension of time spent with the family (Hewlett & Luce, 2005). For this reason, in practice, women have fewer opportunities for promotion, which includes, among other things, increased power and decision-making (Durbin & Tomlinson, 2014). Family life forces them to stop their career growth and pay attention to the demands of family life, that is why many women choose to work part-time (Eagly & Carli, 2007), by which they can balance work and family life (Parkes & Langford, 2008). In practice, this results in less experience, less income and less room for career development (Hewlett & Luce, 2005). Although gender barriers are gradually being suppressed, the representation of women in top management is still low (Dawley et al., 2004), although their position in middle management is constantly improving (Hoobler et al., 2011). The basic myths about women managers in the international environment include: women lack motivation, two-career marriages, in some countries there are prejudices against women managers (Ubrežiová et al., 2018). According to Ubrežiová et al. (2018) we know several obstacles preventing women in management positions:

Glass Ceiling - barriers such as traditional attitudes, prejudices and values that hinder the position of women within management to grow their careers (Ubrežiová et al., 2018),

- Glass Cliff - women are only promoted if the company is in crisis (Barošová, 2007).
- Sticky Floor - men are more often promoted to managerial positions compared to women, even with a different salary than a woman would receive for a given position (Christofides et al., 2010).
- Leaky Pipe - women are not willing to go abroad on business trips because of children (Koput & Gutek, 2010).
- Glass Walls - women are filled in positions from which it is not possible to grow a career (Bartošová, 2007).
- Tokenism - women are considered a symbol of the group in which they find themselves. In some cases, this fact is considered a "handicap" (Křížková & Pavlica, 2004).

In regards of sex, Křížková & Pavlica (2004) divided corporate cultures into 2 groups:

Masculin culture of the enterprise:

- A manager is considered to be an ideal if he is strong, independent, resolute, focused on his own self-realisation,
- faith in the individual and his or her performance,
- performance and power motivation. Material wealth and prestige is a condition for social and work success,

- personal interests are subordinated to organisational,
- conflicts are solved by force, high levels of work-related stress arise,
- women are considered less reliable as well as less powerful,
- managerial posts are dominated by men.

Feminist culture of the enterprise:

- The ideal of the manager is an individual who understands his position as a service to the public, where the emphasis is on discussion and consensus,
- faith in teamwork and teamwork,
- performance motivation is in line with the focus on interpersonal relationships, where success is conditioned by the ability to be helpful,
- corporate interests are not superior to private life,
- conflicts are a natural component and are resolved without increased stress,
- women are equal to men, both sexes are represented in managerial posts.

## 2.1 The position of women in the family business

Family businesses are gender-based, so the issue of women's employment in management is not viewed from the perspective of society but families. (Overbeke et al., 2013). Family businesses provide women with better opportunities than non-family businesses (Lerner & Malach-Pines, 2011). In family businesses, women have lower salaries, better jobs and greater flexibility to work so that they can also address personal needs (Kirkwood, 2009). The share of female managers in family businesses is constantly growing (Barrett & Moores, 2009). It makes it easier for women in family businesses to access top management positions as well as family participation in terms of ownership (Meroño-Cerdán & López-Nicolás, 2017). Family ownership offers women the flexibility to effectively manage the family and work (Lee et al., 2006).

The position of women in family businesses is also influenced by socio-emotional wealth (Overbeke et al., 2013), which is characterized by emotional needs of identity, the ability of family members to influence business and succession (Gomez-Mejia et al., 2007). This approach to family businesses allows women to hold senior management positions (Dyer, 2003). Family businesses appoint more women as top managers than in non-family businesses. The main influencing factor is the higher share of female managers and owners in family businesses (Wilson et al., 2013).

**Research assumption 1:** *We assume that women are more represented in CEOs in family businesses than in non-family ones.*

**Research assumption 2:** *We assume that women are more represented in the management of family businesses than in non-family ones.*

## 3 METHODOLOGY

The main goal of the paper was to reveal the differences in the perspective of women in management between family and non-family multinational corporations operating in Slovakia from the perspective of employees.

The research was carried out in the period from October to December 2020 through structured interviews, which took place with employees of multinational companies, where we focused primarily on managers. We carried out structured interviews through trained interviewers (Kozáková et al., 2021) in the period from September to December 2020. The structured interviews focused on the areas of women's involvement in management (CEO, middle management, supervisory boards, ownership) (Ubrežiová et al., 2018). The average length of the interview was 15 minutes, which represented more than 27 hours of interviews.

The survey involved 111 respondents who were internal stakeholders of multinational companies operating in Slovakia. Most respondents were from the production area of the company (55.9%), then from the area of trade (25.2%) and the least from the area of services (18.9%). As we focused on multinational companies, 75.7% of companies were large companies, only 22.5% of medium-sized companies and 1.8% of small companies were the smallest. We also focused on the share of foreign co-ownership. Purely Slovak companies that went through the process of internationalization were 4.5%, so the share of their foreign co-ownership is 0%. Only 0.9% of enterprises had foreign co-ownership of 1-25%, 5.4% of the surveyed enterprises had a share of 26-50% of co-ownership and 3.6% of enterprises had co-ownership in the range of 51-75%. If we deduct Slovak multinational companies that do not have foreign co-ownership, we see that only 9.9% of multinational companies operating in Slovakia have a foreign share in ownership below 75%. Higher participation in foreign co-ownership, i. 76.2% of enterprises had 16.2% of enterprises and the highest representation was of multinational enterprises, which have 100% foreign ownership. If we take a closer look at these companies, we see that up to 78.2% are European multinationals, 17.3% are American multinationals and only 4.5% are multinationals from Asia.

In the research, we primarily divided companies into family and non-family multinational companies. As there are countless definitions of a family business, in the research we selected family businesses according to Zellweger (2017), which defines a business as family if the business is run by family members or descendants of the business founder. According to the CEO, we divided companies into family and non-family ones in the parent branches. In the survey, family businesses accounted for 64.9%, while non-family multinationals accounted for only 35.1%, which also cooperates with the theory that family businesses account for 60-80% worldwide (Mucha et al., 2016). The monitored non-family businesses had women represented in the CEO in 0%, while in the family it was 9.72%.

Respondents' answers were recorded in writing in English and subsequently evaluated by the Text Mining method (Miner et al., 2012). Text Mining is a method that extracts clustered information from various sources to form new facts (Hearst, 2013). Text mining has two phases: exploring unstructured text data and discovering new information from it (SAS, 2009). We evaluated the answers by the text mining method in the program Statistica 13. After the implementation of the number, we used the inverse frequency of the document (in literature referred to as TF-IDF) for a more accurate evaluation, which reveals the importance of individual expressions in the text. The results of the importance of the terms are shown in Tables 1 and 2. Subsequently, we extracted expressions into concepts using the decomposition of the singular value - a way that when evaluating expressions takes into account the fact that some expressions may have a different meaning in the concept than their independent position (Miner et al., 2012). Based on the results of the decomposition of singular values, we found that in the case of family and non-family businesses, we obtained the largest percentage of data from the first concepts (Figure 1 and Figure 2). Increased concepts have a similar informative value, but in research we will work with the first two concepts, for greater objectivity. We displayed the values of the first two concepts in a scatter plot (Figure 3 and 4), where we focused on the extremes that arose in the graph. Based on the clusters in these places, we can determine what

individual stakeholders focus on in family and non-family businesses in the gender issue of business management.

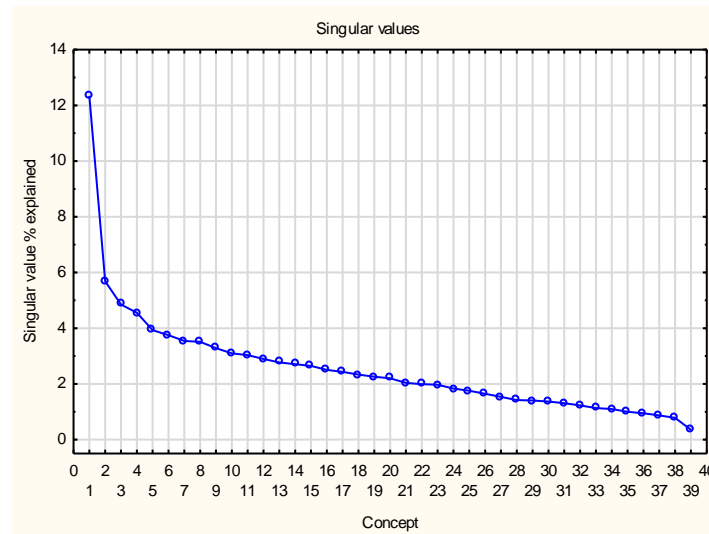


Fig. 7 - Singular values - Non-family business. Source: own research

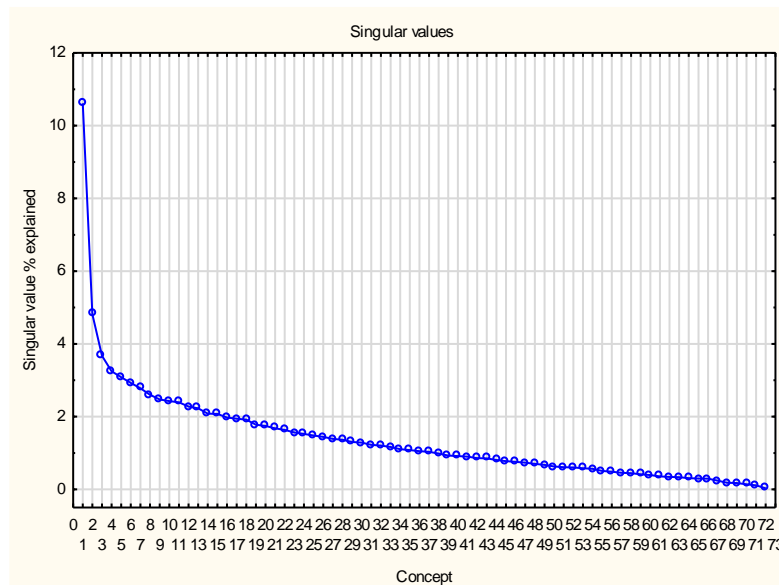


Fig. 8 - Singular values - Family business. Source: own research

## 4 RESULTS

In the international environment, it is more difficult to distinguish a family business from a non-family business, especially if it is a branch abroad. In the answers of the respondents who work in these companies, we examined their views on the position of women in the management of the company.

Respondents from international family businesses gave the greatest weight to the topic of women in management (Table 1) to parenthood as well as non-family businesses. Unlike non-family businesses, this is not such a career barrier for family businesses. Family businesses are typical that if a woman is in management from a family status, which is also said in the second expression - succession, her position is not as endangered as in non-family businesses. Women in family businesses during parenthood can still be actively involved in management, although

not to such an extent, but at the same time educate the future successor of the family business. For women in family businesses, involvement in management is more natural than in non-family businesses. Gender came out as the fifth expression with the greatest weight, which is precisely aimed at the fact that in multinational family businesses it is not the person's gender that looks at the person's gender, but his or her status in the family.

Tab. 3 - Weight of criteria: Family business. Source: Output from Text Mining

expression	weight
parenthood	51,53
secession	45,55
parent	43,24
naturally	42,32
sex	42,22

In non-family-owned enterprises (Table 2), in addition to the above-mentioned parenthood, weight was also given to the areas of women's activity in the enterprise; non-family-owned enterprises prefer women in middle management rather than in CEO. They provide support mainly from a "gentler angle" and, of course, are affected by pregnancy, which does not have such a positive effect on the company as in a family business. In non-family businesses, more emphasis is placed on representation on supervisory boards than on company management.

Tab. 4- Weight of criteria: Non-family business. Source: Output from Text Mining

expression	weight
parenthood	21,83
area	21,16
support	20,93
pregnancy	20,62
board	20,56

In Figure 3, we see in the most positive cluster (top right) the terms parenthood, natural, flexible, adjust. This cluster shows us a positive approach to women's parenting in the management of international family businesses, as family businesses operate in a succession process, parenthood is taken positively for women in these businesses and does not hinder her career, as other family members in management create suitable conditions for blending parenthood with work.

If we look at the second cluster on a neutral level: women, company, work, men, we see that gender is not influenced at all in the management of family businesses, because there are negligible differences. The third cluster: can, equal, make, different, sex focuses on gender equality, even if they have different management. In concept 1, this cluster is in positive values, while in concept 2 we are already going to negative values. This fact arose from the still existing gender roles, where male respondents feel less superior.

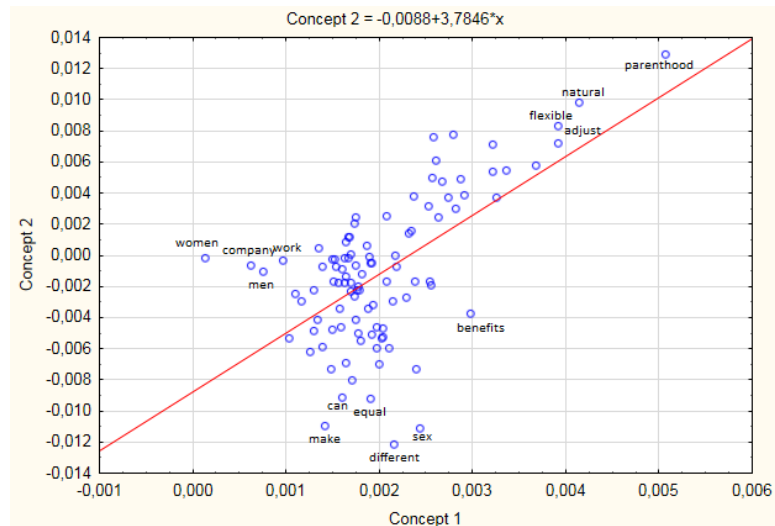


Fig. 4 - Scatterplot of Concepts: Family business. Source: own research

In non-family businesses, a similar evaluation was issued in some places, but the greatest focus compared to family businesses was in the place of women in management. During the interview, we found out that women in these companies are mainly in middle management, while in family companies and in the CEO. The first cluster (area, childbirth, parenthood, adjust, pregnancy, benefits, support) reaches positive values, in the current online age, pregnancy is not as much a problem in a career as it was in the past and if a woman is in lower or middle management, then it will not fundamentally affect her in a job position, but it will slow her down in her career growth. In the group of women, men, company we achieve similar results as in family businesses. The last group of director, can, board, points out to us that women are in non-family businesses, especially on supervisory boards.

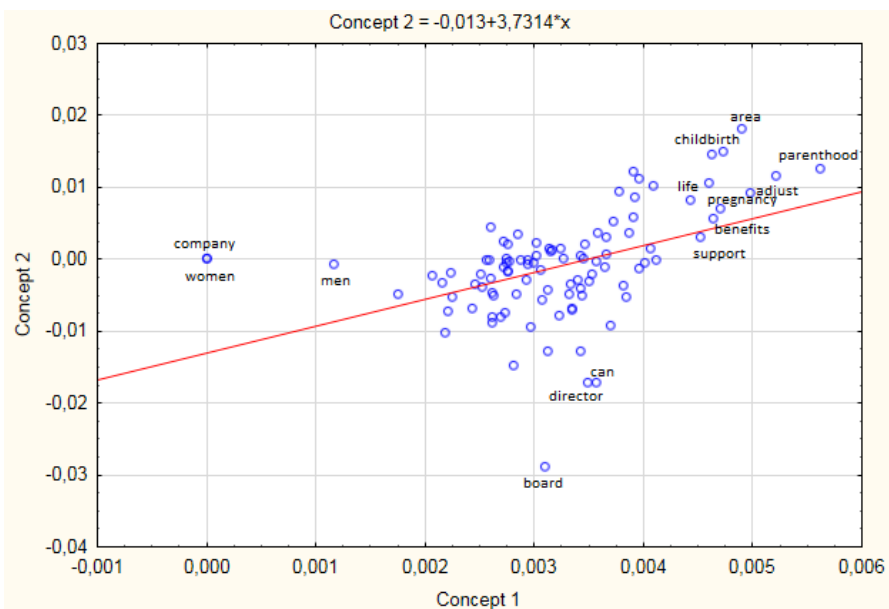


Fig. 5 - Scatterplot of Concepts: Non-family business. Source: own research

## DISCUSSION

If we compare these 2 models of clusters, we find that the view of women in family and non-family businesses is not so different. In both cases, parenthood plays an important role, with

the woman having to devote herself not only to her career but also to her family life (Hewlett & Luce, 2005). From the answers we found that in family businesses, parenthood of women in management is taken more positively than in non-family businesses, which is of course also influenced by family relationships in the management of family businesses. On the topic of gender representation in management, we see a similar position of men and women on the axis in both cases, when there were smaller differences in the view of gender in management. The status of the terms men and women is close to each other and with a minimal difference in status, which allows us to see gender balance with minor variations in the perspective of employees (Dawley et al., 2004). However, men achieve more positive results in the results, which corresponds to the statement of Langowitz and Minniti (2007), it is unlikely that women will be part of top management. The difference that arose was the representation of women in the CEO. Our results correspond to Barrett & Moores (2009), who claim that women are more represented in CEOs in family businesses.

In non-family businesses, women were under-represented in CEOs than in family businesses (Wilson et al., 2013), confirming research assumption 1. Another difference was that although women are more present in the CEOs of family businesses, in non-family businesses they are more often represented on supervisory boards (Sarkar & Selarka, 2021). However, if we look at the whole management, then a larger percentage of women in management had family businesses, which confirmed the research assumption 2. Meroño-Cerdán and López-Nicolás (2017) argue that age and level of education do not affect women's access to top management. Our findings also correspond to the research of Andersson et al. (2018), who argue that women find it easier to get into top management in family businesses. This fact is also influenced by succession (Drozdow, 1989; Wang, 2010; Bettinelli et al., 2019), according to Drozdow (1989) family business owners are more likely to choose daughters as successors than their worst sons.

## **5 CONCLUSION**

Family ponies are a specific form of business, because they combine family and work life of family members in business management. Although women have held various positions in society throughout history. Their representation in management is still low. In research, we found that women in family businesses have different options than in non-family businesses.

Multinational family businesses employ more women in management, especially as CEOs. This fact also arises from the influence of succession and holding power in the company in the hands of the family. The female CEOs are often the direct descendants of the company's founder. In contrast, in non-family businesses, we meet women more on supervisory boards than in CEOs. However, women are still preferred in middle management.

In the following research, our attention will be focused on the position of women in the succession process in the family business. The succession process is a critical process of any family business, so we see potential in research into the gender preferences of successors in family business owners.

### **Acknowledgements**

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## **Contact information**

### **Ing. Boris Rumanko**

Slovak University of Agriculture, Faculty of Economics and Management

Trieda A. Hlinku 2, Nitra, Slovakia, Department of Management

E-mail: xrumankob@uniag.sk

ORCID: 0000-0002-3320-8508

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# CONTROLLING AS A TOOL OF MANAGEMENT: AN EMPIRICAL STUDY IN SLOVAKIAN PRACTICE

*Mariana Sedliačiková, Anna Kocianová, Miroslava Vetráková and Mária Moresová*

## Abstract

Controlling is an effective tool of active management of the future of the enterprise. The aim of the paper is to determine the level of understanding and implementation of the controlling issue in the economic practice of wood and furniture small and medium enterprises in Slovakia, as well as the determination of potential interest in its implementation into the business and economic practice in the future of the enterprises, which do not use this support management tool. To meet the set goal, the questionnaire survey was conducted, addressed to Slovak small and medium enterprises in the area of wood and furniture industry. Those respondents who do not apply controlling, expressed subsequently an interest in its implementation in the future, however, especially from the category of small businesses. The results show that the scope of controlling application is not extended and that there is a considerable space for improvement. This is also indicated by the demonstrably lower interest of enterprises in the implementation of the controlling. From the point of view of the size division, the highest interest prevails among medium-sized enterprises. Micro and small businesses are uncertain in this step. The paper is beneficial not only from the theoretical point of view about the controlling issue but also from the practical point of view. It reveals a weakness in the management of small and medium-sized enterprises in the wood and furniture sector in Slovakia, which can be easily eliminated through continuous education, not only in the issue of controlling.

*Keywords:* controlling, small and medium-sized enterprises, wood-processing industry, management.

## 1 INTRODUCTION

Not only small and medium-sized enterprises, but even large enterprise often face low demand for their own products due to internal and external determinants. One of the solutions for declining demand or insufficiently efficient economic activity of enterprises is the application of controlling in the management process. (Havlíček, 2011; Potkány et al., 2011; Jánská et al., 2017). This is the essence of the importance of solving the problem of controlling and its application in practice. Also on the grounds, enterprises and their management solve the situation by optimizing cost items, which sometimes means reducing the number of employees. To prevent such decisions, it is necessary to apply the principles of controlling in order to maintain the core business of enterprises. (Potkány et al., 2012; Havlíček, 2016). This means primarily to maintain the existing focus of business activities and their sequence with an emphasis on the efficient and optimal amount of cost items. The cost savings should be as high as possible, but at the same time must allow the enterprise to carry out all the necessary activities in the full scope. Small and medium enterprises in Slovakia probably implement and apply controlling mainly in cases when they have foreign capital, which allows them to use this support management system effectively. This often requires know-how or experienced employees who know how to work with this tool (Sedliačiková et al., 2012; Potkány and Babiaková, 2013). Based on the above the main objective of the paper is to determine the level

of understanding and implementation of controlling issue in the economic practice of wood and furniture small and medium enterprises in Slovakia, as well as to identify the potential interest in its implementation in business and economic practice in the future. Therefore, the paper presents a total of four hypotheses aimed at clarifying the causes of different degrees of application of controlling and at the same time its aim is to reveal the attitude of companies to education in the topic of controlling as this topic has not been investigated in Slovak conditions yet.

## 2 LITERATURE REVIEW

In total up to 99.9 % out of the total number of enterprises in Slovakia are small and medium-sized enterprises (SMEs) (Malega, 2017; Belás et al., 2015). The basic characteristic of SMEs is therefore appropriate. In 2005, based on the recommendations of the European Commission, the definition of SMEs was specified, as shown in Table 1. Enterprises are divided into categories of micro, small and medium-sized according to the number of employees and annual balance sheet total or annual turnover. The category of medium enterprises is followed by large enterprises. However, it is not necessary to define them for the needs of this paper.

Tab. 1 – SME criteria. Source: McCarthy and Weitzel, 2011; Johnson, 2007; Deakins and Freel, 2006

Category	Number of employees	Annual turnover	Balance sheet total
Micro	< 10	$\leq 2$	$\leq 2$
Small	< 50	$\leq 10$	$\leq 10$
Medium	< 250	$\leq 50$	$\leq 43$

In some countries, a larger number of indicators were defined, such as the amount of profit, investments, type of capital, market share, production and sales volume, number of job positions. All of these criteria can be classified as technical-quantitative, while there is a number of weaknesses, as each criterion has a limited informative value (Donovan et al., 2006; Gunasena, 2017; Polkowski – Dysarz, 2017; Dvorsky et al., 2020). SMEs in Slovakia and worldwide present a relatively large (in terms of share of employment and value-added), fast-growing (in terms of dynamics of the density of start-ups) and relatively uncompetitive (in terms of labour productivity) corporate sector (Malega, 2017; Abdulaali et al., 2019; Shapira et al., 2011). They are referred to as the pillar of the market economy, or the essential element of a well-functioning economy. SMEs make an indispensable contribution to the economic growth, employment and competitiveness of each country (Bašová, 2018; Malega, 2017; Mattila, 2016; Hamáry-Gurová and Sedliačiková, 2016; Servon and Doshna, 2000). Slovak SMEs create up to 72.1% of all jobs and 54.4% of the value-added created in the economy. The importance of SMEs is even bigger in regions where foreign investments flow to a lesser extent. They are the main source of employment, form local capital and are the driving force of the economic development in the regions. Support of SMEs and creating suitable conditions for their business in the regions is the main prerequisite for further fast growth of the national economy as well as for reducing regional disparities. (Bašová, 2018; Malega, 2017; Zajko, 2010; Ropega, 2011).

The paper deals with the topic of controlling and the state of its application in the wood-processing industry (WPI) in Slovakia. The following section presents its basic characteristics. WPI includes the timber, furniture and cellulose - paper industry (Sedliačiková et al., 2019). It has got great potential in terms of environmental orientation, which shall be used as much as possible. Recently, there has been a growing interest in Slovak ecologic products, i.e. outputs of the WPI. The increased social effort for ecological direction and environmental protection promote the situation. A considerable shortage to the detriment of WPI is the absence of the long-term and targeted support focused on the comprehensive development strategy. A strategy

that will ensure the modernization of technological and technical equipment, increase the competitiveness of enterprises in the market and, last but not least, increase interest in this industry, either from the point of view of investors or entrepreneurs themselves (Hajdúchová and Hlaváčková, 2014; Malá et al., 2019; Sedliačiková et al., 2016; Stoková and Drábek, 2018). Wood is the input of WPI and its demand is covered mainly by national supplies. The forest coverage of Slovakia is 41.2 % (data from 2017). Deciduous trees are represented by a ratio of 63% and coniferous of 37%. Domestic processing of wood raw material is increasing year by year (Moravčík et al., 2018; Forestportal, 2017). The industry is profitable and investment efficiency is high. The current value of WPI production is at the level of 3 billion € and employs nearly 40 thousand people (SO SR, 2019; Moravčík et al., 2018; Hajdúchová and Hlaváčková, 2014; Michalski, 2015).

The concept of controlling has been present in practice since the nineteenth century. Therefore, many authors have already dealt with its definition and it has passed through several modifications. It is worth mentioning authors and their publications such as Eschenbach and Siller (2011), Šatanová and Potkány (2004), Jung (2007) and many others. Controlling may be understood as an effective tool of active management of the future of the enterprise, which connects various control and information subsystems. It serves as an information base for the management of the enterprise, for setting goals and planning. Further on it monitors the implementation of the plan, detects deviations, analyses them and then proposes corrective measures (Sedliačiková et al., 2012; Havlíček, 2016; Ratanova and Zhukovskaya, 2011; Gureva et al., 2016).

Controlling can be divided in terms of time dimensions into strategic and operational controlling. Strategic controlling has a medium to long-term character, i.e. it focuses exclusively on the future. Its essence is to look for future opportunities and threats in order to take such measures to ensure the existence of the company in future periods. It fulfils this role by taking decisive actions and monitoring their fulfilment. Through opportunities and threats, it is possible to define the external orientation of strategic controlling, i.e. focus on the business environment. However, it is not possible to reject its connection with the internal environment, influenced through targeted decisions made inside an enterprise (Weber and Schäffer, 2015; Jánková et al., 2017; Kruml and Cincalová, 2016; Sedliačiková et al., 2015; Lesnikova and Schmidtova, 2020). Operational controlling is the opposite of strategic controlling. It focuses on the present; the time horizon is in the range of short-term to medium-term goals. It uses information from the present or recent past to take such measures that would lead to effective management. It focuses mainly on the internal environment of the enterprise. Costs and revenues of an enterprise are the means to fulfil the set goals. The operational controlling is primarily oriented on profit management, while it uses available information about the cost and revenue items. The result is the adoption of management measures to meet the annual plan (Sedliačiková et al., 2012; Jánková et al., 2017; Kruml and Cincalová, 2016; Falko, 2011).

Controlling can be differentiated not only in terms of the time dimension but also in terms of the subsystems that complement the comprehensive controlling system. In addition to the relatively common controlling subsystems (cost, investment and financial), there are new dynamically developing subsystems. These are quality controlling and personnel controlling (Sedliačiková et al., 2012). Figure 1 shows their organization within the whole controlling system.

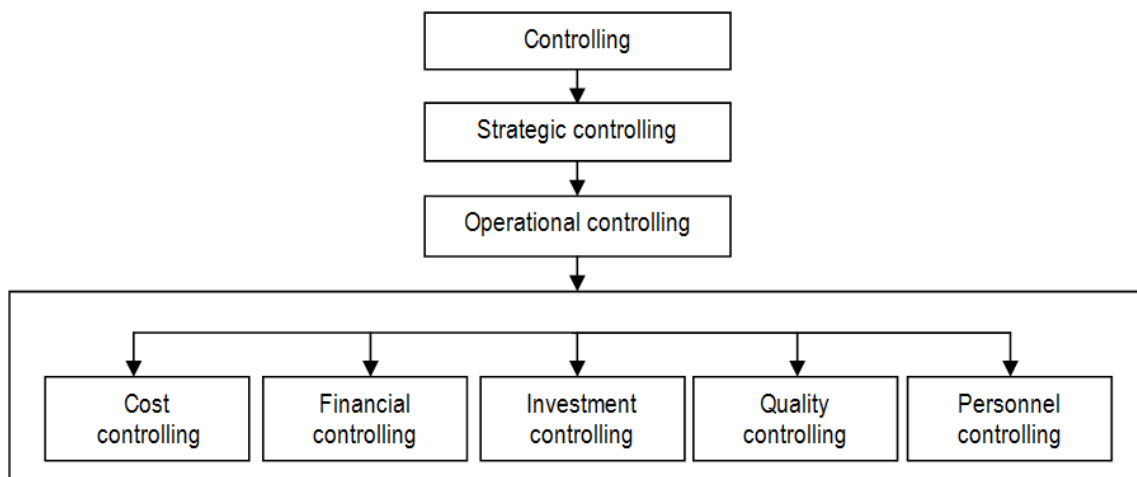


Fig. 1 – Structure of corporate controlling. Source: Sedliačiková, 2015

Cost controlling serves for economic management with the focus on the cost, revenues and profit. It uses the calculation and cost system. Financial controlling is used for cash flow management, within the meaning of primarily flowing outside the enterprise (Drábek and Sedliačiková, 2004; Dmytrenko and Kolisnyk, 2019). Investment controlling serves as an impulse for corporate management in the area of potential investments. It submits to the management the processed and evaluated investment opportunities, capital expenditure plans, project plans and other possible alternative documents that would serve to make the right decision in the investment area (Drábek and Sedliačiková, 2004; Engelbergs and Moreira, 2020; Claussen, 2003). Each enterprise challenges the goals for effective management at an optimal amount of costs and this can be supported by quality controlling. Besides this, it leads to the improvement of customer satisfaction in the future because it concentrates on ensuring the best production effects. At the same time, it identifies hidden reserves in the area of quality, the solution of which can contribute to the further development of enterprises (Wildenmann, 2000; Hardt, 2000).

If an enterprise decides to apply controlling, it enters the implementation process. This begins with the evaluation of the financial and economic situation of the enterprise through financial analysis. This will reveal the weaknesses and shortcomings that need to be solved as a matter of priority. The next step is the identification of a work team and employees who will be responsible for controlling in the enterprise. The issue of controlling software support also needs to be addressed. Implementing controlling is not an easy task and requires enough time until the first results are visible. The success of the implementation of controlling in an enterprise also depends on the schedule and its application, psychological factors on the part of employees and management (Sedliačiková et al., 2012; Havlíček, 2016).

### 3 METHODOLOGY AND RESEARCH METHODS

The subject matter is the issue of the application of controlling in the management of enterprises in Slovakia in the area of wood and furniture industry. In addition to the above, it is the level of its knowledge and ability or interest in the implementation of this support system in their own enterprises. The specific and main objective of the paper is to find out the level of comprehension and implementation of controlling in the economic practice of wood and furniture SMEs in Slovakia, as well as to identify the potential interest in its implementation in



business and economic practice in the future. In order to meet the set goal, a questionnaire survey was realized, addressed to Slovak SMEs from the wood and furniture industry.

The questionnaire consisted of seventeen questions, which were formulated as closed questions. The respondent, addressed owner or manager of the surveyed enterprises could choose from the offered options. This way was chosen due to demand on time, money and exactness. The questionnaire was divided into three parts. The first part related to the demographic data of the enterprise (size of the enterprise, length of operation on the market and type of enterprise according to the distinction into wood and furniture), the second determined the level of use and application of controlling and its subsystems in practice, the third was to identify interest in implementing controlling in the practice, or the realization of workshops on controlling for employees and management in the future. The questions formed an organized whole and their evaluation resulted in a total of seven areas which are elaborated in detail in the next part of paper.

At the time of the survey, 153,284 SMEs were operating in Slovakia, and according to the information provided by the Association of Wood Processors, approximately 5% of them are wood and furniture enterprises. According to the calculation, it is approximately 7,660 enterprises (Hajdúchová and Hlaváčková, 2014; Malá et al., 2019; Sedliačiková et al., 2016). The questionnaire was sent to 450 most important wood and furniture SMEs in Slovakia with a return of 30%, i.e. 135 completed questionnaires. The method of distribution electronically via the Internet (electronic questionnaire) was chosen after a phone agreement with an employee, responsible for the area of economics in the company. In addition to the above, the collection of questionnaires also occurred by sending an e-mail to the responsible employees or business owners. According to the criterion of enterprise size, the structure of the research sample is as follows (Figure 2):

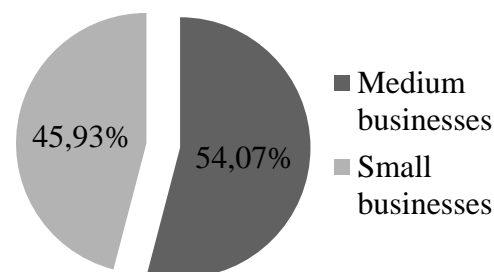


Fig. 2 – Structure of the research sample in terms of the size of the enterprises. Source: own research

The survey was evaluated descriptively and the results are presented in the form of tables and graphs. This type of evaluation of obtained data is based on the compilation of a frequency table using the frequencies of respondents' answers in individual indicators (Scheer, 2007; Pacáková, 2009). It is possible to create transparent bar graphs from data processed in this way. All results are shown and broken down according to the size of the enterprise, and thus they represent the differences of the surveyed characteristics of the individual categories.

The following hypotheses have been assumed:

H<sub>1</sub> = It is assumed that the level of application of controlling in SMEs varies depending on the size of the enterprise.

H<sub>2</sub> = It is assumed that the level of application of controlling in SMEs depends on the type of controlling subsystem.

H<sub>3</sub> = It is assumed that most SMEs are interested in workshops explaining the principles of controlling.

H<sub>4</sub> = It is assumed that SMEs are interested in implementing controlling in management.

Based on the hypotheses, questions were compiled and formulated in the questionnaire, while each (Q1 - Q5) focused on a different controlling subsystem and its application. Question Q1 focused on cost controlling, Q2 aimed at financial controlling, Q3 dealt with investment controlling, Q4 on quality controlling in terms of content and Q5 on personnel controlling.

In addition to the above, there were also future-oriented questions and questions concerning the interest or decision to implement controlling into business in case it hadn't been implemented so far (Q6). Question Q7 aimed at finding out the interest or non-interest in workshops in the enterprise that would deal with the application of the controlling and its comparative advantages.

## 4 RESULTS

The following findings emerged from the survey focused on mapping the state of controlling application in the management of wood and furniture SMEs. The individual questions in the questionnaire were put according to the division of controlling in the enterprise (Figure 1) into cost controlling, financial controlling, investment controlling, quality controlling and personnel controlling.

**Q1: Do you use Cost controlling in your enterprise?**

Regarding the use of cost controlling in the enterprise, it was found out that medium enterprises make up the largest share in terms of SMEs, at which this type of controlling is part of the management. Expressed in percentage, 50.8 % of medium enterprises have introduced the cost controlling in the management system, 16.6 % don't apply controlling and the rest of 32.6 % don't distinguish the notion of cost controlling or don't understand it.

From the point of view of small enterprises, the percentages in terms of the application of cost controlling are significantly different. At more than a fifth of small enterprises, the cost controlling is implemented in the management system. In comparison with medium enterprises, it is less than a half. The situation is in favour of medium enterprises, which to some extent corresponds to the scope of management itself and its position within the enterprise. The other comparison is shown in Figure 3, from which it can be deduced that approximately one third of small and medium enterprises don't distinguish the notion of cost controlling or don't understand it.

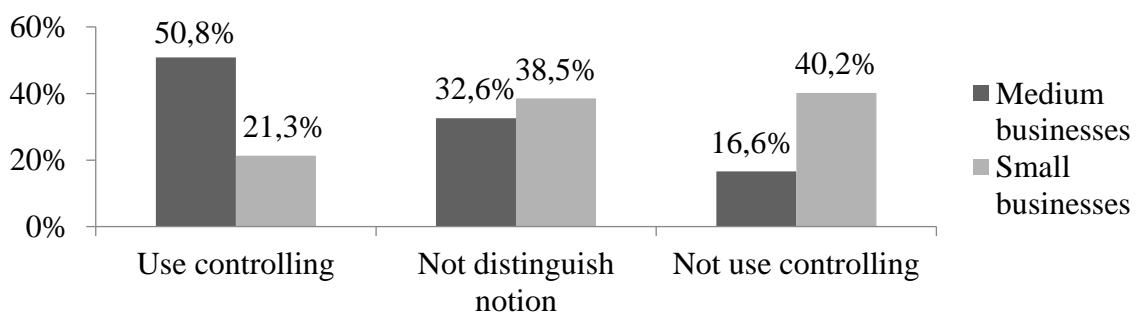


Fig. 3 – Application of cost controlling in the SMEs in Slovakia. Source: own research

### Q2: Do you use Financial controlling in your enterprise?

In terms of financial controlling, the share of medium enterprises that don't understand the notion of financial controlling is rather high. On the contrary, in the case of small enterprises, the share is slightly lower by 2%. It results that each of the controlling types is perceived differently. Financial controlling is implemented in small enterprises less than in medium businesses. The share of small enterprises represents 16.1% and the medium enterprises reach the level of 31.3%, i.e. it is again a lower range. This situation is considered unfavourable also due to the increase of the share of the businesses that don't apply financial controlling. Figure 4 shows a comparison, which indicates a rapid decrease in the application of financial controlling in practise.

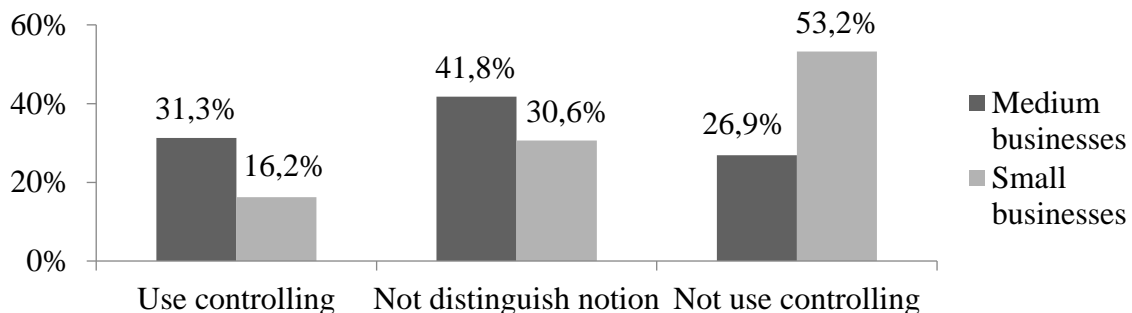


Fig. 4 – Application of financial controlling in the SMEs in Slovakia. Source: own research

### Q3: Do you use Investment controlling in your enterprise?

More than a third of medium-sized enterprises use the possibility of management support through investment controlling. The share of medium businesses is higher than that of small businesses also in this case, which is shown in Figure 5. The difference is almost threefold. For medium-sized enterprises, it is assumed that they also approach the application of investment controlling due to the drawing on the resources from EU funds, and therefore their share is much higher. It is the investment controlling that is helpful in the address preparation and implementation of investment projects, monitoring deviations from the required state and the preparation of corrective measures. Investment controlling helps to make the whole process clearer and simpler. However, the share of medium-sized enterprises that do not distinguish the notion of investment controlling is rather high and almost a quarter of all respondents do not even apply it. From the point of view of small businesses, more than half do not distinguish the notion of investment controlling and almost a third do not apply it.

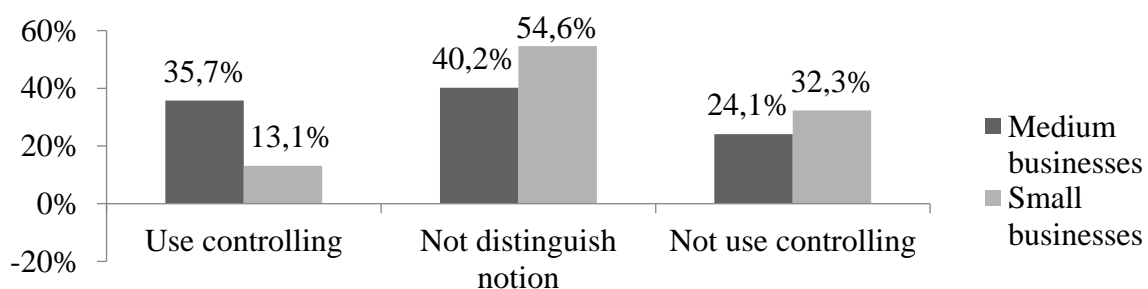


Fig. 5 – Application of investment controlling in the SMEs in Slovakia. Source: own research

**Q4: Do you use Quality controlling in your enterprise?**

Out of the whole group of the surveyed controlling variants, the quality controlling appears the least used and least known. The survey shows that both types of enterprises, i.e. small and medium-sized, it is an underestimated support management tool in the enterprise. Quality controlling is an opportunity to minimize costs (or their optimization) to meet the conditions of the best effects and overall economic results of the enterprise. Therefore, the unfavourable state of awareness and use of this controlling subsystem is alarming. Although the difference in shares for small and medium-sized enterprises is very small, it is again in favour of medium-sized enterprises. The observed differences are shown in Figure 6.

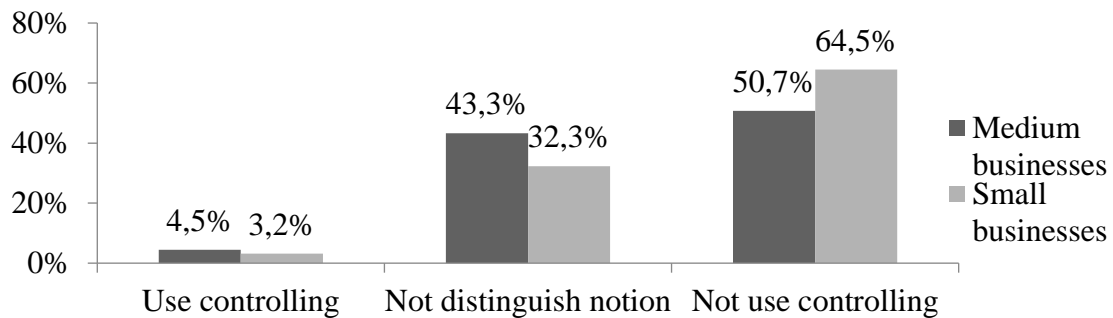


Fig. 6 – Application of quality controlling in the SMEs in Slovakia. Source: own research

**Q5: Do you use Personnel controlling in your enterprise?**

In the last monitored subsystem of controlling, the share of medium businesses that apply personnel controlling is again higher. In particular, more than a fifth of medium-sized enterprises use the support for personnel management also by personnel controlling. At this subsystem, it was observed the biggest share of small and medium-sized enterprises that don't distinguish this notion or don't know what it means. Other two thirds of small and medium businesses don't apply nor use the personnel controlling in their enterprise. Figure 7 shows the results with the differences in the surveyed groups.

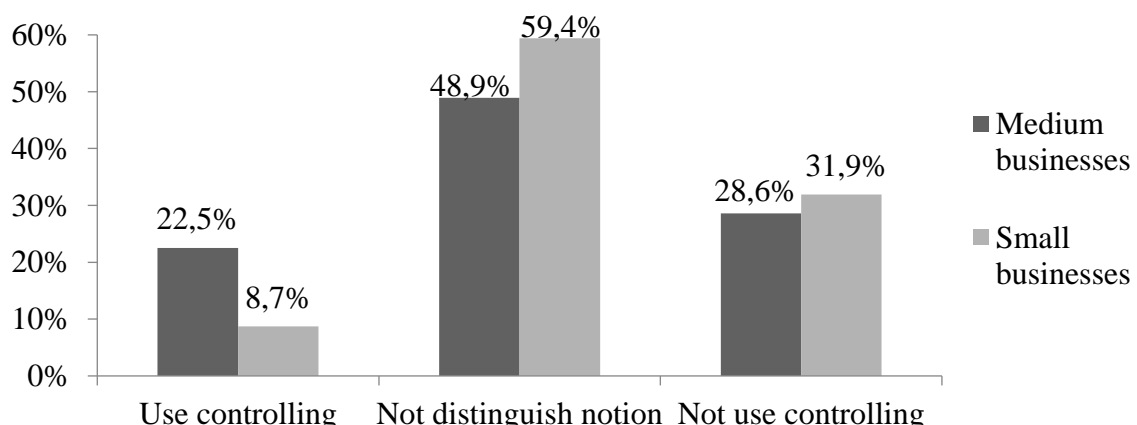


Fig. 7 – Application of personnel controlling in the SMEs in Slovakia. Source: own research

**Q6: Would you welcome a workshop about the controlling issue in your enterprise?**

Approximately two-fifths of the respondents answered positively and would therefore welcome the organization of a controlling workshop in their enterprise. This is a positive finding. More than a fifth of medium-sized and one third of small businesses did not comment specifically on the issue. This means that the number of consensus statements could increase if the conditions for organizing workshops were specified. It is necessary to express that enterprises are

interested in management development and progress and therefore, the hypothesis H<sub>3</sub> can be confirmed, which followed the statements of the authors (Havlíček, 2016; Vuko and Ojvan, 2013). These stated in their papers that education is welcome in connection with the innovations of the management system. Also, in this case, the share of consents is higher at medium-sized enterprises, which have greater development opportunities. However, in this particular case, the difference is very low at 3%, as shown in Figure 8.

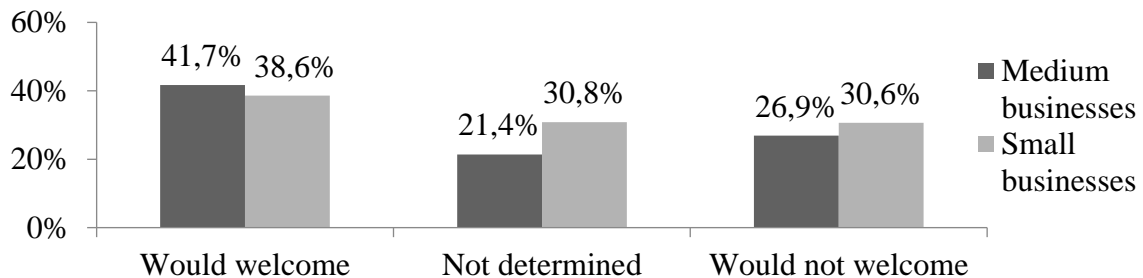


Fig. 8 – Opinion about organizing controlling workshop in the enterprise. Source: own research

**Q7:** *Would you be interested in controlling implementation in your enterprise?*

The question about controlling implementation in the enterprise showed a significant uncertainty resulting from this step. There was added an option for answer - Think so, but not sure, as Figure 9 shows. It means in the practice that even though enterprises think about this possibility for management support, they feel some uncertainty. It can result from the specific reasons such as fear from the unknown, lack of financial or capacity sources, feeling of uselessness of controlling in the management and many others that could be solved separately within the topic of the problems of controlling implementation. The trend that medium-sized enterprises are more determined and ready to implement controlling into corporate management has been confirmed again. They have exceeded the share of small enterprises four times in case of interest in controlling implementation.

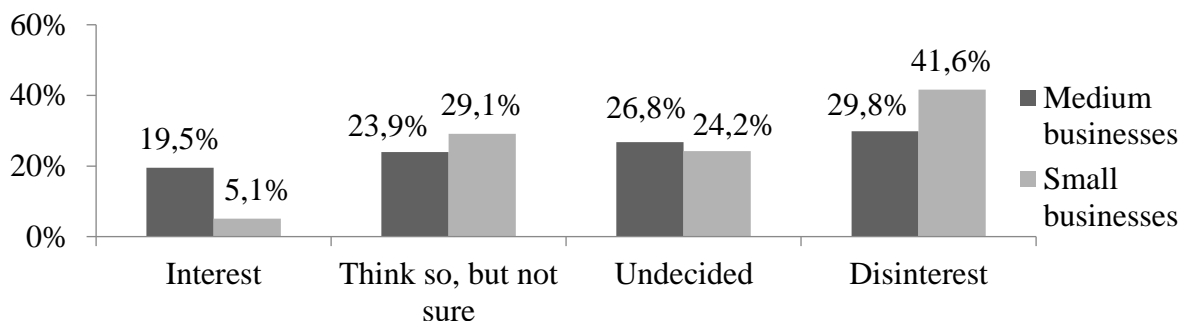


Fig. 9 – Opinion about controlling implementation in the enterprise. Source: own research

## 5 DISCUSSION

Based on the results of the survey, it can be stated that medium-sized enterprises of the wood and furniture industry in Slovakia use and apply individual subsystems of controlling to a greater extent than is the case of small enterprises. The cost controlling subsystem is applied to the greatest extent and quality controlling to the lowest extent. Personnel controlling seems to be the greatest unknown for SMEs.

Hypothesis H1 and H2 have been confirmed, which were derived from the claims of Havlíček (2016), Havlíček (2011), Riemenschneider (2003), Becker et al. (2011) and Deming (2017) that

the level of application of controlling in SMEs varies depending on the size of the enterprise and the type of controlling subsystem.

The mapped situation about the controlling application in the practice of Slovak wood and furniture small and medium-sized enterprises hasn't proven its wide scope of application, and therefore the enterprises were questioned also about the controlling implementation and controlling workshops. The results showed and confirmed the hypothesis H<sub>3</sub>, derived from the claims of the authors (Havlíček, 2016; Vuko and Ojvan, 2013; Gunther and Schomaker, 2012; Marková et al., 2017), that enterprises welcome any form of education in the area of the solution of management system innovations.

The survey further on showed that wood and furniture SMEs in Slovakia apply controlling in the management to a lesser extent than expected. Figure 9 shows that the interest in implementing controlling into an enterprise exceeds at medium businesses more than in the case of small businesses. At the same time, the hypothesis H<sub>4</sub> that SMEs are interested in applying controlling was not confirmed. This resulted from the statements of Kruml and Duspiva (2015), Sedliačiková et al. (2016), Jelačić, et al. (2015), Feldbauer-Durstmuller and Hiebl (2015) and Becker et al. (2011) based on their findings of positive impacts of controlling, implemented in the management system of SMEs. The survey showed that small businesses are not as interested as medium-sized businesses, which is probably due in particular to their financial situation. When it comes to the interest in implementing controlling in an enterprise, a relatively large part of enterprises is unsure about their decision to introduce controlling into the management system. Likewise, a large proportion of businesses did not take a specific opinion on this matter. Both may be related to the non-specification of conditions related to the introduction of controlling into the enterprise, whether financial, personnel or other.

Wood and furniture SMEs in Slovakia use controlling as a management tool, however, not to the maximum extent. There is certainly much room for improvement and development in the application of this managerial tool. SMEs should approach the issue responsibly and take into account that without continuous and targeted education, development, targeted support, their further development will not be possible. Although results of education cannot be seen immediately, they will certainly manifest in the near future. Therefore, SMEs should also invest a certain amount of funds into development, for example in the form of the application of controlling in management. It is also one of the tools to support competition, financial health and stability.

## **6 CONCLUSION**

The aim of the paper was based on the results of a questionnaire survey realized in small and medium-sized enterprises in the field of wood and furniture industry in Slovakia, to clarify the state of awareness and application of the support management tool - controlling, in the enterprises. At the same time, on the basis of the determined state, find out the level of interest in the implementation of controlling in those enterprises that do not use this tool. The paper presents findings on the level of application of controlling in enterprises and according to its individual subsystems (cost, financial, investment, quality and personnel controlling). The findings confirmed the assumed hypothesis that the degree of application of controlling in enterprises is also different based on the size differentiation into small and medium-sized enterprises. The implementation of controlling is more significant at medium businesses; from the point of view of the typology, cost, financial and investment controlling prevail. Based on the above, the hypothesis was also confirmed, which assumes a different degree of application of controlling according to its types and subsystems. The finding that almost half of the SMEs are interested in organizing workshops or other forms of education about controlling and its

introduction into the enterprise seems to be positive. However, it is striking the finding on the issue of implementing controlling from among those enterprises that have not done so yet. A large proportion of enterprises are namely undecided or uncertain on this matter. Only a fifth of medium-sized enterprises are convinced of the implementation of controlling and in comparison with small enterprises, the share is even lower, by almost a quarter. The paper is a benefit not only for theory but especially for practice. It reveals a considerable space for improvement. This can be observed in systematic education about the benefits of controlling for the practice of small and medium-sized enterprises, which is related to the optimization of cost items, but it also brings other positive benefits (growth in demand, profit, employee loyalty, etc.) The state of complete knowledge of controlling and the steps necessary for its implementation in the enterprise would also increase the share of enterprises decided to introduce controlling into their management.

### **Acknowledgement**

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## **Contact information**

### **prof. Ing. Mariana Sedliačiková, PhD.**

Technical university in Zvolen, Faculty of Wood Science and Technology  
T. G. Masaryka 24, 960 01 Zvolen  
E-mail: sedliacikova@tuzvo.sk  
ORCID: 0000-0002-4460-2818

### **Ing. Anna Kocianová**

Technical university in Zvolen, Faculty of Wood Science and Technology  
T. G. Masaryka 24, 960 01 Zvolen  
E-mail: xkocianovaa@is.tuzvo.sk  
ORCID: 0000-0001-6169-8578

### **Ing. Miroslava Vetráková**

Technical university in Zvolen, Faculty of Wood Science and Technology  
T. G. Masaryka 24, 960 01 Zvolen  
E-mail: xvetrakova@is.tuzvo.sk  
ORCID: 0000-0003-2485-1961

### **Ing. Mária Moresová, PhD. et PhD.**

Technical university in Zvolen, Faculty of Wood Science and Technology  
T. G. Masaryka 24, 960 01 Zvolen  
E-mail: maria.moresova@tuzvo.sk  
ORCID: 0000-0001-6815-0724

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# **ANALYSIS OF FINTECH IN THE BANKING INDUSTRY: OPPORTUNITIES AND CHALLENGES IN CENTRAL AND EASTERN EUROPEAN COUNTRIES**

*Albulena Shala, Vlora Berisha*

## **Abstract**

The purpose of this study is to make an Analysis of FinTech usage in the banking industry and to highlight the Opportunities and Challenges in Central and Eastern European countries in adopting FinTech. Using a comparative analysis, the most progressive countries regarding the development of fintech companies in Central and Eastern European (CEE) region are: Czech Republic, Slovenia and Poland. The main challenges that banks in CEE countries may bring from cooperation with fintech companies are: data security remains as a main challenge, difficulty in hiring qualified personnel to make the collaboration effective, regulatory issues, banks are becoming more dependent on financial technology solutions. While the main benefits are: bank customers would benefit from the opportunity to transact using cutting-edge technologies, saving time, effort, and money in the process, joint investment in technology, innovation, in terms of high transaction volumes with a low operating cost. Fintech companies can also benefit from these collaborations such as: in a pure peer-to-peer lending model the fintech platform does not take any risk, financial markets are highly standardized and low-cost, they can gain access to a certain market as well as the customers within that region. However, they also have challenges in the CEE market: Cybersecurity risks, lack of support system for fintech innovation, lack of a clear fintech strategy by regulators and policy makers, emigration of local talent or “brain drain” and smaller domestic market.

**Keywords:** *Fintech, CEE countries, Banks, Opportunities, Challenges, Sustainability*

## **1 INTRODUCTION**

Banks have had no major rivals for a long time. For financial facilities, consumers have always had to pay higher and sometimes undisclosed rates. However, digital innovation has shook and reshaped the banking sector in the last decade, with emerging technologies transforming consumer interactions and experiences. Financial Technology's key aim is to drive the industry to success. In order to offer their services, banks will have to continue to collaborate with fintech businesses and non-traditional financial services firms, due to new transparent banking legislation. Fintechs are mainly start-up technologies and financial expertise companies that provide domain-specific products and services that are now sold by conventional financial institutions such as banks, asset management firms and insurance firms.

Banks and the financial industry around the world are undergoing a technological transformation that is reducing the position of today's banks and allowing institutions and individuals to create better, quicker, and cheaper services, making them an ever more important part of daily life.

Baba et al. (2020) mention that fintech loan platforms vary from conventional bank lending services in a few main aspects. Fintech companies use interconnected digital networks to communicate with consumers entirely or partially electronically, without human involvement in individual transactions. Despite the fact that commercial banks are expanding their online

offerings, most loan applications still necessitate any face-to-face contact. Another defining characteristic is the use of cutting-edge techniques for processing vast volumes of consumer data and assessing creditworthiness.

Therefore, the main purpose of this study is to identify the advantages and challenges of banks from cooperating with fintech companies. The second goal is to identify the challenges and opportunities that fintech companies have in CEE countries. The last goal is to identify the countries for the best opportunities and those at a disadvantage when it comes to the development of fintech companies. Countries that include from CEE region are: Albania, Bosnia & Herzegovina, Bulgaria Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia and Slovenia.

This study has a special contribution in highlighting the level of use of fintech by banks in CEE countries, and is one of the first studies that addresses the pros and cons of fintech in the banking industry for whole Balkan countries.

This paper is organized as follows: Section 2 includes a literature review. Section 3 includes methodology that is used for this study. Section 4 it provides an extensive analysis of recent trends in fintech and banking sector in CEE countries. Section 5 identifies the main challenges and opportunities for both industries as a result of their collaboration and summarizing the results. Section 6 includes conclusions and recommendations.

## **2 LITERATURE REVIEW**

As a result of the emerging operation of fintech start-ups in the financial industry's grassland, policymakers, regulators, supervisors, and foreign institutions have taken note and are starting to explore the new environment as well as academics are responding by holding conferences and publishing special issues of journals devoted to fintech studies (Bofondi and Gobbi, 2017).

It is important for banks to be able to test and incorporate the latest technological solutions in order to dramatically boost their competitive position in the future. Banks that have adapted their business models to take advantage of the opportunities created by financial technology will be the most competitive banks in the future. In accordance with Goldfarb and Tucker (2017), digital technologies minimize five forms of economic costs: (i) search costs; (ii) replication costs; (iii) transportation costs; (iv) monitoring costs; and (v) verification costs.

The introduction of new techniques could result in lower financial intermediation costs and better products for customers. Fintech facilities, for example, can help in better assessing the creditworthiness of loan applicants during the screening process, as well as improving the interface between financial clients and their service providers (Vives, 2017). According to Rabbani, Khan, and Thalassinou (2020) fintech as a term emerged in 1972 by Abraham Leo Bettinger in 1972 by saying "FinTech can be defined as a contraction which combines bank experience and expertise with information technology". Meanwhile, Puschmann (2017, p.70) reports that the term is most likely first mentioned in the early 1990s: "the term "fintech" is a contraction of "financial technology" and was most probably first mentioned in the early 1990s by Citicorp's chairman John Reed in the context of a newly founded "Smart Card Forum" consortium". Oxford Dictionary defines "FinTech is the traditional financial services provided through the use of information technology".

Either bank accepts digitalization or risk losing their customer base. Financial Stability Board (2019, p.1), defines fintech as "technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services." Also, we have another definition of Fitches: "Fintech are Internet-based startups that build products that allow or provide new financial

services” (Dapp et al., 2014). Meanwhile, Bömer and Maxin (2018, p.5) mention that: “The term fintech is a contraction of financial technology and encompasses young companies that develop internet-based technologies that enable or provide financial services”. Fintech, according to Schueffel (2016, p.5), is: “a new financial industry that applies technology to improve financial activities”. In conclusion, fintech is bringing new products, business models, and players to the financial landscape.

The payment system and part of the intermediation chain are moving outside of the conventional financial ecosystem. These developments are putting pressure on incumbents, who are the potential for productivity improvements, improved accessibility to financial services, and lower end-user prices is great, but great opportunities often come with great risks, and regulators will face a challenge in the near future in protecting against risks that can bring the technology (Bofondi and Gobbi, 2017). Bofondi and Gobbi (2017) emphasize that defining and tracking threats is just the first and perhaps easier challenge for regulators. Designing the rules and establishing the regulatory perimeter is the next and much more difficult step. Regulators and supervisors have a great deal of experience dealing with banks and markets, much of it acquired at the expense of painful crises. However, they are still developing their capacity to deal with the shadow banking system, of which fintech companies are the most dynamic component. Fintechs are classified into many categories, with the largest category consisting of companies involved in the banking industry. The insurance industry is a second important group. These fintechs are commonly referred to as insurtechs (Bömer and Maxin, 2018).

In order to offer their services, banks will have to continue to collaborate with fintech companies and non-traditional financial services firms, thanks to the new open banking regulations. Banks are still searching for ways to improve their services and products for their huge customer base. Meanwhile, fintech companies are working hard to develop themselves as long-term financial solution providers through customer activations. They are entrants to the financial industry, competing with incumbent banks and insurers (Lacasse et al. 2016; Jakšič and Marinč 2015). The Financial Stability Board (2017, p.8) in relation to financial regulation organizes fintech activities in five broad categories: (i) payments, clearing and settlement; (ii) deposit, lending and capital raising; (iii) insurance; (iv) investment management; and (v) market support. In line with Puschmann (2017) fintech solutions vary in terms of the providers and types of interactions they support as well as the banking and insurance processes they support: (i) Banks-Fintech services focus on interactions between customers and banks or only among customers, depending on the supplier type (bank/non-bank) and the interaction type, (ii) Insurers-Fintech solutions cover insurance-related processes such as client advice, life and non-life insurance, claims and risk management, as well as cross-processes. Klus et al. (2019) identify five reasons why banks form strategic partnerships with fintechs. The first one, banks outsource projects to fintechs as part of strategic alliances in order to save time and money. Second, banks are looking for fintech partnerships to help them speed up their innovation processes. Third, bank’s view fintech investments as Mergers and Acquisitions (M&A) transactions that will benefit their own business models. Fourth, banks are eager to work with fintechs in order to boost revenue by providing innovative fintech services. Fifth, banks want to gain access to fintechs' technical knowledge and learn from their process execution methods. Also, Klus et al. (2019) mention four motives for fintechs to cooperate with banks: resources and synergies, trust and credibility, customer acquisition and learning. However, Kalmykova et al. (2016) and Burgmaier and Hüthing (2015) argue that fintechs and incumbents in the finance sector will be better off cooperating rather than competing. Bömer and Maxin (2018) argue some special characteristics to focus on collaborations between fintechs and financial industry: First, the financial crisis of 2008 caused increased regulation of financial institutions, especially

in Europe and the United States. The aim of this increase in regulation was to ensure the financial market's stability. In reality, financial sector regulation has had a significant effect on both incumbent banks and insurance companies, as well as fintechs. Second, the finance industry has a unique business-to-consumer relationship. Finally, other industries (e.g., pharma/biotech) have traditionally faced greater innovation risk, while the financial sector has not had to deal with new developments in recent decades. There are three main reasons for this cooperation, as stated by Gomber, Koch and Siering (2017). First, fintech companies provide new products and solutions that address customer needs that were previously unmet or inadequately addressed by traditional financial service providers. Second, fintech companies used new technologies and concepts to develop new sales opportunities for products and services. Third, IT companies often have a culture that differs significantly from that of traditional financial services firms.

Although the fintech market covers all areas, the maturity level of the different fintech solutions varies in terms of the process areas covered. Vives (2017), highlight that the fintech sector is limited in relation to the size of financial intermediated assets and capital markets, and Europe lags behind the US and China in terms of both size and growth rate. Only the United Kingdom has made considerable progress in the European Union (EU). Haddad and Hornuf (2019) also investigate into the economic and technological factors that influence fintechs in 69 countries. They show that as the latest technology is available in the market, countries witness more fintechs because young businesses need these innovations for their products. Fintechs are also more common in countries with a more fragile financial market, according to the authors. Just as Jakšič and Marinč (2015) mention that to improve the customer experience, banks should improve their IT systems.

Of course, such collaborations bring risks and challenges for both parties. In line with Panetta (2018) fintech regulation is still in its infancy, with regulatory frameworks varying from country to country. The authorities' key task is to strike the right balance between the overarching goals of promoting innovation and competition on the one side, and maintaining the integrity of financial markets and ensuring consumer security on the other. Regulation should be designed in order to accomplish these goals. First, it should ensure a level playing field to prevent regulatory arbitrage and distortions. Second, considering the rapid change that will impact the fintech sector in the future, regulation and supervision should be flexible in order to promote creative projects and prevent any barriers to future developments that will affect the supply of innovation projects. Third, a true level playing field will necessitate financial sector authorities in each country – such as bank and insurance supervisors, market authorities, and so on – cooperating with one another as well as with regulators in other fields like data security, cyber risk, and antitrust. Based on Anikina et al. (2016) fintech responded to investors' need for more protection by offering creative and reliable financial services. Another reason for fintech's emergence is the need for more affordable financial services that offer mobility and pace. Fintech companies have provided traditional banks a chance to go digital and offer low-cost financial services. According to Navaretti et al. (2018), banks have a few strategic advantages as well. Banks profit from customer's concerns about the safety of their liquid assets. While the financial crisis of 2007-09 raised questions about bank stability, banks are still seen as a safe place for money. Being a bank with a license and an implied government guarantee is valuable. Banks may also be able to provide useful enforcement expertise. As mention by Vatanasombut et al. (2008) relationship commitment means that a relationship is precious and should be protected. Due to legal and policy concerns, banks must state that they will not share customer information with third parties without the customer's permission and this policy will be communicated on their website. Meanwhile Coutu (1998) mention that in internet environments, trust is critical, also, a high level of trust is required for the efficient operation of



such computing environments. In table 1, are summarizes the opportunities and challenges faced by banks during the cooperation with fintech companies that we have encountered in the literature.

Tab. 1 – Opportunities and challenges of banks from fintech companies. Source: Authors’ summary using data from: Temelkov, (2018); Gnanmote (2018); World Bank (2020); Manatt (2016, pp. 17-23)

<b>Opportunities</b>	<b>Challenges</b>
Investors do not have any recourse to public guarantees.	Partial loss of the market shares due to new competitors (especially in payments, credit cards, simple savings).
Fintech companies providing services complimentary to bank services (e.g., providing technologies used by banks to provide financial services).	Increased margin pressure, resulting in lower revenues.
Increased access to customers in new geographies and to customers in younger age groups	Increased fraud risk and operating risk.
They could partner with fintech companies to use their cutting-edge technology and still continue to be the transaction authenticating authority, to ensure safety and security in all transactions.	Banks are becoming more dependent on financial technology solutions.
Partnerships between banks and fintechs could open the door to joint investment in technology, innovation, and various acceleration programs aimed at various areas of banking for mutual growth.	The emergence of new industry competitors delivering advanced, high-quality, would eventually intensify competition for conventional banks, resulting in consumer losses.
The majority of policymakers and regulators in both developed and emerging countries are promoting and loosening legislation to encourage the use of technology in banking and financial markets. Both banks and fintechs can leverage this support.	As a result of increased competition, bank revenues from financial services have decreased.
Banks and fintechs should collaborate and provide a variety of products and services to their clients. This would draw new customers.	Cybersecurity issues.
Bank customers would benefit from the opportunity to transact using cutting-edge technologies, saving time, effort, and money in the process. High transaction rates and low running costs in a short period of time would favor both banks and fintechs.	High risk of investment.
Thanks to such partnership, it would be a win-win scenario for banks and fintechs, and the rate of return on investment will most likely be higher in the long term, given the high volumes and low operational costs.	Legal/regulatory issues. Technical complexity of adding fintech functions. Difficulty in hiring qualified personnel to make the collaboration effective.

Romānova and Kudinska (2016) mention that fintech's growth has been seen by others in the financial services sector as a challenge to conventional banking. Others say fintech has evolved into a challenge that can be turned into an advantage because it offers more stability, improved functionality in certain aspects of banking, and service aggregation. As a result, the evolution of fintech and its implications for the future of banking are key issues right now. Table 2 summarizes the challenges and opportunities faced by fintech companies.

Tab. 2 - Opportunities and Challenges of Fintech Companies. Source: Authors’ summary using data from: Temelkov, (2018); Gnanmote (2018); World Bank (2020); Manatt (2016, pp. 17-23).

<b>Opportunities</b>	<b>Challenges</b>
Investors do not have any recourse to public guarantees	Cultural fit.
A high degree of automation; a low share of fixed assets; low capital requirements; low regulatory and compliance costs.	Cybersecurity issues.
Focus on convenience and simplicity in customer experience.	Inadequate returns available from their customer base
Digitally active and younger customer base. A large share of IT specialists among employees.	Legal/regulatory issue.
In a pure peer-to-peer lending model the fintech platform does not take any risk.	Excessive overhead involved in adding fintech functions to their systems
Fintech lending companies are typically not subject to bank licensing requirements.	Banks hold good market positions, and more consumers choose to use banks for stability and confidence purposes. In contrast to conventional banks, fintech companies do face

Financial services/products of lower risk (e.g., loan default risk, maturity risk), etc.	difficulties in winning confidence and proving their reliability.
In fintech lending models (P2P and Crowdfunding) the risk is taken by investors, meanwhile in Balance Sheet model risk taking is fintech platform and in Other models the risk taking is by Investors or mixed. P2P lending has opened up new services for many kinds of clientele.	If you work in the fintech industry, you can expect to comply with regulations on a regular basis. Globally, fintech startups are under - pressure to overcome and comply with current or future regulatory barriers.
Fintech lending services are regulated at the EU or national level, or unregulated.	Understanding how players screen borrowers when allocating credit is a key challenge for P2P finance.
Financial markets are highly standardized and low-cost. Gaining a partner with market credibility. Increased access to customers in new geographies and to customers in younger older groups.	Fintech players often fall outside the applicable regulatory and supervisory framework, creating an uneven playing field between established financial institutions and new fintech players.
Internet-based and therefore not geographically concentrated;	Depositor and investor risk.
Through partnering with a bank, they can gain access to a certain market as well as the customers within that region.	Consumer and business risks will rise, particularly if consumer protection standards are poor or inconsistently enforced.

Certain bank operations, such as deposit taking, cannot be left unregulated and unsupervised. Banks may be able to maintain their competitive advantage in this situation. Fintech companies may be excellent innovators, but they have a high failure rate. Jakšič and Marinč (2015) in their study emphasized that banks compete for customers not only with established IT firms, but also with start-ups. The traditional players in banking and financial services are facing a significant transformation with the rise of digital finances in a rapidly changing economic climate and in light of demanding and expensive regulatory requirements.

### 3 METHODOLOGY

The study's methodology is based on a comparative analysis of developments in the fintech and banking industries for CEE countries.

The topic of how many cases should be investigated, as stated by Lor (2010), is one of the most influential topics addressed in comparative methodology texts in the social sciences (where cases refer mostly to countries). Thus, he counts three key comparative study designs: single-country studies, many-country (large-N) comparisons, and few-country (small-N) comparisons. Similarly, a three-part classification of comparative research was introduced by Landman (2008) to evaluate multiple countries, several countries, and single-country research. Lor (2010) suggested that we typically ought to pick or combine countries, or both, in comparative studies. He also often discusses critical sample collection problems. The first step in choosing specific countries, according to him, could be to restrict the scope to countries in particular areas or groups, such as democratically governed countries, Islamic countries, or developing countries. Landman (2008) developed a three-part grouping of comparative analysis to compare different nations, many countries, and single-country research. Lor (2010) proposed that in comparative studies, we can usually select or mix countries, or both. He also addresses critical sample selection questions regularly. The first step in choosing specific countries, according to him, could be to limit the scope to countries in particular areas or groups, such as politically ruled countries, Islamic countries, or developing countries.

As summarized by Azarian (2011, p.113), comparative analysis: “as a method strategy, comparison plays an important part in the most diverse branches of the humanities and the social sciences alike; and while its early uses can be traced back to the Antiquity, it seems to be more fashionable and evolving than ever, as results from contemporary comparative research can be found in nearly all disciplines and applied to the study of almost any topic, ranging from comparative study of the working conditions across nations, to the analysis of the differences

of life values within a single societal context, to the examination of the contrasts of face-work in various cultures, to the study of the varieties of written documents in different countries.”

Considering the method used in this study, two stages were followed. The first stage analyzed the banking sectors and the relevant reports for level of fintech companies of the countries that are involved, and the second stage, analyzed all this data to highlight which of the countries are more progressive and which are less. Also, based on the analysis of this data, challenges and opportunities are identified for both parties.

As mentioned above, this study is based on comparative analysis. Specifically, it was performed by an analysis of relevant literature and databases, such as World Bank (WB), Raiffeisen International Bank (RIB) and Statistics of International Monetary Fund (IMF). Countries that are include are: Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia.

#### 4 BANKS AND FINTECH COMPANIES – SOME STYLIZED FACTS IN CEE COUNTRIES

Over the last decade, the financial industry has changed dramatically. ATMs have proved to be a highly efficient transactional mechanism for banks and financial institutions. ATMs have proved to be a highly effective means of exchange for banks and financial institutions, also recent technical advances allowing a wide variety of financial transactions, including contactless transactions, boosting the global ATM market even further. Based on data from the IMF, the number of ATMs has multiplied in recent years (2018-2019) compared to 2009-2010. The country with the largest number of ATMs is Poland, followed by Romania and Bulgaria (Table 3).

Tab. 3 – Number of Automated Teller Machines. Source: Authors’ summary using data from:

<https://data.imf.org>

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Albania	741	771	805	823	822	811	826	800	747	723	-
Bosnia & H.	1355	1098	1202	1284	1368	1426	1509	1512	1539	1582	1640
Bulgaria	5660	5793	5955	5864	5861	5615	5616	5751	5731	5604	5614
Croatia	3601	3794	3975	4083	4123	4222	4418	4551	4941	5148	5446
Czech Rep.	3573	3742	3935	4106	4399	4442	4553	4716	4988	5124	5215
Estonia	1006	1002	987	934	884	848	801	772	748	751	741
Hungary	4748	4827	4907	4785	4830	4880	4821	4995	5107	5067	5095
Kosovo	339	415	460	483	496	498	540	522	512	507	-
Latvia	1320	1361	1207	1270	1177	1067	1058	1018	1016	993	933
Lithuania	1543	1571	1305	1323	1261	1283	1216	1181	1126	1119	913
Montenegro	299	321	332	350	361	359	386	396	412	443	413
North Mac.	832	869	876	852	930	959	1049	1039	1031	1040	1072
Poland	15714	16413	17392	18188	18876	20531	22143	23443	23230	22885	22720
Romania	9702	10102	11006	10987	10772	10950	11492	11127	11069	10644	10531
Serbia	2723	2857	2830	2785	2673	2632	2705	2983	2685	2848	-
Slovakia	2279	2339	2405	2508	2581	2707	2735	2765	2794	2849	2849
Slovenia	1786	1814	1845	1789	1775	1692	1690	1676	1646	1580	1545

The rapid expansion of the banking industry leads to a rapid expansion of the bank services. In the last two years, these evolutions and changes have reflected in the increase of the number of online transactions. The largest number of transactions with mobile and internet banking are from Slovenia, followed by the Republic of North Macedonia and Croatia (Table 4).

Tab. 4 - Use of Financial Services- Number of mobile and internet banking transactions per 1000 adults. Source: Authors' summary using data from: <https://data.imf.org>

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Albania	10.13	12.09	16.61	21.35	27.77	31.62	34.63	36.61	40.89	44.68	
Bosnia & H.	126.39	92.23	100.53	106.72	109.02	112.05	115.96	123.40	127.46	140.61	145.80
Bulgaria	-	-	165.31	161.57	143.89	151.14	153.48	199.10	189.91	206.61	208.97
Croatia	562.16	548.00	547.78	517.74	501.83	453.94	466.95	481.48	489.62	479.40	623.83
Czech Rep.	171.56	186.75	202.72	209.50	179.47	176.93	219.34	210.04	196.84	179.69	173.98
Estonia	378.10	348.64	328.67	318.29	313.19	311.03	306.07	304.95	297.94	293.70	288.55
Hungary	-	162.69	147.65	150.19	162.37	167.66	166.85	163.38	169.10	155.47	152.89
Kosovo	23.85	28.48	55.75	70.87	79.93	89.05	106.47	114.86	115.87	120.83	-
Latvia	233.69	219.29	187.84	190.22	198.19	202.34	215.69	233.09	221.63	186.44	163.80
Lithuania	232.41	237.43	183.96	180.64	209.92	257.82	176.05	173.44	165.71	158.46	141.47
Montenegro	114.35	108.60	101.45	98.77	97.71	96.58	79.36	77.98	61.62	63.99	115.55
North Mac.	111.55	178.33	170.03	172.38	182.11	184.33	189.66	216.94	215.88	214.07	214.12
Poland	336.44	275.98	215.19	199.38	189.45	186.60	179.54	181.87	179.91	182.09	-
Romania	136.01	131.42	127.15	134.54	132.12	136.89	148.12	169.55	169.99	176.27	185.24
Serbia	-	155.29	161.64	158.90	159.82	161.68	160.98	184.12	195.09	200.73	-
Slovakia	232.06	186.87	177.29	134.78	134.80	194.10	200.82	193.61	171.12	167.05	150.20
Slovenia	832.27	869.18	901.74	911.50	954.70	711.55	713.93	705.17	724.19	765.72	784.49

In developing markets, mobile financial services are mainly used as an add-on service for bank customers. They are, however, recognized as a good instrument for reaching lower income groups in developed and transition countries, especially those in rural and remote areas. By removing the need to visit a traditional bank branch, the ability to make financial transfers anytime, anywhere using a personal computer or mobile device saves both time and money. Banks have worked hard to convince customers that E-banking is just as easy and convenient as traditional banking. After the financial crisis, the quality of financial services and the processes by which they are provided have become more critical. The internet, including electronic money, credit and debit cards, is opening up new possibilities for account management and financial services. All at the same, smart phones and widespread telephone network coverage have broadened the distribution channels for bank-customer contact. Many financial institutions see mobile financial networks as an emerging technology capable of lowering high operating costs and rising operational performance, but engaging with mobile network providers, as well as regulatory criteria, is always a new challenge. Mobile network operators have an edge in the setup of an agent network that handles simple banking operations such as account opening and withdrawals, which has proven to be necessary where standard banking infrastructure is weak. The best model for a country is determined by a variety of criteria which must be assessed on a case-by-case basis. Each mix has its own set of benefits and drawbacks, and performance is highly dependent on the starting point as well as the long-term objectives.

In Table 5, it shows the ranking of CEE countries under the Digital Readiness Index. In line with the Report of World Bank (2020) by The Digital Readiness Index is meant: "to be a rough approximation of a country's readiness to adopt FinTech technologies relative to other countries in the middle-and-high income categories" (p.65).

Tab. 5 - Level of fintech and ranking of CEE countries under the digital readiness index. Source: Authors' summary using data from: Fintech in Europe and Central Asia: Maximizing Benefits and Managing Risks (The World Bank, 2020, pp.53-64); (Data for other countries are missing).

Country	Level of FinTech	Digital Readiness Index	
	FinTech Development	Digital Readiness Score (5 - 25 quintiles)	Final Rating
Kosovo	Basic	7.3	Very Low
Albania	Basic	11	Low
Bosnia and Herzegovina	Basic	12.5	Low
Republic of North Macedonia	Basic	13.67	Low
Serbia	Evolving	14	Low
Montenegro	Basic	16	Moderate
Romania	Evolving	16	Moderate
Bulgaria	Innovating	16	Moderate
Croatia	Evolving	19	Moderate
Slovak Republic	Evolving	19	Moderate
Hungary	Innovating	18	Moderate
Slovenia	Innovating	21	High
Poland	Innovating	20	High
Czech Republic	Innovating	22	High

**Note:** Data points were missing for Kosovo and North Macedonia, under one or more data sets- in each case, the score assigned is the average of the scores under other categories. For Kosovo in particular, the final score represents the scaled average of scores under the Findex data points only (WB, 2020, p. 65).

According to a World Bank Report (2020), countries were scored and ranked into quintiles, with a score of 1 being awarded to any country that was in the lowest quintile of a particular category (below the 20th percentile), and a score of 5 being allocated to any country that was in the highest quintile (80th percentile or higher). On four specific data points, each country's performance has been rated in relation to global data (World Bank, 2020, p.64-65):

- Scores for level of digitization as per BBVA's Digix (2017);
- Scores for "Technological Readiness" under the 9th pillar of World Economic Forum's Competitiveness Index (WEF Competitiveness Index);
- World Bank's Digital Adoption Index score (2016) (DAI);
- Percentage of adults who made digital payments as per Global Findex (2017);
- Percentage of adults who used mobile phone or the internet to access a financial institution account as per Global Findex (2017).

*"Final scores represent the cumulative score under each index, with 5 indicating that the country featured in the lowest quintile under all categories, and 25 indicating that the country featured in the highest quintile under all categories"* (World Bank, 2020, p. 65). As we can see from Table 5 countries with the highest rating in line with the Digital Readiness Index are Slovenia, Poland and Czech Republic. Final ratings were assigned based on the following overall score ranges: 6-9 (Very Low), 10-14 (Low), 15-19 (Moderate), 20-24 (High).

Raiffeisen Bank International (RBI, 2018 & 2019), in their report show that countries with the largest number of fintech companies in the last two years are: Poland, Estonia and Lithuania. Mainly in the segments of: Technology, Retail Banking, and SME Banking (Table 6).

Tab. 6 – Active number of fintech local companies (2018-2019). Source: Authors' summary using data from: CEE Fintech Atlas 2018 Exclusive insights into 19 fintech ecosystems in Central and Eastern Europe (RBI, 2018) and CEE Fintech Atlas 2019 Exclusive insights into 19 fintech ecosystems in Central and Eastern Europe- Special Focus Open Banking (RBI, 2019).

Country	Years: 2018/2019	Number of active local fintechs	Technology (%)	Retail Banking (%)	SME Banking (%)
Albania	2018	-	-	-	-
	2019	87	21	32	13
Bosnia & H.	2018	-	-	-	-
	2019	52	31	34	6
Kosovo	2018	-	-	-	-
	2019	154	14	33	27
Estonia	2018	104	24	35	17
	2019	162	20	42	17
Latvia	2018	48	4	60	19
	2019	71	17	45	16
Lithuania	2018	85	14	35	27
	2019	101	19	29	25
Bulgaria	2018	32	38	31	9
	2019	52	31	34	6
Croatia	2018	-	-	-	-
	2019	71	14	32	14
Czech Rep.	2018	87	20	32	14
	2019	71	14	32	14
Hungary	2018	39	18	38	10
	2019	46	22	3	9
Poland	2018	171	11	39	23
	2019	101	19	29	25
Romania	2018	49	18	37	16
	2019	50	46	20	2
Serbia	2018	-	-	-	-
	2019	38	34	29	10
Slovakia	2018	35	17	34	26
	2019	38	8	34	29

## 5 RESULTS

### 5.1 Bank vs Fintech – Opportunities and Challenges in CEE countries

The number of new fintech companies has doubled recently. Fintech for banking has influenced a wide variety of technologies and transformed the way people handle their finances. Customers are less interested in conventional banking markets in today's digital world. Instead, they choose fast and secure facilities. Fintech services have emerged in a number of banking categories, with payment and lending being the most prominent. Several factors on both the demand and supply sides affected the advent of new, non-bank players and ideas, as well as the growing interest of investors. Changing consumer preferences, constant technological change, and the macroeconomic and regulatory landscape are all examples of such causes (Kerényi and Molnár, 2017).

As mention in Research by Raiffeisen Bank International (RBI, 2018) even though Albania has a developing and innovative startup scene, most of the country's fintechs are still in the initial stages. There are, however, a few more advanced startups, especially in the payment industry. Meanwhile, Kosovo government, as well as a number of foreign governments, fund innovation and the startup community in the country. In Kosovo, tax rates are among the lowest in Europe

(for example, 10% corporate and 0% to 10% personal taxes), and the economy is favorable to industry. Over the last few years, Kosovo has seen a large rise in the number of fintech startups, as well as the creation of two hubs. The fintech industry is not yet to develop itself in the educational system. There are no courses on the subject offered at any university (RBI, 2018). As mentioned in this research in contrast to other markets, Bosnia and Herzegovina's entrepreneurship scene receives no government funding. Despite this, the high quality and comparatively low cost of IT means that there is a healthy fintech software creation scene (RBI, 2018). Sofia, Bulgaria's capital, is one of the region's fastest-growing fintech hubs, with a critical mass of entrepreneurs and financial and technical service providers. Bulgaria is the world's third most creative upper-middle-income nation and a regional leader in terms of innovation efficiency and achievement in the SEE region. In general, the Bulgarian fintech industry follows the example of larger CEE countries. The Bulgarian Fintech Association was recently founded as a result of the sector's rapid growth. (RBI, 2018).

According to RBI (2018) the recognition of the fintech industry and its businesses, as well as the organization of two fintech conferences, were undoubtedly the most significant developments in Croatia's fintech scene in 2018. Croatia is home to around 15 fintech companies, the majority of which provide financial institutions with tools and platforms. Banks began to embrace the fact that they were creating their own financial technologies instead of partnering with multinational fintechs in 2018. Just the top five to ten banks, on the other hand, have truly focused on digital transformation. The search for technological talent is the biggest challenge for fintechs in Croatia. The Czech Republic in 2018 saw a series of major developments, where fintechs are regulated in line with EU legislation. Another one, was creation of the Czech Fintech Association (RBI, 2018). With its regulatory sandbox, the Hungarian National Bank was one of the first in the region to support financial sector innovation. Despite its obvious advantages, most consumers will not use a service that is not protected by law (RBI, 2018). In line with RBI (2018) in the introduction of new banking technologies, Poland is a European leader. The level of creativity among several Polish banks demonstrates the fintech scene's strength in 2018. The sector's key problems include a lack of a single comprehensive support structure for startups and a low degree of VC (venture capital) and equity funding operation.

The Special Task Force for Financial Innovation is one example of government funding for fintechs. The growth of local startups and the entry of international fintechs are two especially important facets of the Romanian fintech scene. The local market is still young, but it is already very successful. In Romania's startup scene, there are a lot of players. Universities contribute to the startup community, and the state has created Start-Up Nation (RBI, 2018). Based on RBI (2018) local branches of multinational corporations are looking for ways to innovate in Serbia. Serbia has a successful startup community, with a significant number of businesses located there. Serbia has a network of venture capital firms, accelerators, and incubators that support and finance fintech startups. Slovakian creativity is not purely based on the fintech industry. This is due to the highly managed climate as well as the ability of local banks to innovate in other ways. The creation of co-working centers designed to promote the entrepreneurial climate was an early important step by these banks toward promoting creativity (RBI, 2018).

Whereas fintech lenders do not accept deposits, they are unable to make capital by lending. In most countries, this helps fintech companies to avoid conventional banks' strict prudential controls, oversight, and reporting standards. Around the same time, they don't have a reliable and cost-effective funding source. As a result, fintech business models have a lot in common: a high level of automation; a low share of fixed assets; low capital requirements; low regulatory and legal costs; consumer experience focused on usability and simplicity; digitally active and younger user base.

The fintech company typically makes money by charging creditors and investors origination and servicing fees. There is no maturity or liquidity transformation in a pure peer-to-peer lending model since the fintech network does not bear any risk on the balance sheet.

Based on a report prepared by the World Bank (2020) they are three main challenges that they face fintech companies in CEE countries: Lack of government support for fintech, lack of financing and lack of support from regulators. While the main risks that are considered will bring fintech companies are: cybersecurity risks and financial consumer protection risks arising from new products and business models.

As shown in Table 7 some opportunities that face banks when they cooperate with fintech companies are: new online platforms are offering alternative models of credit intermediation, fintech companies are developing innovative tools that are reshaping the financial services structure, the development of fintech also promotes financial inclusion for consumers and SMEs, innovations in payments and transfers are changing the way consumers engage in financial transactions, bank customers would benefit from the opportunity to transact using cutting-edge technologies, saving time, effort, and money in the process, joint investment in technology, innovation, in terms of high transaction volumes with a low operating cost. Fintech solutions will fill in the gaps in the financial ecosystem's customer needs. In accordance with World Bank (2020), some fintech technologies are intended to help consumers save time while looking for new financial products. Fintech solutions will also enhance financial access and inclusion by facilitating providers in introducing new processes. Ultimately, the increased competitiveness brought on by fintech players can have beneficial effects on performance of banking sector.

Tab. 7 – Banks-Fintech: Challenges and opportunities in CEE countries. Source: Authors’ summary using data from: Word Bank Report, 2020, pp. 41-45.

CEE countries:	Most challenges to fintech companies’ development in CEE countries:	Major challenges arising from fintech for banks	Major opportunities from Fintech for banks
Albania, Bosnia & Herzegovina, Bulgaria Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia and Slovenia.	Lack of financing and capital	Cybersecurity risks	New online platforms are offering alternative models of credit intermediation.
	Lack of support system for fintech innovation		Lower financial intermediation costs
	Lack of a clear fintech strategy by regulators and policy makers		Fintech facilities, for example, can help in better assessing the creditworthiness of loan applicants during the screening process
	Lack of investment in research and development of new and innovative products by local IT companies	Financial consumer protection risks arising from new products and business models	Fintech companies are developing innovative tools that are reshaping the financial services structure
	Poor ICT (Information, Communication and Technology) infrastructure in comparison with peers		The development of fintech also promotes financial inclusion for consumers and SMEs.
	Emigration of local talent or “brain drain”		Innovations in payments and transfers are changing the way consumers engage in financial transactions.
	Lower levels of internet usage		
	Smaller domestic market		



As stated by Stern (2017) the level of implementation of new technologies varies across the CESEE (Central, Eastern and Southeastern Europe) countries. Stern (2017) mention that fintechs provide solutions to assist individuals or businesses in managing their finances, they also provide financial management services to SMEs as well as larger corporations. These fintechs' offerings are less expensive than conventional banks because they don't provide person-to-person or financial advice services. In the one hand, online trading platforms lower the entrance barriers for private consumers and, as a result of lower transaction costs, open up additional investment options for them. Around the same time, certain fintechs have services that improve the efficiency of "traditional" electronic payment methods. As it mentions by Vives (2017) the introduction of innovative techniques could result in lower financial intermediation costs and better goods for customers. Fintech facilities, can help in better assessing the creditworthiness of loan applicants during the screening process, as well as improving the interface between financial clients and their service providers.

## 6 CONCLUSION

The current incarnation of information technology has ushered in a "fintech boom," in which banks are up against new rivals of diverse – and increasingly specialized – market models. They offer technology-driven alternatives to core banking services such as payments and lending. For a competitive advantage over fintechs, banks should concentrate in all of the priority areas. However, in places where they cannot profit from operating alone, they can partner with fintechs. They can keep working together until they are well-equipped to manage on their own. Banks should identify the areas with growth prospects and low customer value proposition areas and accordingly select the right fintech partner to fill this service gap and be market-compatible. As another strategy, banks should analyze their core strengths and weaknesses and then decide to collaborate with fintech start-ups for a win-win situation for both. Many businesses in the corporate sector use technology as a catalyst to deliver different financial services to customers more effectively. Information technology is important in the transformation of banking.

Fintech services, despite their possible advantages, often introduce new forms of risks. Based on the comparative analysis of this study, the main challenges that banks may come from cooperating with fintech companies in CEE countries are: difficulty in hiring qualified personnel to make the collaboration effective, legal/regulatory issues, financial consumer protection risks arising from new products and business models, cybersecurity risks, also banks are becoming more dependent on financial technology solutions. While the main benefits are: bank customers would benefit from the opportunity to transact using cutting-edge technologies, saving time, effort, and money in the process, lower financial intermediation costs could open the door to joint investment in technology, innovation, and various acceleration programs aimed at various areas of banking for mutual growth, the rate of return on investment will most likely be higher in the long term, in terms of high transaction volumes with a low operating cost.

Fintech companies can also benefit from these collaborations such as: In a pure peer-to-peer lending model the fintech platform does not take any risk, financial markets are highly standardized and low-cost, they can gain access to a certain market as well as the customers within that region. However, they also have challenges in the CEE market: Cybersecurity risks, lack of support system for fintech innovation, lack of a clear fintech strategy by regulators and policy makers, lack of investment in research and development of new and innovative products by local IT companies, poor ICT infrastructure, emigration of local talent or "brain drain", smaller domestic market. The most progressive countries regarding the development of fintech companies are: Czech Republic, Poland and Slovenia.

In CEE countries banks should find opportunities to partner with fintech companies, start-ups, and other industry players while keeping into account all of the financial and regulatory implications in order to stay ahead of the competition. In conclusion, banks have two options. The first is that they attempt to maintain their market share by modifying their existing business processes. The second choice for a bank is to develop a strategic partnership with a fintech company. Also, governments should support more fintech companies, as well as regulatory authorities, should regulate the legal aspect and ensure the protection the data of consumers.

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## Contact information

### **Albulena Shala, (Professor Assistant)**

University of Pristina “Hasan Prishtina”, Faculty of Economic & Dardania College  
 Str. "Agim Ramadani" p.n., 10 000 Prishtinë, Republika e Kosovës  
 E-mail: [albulena.shala@uni-pr.edu](mailto:albulena.shala@uni-pr.edu), [albulenashala@kolegjidardania.com](mailto:albulenashala@kolegjidardania.com)  
 ORCID: 0000-0002-8403-4536.

### **Vlora Berisha (Professor)**

University “Haxhi Zeka”, Business Faculty  
 Str. “UCK” p.n. / 30000 Pejë, Kosovo  
 E-mail: [vlora.berisha@unhz.eu](mailto:vlora.berisha@unhz.eu)  
 ORCID: 0000-0002-1049-1742

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# MANAGING RESPONSIBLY: GREEN HUMAN RESOURCE MANAGEMENT LEADS TO CORPORATE SOCIAL RESPONSIBILITY

*Muhammad Shoaib, Roman Zámečník, Zuhair Abbas, Ghulam Kalsoom*

## Abstract

Prior research has rarely addressed the research gap to examining the relationship between green human resource management (GHRM) and corporate social responsibility (CSR). In this way, this research attempts to examine the relation between GHRM and CSR especially in the textile sector of Pakistan. The survey questionnaires were used to gather data from 251 employees working in textile companies. The Co-variance based structural equation modeling was used for the conceptual framework of the study. The findings indicate that GHRM has a significant impact on corporate social responsibility CSR. These results help corporate managers make choices, as they show that organizations must have a cohesive social and environmental mindset. This paper provides a new theoretical model for academics, based on data from Pakistan manufacturing sector, that sheds light on the aspects of GHRM and CSR. More research is required in developing countries to examine the feasibility of sustainable practices and impacts in the textile and manufacturing industries.

**Keywords:** *Human resource management, green human resource management; corporate social responsibility; Pakistan*

## 1 INTRODUCTION

There is an increasing debate in the literature to explore green human resource management and corporate social responsibility. Several studies exist in support of this integration between human resource management and corporate social responsibility (Jamali et al., 2015). Thus, green human resource management's integration of environmental and social well-being facilitates its sustainability and overall efficiency (Ahmad, 2015). An additional significant thing is that socially, environmentally, and economically, we must build organizations in an integrative way (Ren et al., 2018). The priority for green Human Resources Managers is to preserve and foster organizational expertise and to apply HR activities that are environmentally sustainable. Sustainability is built into the HR mechanism by aligning the firm's policies and practices with its route (Jabbour & de Sousa Jabbour, 2016).

Among the ideas from the practices of GHRM, training is thought to enhance environmental management, and sustainable company intervention is considered a crucial activity. They took employee commitment and job results into account in the evaluation. It gives guidance to managers and staff, helping them to track priorities and target rewards are regarded as being seen as crucial to sustainable progress, as they incite workers to be vigilant towards environmental ethics and well-being, be it financially or not (Jabbour et al., 2009; Jackson et al., 2014, Masri and Jaaron, 2017).

In reality, many scholars explored the scarcity of observational studies from the developing countries manufacturing sector (Zhan et al., 2016; Rehman et al., 2016). As these studies are conducted in the challenging environment of a developing nation like Pakistan, their importance shoots up. Similarly, studies in Pakistan have shown that manufacturing companies have a low ethical level, requiring the need to raise awareness about issues such as GHRM, CSR, and

sustainable performance. Thus, companies would be willing to recruit professional workers who are familiar with GHRM and sustainable performance, allowing them to reach long-term sustainability (Buchert et al., 2019; Yusliza et al., 2020).

Corporate social responsibility (CSR) has its meaning according to World Business Council for Sustainable Development (WBCSD, 2000), which refers to continuous attentiveness towards ethics, socio-economic-environmental development, and business objectives while furthering the employee welfare and societal well-being of the employees, and most importantly, their families and the community. An organization that places increased emphasis on providing long-term, mutually beneficial customer relationships has drawn on new investment opportunities that use these resource management technologies (Luu, 2019). This has led to their appearance as powerful management tools (Cheema and Javed, 2017). To take one last point, several companies implement CSR initiatives in related work roles that might be associated with human resources or elsewhere, such as assignments, workspaces, or procedures (Mishra, 2017).

It has been suggested by a recent studiesrecent study to further research on GHRM with corporate social responsibility to get a better understanding for addressing environmental and social issues in the developing country context especially in Pakistan (Shoaib et al., 2021; Abbas et al., 2020; Shoaib et al., 2020). More importantly, this study responds to a recent callsrecent call for further research to explore important topics such as GHRM and CSR (Mousa & Othman, 2020).

This study aims to include a context that would benefit both researchers and businesses who wish to implement green human resource management strategies that will result in the implementation of green processes and CSR initiatives in a sample of companies located in Pakistan. This paper is split into five sections to reach the objective: Section 1 contains the introduction, Section 2 contains the conceptual framework and assumptions, Section 3 contains the methodological procedures, and Section 4 contains the results and discussion. Finally, in Section 5, there is a conclusion.

## **2 LITERATURE REVIEW**

### **2.1 Green human resource management (GHRM)**

Recent research has focused on green human resource management, which relates to the convergence of human resource activities with environmental management (Roca-Puig, 2019). The word "green HRM" relates to the usage of workers and employee-related facets of the industry to encourage environmentally friendly activities by raising employee consciousness and dedication to environmental sustainability concerns (Sheopuri and Sheopuri, 2015). These programs include introducing practical, environmentally sustainable HR activities that, among other factors, result in improved performance, cost savings, and employee satisfaction and engagement.

The further expansion of these researchers (Jabbour and Santos, 2008; Freitas et al., 2011; Riman and others, 2012) was investigating HRM structures' impact on sustainability. However, they concentrate on HRM-related activities that occur within the organization's boundaries; they fail to consider the role of sustainable HRM in managing the market environment and a contributor to the external stakeholders (De Stefano et al., 2018). Managers can take on responsibility for handling company social responsibility and any number of support functions in HR, such as training and employee engagement (Mishra, 2017). The people involved with a CSR program should have relationships with the company's agenda and mission- and goals and adjust their priorities and measurements to define how HR fits into the program and specifies crucial CSR targets, and give results. They may also make sure the program objectives and

outcomes are congruent with the overall business plan and determine which stakeholders should be aligned with the CSR strategy (Jamali et al., 2015).

## **2.2 Corporate social responsibility**

The word CSR comes to mind when discussing environmental protection or worries regarding the environmental effects of organizational activities. Although sustainability is an essential component of CSR, it often encompasses various social and economic frameworks. Ergonomic partners are essential in dealing with societal issues, such as the rising public interest in the climate, which manifests itself in non-governmental activists' development. However, short-term factors are diminishing the funding (Porter and Kramer, 2006). Since it deals with constantly illuminated issues, such as social and environmental challenges, CSR has been an essential force in elaborating organizational strategies (Arslanagic-Kalajdzic and Zabkar, 2017), showing that organizations are not extrinsic elements of society (Levkivska and Levkovych, 2017).

Furthermore, CSR has been essential in building a more viable business model that increases the businesses' prospects of success and performs well by providing benefits to customers and the community (Benedetto, 2017).

### **Theoretical perspective**

## **2.3 Ability-motivation-opportunity theory**

Appelbaum et al. (2000) explain AMO HRM activities that maximize human resource efficiency, output, and income, according to them. The use of HRM activities can significantly improve the overall organizational efficiency may be interpreted by the AMO philosophy, which incorporates HR interventions (Boselie et al., 2005). This AMO policy serves as a crucially important connection in implementing HR policies on ability, motivation, and opportunity (Katou and Budhwar 2010). creating favorable human resource management strategies enhances HRM results, the chance for personal success, and success in employment) (e.g., collective job satisfaction, commitment, and perceived organizational support).

GHRM in organizations can be applied by creating three main elements, according to AMO theory: developing green capabilities, motivating green employees, and creating green opportunities (Opatha et al., 2014; Renwick et al., 2013; Dutta, 2012; Ahmad, 2015). Based on the AMO theory, the paradigm in use has its own policies and framework for human resource management. With the fundamental foundations of AMO in mind, we will determine how the HRM creates certain capabilities, opportunities, and motivation for people management. Senior managers play a critical part in putting the AMO model into action.

## **2.4 The link between Green Human Resource Management and Corporate social responsibility**

Sustainability and financial strategies are part of CSR services because HR is essential to achieving these goals (Ahmad, 2015). These measurement approaches are identified and established from various angles, almost always correlated with the purpose of the research or inquiry under consideration. One of the similarities between CSR and HRM is that it is generally seen in many large companies. Recruiting and selection, training and development, performance management, compensation, planning, and retention are all strategic HR operations that can assist in implementing CSR by supplying the necessary resources (Jamali et al., 2015). CSR is usually carried out in conjunction with or in close coordination with most

organizations' HR departments (Mishra, 2017). This framework assists in incorporating activities in implementing CSR policies (Jamali et al., 2015).

CSR issues' sensitivity is tested while companies are searching for talent. They may use an even more economically and environmentally conscious HR preparation approach. Pinzone et al. (2016) demonstrated that we could use GHRM strategies to promote environmental CSR. Importance and organizational greening and staff environmental participation (Mishra, 2017). CSR adds value to HRM (Voegtlin and Greenwood, 2016).

### Hypothesis

**H1:** Green HRM will be positively associated with corporate social responsibility.

## 3 METHODOLOGY

The population of this study consisted of employees working in the textile companies of Pakistan. This paper uses a survey to follow a quantitative approach. The questionnaire used in the data collection process followed all of Synodinos' (2003) steps and included questions from the mainstream of the specialized literature on green human resource management and corporate social responsibility. The questionnaire was constructed on a five-point Likert scale ranging from one to five, with one indicating strongly disagree and five indicating strongly agree. Data was collected directly from respondents using questionnaires. Questionnaires were randomly distributed to the employees through the HR department of the respective textile organizations. A total of 251 respondents were selected for further analysis. To obtain empirical results, AMOS 23 was used to examine the validity of this study model and the relationships between the variables using confirmatory factor analysis.

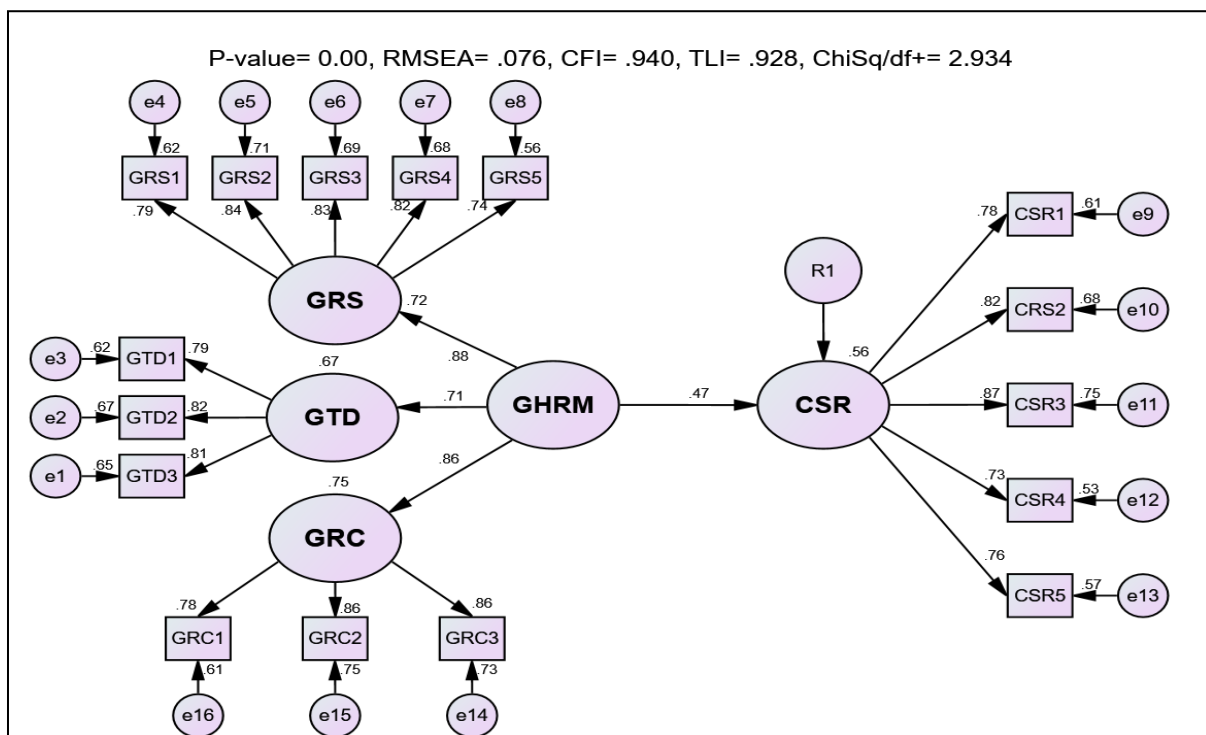


Fig. 1 - Standardized Structural Equation Modelling. Source: own research

From Figure 1, there is one exogenous construct, namely, green human resource management, and one endogenous construct, namely, corporate social responsibility.



Green human resource management is a second-order construct, and the following three components, namely, measure this construct:

1. Green Recruitment and Selection (5 measuring items),
2. Green training and development (3 measuring items)
3. Green reward and compensation (3 measuring items).

The other construct, namely, corporate social responsibility, is a first-order construct, and five measuring items measure this construct.

### Results and discussion

The threshold values for the fitness indexes in Figure 1 have been met. The Absolute Fit category, RMSEA, has a value of 0.0760 (less than 0.08), the Incremental Fit category, CFI, has a value of 0.940 (greater than 0.90), Parsimonious Fit category, Chisq/df ratio, has a value of 2.934. (merely achieved the threshold of 3.0). As a result, the measurement model for green human resource management (GHRM) and corporate social responsibility (CSR) has met the Construct Validity criteria (Awang et al., 2018; Mohamad et al., 2018, 2019; Raza & Awang, 2019, 2020, 2021; Bahkia et al., 2019, 2020 and Afthanorhan et al., 2020, 2020a).

Green Human Resource Management has a large effect on corporate social responsibility with  $R^2=0.56$ . (See Table 1.)

Tab. 1 - R2 and Q2 of endogenous constructs. Source: own research

Predictor construct	Target Construct	R2	Predictive accuracy
Green human resource management (green recruitment and selection, green training and development, and green reward and compensation.	Corporate Social Responsibility	0.56	Large

Tab. 2 - Regression Path Coefficient, its Significance and Hypothesis Testing. Source: own research

Endogenous	Path	Exogenous	Estimate	S.E.	C.R.	P	Result
CSR	←	GHRM	0.469	.106	4.678	.001	Significant
Hypothesis						P-value	Result
Green Human Resource Management has Significant positive effects on Corporate Social Responsibility						0.01	Supported

The proposed structural model has been tested with respect to path coefficients and whether they have a meaningful effect on the outcome (standardized  $\beta$ ) variables by observing the respective path coefficients' values. Table 2 shows the factors, including green human resource

management as an endogenous variable and corporate social accountability as an exogenous variable. When Probability (P) is less than or equal to 0.005, the model is predictive relevant. Green human resource management (GHRM) has a clear significant positive impact on (CSR)corporate social responsibility ( $\beta = 0.469$ , CR = 4.678,  $p \leq 0.005$ ), indicating that hypothesis H1 was supported.

This research aimed to look into the connection between green human resource management and corporate social responsibility. The coefficients are significant and indicate strong internal consistency and data validity, according to the findings provided in Table 2, which were based on data from 251 textile companies in Pakistan and analyzed using AMOS 23. Furthermore, the hypothesis tests revealed that H1 was supported. As a result, GHRM has a good relationship with CSR.

## **4 CONCLUSION**

As a management concept that strikes a balance between an organization's economic, social, and environmental goals, CSR is a relatively new business philosophy that companies around the world have embraced to varying degrees over the last two decades. It can be concluded that the relationship between CSR and GHRM is well defined and analysed in the literature, as presented in the theoretical section of this article. It is essential to know that companies with a CSR statement also use GHRM action plans at a higher rate. GHRM with CSR incorporation is a viable approach for the manufacturing sector for sustainability. More research is required, however, to accommodate GHRM and CSR in the industry. This comprehensive study would be helpful for top management and HR policymakers who should inform employers that their company's green policies can guarantee a healthier life for workers in terms of justice, health, well-being, and long-term sustainability.

### **Limitations and future directions**

The following are the primary constraints of this paper, which indicate future study opportunities. This sample correlates with the industry of textiles. Studies in other areas may produce various conclusions and insights; the emphasis was on Pakistan's single emerging economy. Should it undertake a study in other emergent nations or perhaps compare distinct realities. Furthermore, it is argued that the proposed model could be validated using various methodologies in service industries in other emerging and developed countries; the implementation of CSR may rely on some considerations, for instance, legal and regulatory requirements; therefore, future studies may test all kinds of studies. This study suggests future researchers may examine GHRM practices for sustainable performance via intervening serial mediation analysis of green human capital and green intellectual capital.

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### **Contact information**

#### **Muhammad Shoaib**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: Shoaib@utb.cz  
ORCID: 0000-0003-0970-2343

#### **doc. Ing. Roman Zámečník, Ph.D.**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: zamecnik@utb.cz  
ORCID: 0000-0003-4564-2317

#### **Zuhair Abbas**

Tomas Bata University in Zlín, Faculty of Management and Economics  
Mostní 5139, 76001, Zlín, Czech Republic  
E-mail: abbas@utb.cz  
ORCID: 0000-0003-2242-2848

#### **Ghulam Kalsoom**

University of Sindh  
Jamshoro, Pakistan  
Email: ghulamkalsoom64@gmail.com

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# VOLUNTARY CONTRIBUTION MECHANISM AS AN ALTERNATIVE MECHANISM FOR PROVIDING PUBLIC GOODS: EVIDENCE FROM ONLINE CLASSROOM EXPERIMENT

*Eva Sirakovová*

## **Abstract**

In this paper, we present the results of online classroom experiment and discuss the possibilities of alternative provision of public goods. We created an online behavioural game based on standard public good game and we examine whether and under what conditions people are willing to participate voluntarily in the financing of public goods. Using the game we designed, we investigated the influence of the size of experimental income, group size effect, provision point mechanism and identification with selected behavioural factors. In this pilot experiment, we found that experimental income did not have significant effect to contribution to public goods, the provision point mechanism was more effective if there is only one group account and subject were more willing to contribute to a group account of small group (local public goods). The identification of beliefs in human cooperation, altruism and moral obligation statements has had a positive effect on contributing to public goods. Identification with conditional cooperation statements had a negative effect on the willingness to participate in the financing of public goods.

*Keywords: public goods, voluntary contribution mechanism, public sector, providing public goods, behavioural economics*

## **1 INTRODUCTION**

The concept of public goods is one of the basic concepts in economics theory. The existence of this type of good is often associated with state intervention. The main reason is the general validity of Samuelson's Pure Theory of Public Goods, formulated in the 1950s. In the context of this theory, we can conclude, that if there is the possibility of consuming some good without having to pay for it, people will resort to the possibility of non-payment. Therefore, the state enters the situation as an authority and oversees that all individuals contribute their amount through the collection of taxes. However, the Samuelson's theory has been criticized by many other economists in recent years. According to them, the reality shows different findings and the model of pure public good is the theoretical abstraction, that is suitable for modeling, but not for its general validity in real economies.

The criticism of the pure theory of public good came with the popularity of behavioral and experimental economics. Many economics experiments show, that people do not behave in accordance with the generally accepted theory. There were many times proven by economics experiments, that people are willing to contribute to public goods voluntarily. Moreover, it has been shown several times that such behavior need not only be motivated financially, but also by various behavioral stimuli, such as altruism or warm-glow effect.

The main motivation for dealing with this topic is to examine the question of whether it is really possible for people to be able to cooperate without being forced to do so by a higher authority (such as the government), and especially under what conditions this type of cooperation would be possible.

In this paper, we discuss the results of our online classroom experiment, which was the pilot experiment for further research. We ran within subject designed online behavioral game with students and thus analyze the voluntary contribution mechanism in different conditions.

## **2 LITERATURE REVIEW**

It follows from Samuelson's interpretation of public goods, that the appropriate way of financing and providing them is in a centralized form, i.e. will be financing from public sector resources (Samuelson, 1954). He argues that private (decentralized) financing is inefficient, because of the impossibility of excluding people from their consumption and nonrivalry in consumption. A rational consumer chooses to pay for a public good less than the value of its actual consumption or chooses not to pay at all. The logical consequence of such an action is that the total amount of charges collected from subjects would be lower (or equal to zero) than their actual consumption. This would lead to an insufficient supply of public goods and therefore it is necessary to financing the public goods by centralized form based on public sector resources (Samuelson, 1955).

Finding the alternatives in financing public goods has become one of the most recent problems in the public sector. The financing of public sector services through taxes is facing criticism from the professionals or ordinary citizens. There are often problems with externalities, economics inequality or corruption.

One of the most popular alternative mechanism for providing public goods is the voluntary contribution mechanism, which is based on voluntary payments from people. So, it is the type of private mechanism for providing public goods.

Olson (1965) describes the basic principles of group behavior as well as the influence of group size on individual behavior. Olson concluded that economics incentives are not the only human incentives, but also prestige, respect, friendship and others social or psychological goals have a great influence in the behavior and decision of people in groups.

According to Olson (1965) there exists the possibility of achieving group goals and it is relatively strong by using the so-called social pressure. Olson notes that in a group where there are social ties (such as friendship), it is relatively easy to achieve group goal, because most people value the community of their friends and people also get used to guarding their social status, provisional prestige and self-esteem.

Bergstrom et al. (1986) developed the model of private provision of public goods based on voluntary contribution. It is a static model of voluntary contributions of individuals, who decide how much to voluntarily contribute to the provision of pure public goods.

According to Miller (1993) it is not appropriate to base private contributions to public goods solely on the motivation of individuals, as he does not consider their motivation to be a sufficient factor for successful cooperation in contributing voluntarily to their funding.

The research of human behavior in game theory has created the preconditions for the development of a mechanism of voluntary contribution in an experimental environment. The willingness of people to participate voluntarily in the financing of public goods is examined. This mechanism is often tested by the so-called public goods game, which usually has the character of a simple investment game, in which participants decide to invest experimental money into two types of accounts – private and group account. A group account represents a public good.

The first experiments with public goods (e.g. Bohm, 1972, Marwell and Ames, 1979, 1980) showed, that a relatively large number of people were willing to contribute to public goods,



even though there were conditions for them to free ride. These experiments also examined the effect of group size on the size of individuals' voluntary contributions. They based on the hypothesis that in larger groups the social ties between people are lower.

The most important finding of Marwell and Ames (1979) study is the fact, that there were not as many free riders as expected. For small groups (four participants in a group), they found that approximately 57% of the resources was invested to the group account. Such a finding was revolutionary – as the theory claimed that the money invested in public goods would be 0% that is, the rational decision of the people to become a free rider. In this experiment, two-thirds of subjects invested more than half of their resources in a group account.

Later, other factors that could affect the amount of contributions to the financing of the public goods were also examined. For example, the possibility of communication between participants increase the average amount collected in group accounts (Isaac, Walker, 1988).

The further analysis of people's behavior in groups has shown, that a higher marginal revenue per individual from a group account leads to fewer free riders and thus a greater contribution to the financing of public goods (Isaac, Walker, Thomas, 1984).

In a standard public good game, the benefit from group account is automatic (except if no one has contributed to public good and the group account has zero value of contributions). Each participant in the game is therefore entitled to the benefit, regardless of whether he has contributed to the group account or not. However, some designs of this game work with the so-called provision point or threshold. The provision point complements the condition for the benefit, which is a predetermined minimum amount of funds that must be collected in the group account. Unlike the basic linear public goods game, in which there is only one Nash equilibrium identical to the dominant strategy – do not contribute, if a provision point is added, there will be two Nash equilibria (or their collections), i.e. a collection of inefficient Nash equilibria of the threshold is not reached, and a collection of effective Nash equilibria of the threshold is reached (Croson, Marks, 2000).

Rondeau and List (2008) in a series of laboratory experiment confirmed a very strong influence of the threshold on the results of the experiment. The subjects of the experiments contributed significantly more to the group account in those treatments in which the provision point was determined. Bagnoli and Lipman (1992) and McBride (2004) observed the convergence of the contributions of individual in the group account to the value of provision point.

In the Czech Republic, the results of laboratory experiment also confirmed the positive effect of provision point on the amount of voluntary contributions from individuals (Špalek, Berná, 2011)

Some scientific studies researched the income differences between participants. They have looked at whether low-income participants contribute less to the group account, whether knowing that there are income differences between participants will change their behavior.

Buckley and Croson (2006) found that lower-income participants contributed approximately the same absolute amount to public goods, i.e. a higher percentage of their income than the individuals with the higher income. These results are also consistent with the results of the study by Hofmeyr et al. (2007), who also did not find significant differences between the nominal contributions of low income and high-income individuals.

Fischbacher et al. (2001) focused on conditional cooperation. After the round of the game end, they showed individuals other participants' contributions. This confirmed, that people wanted to get closer to others by the amount of their contribution to the group account. They also found that not only do people want others to contribute about the same, but they are also willing to

punish those, who do not contribute or contribute very little. This was the case even if the costs of punishing free riders were high and did not bring any additional material benefits.

### 3 METHODOLOGY

We collected data through our online behavioral game, which is based on standard public good game with our own modifications. This experiment was pilot experiment and we tested how students will behave in different game conditions. In our research, we focused at the group size effect, income differences, provision point effect and behavioral factors.

Our participants were students of the University of Economics in Bratislava, Slovakia, who attended the Principle of Economics course. They could participate in this game voluntary. They registered via online form. The game was anonymized. We did not pay students real money, but they could gain points to the preliminary evaluation. The exchange ratio was follows: 1 experiment money = 0,01 point. The participants were randomly divided into small and large groups. In the small group were 5 participants and in the large group were 10 participants (one large group = two small groups). In our experiment participated 40 students, so we had 8 small groups and 4 large groups. The group account of small groups represents local public goods (municipal budget) and the group account of large groups represent global public goods (national budget). Participants invested experimental money into various accounts – private and group account 1 (first and second treatment) and private, group account 1 and group account 2 (third and fourth treatment). The group account 1 represented contributions of small group, the group account 2 represented contributions of large group. The benefit from private account is equal to contribution to this account. After the end of each treatments, the contributions to group accounts were added up and multiplied by multipliers. The multiplier of group account 1 was 1,2 and the multiplier of group account 2 was 1,3. Subsequently, the counted and multiplied contributions were evenly distributed among the members of the groups. All participants received the same benefit from group accounts regardless of whether and how much they contributed. The individual’s benefit consisted of benefit from the private account and benefit from the group account 1 (first and second treatment) and the benefit from private account, group account 1 and group account 2 (third and fourth treatment). All experimental money had to be invested in one of the accounts in each round. All benefits from all treatments were counted and have been convert to the points at the end of the experiment. Detailed instructions for the game were available to participants before the start of the experiment and before each treatment.

Before the behavioral public good game started, participants earned experimental money in a knowledge quiz. The quiz has 20 questions. The more correct quiz answers they had, the more experimental money they had available in the game. In this way, we differentiated the participants in terms of experimental income.

In the next table we show the exchange ratio between the right answers in the quiz and the number of experimental money.

Tab. 1 – Exchange ratio – experimental money. Source: own research

Number of right answers in the quiz	0-5	6-10	11-15	16-20
Number of experimental money	10	20	30	40

The quiz was followed by an investment game, that had four treatments. The first treatment was control treatment. In control treatment the participants invested experimental money into two accounts – private account and group account 1.

In the second treatment, we added modification – the provision point. Entitlement to benefit from group account 1 was conditional on the collection of a minimum amount of 20 experimental money for this account.

In third treatment we added the second group account, group account 2, and the participants decided to invest experimental money into three types of accounts. In this treatment, each participant was a member of two groups at the same time.

In last, fourth treatment, there were thresholds on both group accounts. The provision point in the group account 1 was 20 experimental money and the provision point in the group account 2 was 40 experimental money.

The last part of experiment consisted of a behavioral questionnaire. The participants expressed their agreement or disagreement with statements about public goods or public benefit projects. With these statements, we have examined the participants identification with various behavioral factors. The statements and behavioral factors are presented in the following table.

Tab. 2 – The statements in the questionnaire and behavioral factors. Source: own research

The statement in questionnaire	Behavioral factor
I am not interested in contributing to public benefit projects (public goods or collective goods), if I know that others from my surroundings will not contribute to them either.	Conditional cooperation
My family 's opinion on voluntary contributing to public benefit projects (public goods or collective goods) is very important for me	Conditional cooperation in family
People from my surroundings are willing to voluntarily contribute to public benefit projects (public goods or collective goods)	Belief in people's cooperation
I have a good feeling when I contribute to a public benefit project (I can help other people)	Altruism
It is my moral obligation to contribute voluntarily to public benefit projects (public goods or collective goods)	Moral obligation

## 4 RESULTS

In this part of paper, we present some results of our classroom experiment. In this experiment 22 women and 18 men participated. First of all, we present the distribution of participants by the amount of experimental money earned.

Tab. 3 –The distribution of participants by the amount of experimental money. Source: own research

	Number of participants in absolute value	Number of participants in %
Low experimental income (10)	8	20%

Middle-low experimental income (20)	11	27,5%
Middle-high experimental income (30)	13	32,5%
High experimental income (40)	8	20%
Total	40	100%

Next, we present the average contributions in each treatment for all accounts. The data on average contributions are given as a percentage of experimental income, because of experimental income differences.

Tab. 4 – Average contributions as a percentage of experimental income. Source: own research

Treatment	Account	Low experimental income (10)	Middle-low experimental income (20)	Middle-high experimental income (30)	High experimental income (40)
First treatment (control)	Private	75,00%	65,45%	53,33%	48,21%
	Group 1	37,50%	39,09%	41,54%	37,50%
Second Treatment (provision point)	Private	65,00%	49,55%	55,90%	66,79%
	Group 1	47,50%	55,00%	40,26%	33,21%
Third treatment (group account 2)	Private	61,25%	54,55%	49,49%	46,43%
	Group 1	28,75%	29,09%	23,85%	19,29%
	Group 2	22,50%	20,91%	21,54%	34,29%
Fourth treatment (provision points + group account 2)	Private	63,75%	50,00%	37,69%	47,86%
	Group 1	28,75%	32,27%	41,28%	19,29%
	Group 2	20,00%	22,27%	23,59%	32,86%

In the first treatment (control treatment) the middle- high income participants contributed the most to the group account 1. Very interesting is, that low-income participants and high-income participants contributed the same share of their experimental income to the group account.

The provision point in the second treatment had a strong impact on the middle-high participants. They contributed 55 percent of their experimental income to the group account. In the second treatment, the participants with the highest experimental income, contributed the least to the group account. In the third treatment, everyone except high-income participants were more willing to contribute to the group account 1 compared to the group account 2 contributions. The provision point in the fourth treatment did not change the situation significantly compared with previous treatment. The middle-low income participants contributed the most to the group account 1 and the high-income participants contributed the most to the group account 2. In the second treatment, the provision points overcome six groups out of a total eight groups. In the fourth treatment, the provision points of group accounts 1 overcome five groups out of a total eight groups and the provision points of group accounts 2 overcome two groups out of a total four groups. The contributions to the private accounts were relatively stable.

Next, we present average contributions to all accounts in all treatments by gender.

Tab. 5 – Average contributions as a percentage of experimental income by gender. Source: own research

Treatment	Account	Men	Women
First treatment (control)	Private	51,49%	62,04%
	Group 1	37,98%	37,96%
Second Treatment (provision point)	Private	50,96%	59,75%
	Group 1	43,77%	41,01%
Third treatment (group account 2)	Private	50,83%	49,54%
	Group 1	24,78%	24,25%
	Group 2	19,12%	26,21%
Fourth treatment (provision points + group account 2)	Private	46,54%	45,54%
	Group 1	32,02%	30,29%
	Group 2	21,45%	24,17%

In the control treatment, men and woman contributed the same share of experimental income to the group account 1. In the second treatment, men were more willing to contribute to the group account, but the differences are not significant. In the third treatment, the women contributed more to the group account 2 than men. In the last, fourth treatment, the contributions of men and women to the all accounts were almost the same. We did not find significant differences between men and woman.

In the next part we present the results of regression analysis. First, we examined the effect of modifications in various treatments on contributions to the group account 1. We focused on the group account 1 because we assume, that the alternative provision of public goods by the voluntary contributions is more likely to be feasible in “small groups”, i.e. at the local government level. The depended variable is contribution to the group account 1 in each treatment as a percentage of experimental income and the independent variables are dummy variables for treatments modification, experimental income and dummy for men participants.

Tab. 6 – Regression analysis – the treatment modifications. Source: own research

Variables	M1	M2
Constant	37,028*** (3,0880)	39,092*** (5,195)
Treatment 2 modification (provision point group account1)	5,063* (4,367)	5,063* (4,390)
Treatment 3 modification (group account 2)	-12,625*** (4,367)	-12,625*** (4,390)
Treatment 4 modification (provision points on both group accounts)	-6,167** (4,367)	-6,167** (4,390)
Experimental income	-	-0,089* (0,151)
Dummy man	-	-0,341* (3,105)
R <sup>2</sup>	0,1158	0,1278

The standard deviations are in parenthesis; \*\*\*  $p < 0,1$ , \*\*  $p < 0,05$ , \*  $p < 0,1$

Based on regression analysis results, we can conclude, that two group accounts in the third treatment have a strong negative impact on the contribution to the group account 1. Positive impact on contributions to the group account 1 have only second treatment i.e. one provision point in one group account. In the treatment 4 is negative impact not so strong, but it is clear that, if people can contribute to the group account 2, it has a negative impact to the contribution to group account 1. Participants were willing to contribute to the both group accounts. Average contribution analysis showed, that higher contributions were on group account 1.

The last part of our analysis is the analysis of behavioral factors and the willingness to contribute to the group accounts. In this regression the dependent variable is the average contribution to the both group accounts in all treatments (for the whole experiment) and the independent variables are the behavioral factors from the questionnaire. We investigated the identification with statements and the willingness to contribute to the group accounts.

Tab. 6 – Regression analysis – the behavioral factors. Source: own research

Variables	M1	M2
Constant	24,230*** (5,140)	22,984* (7,752)
Conditional cooperation	-2,117* (3,850)	-1,886* (4,143)
Conditional cooperation in family	-5,125* (3,862)	-5,087* (3,957)
Belief in people's cooperation	2,944* (3,759)	2,711* (3,713)
Altruism	3,110* (3,574)	2,711* (3,991)
Moral obligation	2,132* (3,665)	1,998* (3,880)
Experimental income	-	-0,101* (0,174)
Dummy man	-	-1,055* (3,919)
R <sup>2</sup>	0,1455	0,1562

The standard deviations are in parenthesis; \*\*\*  $p < 0,1$ , \*\*  $p < 0,05$ , \*  $p < 0,1$

Using the regression analysis, we found that the identification with altruism statement, moral obligation statement and belief with people's cooperation has a positive impact on contribution to the group accounts. The identification with both conditional cooperation statements has a negative effect on contribution to the group accounts.

## 5 DISCUSSION

In this paper, we examined the effects of income differences, provision point mechanism, group size effect and identifications with behavioral factors by using an online behavioral game based on standard public good game. Before the start of our experiment, the subjects can earn experimental money in knowledge quiz. This step allowed us to differentiate the participants of the game in terms of income. In our pilot experiment with students, subjects were randomly assigned to the small and large groups and they repeatedly allocated their experimental income to private account (private groups), group account 1 (local public goods) and group account 2 (global public goods).

For the formulation of policy recommendations, we consider it is important to examine the willingness to contribute voluntarily to local and global public goods. Participants in our game were willing to voluntarily participate in the financing of both types of goods - local and global. However, it is clear, that average contributions to local public goods were higher in most cases. An interesting finding is also that we did not find a significant difference between high-income participants and low-income participants.

Alternative theories that have emerged in recent decades seek to find an effective mechanism that reflects as closely as possible the needs of people in the provision of public goods while addressing the free rider problem. Today, none of the existing mechanisms is universally applicable and further scientific research is needed to contribute to the formulation of new

alternative models of private provision of public goods, while the development of experimental and behavioral economics creates new opportunities in this direction. Using the approaches of these disciplines, mechanisms of voluntary contribution were developed, which were experimentally tested in numerous experiments in laboratory and field conditions. They show that, under certain conditions, people are willing to participate voluntarily in the financing of public goods. However, even this mechanism cannot completely eliminate the free rider problem but based on a thorough analysis and examination of factors influencing human decision-making, it is possible to formulate recommendations on how this problem can be largely eliminated.

## 6 CONCLUSION

Our pilot research has shown that, under certain conditions, people are willing to participate voluntarily in the financing of both local and global public goods. By regression analysis, we found that the provision point in Treatment 2 had a positive effect on the amount of the contribution to group account 1. On the contrary, the existence of another group account in which members of a large group participated had a negative effect on contributions to local public goods. The level of experimental income did not have a significant effect on the amount of contributions to group accounts, it even turned out, that people with lower incomes are willing to give almost the same part of their income to public goods. We also found that men were less willing to participate in the financing of public goods.

The identification of beliefs in human cooperation, altruism and moral obligation has had a positive effect on contributing to public goods. Identification with conditional cooperation statements had a negative effect on the willingness to participate in the financing of public goods.

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## Contact information

### Ing. Eva Sirakovová

University of Economics in Bratislava, Faculty of National Economy  
 Dolnozemska cesta 1, 852 35 Bratislava, Slovakia  
 E- mail: eva.sirakovova@euba.sk  
 ORCID: 0000-0003-1591-4166

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# INTERVAL PROGRESSIVITY OF THE INCOME TAX IN CZECH REPUBLIC IN 2020 AND 2021

*Jiří Slezák, Ivana Čermáková*

## **Abstract**

In the Czech Republic, a linear personal income tax rate was introduced from 2008 to 2020, but due to non-taxable parts or tax benefits for children, the tax was progressive. In 2021, zonal taxation will be introduced. For income up to the maximum assessment base, the 15% tax rate is maintained and for income exceeding the specified limit, the 23% tax rate is used. The paper deals with the analysis of the tax progressivity of the tax system of the Czech Republic in 2020 and 2021. All calculations are performed on the basis of effective tax rate, average rate progressivity, tax liability progressivity and progressivity of income after tax for taxpayers receiving only income from dependent activities. As a source of data, the average gross wage for 2020 and for 2021 and its multiples, is used. Four hypothetical situations of taxpayers are analyzed, namely a taxpayer entitled only to a basic discount for a taxpayer, a taxpayer with one child living in a joint household, a taxpayer with two children in a joint household and a taxpayer living with one child in a joint household and further with a low-income wife. The results of interval progressivity show that the highest progressivity is among low-income taxpayers and decreases with increasing gross income. Furthermore, in 2021, compared to 2020, there is no significant change in the indicators of interval progressivity, respectively, in 2021 there is a slight increase in progressivity.

**Keywords:** *effective tax rate, interval progressivity, personal income tax, tax burden, tax progressivity*

## **1 INTRODUCTION**

Personal income tax is considered a so-called direct tax, which is addressed and imposed on the income or property of the taxpayer. In the Czech Republic, it consists of income from dependent activity, independent activity, capital assets, rent and other income. However, due to the fact that the tax legislation concerning the taxation of natural persons is subject to annual change, the tax burden of taxpayers also changes. The main factors of the tax burden include the amount of gross income, the amount of items deductible from the tax base, the amount of non-taxable parts of the tax base, the amount of tax rebates and the amount of tax benefits or tax rates (Cotrut, De Lillo, Gerzova, et. al., 2020).

With effect from 1 January 2021, a tax package was adopted in the Czech Republic, which introduces a number of changes to the Law of Income Tax. The super-gross wage was abolished, which consisted of the gross wage plus social and health insurance premiums paid by the employer, and the solidarity-based tax increase was abolished. Only the gross salary of employees is now subject to taxation. Two tax bands are newly introduced, namely 15 % and 23 %, which is applied to income that exceeds the maximum assessment base for the calculation of insurance premiums. The abolition of super-gross wage should be beneficial for employees, as their net wage increases. On the other hand, there is a reduction in revenues from personal income tax to the state budget. Furthermore, the discount per taxpayer is increased, which reduces the tax liability, from the original CZK 24,840 to CZK 27,840 per year, and the maximum limit for the payment of the tax bonus, which originally amounted to CZK 60,300

and to which taxpayers living with their children under the age of 26 in a co-managed household were entitled, is abolished (KMPG, 2020). About the impact of the abolition of the super - gross wage on employees, for example in Slezák & Kahánková (2021).

The aim of the paper is to analyze changes in the interval progressivity of personal income tax in 2020 and 2021. All calculations are performed on the basis of effective tax rate, average rate progressivity, tax liability progressivity and progressivity of income after tax for taxpayers. From 2008 to 2020, the nominal personal income tax rate was linear, but for several reasons the tax was still more progressive.

## 2 THEORETICAL BACKGROUND

Krajňák (2020) occupied with the progressivity of personal income tax in the Czech Republic for the period 1993 – 2018. Based on the indicator of the progressivity of tax liability, it was confirmed that personal income tax is progressive in most of the analyzed periods. The exception was the period 2008–2012 due to the maximum tax base for the calculation of social insurance. It was also found that in 2008, tax progressivity increased for taxpayers with average or below-average incomes compared to the situation before 2008 and before the major tax reform in the Czech Republic. Genčev, Musilová and Široký (2018) examined global progressivity based on the Gini coefficient and found that during the analyzed period 2006–2016, global progressivity of the allowance system was progressive. However, in 2008 after the tax reform, global tax progression did not change much.

Verbist and Figari (2014) discussed the reasons why personal income tax should be progressive, based on the EUROMOD model. Research has shown that a progressive tax system provides a redistributive function of taxes better than a linear tax rate.

Wagstaff and Van Doorslaer. (2001) examined the effect of tax credits, rate structures and deductions in determining the progressivity of net income tax liabilities. Barrios, Sivaskaite–Tamosiune, Maftai, Narazani and Varga (2020) occupied with the introduction of a flat tax and the progressivity of tax systems and found, among other things, that a reduction in income inequality can be achieved with a positive impact on employment. On the influence of the labor market, wage setting and the progressivity of the tax system, for example, in Roed and Strom (2002).

Limberg (2019) occupied with the impact of the economic crisis on high-income taxpayers. Based on this research, it was found that countries affected by the economic crisis have increased the progression of income taxes. Based on the research of Garcia – Muniesa (2019), it can be argued that in case of an economic crisis, taxpayers who are oriented to the left in the political spectrum do not support progressive taxation, unlike other taxpayers. Furthermore, it was found that taxpayers who were affected by the economic crisis only temporarily also do not support the progressivity of taxation.

Corneo (2002) proved that the introduction of a progressive income tax can, under certain conditions, bring about an improvement in Pareto, only if the pre-tax income is distributed fairly.

Doerrenberg and Peichl (2013) analyzed the influence of the progressive tax system on the tax morals of taxpayers. It was found that the tax morals of taxpayers are higher the more progressive the tax system is. Oishi, Schimmack and Diener (2012) examined the effect of progressive taxation on the level of subjective prosperity. According to the article, taxpayers living in a country with a more progressive tax system were found to experience a higher level of subjective prosperity than taxpayers living in countries where the tax system is not as highly progressive. This fact is associated with a higher level of public goods.

Bird and Zolt (2005) occupied with the redistribution of income to personal income tax in developing countries of the world, with the result that personal income tax has no effect on reducing inequality in most of these countries. According to Diamond and Saez (2011), high-income taxpayers should be subject to a high and rising marginal tax rate, or low-income families should be subsidized to work for earnings. Farhi and Werning (2010) argue based on their research that real estate tax should be progressive. According to Heathcote, Storesletten and Violante (2017), a progressive tax system can to some extent counteract inequality, on the other hand, it reduces the motivation to work or invest. About optimal taxation in the USA, for example in Conesa and Krueger (2006).

Oishi, Kushlev and Schimmack (2018) examined income inequality in the United States between 1962 and 2014. According to this research, it was found that income inequality was smaller during periods of higher progressive taxation.

### 3 METHODOLOGY

The paper uses basic statistical methods, namely the method of description, analysis, comparison and finally the method of synthesis. The calculation of the average effective tax rate and indicators of interval progressivity is based on Široký, Friedrich and Maková (2012).

The effective tax rate (ETR) is determined according to the formula:

$$ETR = \frac{T + SH}{Y} \quad (1)$$

where: T is the tax after applying the tax reliefs, SH is the social (6.5 %) and health (4.5 %) insurance paid by the employee and Y is the gross income.

Progressivity of the average rate (PAR) measures the ratio of the average rate change and the income change:

$$PAR = \frac{\frac{T_1}{Y_1} - \frac{T_0}{Y_0}}{Y_1 - Y_0} \quad (2)$$

where: Y is the gross income and indices 0 and 1 represent individual income groups of taxpayers. PAR value greater than 0 represents progressive tax, and PAR value less than 0 represents regressive tax.

The progressivity of the tax obligation (PTO) represents the elasticity of the tax obligation with regards to the income, but before taxation (gross income):

$$PTO = \frac{\frac{T_1 - T_0}{T_0}}{\frac{Y_1 - Y_0}{Y_0}} \quad (3)$$

PTO value greater than 1 represents a progressive tax, and PTO value less than 1 represents a regressive tax.

The progressivity of earnings after taxation (PEAT) is the elasticity of the earnings after taxation with regards to the income, but before taxation (gross income):

$$PEAT = \frac{\frac{(Y_1 - T_1) - (Y_0 - T_0)}{Y_0 - Y_1}}{\frac{Y_1 - Y_0}{Y_0}} \quad (4)$$

PEAT value less than 1 represents a progressive tax, and PEAT value greater than 1 represents a regressive tax (Široký, Friedrich & Maková, 2012) or (Kubátová, 2016).

Taxpayers' incomes are derived as multiples of the average annual wage. The average annual wage is used to determine the maximum assessment base for the calculation of social insurance, which in the Czech Republic amounts to CZK 34,835 in 2020 and CZK 35,441 in 2021 (MPSV, 2020).

Hypothetical taxpayers are divided according to individual incomes, into 10 income groups, see tab. 1. The range of income groups is determined with regard to covering all effects of taxation, including the maximum assessment base for the calculation of social insurance in the Czech Republic, which in 2020 was CZK 1,672,080 and in 2021 is CZK 1,701,068.

Tab. 1 – Income groups. Source: own research

Income of group	1	2	3	4	5	6	7	8	9	10
Multiple of the average wage	0.5	0.75	1	1.25	1.5	1.75	2.5	3.5	4.5	5.5

4 hypothetical situations are modeled (S):

S1: A taxpayer who is only entitled to a basic taxpayer discount (in 2020 in the amount of CZK 24,840 and in 2021 in the amount of CZK 27,840)

S2: A taxpayer who is entitled to a basic taxpayer discount and claims a tax benefit for the first child (in 2020 and 2021 in the amount of CZK 15,204)

S3: A taxpayer who is entitled to a basic taxpayer discount and claims a tax benefit for the first and second child (in 2020 and 2021 in the amount of CZK 19,404)

S4: A taxpayer who is entitled to a basic taxpayer discount and claims a tax benefit for the first child and applies for a discount on a low-income wife (in 2020 and 2021 in the amount of CZK 24 840)

Based on the tax legislation valid as of 1 January 2020 and 1 January 2021 in the Czech Republic, the amount of personal income tax, the amount of social security, health insurance and the amount of net income were calculated for all income groups. The income tax in 2020 is determined according to the formula:

$$IT = (Y + SH) \times TR \quad (5)$$

where: IT is the income tax, Y is the gross income (tax base) rounded down to whole hundreds of Czech crowns, SH is the social (24.8 %) and health (9 %) insurance paid by the employer and TR is the tax rate.

The income tax in 2021 is determined according to the formula:

$$IT = Y \times TR \quad (6)$$

## 4 RESULTS

The subchapters below show the results of the indicators of the effective tax rate, the progressivity of the average rate, the progressivity of the tax obligation and the progressivity of earning after taxation.

#### 4.1 The effective tax rate

Figure 1 shows evolution of the effective tax rate in Czech Republic in 2020 for all analyzed situations.

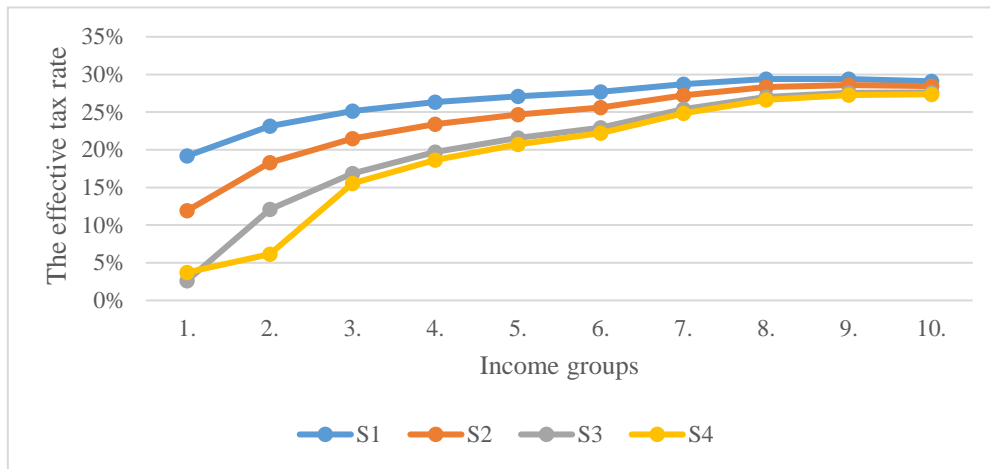


Fig. 6 – Development of effective tax rate in Czech Republic in 2020. Source: own research

Figure 2 shows evolution of the effective tax rate in Czech Republic in 2021 for all analyzed situations.

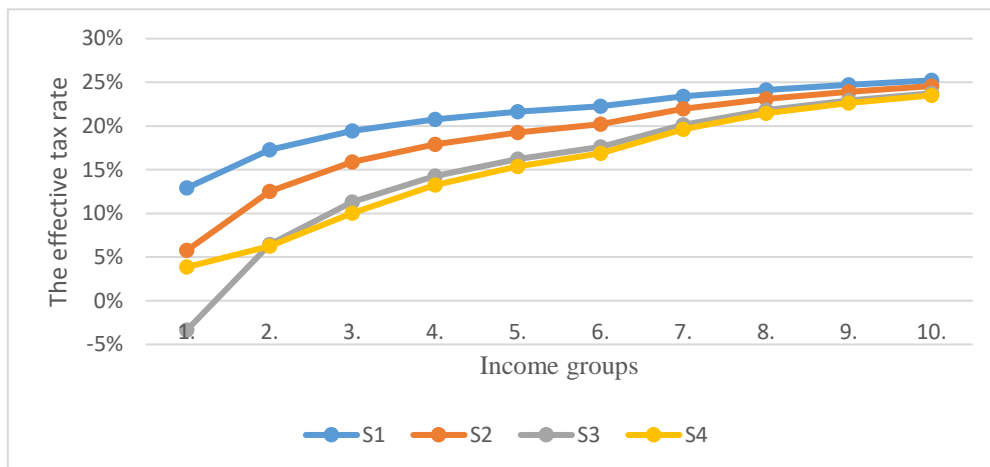


Fig. 7 – Development of effective tax rate in Czech Republic in 2021. Source: own research

In the case of S1, it is possible to see a lower average effective tax rate in 2021 compared to 2020, which is caused, for example, by the abolition of the super-gross wage, and thus to a reduction in tax liability in 2021. In both analyzed periods, the average effective tax rate increases with increasing gross income, with the exception of the 10th income group in 2020, when it decreases, which is due to the maximum assessment base for the calculation of premiums. The biggest change can be seen between the 1st and 2nd income group in both analyzed years. In the case of S2, it is also possible to see an increasing tendency of the average effective tax rate throughout our course of both analyzed years (except for one situation, as in the previous case). Compared to S1, it is possible to see smaller values, due to the application of a tax benefit for the first child. The biggest change can be seen again between the 1st and 2nd income group in both analyzed years. In the case of S3, you can see the same course as in the previous cases. In the 1st income group, it is possible to see a negative effective average tax rate, which is caused by a large tax bonus, which arose due to a tax benefit for two children. Compared to S2, it is possible to see smaller values, due to the application of a tax benefit for

the 1st child and the 2nd child. The biggest change can be seen again between the 2nd and 3rd income group in both analyzed years. In the case of S4, it can be seen that the effective tax rate in the case of the 1st and 2nd income groups is higher in 2021 compared to 2020, in the others, another course is taking place as in previous situations. Furthermore, in the case of the 1st income group, the effective tax rate in both analyzed years is higher than in the case of S3. The average effective rate is lower in 2021 than in 2020, due to the already mentioned abolition of the super-gross wage and an increase in the basic taxpayer discount.

#### 4.2 Progressivity of the average rate

Figure 3 shows evolution of the progressivity of the average rate in Czech Republic in 2020 for all analyzed situations.

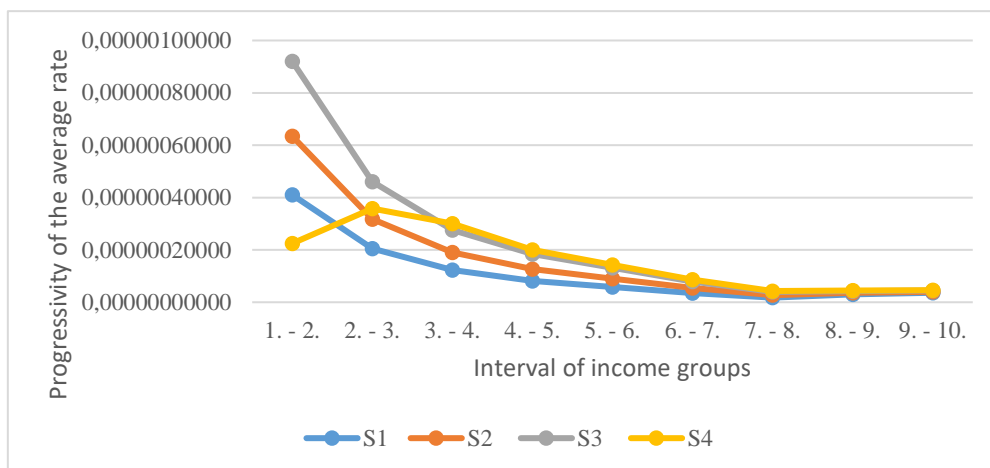


Fig. 3 – Development of progressivity of the average rate in Czech Republic in 2020. Source: own research

Figure 4 shows evolution of the progressivity of the average rate in Czech Republic in 2021 for all analyzed situations.

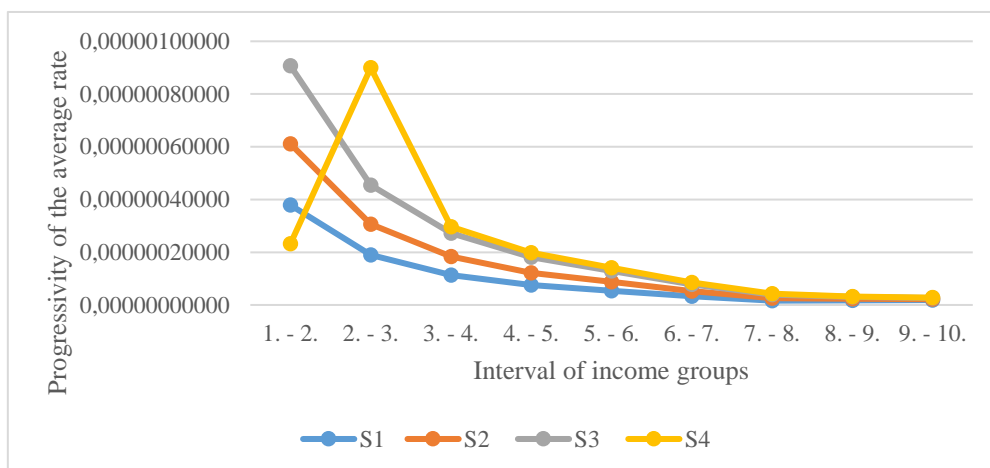


Fig. 4 – Development of progressivity of the average rate in Czech Republic in 2021. Source: own research

Based on the result of the indicator of the progressivity of the average rate, it is clear that personal income tax in 2020, but also in 2021 for all analyzed situations is progressive throughout its course, as its amount is greater than 0, which confirms the graphical course of this indicator. The progressivity of the average rate in 2021 is higher than in 2020 in most of the analyzed situations. An exception is S4 for the interval of income group 1. – 2. and 2. – 3. The highest value of the indicator in 2021 is in the case of S1, S2 and S3 for the interval of income group 1. – 2., in the case of S4 it is for 6. – 7. The highest value of the indicator in 2020

is in the case of S1, S2 and S3 in the interval of income group 1. – 2., in the case of S4 it is in the case of 2. – 3. In the case of S1, S2 and S3 there is no significant change in progressivity of the average rate comparing 2020 and 2021. However, in the case of S4, in the interval of the income group 2. – 4., the progressivity of the average rate shows a significant difference, which is caused by the tax bonus. The legislative change in 2021 in the Income Tax Act has a negligible effect on the progressivity of the analyzed situations (with the exception of situation S4 at 0.75 and 1 multiple of the average wage), but we can say that progressivity has increased slightly. Higher progressivity can be seen in lower income taxpayers, with higher income there is a decrease in progressivity. The higher progressivity of low-income taxpayers is caused, for example, by the achievement of a tax bonus, or rather by the fact that taxpayers often do not pay any tax. The low effective tax rate compared to the linear tax rate also corresponds to this fact. The lower progressivity of taxpayers with higher incomes is mainly due to the achievement of the maximum assessment base for the calculation of social insurance.

### 4.3 Progressivity of the tax obligation

Figure 5 shows evolution of the progressivity of the tax obligation in Czech Republic in 2020 for all analyzed situations.

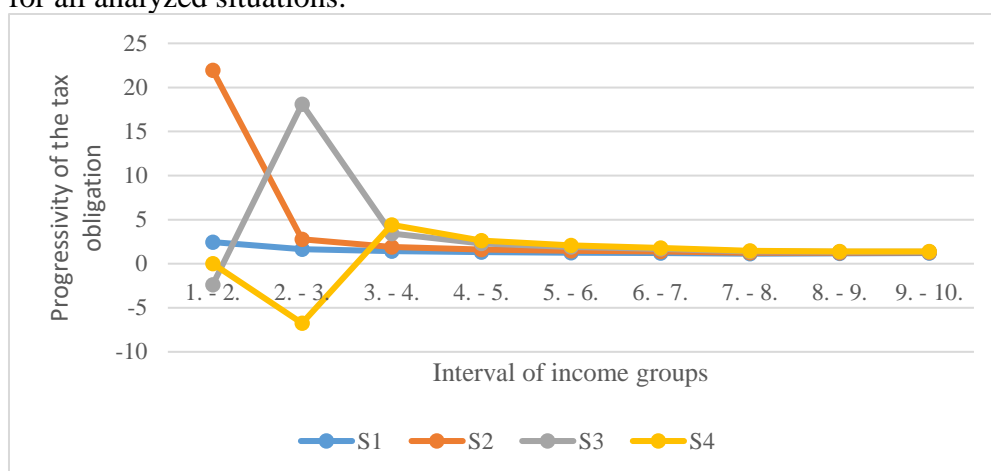


Fig. 5 – Development of progressivity of the tax obligation in Czech Republic in 2020. Source: own research

Figure 6 shows evolution of the progressivity of the tax obligation in Czech Republic in 2021 for all analyzed situations.

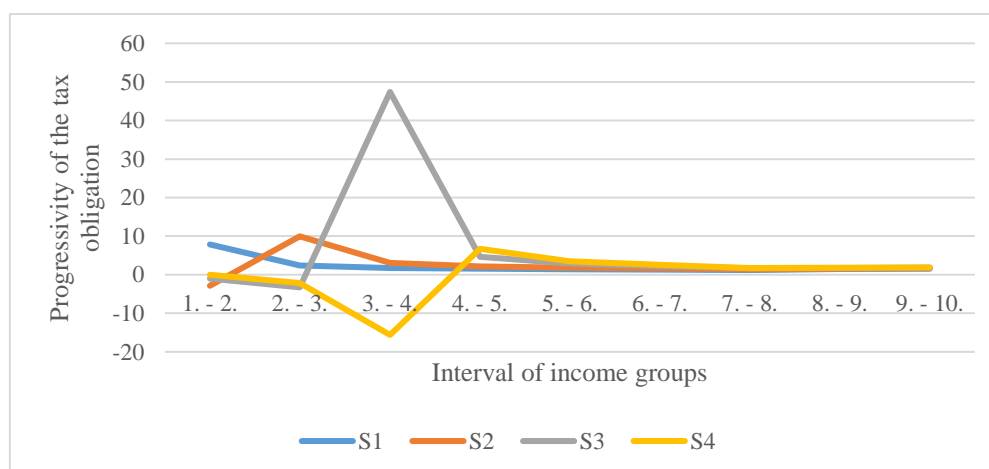


Fig. 6 – Development of progressivity of the tax obligation in Czech Republic in 2021. Source: own research

Based on the result of the indicator of the progressivity of the tax liability, it is clear that the personal income tax in 2020, but also in 2021 for most analyzed situations in its entire course is progressive, as its amount is greater than 1, which confirms the graphical course indicator. Regressive course, we can see in 2021 in the case of  $S_2$  for the income interval 1. – 2., then  $S_3$  for 2. – 3. and  $S_4$  for 2. – 3. In 2020 we can see the regressive course in the case of  $S_3$  for interval 1. – 2. The progressivity of the tax liability in 2021 is higher than in 2020 in most of the analyzed situations. The exception is  $S_2$  for the income group interval 1. – 2. and  $S_4$  for 2. – 3. In the case of  $S_1$ , and  $S_2$ , there is no significant change in the progressivity of the average rate comparing 2020 and 2021, with the exception of the income interval between 1. – 4. In the case of  $S_3$  and  $S_4$ , the indicator develops similarly from 1.5 and 1.75 multiple of the average wage. The legislative change in the Income Tax Act affects the progressivity of the analyzed situations much more than the indicator of the progressivity of the average rate. The development of the indicator is more volatile, especially from 0.5 to 1.75 multiple of the average wage.

#### 4.4 Progressivity of earning after taxation

Figure 7 shows evolution of the progressivity of earning after taxation in Czech Republic in 2020 for all analyzed situations.

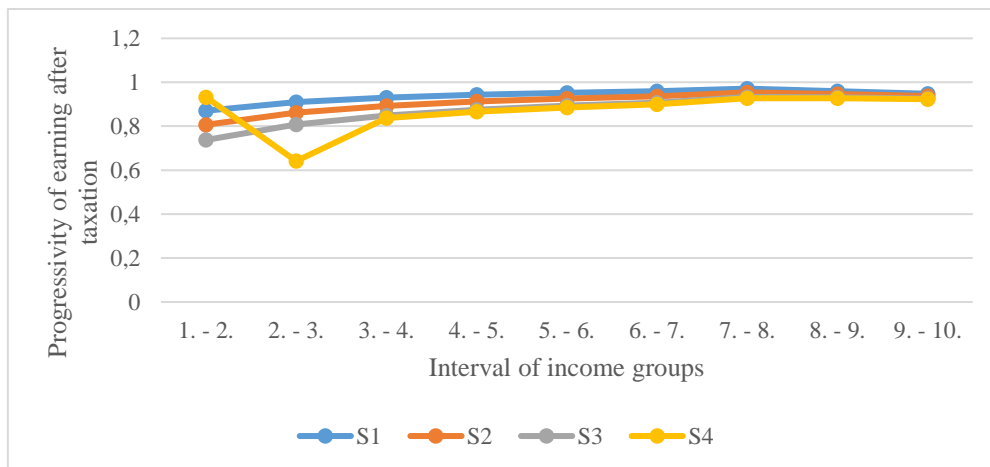


Fig. 7 – Development of progressivity of earning after taxation in Czech Republic in 2020. Source: own research

Figure 8 shows evolution of the progressivity of earning after taxation in Czech Republic in 2021 for all analyzed situations.

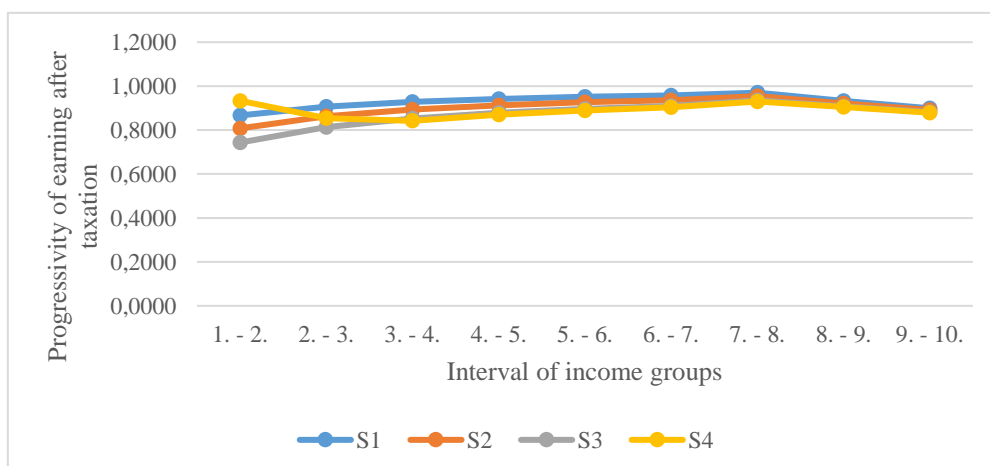


Fig. 8 – Development of progressivity of earning after taxation in Czech Republic in 2021. Source: own research



Based on the result of the indicator of progression of income after tax, it is clear that personal income tax is in 2020, but also in 2021 for all analyzed situations is progressive, as its amount is less than 1, which is confirmed by the graphic the course of this indicator. The progressivity of income after tax in 2021 is higher than in 2020 in most of the analyzed situations. The exception is the whole course of  $S_1$  and in the case of  $S_2$ ,  $S_3$  and  $S_4$  for income group intervals 8. – 10. In the case of  $S_1$ ,  $S_2$  and  $S_3$  there is no significant change in the progressivity of the average rate comparing 2020 and 2021. The exceptions are 3.5, 4.5 and 5.5 multiples of the average gross wage, in which the progressivity in 2020 is higher than in 2021. In the case of  $S_4$ , there are differences in the indicator in 0.75, 1 and 1.25 multiples of the average wage, in which the indicator in 2021 is higher compared to 2020 and further in 3.5, 4.5 and 5.5 multiples of the average wage, when, on the contrary, the indicator is higher in 2020.

## 5 DISCUSSION AND CONCLUSION

The paper dealt with the analysis of interval progressivity in 2020 and 2021, based on indicators of the progressivity of the average rate, the progressivity of the tax liability and the progressivity of income after tax. A total of four situations were analyzed in terms of the application of various options to reduce the tax burden on taxpayers. As a source of data, the average gross wage for 2020 and for 2021 and its multiples (0.5 to 5.5), is used. Non-taxable parts of the tax base (such as life insurance contributions or interest on the loan) or deductible items were not considered. The personal income tax in the Czech Republic is progressive. The results of the progressivity of the average rate showed a progressive development of this indicator in all analyzed situations. Higher progressivity was reported for lower income taxpayers and decreases with increasing income. The reason for higher progressivity for people with lower incomes is tax rebates and a low effective tax rate. For this reason, the effective tax rate increases as income grows. In the case of the progressivity of the tax liability and the progressivity of income after tax, its progressive course was also shown, with certain exceptions. The effective tax rate was higher in 2021 than in 2020. The effective tax rate and indicators of interval progressivity changed only slightly, due to a change in the average gross wage, and also due to a change in tax legislation. The super-gross wage was abolished and the basic taxpayer discount was increased, as well as the solidarity surcharge was abolished and the 23% tax rate for high-income taxpayers was introduced. Since 2021, tax liability has been determined directly from gross wage. This fact reduced the tax burden on employees' work, which is above average in the Czech Republic compared to the European Union, but also reduced state budget revenues, which will decrease even more in the coming years, due to another increase in the basic taxpayer discount in 2022. However, the interval progressivity did not change significantly in 2021 compared to 2020. Due to the expected tax changes in 2022, the topic still needs to be addressed.

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### Contact information

#### **Ing. Jiří Slezák**

VŠB – Technical University of Ostrava, Faculty of Economics  
Sokolská tř. 33, Ostrava 70200, Czech Republic  
E–mail: [jiri.slezak@vsb.cz](mailto:jiri.slezak@vsb.cz)  
ORCID: 0000–0003–2188–8881

#### **Ing. Ivana Čermáková**

VŠB – Technical University of Ostrava, Faculty of Economics  
Sokolská tř. 33, Ostrava 70200, Czech Republic  
E–mail: [ivana.cermakova@vsb.cz](mailto:ivana.cermakova@vsb.cz)  
ORCID: 0000–0003–3208–6374

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# BIG DATA PROJECTS MANAGEMENT METHODOLOGIES: A LITERATURE REVIEW

*Bára Smolová*

## **Abstract**

Due to modern technologies and smart devices, the amount of miscellaneous data is growing exponentially every year. Data are considered one of the assets of every company. But what is it good for, if the information needed is not extracted and the companies don't enjoy adequate benefits? Big Data technologies enable analyses of large volumes of structured and miscellaneous data, including data that needs to be processed, almost in real time. Projects aimed at the implementation of this technology are specific from the perspective of their comprehensiveness and therefore their complexity as well. Even though companies keep investing in projects for the implementation of Big Data, the success rate is very unsatisfactory. Therefore, it is necessary to focus on the key factors directly affecting the success of these projects. For the purposes of this study, is created literature review based on articles and papers indexed in academic databases (Scopus, Web of Science) in the years 2010 to 2021 to cover the research subject. The result of this review is the identification of management approaches recommended or used for Big Data projects, which will make the orientation of companies in this issue easier and also can serve as a support in their decision making regarding which approach to the management of such comprehensive projects to use.

*Keywords* Big Data, data science, management approach, management framework, methodology, project management

## **1 INTRODUCTION**

Big Data can be understood as a large amount of data with varying structure, from various sources and generated at different rates, which can be processed for the purpose of acquiring new knowledge and information from the researched environment (Manyika et al., 2011). In order to utilize the potential of the data, suitable advanced tools and technologies for their aggregation, storage, analysis, and visualization must be used.

The subject of Big Data processing is very topical, many scientists even say we live in the “era of Big Data”. In recent years more and more devices generating data have appeared and the contents of the Web (e.g. social media) are growing as well. All this is causing an exponential growth in data (Reinsel et al., 2018; Francis & Francis, 2021). This trend supports the development of new technologies and new options for the processing of miscellaneous data allowing the extraction of a maximum from the available data.

Also, pressure on private and public institutions regarding the publication of their data is growing stronger. Therefore, companies focus not only on their internal data, but are also expanding their analyses with publicly available data (Open Data), Linked Data and also geographical data (Kitchin, 2014). The results consequent upon the analysis may reflect not only data from the internal environment of the company, but also the external environment, to get closer to the reality.

The idea of acquiring wealth from data is very attractive for companies, so they invest in the implementation or further development of Big Data. But projects focusing on this subject are

very demanding due to its complexity. According to a recent statement from Gartner, 60% of all Big Data projects are unsuccessful (Gartner, 2017). Other sources claim the failure rate is much higher - approx. 85% (Heudeker, 2017).

Due to such adverse results of the projects, great attention is focused on the identification of critical factors of success. Many studies and statements have emerged from leading data scientists on the key factors of success, among which we count, along with the need for quality and available data, a qualified team, also complete and correct definitions of objectives and requirements and, e.g. Project management (Gao et al., 2015; Yeoh & Popovič, 2016; Evers, 2014, Koronios et al., 2014, Saltz & Shamshurin, 2016; McAfee & Brynjolfsson, 2012; Gómez & Heeks, 2016; Wamba et al., 2020)

This study focuses on project management, which is considered to be one of the most critical factors in the success of Big Data projects, with an emphasis on management approaches.

The first part of the work is devoted to the theory of the researched issues. Then the research methodology is described - research goal and research questions are determined and the procedure of literary research is described. The next part is focused on research results. The conclusion of the thesis is devoted to a discussion, a summary of the acquired knowledge and limitations of the research, as well as an outline of further continuation.

## **2 THEORETICAL BACKGROUND**

Part of this study will describe the theoretical background of the topic in question.

### **2.1 Big data**

The term Big Data was first used in 1997 by the scientists Michael Cox and David Ellsworth in research conducted for NASA. They used it for data which at that time couldn't be processed by the computer system (Cox & Ellsworth, 1997).

But the term Big Data was made famous by a study from 2008 published by IT scientists Rendal E. Bryant (Carnegie Mellon University), Randy H. Katz (University of California, Berkeley), and Edward D. Lazowska (University of Washington) (E. Bryant et al., 2008). It predicted a change in behaviour of companies, scientists, etc., in reaction to possible Big Data processing.

Big Data can be described using the so-called V characteristics. Basic 3V (data Volume, Velocity and Variety) was defined in 2001 by Douglas Laney, a Gartner analyst, in his study. This characteristic describes data properties - Volume (large data volumes), Velocity (ability to process data as they are created) and Variety (data in various structures)(Laney, 2001).

Since the first definition of Big Data through 3V the characteristic has been further developed. In 2011 further data properties were added, another V (Veracity) – data should be valuable for business (Snow, 2012). In 2012 the Value feature (IBM, 2012) was defined, in 2013 the Viability feature (representativeness of reality) and many others.

Big Data belongs to the field of data science, which includes scientific methods, processes, algorithms, and systems for the acquisition and processing of data. These terms are closely connected with data mining, which is an operation to gain insights and knowledge from large volumes of data with various structures.

### **Business Intelligence and Big Data**

Business Intelligence means the process of collection, integration, analysis, and interpretation of business data to gain information valuable for the business of the company in question.

Therefore, it is a field of data processing closely associated with Big Data, which can be used to analyse large volumes of miscellaneous data. With the possibilities of Big Data, Business Intelligence moved from descriptive analyses to predictive and prescriptive analyses (Larson & Chang, 2016).

## **2.2 Project management**

The main purpose of project management is the efficient management of a project, i.e., terminable and integrated activity, the objective of which is to achieve a defined state (e.g., software development). A project can be considered successful if the specified objective is achieved in the specified time, assigned costs and in the required quality.

This study focuses on approaches to the management of a Big Data solution development project in a company. It is the reason it researches the methodologies of ICT development implementation, not its operation. The purpose of these methodologies is to formalize processes, define responsibilities and rules of communication (Voříšek, 1997).

The choice of approaches depends on the technology used. Project management is divided into two basic approaches, which further split into individual frameworks.

### **Traditional approach**

It is based on precise, thorough, formal and directive planning of all activities of a project with precisely set objectives of the activities. It precisely specifies processes, requirements, and objectives. This approach assumes the project can be precisely defined and described right at its beginning and, after completion, repeatedly implemented (Bruckner, 2012). Because of this assumption the project is very sensitive to any changes or unplanned situations, which can and do arise in the IT industry – especially in the Big Data field.

This approach includes the waterfall, spiral model, etc.

### **Agile approach**

The agile approach is also called an approach governed by change and therefore represents the opposite of the traditional approach. It is based on the assumption that the project processes cannot be precisely described and only principles and planned practices can be specified.

This approach is suitable for projects with a defined objective, for which it is still unclear how it will be achieved. This approach is usually used in cases when the project (development) plan cannot be clearly specified (Wysocki, 2014).

This method offers a client who is part of the project team and can continuously change the specifications great flexibility. There are no limits on the project. The deliveries to the client take place in the form of increments (iterations), and individual increments are tested and eventually modified according to the client's requirements.

The agile approaches to Big Data project management include Scrum, Kanban and eXtreme programming, and other frameworks. The principles of agile management are described in the manifesto and principles of Agile Software Development (Manifesto for Agile Software Development, 2001).

The management of projects focused on Big Data is still being researched. The study reflects not only standard approaches to project management (Scrum, Kanban, waterfall model etc.), but also approaches used for data mining process (CRISP-DM, KDD, SEMMA, etc.), which is a necessary part of every Big Data project. These frameworks are used with both agile and non-agile projects approaches (Schmidt & Sun, 2016).

### 3 METHODOLOGY

The research aims to answer questions regarding the approach to Big Data project management.

The objectives of the research are:

*ROI: Identification of the most relevant researches on the issue of approaches to the management of Big Data projects since 2010.*

And to find answers to questions based on the search conducted:

*RQ1: Are more agile or traditional approach for Big Data project management used?*

*RQ2: Which particular frameworks to the project management of Big Data development are used?*

For the purpose of finding the answers to the above-described questions a literature review of scientific articles and contributions indexed in Scopus and Web of Science databases was conducted.

The manual search process was conducted in February 2021 using the key words “big data“, “data science“, “scrum“, “kanban“, “crisp“, “kdd“, ”semma“, “agile“, “spiral“, “waterfall“, “project management“, “project methodology”, “project framework”. The query was limited to articles published prior to 2010.

This chain was modified based on the rules for searches in the Scopus and Web of Science databases, the development of the number of articles for the specified period is shown in Fig. 9. These charts show that the number of articles on the approach to Big Data project is growing.

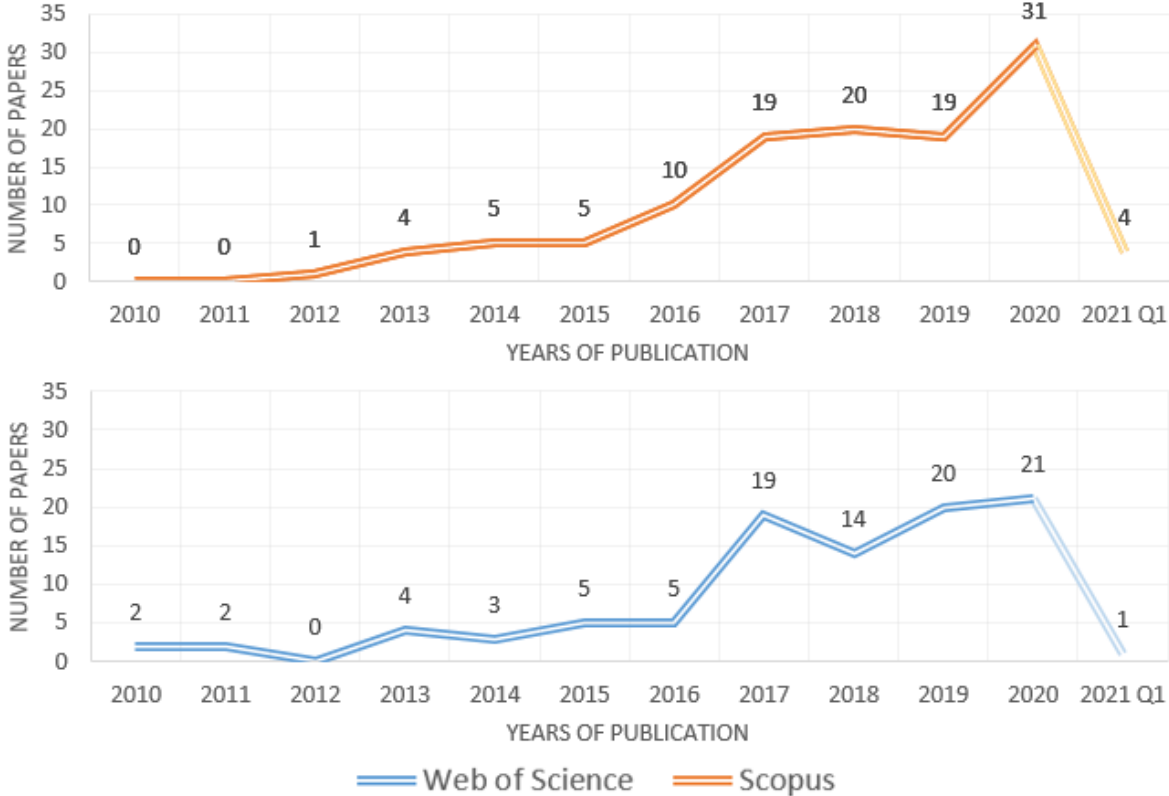


Fig. 9 - Number of articles in database Scopus and Web of Science according search query. Source: own research

Based on the key words, 214 articles were found. Fig. 10 shows the process of processing identified articles, conducted for the purpose of identifying the relevant ones.

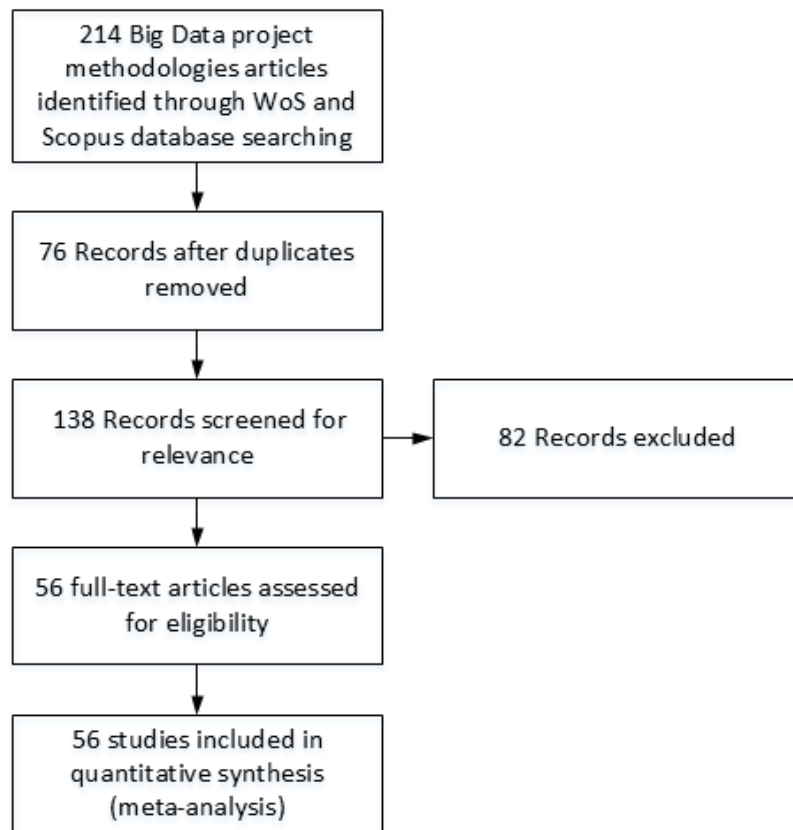


Fig. 10 - Systematic Literature Search. Source: own research

The relevance of the articles was assessed by the following steps:

1. Reading the abstracts.
2. Searching for each criterion within the complete content of the articles.
3. When necessary, reading the whole article.
4. Classifying articles by project management methodology and Framework
5. Classifying articles by type of Research (case study/journal article)

Only articles published from 2010 to 2021, available in English, were included in the search. Therefore, the output of this research doesn't reflect this topic researched and published in other languages.

## 4 RESULTS

The result of the systematic literature review is 56 relevant articles on the researched topic, the Tab. 7 and Tab. 8 summarizes 20 of them, divided based on the type of study. These articles are considered by the author as the most beneficial and interesting of the researched issues.

Tab. 7 - Summary of Relevant Studies on Big Data project management approach – Journal paper. Source: own research

Year	Reference	Project approach	Framework	Big Data context
2016	Franková et al.	Agile	Scrum	Questionnaire survey about Big Data management
2016	Larson & Chang	Agile	Scrum, eXtreme programming	Design a framework for agile Big Data



2017	Saltz et al. (2017a)	Traditional	CRISP-DM	Big Data project characterization
2017	Grady et al.	Agile, Traditional	Kanban, CRISP-DM, Waterfall model	Deep and machine learning, DevOps and Business Intelligence
2017	Ponsard et al.	Agile	CRISP-DM, KDD, AABA	Data Mining methodologies
2017	Saltz et al. (2017b)	Agile	Kanban, Scrum, CRISP-DM	Different techniques of project management – project quality
2019	Soukaina et al.	Agile, Traditional	Kanban, Scrum, CRISP-DM, KDD, AABA	Successful adoption of Big Data solutions
2020	Kharlamov et al.	Traditional	CRISP-DM	Supply Chain - Logistics
2020	Raharjo & Purwandari	Agile	Scrum, Kanban, eXtreme programming	Agile project Big Data management challenges
2020	Al-Mazrouai & Sudevan	Agile	Scrum, Lean-Kanban	Managing Blockchain using agile project approach

Tab. 8 - Summary of Relevant Studies on Big Data project management approach – Case Study. Source: own research

Year	Reference	Project approach	Framework	Big Data context
2015	Maria et al.	Agile	Scrum, Kanban	Development of a prototype Big Data application - IoT, bank card fraud
2016	Schmidt & Sun	Agile	Scrum, eXtreme programming, CRISP-DM, SEMMA, KDD	Synthesizing agile and CRISP-DM approach
2017	Sachdeva & Chung	Agile	Scrum, eXtreme programming	Non-Functional Requirements for Big Data - IoT and banking
2017	Saltz et al. (2017c)	Agile	Scrum, Kanban, CRISP-DM	Geographic information, algorithms, Data Mining and machine learning
2017	Vidgen et al.	Agile	Scrum, eXtreme programming	Different types of efforts in data science
2018	Ponsard et al.	Agile	Scrum, CRISP-DM, KDD, AABA	Data Mining methodologies
2019	Saltz & Shamshurin	Agile	Scrum, Kanban, CRISP-DM	Migration Scrum - Kanban
2020	Baijens et al., 2020a	Agile	Scrum, Kanban, CRISP-DM, KDD	Focus of the Scrum approach on Data Science - Scrum-DS
2020	Baijens et al., 2020b	Agile, Traditional	Scrum, Kanban, CRISP-DM, KDD	Data Mining methodologies
2020	Tsoy & Staples	Agile	Scrum	Big Data - Business Intelligence value

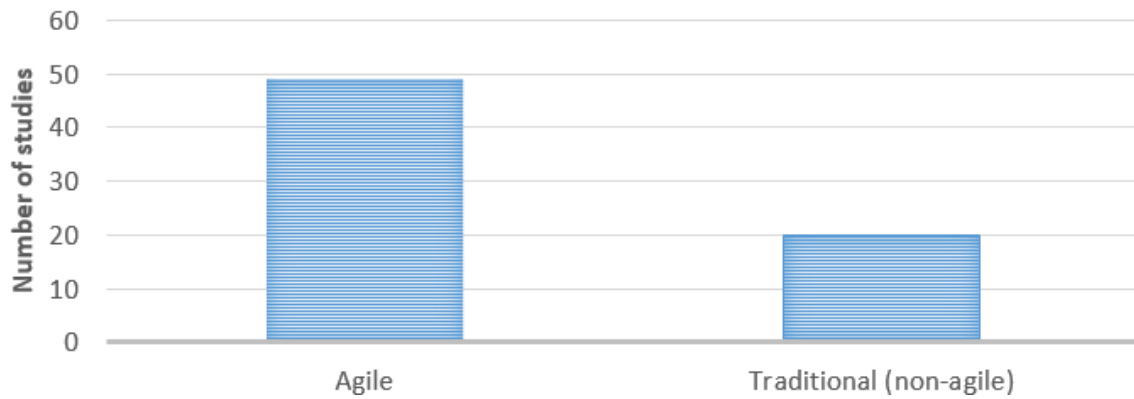


Fig. 11 - Relevant articles of Big Data project management - described approaches. Source: own research

Based on the findings of the literature review, an agile approach to Big Data project management is most often described, see Fig. 11. Fig. 12. shows that Scrum is the most described framework.

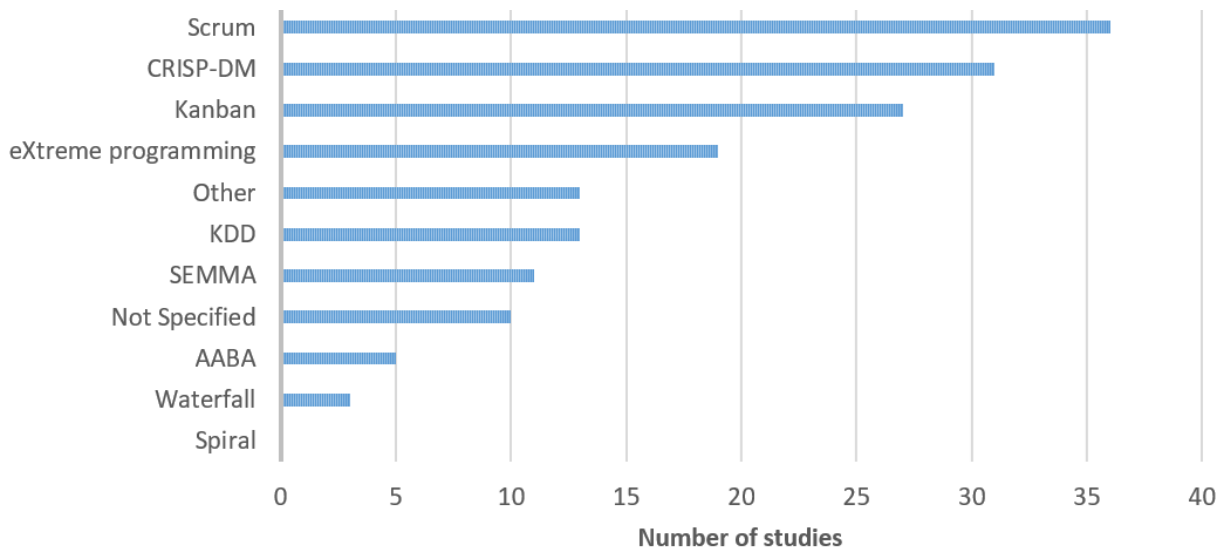


Fig. 12 - Representation of frameworks to the management of Big Data projects in the examined articles. Source: own research

Approaches to the management combining several available methods, such as combinations of the methods Scrum-CRISP-DM, Scrum-Kanban (Scrumban), Lean-Kanban, Kanban-CRISP and Scrum-eXtreme programming, are also often mentioned (Baijens et al., 2020; Al-Mazrouai & Sudevan, 2020 etc.).

The result of the systematic literature review is different from the statements of Saltz et al. (2017c), who, based on their case study, assume that Kanban is more suitable for a Big Data project than Scrum.

## 5 DISCUSSION

The purpose of this study was to provide findings regarding the results of scientific studies oriented towards the issue of project management, focused on Big Data. Even though the Scrum agile method is described most frequently, the literature mentions reasonable objections that it is not the most suitable solution, with a post scriptum that there are better approaches to management, based on, e.g. a combination of traditional and agile management methods. For

instance, Grady et al (2017) propose the use of a combination of Kanban and the CRISP-DM approach.

Furthermore, it is necessary to verify whether the described approaches and management frameworks identified as suitable for Big Data projects are actually used, through another type of research - such as a questionnaire survey.

## 6 CONCLUSION

Quantitative research using a literature review on the approaches to Big Data projects management was conducted. The output of the literature review is the identification of approaches to management which, according to the literature, are mostly used and recommended.

The findings from this research will facilitate orientation in this issue and simplify decision-making in terms of suitable management approach and frameworks to Big Data projects.

### Limitations and future research

The main drawback of this research is the fact that it is based only on the results of quantitative research, based solely on a literature review of the issue at hand.

Therefore, the research continues and based on the conducted systematic review a questionnaire survey is being conducted, focused on the identification of approaches to Big Data project management in the Czech Republic.

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## Contact information

### Ing. Bára Smolová

Technical University of Liberec, Faculty of Economics  
 Studentská 1402/2, 460 01 Liberec 1, Czech Republic  
 E-mail: [bara.smolova@tul.cz](mailto:bara.smolova@tul.cz)  
 ORCID: 0000-0003-3390-106X

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# IDEAL PROCESS AS A GOAL FOR PROCESS IMPROVEMENT

*Vladimir Sojka, Petr Lepsik*

## **Abstract**

When production processes are improved, there is a need for goal determination. A way how the goal is defined and described can significantly affect the size and success of improvement efforts. This paper reviewing approaches for the determination of goals for process improvement also proposes that for big improvements, big goals are needed. Such a goal can be an Ideal Process. Definition of Ideal and Perfect processes are compared, and overall Ideal Process as a goal for process improvement is proposed. This Ideal Process is based mainly on TRIZ's principle of Ideality, but it is extended by other aspects of ideal process definitions. On a case study of custom glass manufacturing, different approaches of goal definition are compared. The founded result is that the Ideal Process based on TRIZ's ideality as a goal for process improvement should provide an opportunity for bigger and more radical improvement in comparison with other commonly used goals.

**Keywords:** *Process improvement, Ideal process, Perfection, Lean thinking, Improvement goal, TRIZ*

## **1 INTRODUCTION**

Companies are constantly improving their processes in order to stay competitive. Continuous improvement contains goals such as time reduction, lowering costs, or better quality. Goals can be defined abstractly, or the improvement goal can be very specific and with a detailed description. In order of big improvement yields, big goals should be determined. For that, some kind of ultimate process improvement goal is needed. Such a goal can be to achieve the perfect, or ideal process. The problem could be in the determination of what is the ideal process.

This paper aims at the definition of the ideal process, in order to use the ideal process definition as the ultimate goal for process improvement. The paper also compares goal determination approaches.

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

### **2.1 Goals for process improvement**

Currently, there are many ways how to determine a goal for a process improvement project. Lean Production gives as an objective of Toyota Production System House to have the best quality, lowest cost, shortest lead time, best safety, and high morale (Liker & Morgan, 2006). In Six Sigma projects, goals are defined in a Define phase of the DMAIC cycle. High-level strategic company goals are break down into goals for individual Six Sigma, or Lean Six Sigma projects (Martin, 2009). The final goal is then included in the project charter and it is specified. Such a goal can be, for example, reduction of defects by 20%. Overall Six Sigma's goal is to decrease the variability of the process in a way to have a maximum of 3,4 defects per million opportunities (Pyzdek & Keller, 2010). Linderman and others (Linderman et al., 2003) go more specific, and they conclude, that the performance of the Six Sigma project depends on the goal statement. The authors are also reviewing Six Sigma projects from the Goal theory point of

view. One of the often used techniques for goal specification is SMART (Specific, Measurable, Attainable, Relevant, Time-bound). The SMART technique can help to define effective goals (Farnsworth et al., 2020). The goal of the Theory of Constraints (TOC) is described as to make money in the present as well as in the future (McMullen, 1998). Where the TOC is focusing mainly on throughput, inventory, and operating expenses.

For mention, there are other goals-related studies. Amaratunga and others (Amaratunga et al., 2001) use the Balanced Scorecard method for strategic vision. They conclude that BSC itself is not enough, it only shows the way of future action, there is a need for further formulation of goals. Authors in (Lepmets et al., 2012) study alignment of goals in organizations. They conclude that weak goals can lead to unsuccessful efforts in process improvements. Authors (Shahzad & Zdravkovic, 2009; Shahzad & Giannoulis, 2011) uses a goal-oriented approach for process improvement. The author (Schneiderman, 1988) describes the definition of goals related to process quality. He concludes that most goals have lack specificity, mainly rational objectives, and a timeline. There is a need for more empirically based goals.

To achieve big improvements, big goals should be determined. We believe, that such a goal can be to achieve an ideal, or perfect process. But what is the perfect or ideal process?

## **2.2 Perfect or Ideal Process**

The perfect process is described by Womack and Jones in (Womack & Jones, 1996a), where pursue perfection is the last principle of Lean Thinking. Authors define perfection as a state where all actions in an organization create value for the customer (Womack & Jones, 1996b). A way how to achieve perfection is through continuous incremental improvements. In (Womack, 2003) Womack defines the perfect process more accurately. Every step of the process has to be completely valuable, perfectly capable, perfectly available, exactly adequate, and highly flexible. Steps should be connected by continuous flow, noiseless pull, and maximal leveling. Authors (Flueck & Li, 2008) trying to define a perfect power model. Womack and Jones (Womack & Jones, 1996a), also describing the usefulness of perfection as a goal. Dreaming about perfection can help to find what can be achieved. Authors (Mone et al., 2011) argue, that a perfect system as a goal can be tricky because it is hard to achieve such a big goal. There is a need for more specific goals.

There are several descriptions of ideal process or process ideality. Model for software process improvement called IDEAL is described in (McFeeley, 1996). It contains several phases: Initiating, Diagnosing, Establishing, Acting, and Leveraging. The use of the IDEAL method is demonstrated for example in (Klendauer et al., 2012). The ideal process model for an agile method is presented by Visconti and Cook (Visconti & Cook, 2004), who proposed a software model, for application on agile software development. The result should give information on how agile a particular agile method is. Another approach to the ideal process can be seen in chemistry. In (Toropova et al., 2018, 2020) authors presenting the index of ideality correlation (IIC). It helps to predict temperatures for a glass transition of polymers. More interesting is the definition of the ideal process by Dobe and Kruthiventi (Doble & Kruthiventi, 2007). They described that the ideal process should be: simple, with minimum steps (exactly one step), safe, use renewable resources, environmentally friendly, 100% yield, zero waste, and atom-efficient. These characteristics can also be easily used for the description of ideal production processes. Characteristics of the ideal process are shown in Figure (Fig. 1). Dobe and Kruthiventi (Doble & Kruthiventi, 2007) also described an ideal product and ideal user. These concepts are also discussed in (Gür & Karagölge, 2016).



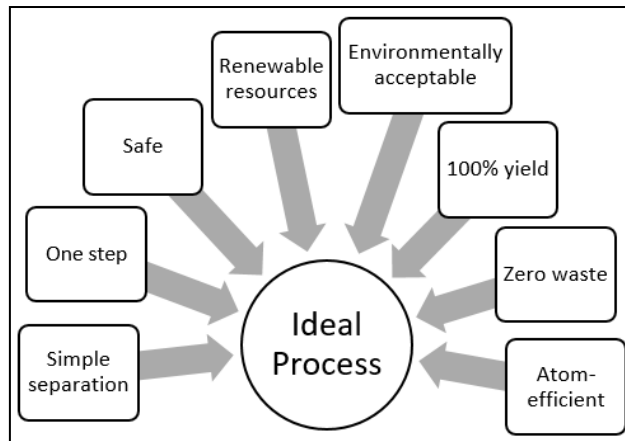


Fig. 1 – Ideal process by Dobe and Kruthiventi. Source: Doble & Kruthiventi, 2007

TRIZ (Theory of Inventive Problem Solving) includes a concept of ideality. Ideality is one of the main principles of TRIZ theory. For seeking ideality an Ideal Final Result (IFR) as a tool is used. The ideal state, or final result, is a state when all functions of the systems are achieved, but there is no system. Ideality is defined by equation (1) below (Soderlin, 2003) or (Dai & Ma, 2013).

$$I = \frac{\sum Benefits}{\sum Harms} \quad (1)$$

Where  $I$ , is the degree of Ideality,  $Benefits$  are all positive functions of the system, and  $Harms$  are all negative functions of the system. Definition of the ideality is also extended by  $Costs$ , which represents inputs to the system or cost for the implementation of the innovative solution. The extended equation for the ideality is in equation (2) below (Domb, 1997; Slocum et al., 2003; Soderlin, 2003).

$$I = \frac{\sum Benefits}{\sum Harms + \sum Costs} \quad (2)$$

The ideal state is often defined as a state where for the description of the system, words as “self”, or “itself” are used (Domb, 2007; Mann, 2003a, 2003b, 2003c). The Ideal Final Result method can help to achieve innovative improvement for the system, either in the case of product or process innovation. This was proven by many authors before, as for example: (Belski, 1999; Bhushan, 2008; Domb, 1997, 1998; Navas, 2017).

TRIZ ideality for process improvement was defined in (Sojka et al., 2020), where overall process ideality depends on partial idealities of process aspects as time, quality, safety, costs, ergonomics, and ecology. The degree of process’ ideality can be calculated by equation (3) shown below (Sojka et al., 2020).

$$PI = \frac{\sum VA_{time}}{\sum NVA_{time}} + \frac{\sum OK_{pcs.}}{\sum NOK_{pcs.}} + \frac{\sum Profits}{\sum Costs} + \frac{\sum activities without safety risk}{\sum safety risks} + \frac{\sum activities without ergonomic risk}{\sum ergonomics risks} + \frac{\sum activities without environmental impact}{\sum ecology risks} \quad (3)$$

Laue (Laue, 2019) suggesting a method for analyzing the potential for process improvement based on TRIZ’s Ideal Final Result.

### 3 METHODOLOGY

A literature review and comparison of goal determination techniques, with descriptions of perfect and ideal processes, were used to define the Ideal Process as a goal for process improvement efforts.

Firstly requirements for the ideal process were reviewed, and an overall definition of the ideal process was made. Requirements are summed in the table (Tab. 1) below.

Requirements for good goal definition were also reviewed. Goal's requirements are listed in the table (Tab. 2) also below.

Tab. 1 – Ideal process requirements. Source: own research

<b>Ideal process requirement</b>	<b>Origin</b>
<ul style="list-style-type: none"> <li>• Make only value</li> </ul>	Lean Thinking
<ul style="list-style-type: none"> <li>• Completely valuable</li> <li>• Perfectly capable</li> <li>• Perfectly available</li> <li>• Exactly adequate</li> <li>• Highly flexible</li> </ul>	Lean Thinking's Perfection principle
<ul style="list-style-type: none"> <li>• Simple</li> <li>• Minimum steps (one step)</li> <li>• Renewable resources</li> <li>• Environmentally acceptable</li> <li>• 100% yield</li> <li>• Zero waste</li> <li>• Efficient</li> </ul>	Green Chemistry and Engineering
<ul style="list-style-type: none"> <li>• generate positive effects</li> <li>• without negative effects</li> <li>• without costs</li> </ul>	TRIZ's Ideality
<ul style="list-style-type: none"> <li>• make demanded function itself</li> </ul>	TRIZ's Ideal Final Result
<ul style="list-style-type: none"> <li>• only value-adding activities</li> <li>• without defects</li> <li>• without costs, only incomes</li> <li>• no safety risks</li> <li>• no ergonomic risks</li> <li>• no environmental risks</li> </ul>	Calculation of Process' Ideality

Tab. 2 – Aims of a process improvement goal statement. Source: own research

<b>Aim of goal statement</b>	<b>Origin</b>
<ul style="list-style-type: none"> <li>• Specific</li> <li>• Measurable</li> <li>• Attainable</li> <li>• Relevant</li> <li>• Time-bound</li> </ul>	SMART
<ul style="list-style-type: none"> <li>• Best quality</li> <li>• Lowest costs</li> <li>• Shortest lead time</li> <li>• Best safety</li> <li>• High morale</li> </ul>	Toyota Production System (TPS)
<ul style="list-style-type: none"> <li>• Reduce waste</li> </ul>	Lean Production
<ul style="list-style-type: none"> <li>• Generate money</li> <li>• Optimize throughput</li> <li>• Reduce inventory</li> <li>• Reduce operating expenses</li> </ul>	Theory of Constraints (TOC)

<ul style="list-style-type: none"> <li>• Lowering defects</li> <li>• Reducing variability</li> </ul>	Six Sigma
<ul style="list-style-type: none"> <li>• Open minded/big goals</li> </ul>	To achieve big changes
<ul style="list-style-type: none"> <li>• Small and specific</li> </ul>	To increase the probability of completion

From the requirements to the ideal process in (Tab. 1), and required aims of a good goal in (Tab. 2), the overall definition of the ideal process as a goal to process improvement could be set.

## 4 RESULTS

### 4.1 The Ideal Process as a goal for process improvement

The proposed model of the Ideal Process has to be time-efficient – there are made only activities that generate demanded function (or Value). These activities are done only in a valuable time. No defects are made, so there is no need for quality control. The process should also generate profit. It should contain a minimum of steps – ideally, no steps. There are no safety and ergonomic risks, and if there are workers, they are motivated by the process itself. The Ideal Process should also be without any negative environmental impact. And also without any waste. The process should be flexible and dynamically available when it is needed. The ideal Process is summed in figure (Fig. 2) below.

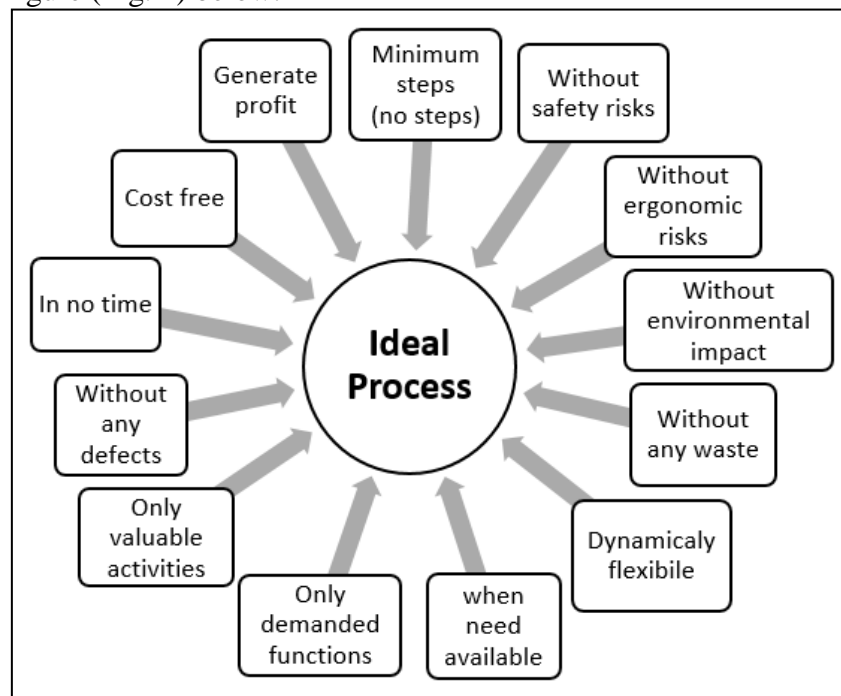


Fig. 2 – The Ideal Process. Source: own research

A higher state of ideality can be described as a state when demanded outcomes are made in no time, for no costs, without any other outcomes.

The Ideal Process can be used as a very good goal for the determination of a way which improvement efforts should go. The problem is that for increasing the probability of completing an improvement task, there is a need for a specific and measurable goal. In other words, the ultimate goal should be abstract in order to allow us to think out of the box and find highly

innovative ideas for improvement. On the other way, there is a need for concrete, specific, and easily achievable goals, in order to complete the improvement project.

That is why a complete goal description should be divided into two parts. Firstly highly abstract goal as the Ideal Process is chosen, for generating innovative ideas. When ideas are found, a new goal must be reformulated. Highly specific tasks for implementation of found improvements from earlier could be described, for example, by the SMART method.

For the measurement of goal, the Process' Ideality can be used. Because equation (3) works with most of the process aspects, it could help to achieve the demanded ideal state. The problem can occur when the number of value-adding steps is reduced. That is why we also propose a new extended parameter for comparison of process improvement. Relative Process' Ideality can be calculated from Process' Ideality when the Process' Ideality is divided by a number of Process steps. Relative Process' Ideality can be calculated by equation (4) below.

$$rPI = \frac{PI}{n} \quad (4)$$

Where *rPI* is Relative Process' Ideality, *PI* is Process' Ideality calculated by equation (3), and *n* is a number of process steps.

In a table (Tab 3.), there are compared approaches for goal determination.

Tab. 3 – Comparison of approaches for defining process improvement goals. Source: own research

	SMART	Toyota Production System	Lean Production	Theory of Constraints	Six Sigma	Ideal Process
Non-specific definition (big goal)		YES	YES	YES		YES+
Specific definition	YES+	YES			YES	
Time improvement		YES	YES	YES		YES
Quality (defect improvement)		YES			YES+	YES
Cost reduction		YES	YES	YES	YES	YES
Profits increasing				YES		YES
Safety improvement		YES				YES
Ergonomics improvement						YES
Environment risks reduction						YES
Moral improvement		YES				
Reduction of waste activities		YES	YES			YES

In the table (Tab. 3), aspects and aims of different goal-setting approaches are compared together. The “YES” means that the approach fulfills the aspect listed in the left column of the table. The “YES+” represents a strong fulfillment of the aspect of the goal. The Ideal Process as a goal covers most of the aspects of the goal.

## 4.2 Case Study

For the purpose of clearer presentation of setting the Ideal Process as a goal for process improvement was compared with other approaches. Comparison of set goals was made on a real process. Custom production of glass eyes for taxidermy, toys, or sculptures was chosen for this purpose. In creating such an eye, the majority of steps are made manually. That is why each eye is slightly different in color texture. As often defect small bubbles in glass can appear, or

the whole eye breaks during the cooling phase. Different approaches on how to determine the goal for improvement were set.

Firstly a goal based on Lean was determined. Lean is focused on making only activities that create value. The goal can be set to find non-value-adding activities in the process and eliminate or reduce them. For specification, a percentage of reduced NVA times can be included. This leads solvers to make a value analysis of the process and executes all waste activities such a transport, movements, inventory, waiting, overproduction, over-processing, etc. The result can be an improvement of material flow, or executing some unnecessary actions.

Six Sigma's goal approach is focused on quality. The goal is to reduce the variability of process outcome, reduction of defects, and cost for defects. Again there can be specified a percentage of demanded reduction. This kind of goal leads to searching for solutions on how to reduce deviations in production, mainly in color texture, and how to prevent the occurrence of bubbles and breaking of eyes. The result can be an improvement of the cooling process, added quality checkpoint, or a new material supplier.

Setting goals based on TRIZ and Ideal Process would focus on self producement of eyes. Eyes are made by themselves, they cool down themselves, they are made in no time for no cost. Additionally can be defined that in a process, there is no danger, there are minimum (or zero) operations, etc. This goal statement guides us to think about the process out of the box. The result can be a radical change in the process. Eyes could be produced in a totally different way. Additional statements are preventing of cases where the main parameter is improved and the second parameter is decreasing. With the improvement of lead time or quality, parameters as safety, or ecology should be the same or better too. After a new way of producement is found more specific goals are set to achieve the implementation.

Tab. 4 – Comparison of approaches for defining process improvement goals from the case study. Source: own research

	<b>Lean</b>	<b>Six Sigma</b>	<b>TRIZ and Ideal Process</b>
<b>Aim/focus</b>	Value/waste	Defects and Variability	Principle and result of production
<b>Type of results</b>	Less waste in the process	Fewer defects	A different approach of production
<b>Example of result</b>	Narrow and shorter flows, less waiting, less unnecessary activities	Improved quality checks, improved process steps (where defects are made)	Products are made by a different technology or from different material

## 5 DISCUSSION

TRIZ's Ideal Process as a goal for process improvement can be useful if our efforts are not only to optimize the process but to achieve a rapid change or innovation. For a higher probability of completing improvement, there is needed to define clear and simple goals after an improvement solution is found. For that, other goal determination methods can be used. Definition of a goal based on TRIZ Ideality and Ideal Process could be good to combine with other TRIZ principles. The most useful can be the use of evolution trends and inventive principles. These principles can show on the way of the evolution of the technical system, and more clearly guide towards a great innovative solution.

Gåsvaer (Gåsvaer, 2013) claims that setting up an aggressive goal leads to innovative thinking and radical changes. The Ideal Process as a goal could represent that aggressive goal for the process innovation efforts. As a different approach for setting a goal for process improvement (Shahin & Mahbod, 2007) described an integrated approach of goal setting based on organizational KPI's with the criteria of SMART.

## 6 CONCLUSION

Approaches for process improvement project's goals definition were reviewed and compared. Also, several definitions of what is a perfect or ideal process were compared. From the result of the comparison, an overall description for the ideal process with demands to a good goal was put together to determine the Ideal Process as a goal for process improvement.

The resulting Ideal process comes out from TRIZ's principle of Ideality and Ideal Final Result. It is also extended by requirements from other approaches. Also, the Relative Process' Ideality (3) as a new indicator for the degree of process perfection was proposed.

The use of TRIZ's Ideal Process for process improvement goal definition was compared with other approaches on the example of glass eyes manufacturing. The example showed that the use of the Ideal Process as a description for the goal leads to more opportunities for a radical change of the process. By the use of the Ideal Process approach, we should be able to achieve much bigger improvements.

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### Contact information

#### **Ing. Vladimír Sojka**

Technical University of Liberec, Faculty of Mechanical Engineering  
Studentská 1402/2, 461 17 Liberec, Czech Republic  
E-mail: vladimir.sojka@tul.cz  
ORCID: 0000-0001-7295-8160

#### **doc. Ing. Petr Lepšík, Ph.D**

Technical University of Liberec, Faculty of Mechanical Engineering  
Studentská 1402/2, 461 17 Liberec, Czech Republic  
E-mail: petr.lepsik@tul.cz  
ORCID: 0000-0003-1900-7264

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# THE ROLE OF ECO-INNOVATION IN THE SUSTAINABLE DEVELOPMENT OF POLAND

*Rafał Śpiewak, Aleksandra Seroka*

## Abstract

The article attempts to identify the role of eco-innovation in sustainable development on the example of Poland. Its content defines innovation. An attempt was made to isolate and characterize eco-innovation from a set of innovations. An overview of eco-innovations in the processing and service industries in Poland in 2010-2019 was made. For this purpose, the Statistical Yearbooks of Industry - Poland analysis was used. The list of industries and their share in the total results for particular types of technological advancement of the economy was also used. The outlays for eco-innovations and the sources of their acquisition were also analysed. On the basis of the collected data and the analysis of phenomena taking place in recent years, identified research gap. That was about indicating the direction of evolution of eco-innovation in Poland. Using descriptive statistics has been proved that eco-innovations and their area of occurrence are closely correlated with the level of economic development of the analysed country. Due to the fact that Poland (depending on the ranking and adopted indicators) has joined or will soon join the group of highly developed countries, the area of eco-innovation is likely to change. Signals indicating this were identified in the article and an attempt was made to define the direction and indicate the area where eco-innovations will appear in the future. The text also proves a change in the social approach to the topic of sustainable development and its consequences.

**Keywords:** *innovation, ecology, sustainable development, circular economy, descriptive statistics*

## 1 INTRODUCTION

Poland is the largest country among those that enlarged the European Union (EU) in 2004.

It is currently the fifth largest population in the EU (Life in the EU, 2021). The development of the Polish economy stimulated by the improvement of trade opportunities with neighbors, which translates directly into the level and quality of life of citizens, stimulates the growth of expectations regarding the care for the natural environment. The will to develop, the need to face competition on the European market, as well as concern for the social needs of Poles, force the direction of economic development towards sustainable development. This requires the development and implementation of eco-innovations in the processing and service industries.

## 2 LITERATURE REVIEW

As a result of the literature review, great interest in the topic of eco-innovation was confirmed. Sources indicate the technology (Ch'ng, Cheah & Amran, 2021) and production (Geng, Lai & Zhu, 2021), sectors as the dominant eco-innovation sphere. The approach of treating eco-innovation as open source is gaining popularity (Chistov, Aramburu & Carrillo-Hermosilla, 2021). The approach of treating eco-innovation as open source is gaining popularity. Eco-innovation is directly related to the level of carbon footprint emissions. The best example of

this are the G7 countries (Ahmad, et al., 2021). The identified need interpreted as a research gap indicate the needed describe of the direction of evolution of eco-innovation in Poland. It was also necessary to indicate the area where eco-innovations will appear in the future. There is observed change in the social approach to the topic of sustainable development and its consequences.

### 3 METHODOLOGY

To carry out the research, the results of which are presented in this article, the authors decided to use descriptive statistics. The obtained effects are presented graphically. Descriptive statistics is the processing of data on a group or sample without using the calculus of probability. It allows you to organize your data in a clear way. He presents the obtained data in a form that facilitates their evaluation and analysis, identifying regularities between them. The content presented in the article is quantitative data.

### 4 ECO-INNOVATION AS A TYPE OF INNOVATION

In the sources, the term "innovation" is defined as "(...) *introducing something new, something newly introduced, novelty, reform (...)*" (Tokarski, 2012). Innovative activity can be considered all scientific, technical, organizational, financial and commercial activities that lead or are intended to lead to the implementation of innovation (Rudzewicz & Strychalska-Rudzewicz, 2014). For this reason, the implementation of a new or significantly improved product, service or process can be considered an innovation.

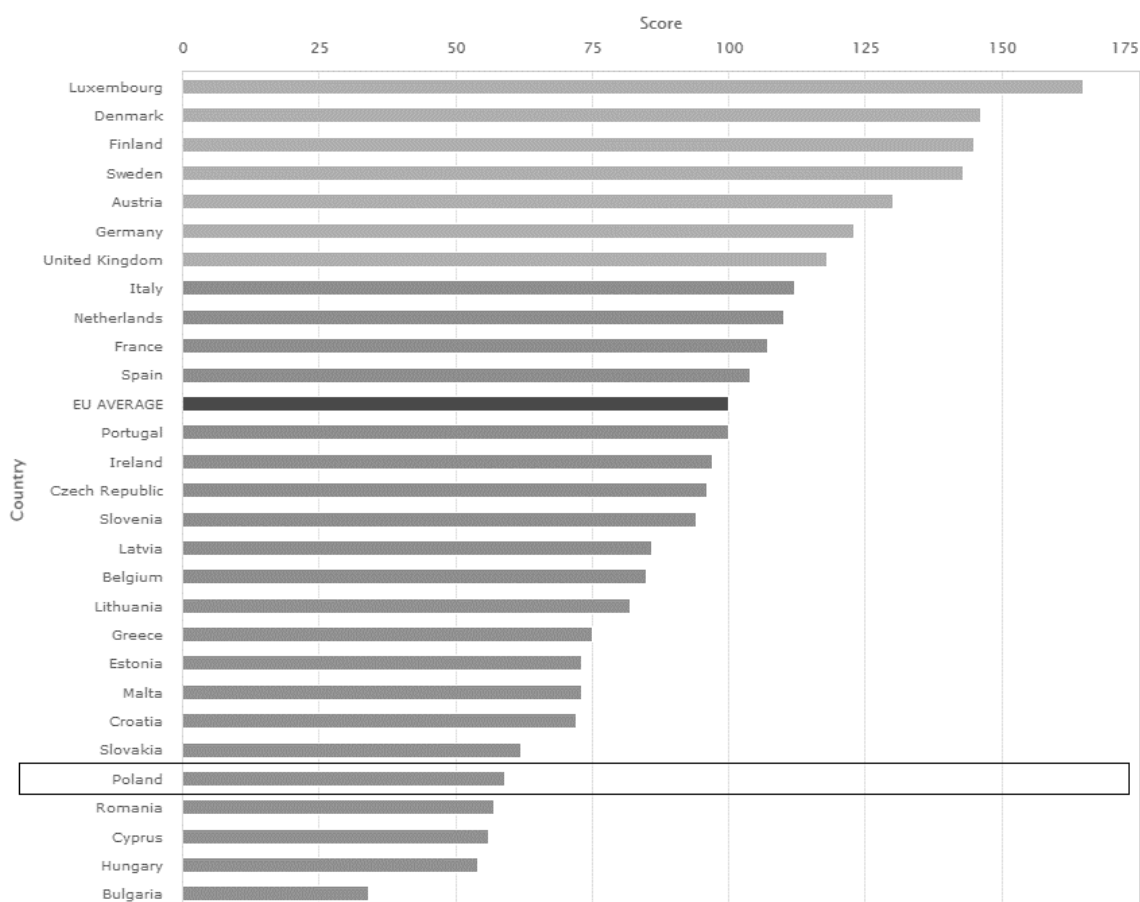


Fig. 1 – Poland in The EcoInnovation Scoreboard 2019. Source: own study based on:

[https://ec.europa.eu/environment/ecoap/indicators/index\\_en](https://ec.europa.eu/environment/ecoap/indicators/index_en)

At this point, the importance of innovation and research and development should be distinguished. Innovation is creating new, better and more effective products, services or processes. On the other hand, research and development (R&D) should be understood as creative work carried out in a systematic manner in order to increase the possessed amount of knowledge.

As part of innovation, investments are usually supported. Innovation is created in cooperation with various entities, among which there are almost always economic units. They are characterized by a diversified potential to carry out tasks in the area of research and development. For this reason, introducing innovations to the market is usually interpreted as a success.

It is widely recognized that eco-innovation is about creating new products, services and processes. These provide the consumer and business with value, but at the same time reduce the negative impact on the environment. Eco-innovations are expressed, inter alia, in minimizing the use of resources (including energy), reducing the negative impact on the environment, and sometimes even eliminating it completely, preventing anthropogenic burden on the environment, eliminating the concept of waste, improving quality and changing the structure of industrial metabolism.

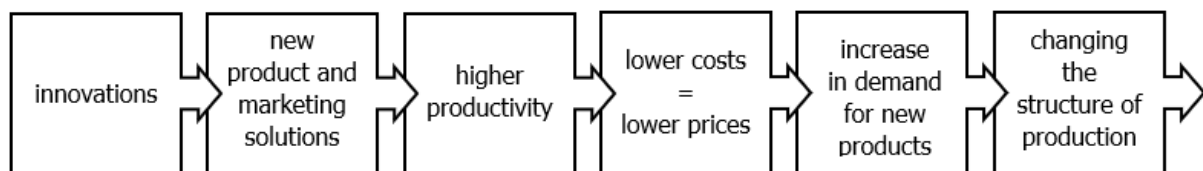


Fig. 2 – The innovation impact on the economy. Source: own study based on Ciborowski (2012) research

According to The EcoInnovation Scoreboard 2019 (Fig. 1), which defines the eco-innovation of national economies, Poland ranks fifth from the end among European countries. The leaders in this regard in 2019 are Luxembourg and the Scandinavian countries (Denmark, Finland, Sweden). In 2012, Poland was on the penultimate place in this ranking. Currently, innovation is perceived as another very important factor influencing economic development. For this reason, innovation is often mentioned in the company of other (widely recognized) traditional factors such as labor or capital. Introducing innovation, and in particular eco-innovation, to a large extent contributes to the process of evolution of the economy towards a sustainable development economy. The innovation process stimulates the economy, resulting in an increase in the share of high technique industries (Fig. 2). As a result, the negative impact of human economic activity on the environment is reduced. Changing the direction of the economy must be implemented by subordinating this process to the criteria of sustainable development. Therefore, no new process or product can be introduced if it would reduce the quality of natural resources.

## 5 THE IDEA OF SUSTAINABLE DEVELOPMENT

There are many definitions of sustainable development in the literature. Everyone is guided by the idea of "(...) *striving towards such development that ensures balance in ecosystems, as well as between the economic, ecological and social elements of economic development (...)*" (Górka, 2010). Therefore, sustainable development is an economic, social and spatial order. The most important element of the idea of sustainable development and its implementation is the implementation of programs aimed at slowing down and finally stopping the degradation

of the natural environment. In Poland, this is done through a system of penalties and incentives, accompanying the gradual increase in the normative requirements for water and air quality, etc., and long-term initiatives supporting the restoration of the contaminated environment. These activities are called instruments of environmental policy. Usually, public administration units are responsible for the implementation of these activities. The instruments of ecological policy are divided into direct and indirect. The set of indirect instruments, i.e. economic and market instruments, includes those whose use is incidental. The effects achieved through them are generally characterized by high values of social impact. System solutions are most often included in the group of direct instruments, i.e. administrative and legal instruments. They are characterized by a moderate or even low social impact. Both indirect and direct instruments are tools to achieve goals. In the perspective of the coming years, these goals are determined by decision-makers in environmental policy. Socio-economic life largely depends on the possessed and available resources. The idea of sustainable development is "(...) to improve both the condition of our planet and the comfort of human life through consistent actions in specific areas" (Konstańczak, 2016). It is "(...) *the doctrine of the idea of sustainable development that shows the need to promote (...)*" (Seroka, 2020) eco-innovation as an alternative development direction for industrial and service enterprises. Recently, in Poland, this aspect has gained importance to such an extent that it is interpreted as a "necessity".

### 6 ECO-INNOVATION IN SUSTAINABLE DEVELOPMENT

Currently, high hopes are placed in the development of the high technology industry. According to experts, this may become a driving force for economic development. New and innovative technologies are inextricably linked with the aspects of environmental protection. A low-carbon economy is gaining importance.

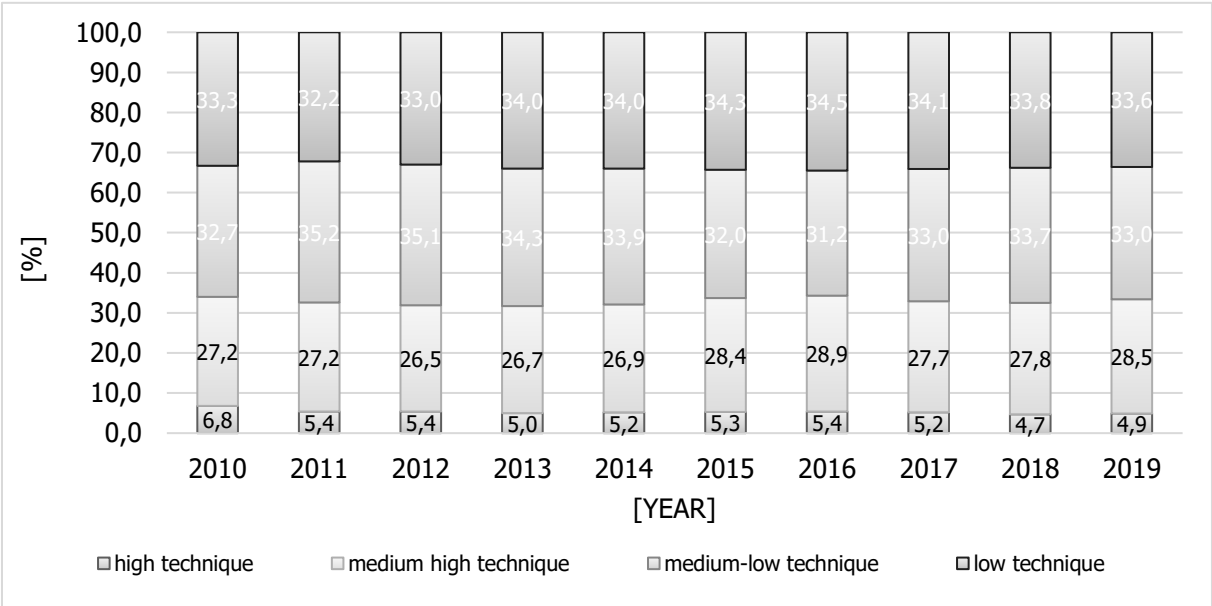


Fig. 3 – The structure of production sold in Poland in the area of industrial processing by the level of technology in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

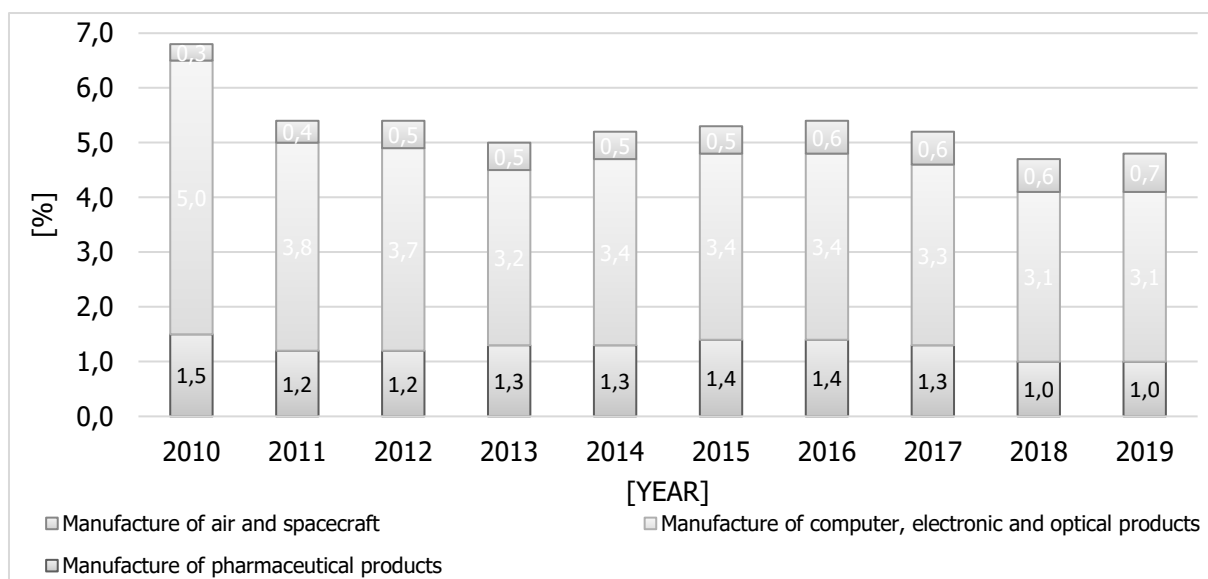


Fig. 4 – The structure of high-tech production sold in Poland, in the area of industrial processing by the level of technology in the area of industrial processing by the level of technology in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

The processing industry in Poland is characterized by a low level of high technique participation. It amounts to an average of 5.3% in 2010-2019 (Fig. 3). Manufacture of computer, electronic and optical products has the largest share in this group. The second position in the ranking is the manufacture of pharmaceutical products (Fig. 4). A much greater share in the processing industry can be attributed to the medium high technique. It averaged 27.6% in 2010-2019 and did not exceed the value of 29% (Fig. 3). The most significant item in this ranking is the manufacture of motor vehicles, trailers and semi-trailers, accounting for 12.7% in 2010-2019. The second position is manufacture of chemicals and chemical products, and the third position is manufacture of electrical equipment (Fig. 5).

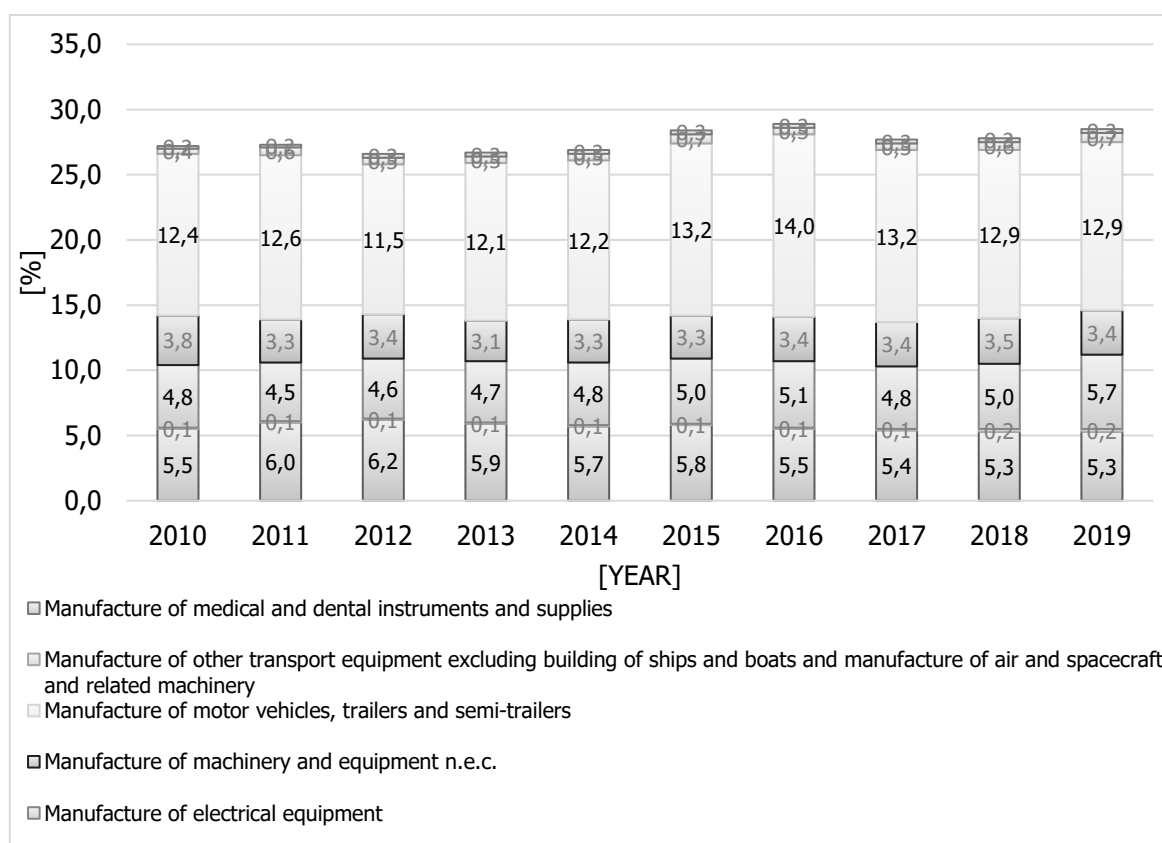


Fig. 5 – The structure of medium high-tech production sold in Poland, in the area of industrial processing by the level of technology in the area of industrial processing by the level of technology in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

It is worth noting that in 2019 the increase in the share of manufacture of electrical equipment in the list was so large that it was ahead of the list in terms of the share of manufacture of chemicals and chemical products. The comparison of the national structure of the sold production is dominated by the medium-low technique amounting on average 33.4% and low technique amounting on average 33.7% (Fig. 3). Their share in the comparison over the years 2010-2019 ranged from 66.0% to 68.3%. The largest share in the medium-low technique can be attributed to: manufacture of coke and refined petroleum products (10.6% on average), manufacture of rubber and plastic products (6.9% on average) and manufacture of metal products excluding manufacture of weapons and ammunition (mean 6.0%) (Fig. 6). In the low technique group, the largest share was: manufacture of food products (17.7% on average) as well as manufacture of paper and paper products, and manufacture of furniture (both on average 3.3%) (Fig. 7).

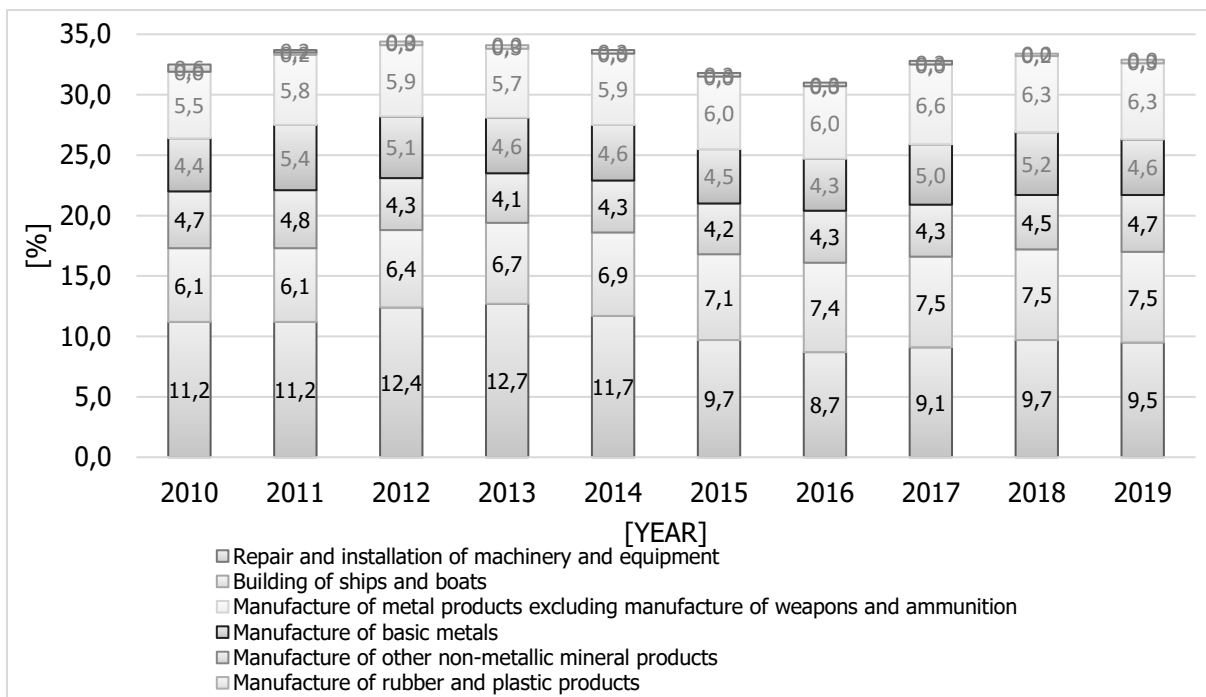


Fig. 6 – The structure of medium low-tech production sold in Poland, in the area of industrial processing by the level of technology in the area of industrial processing by the level of technology in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

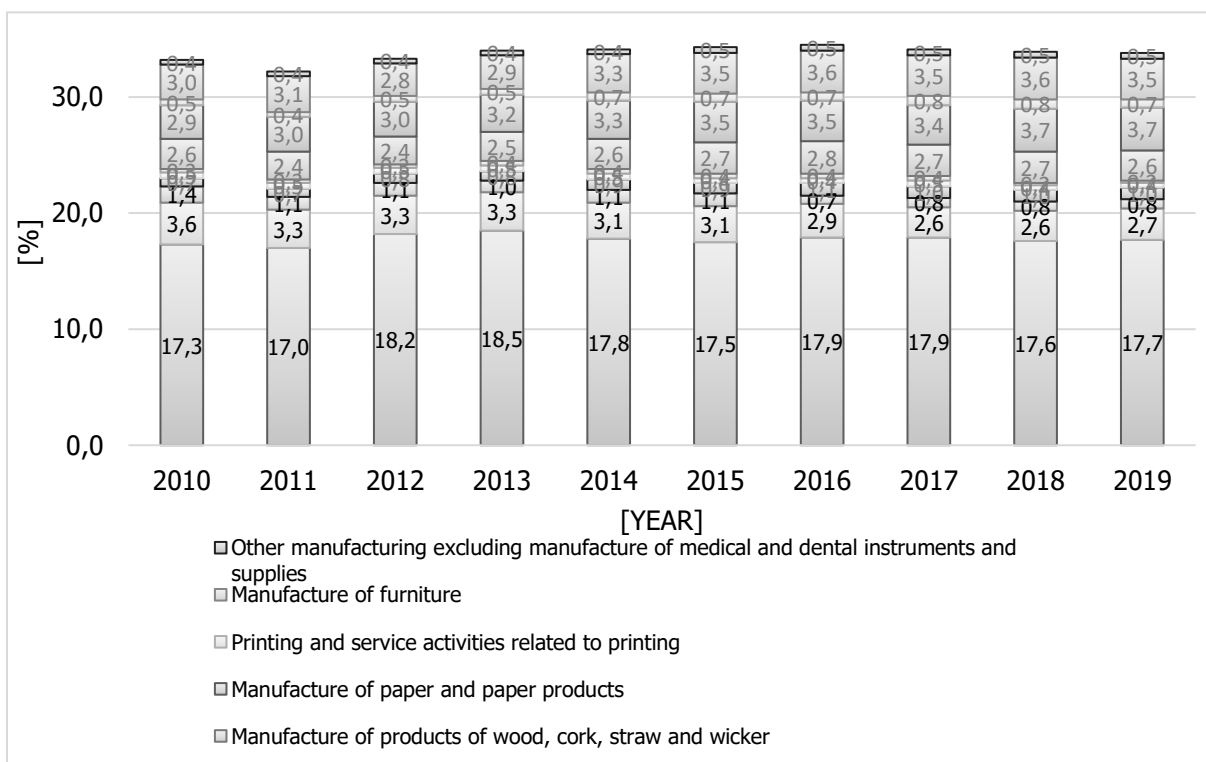


Fig. 7 – The structure of low-tech production sold in Poland, in the area of industrial processing by the level of technology in the area of industrial processing by the level of technology in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.



In the years 2010-2019, the list devoted to the share of innovative enterprises in the total number of enterprises in Poland included innovations focused on a low-carbon economy and bringing benefits to the environment. Therefore, the demonstrated innovations can be interpreted as eco-innovations. In the analysed period, the share of eco-innovations in industrial enterprises ranged from 16,1% (2011) to even 24% (2018) (Fig. 8). Eco-innovations in industrial enterprises definitely exceeded the amount of eco-innovations in service enterprises. In the group of service enterprises, the share of eco-innovation ranged from 9,8% (2015) to 19,6% (2018) (Fig. 8).

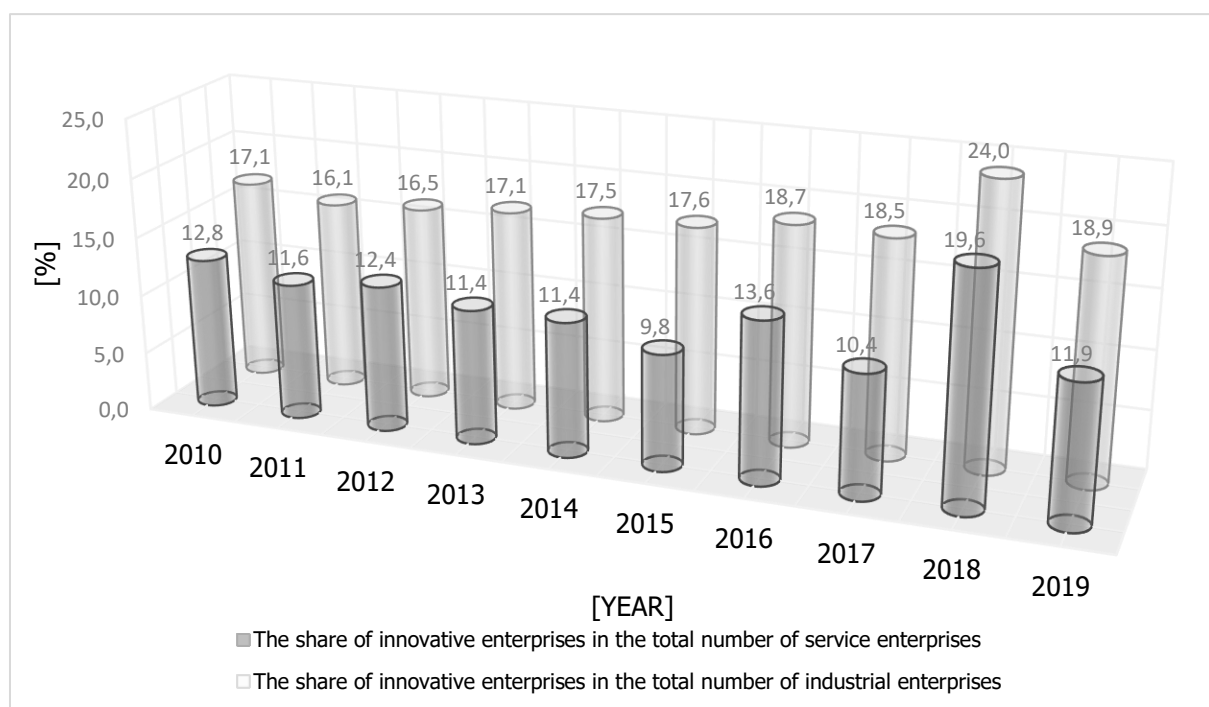


Fig. 8 – The share of innovative enterprises in the total number of enterprises in Poland in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

Process and product eco-innovations dominated among industrial enterprises (Fig. 9). Among service enterprises, product eco-innovations dominated, among which product eco-innovations introduced to the market usually accounted for  $\frac{1}{3}$  to  $\frac{1}{4}$  of all (Fig. 10).

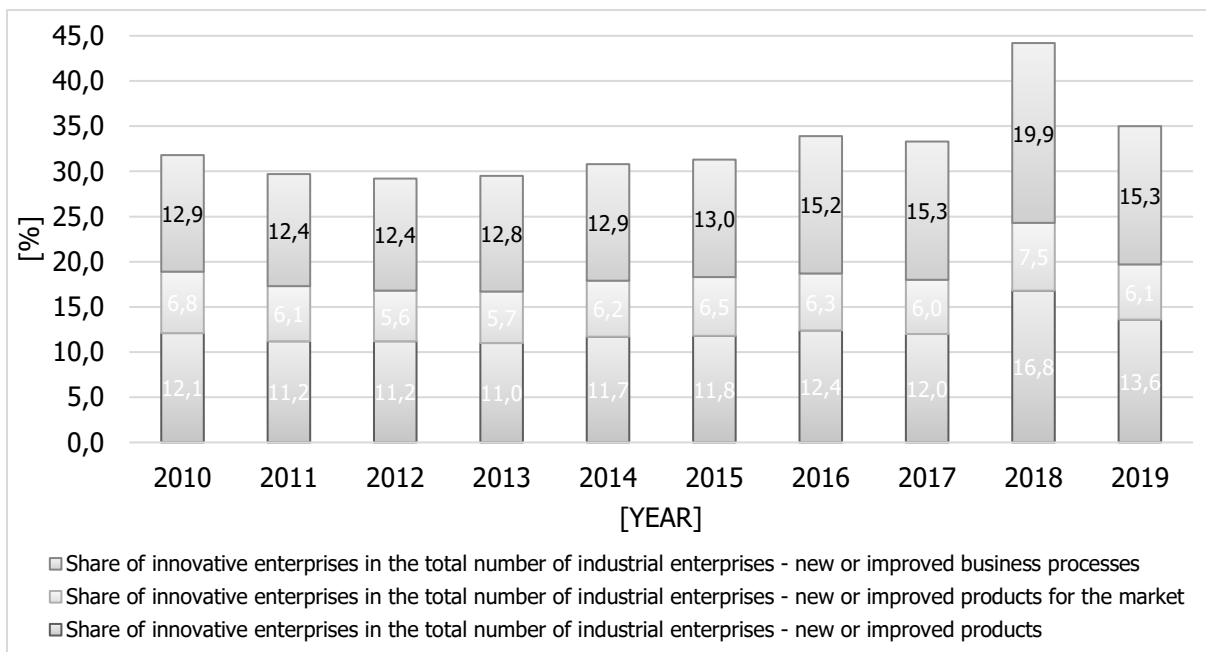


Fig. 9 – The share of innovative enterprises in the total number of industrial enterprises in Poland by type of innovation in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

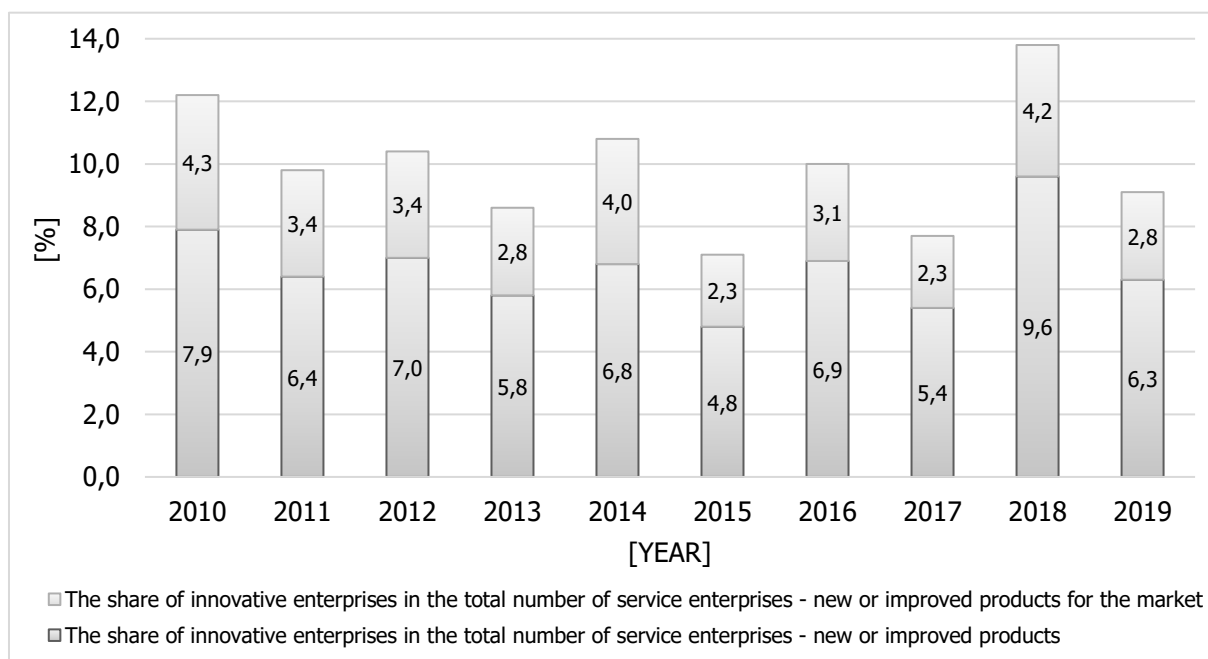


Fig. 10 – The share of innovative enterprises in the total number of service enterprises in Poland by type of innovation in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

Among industrial enterprises, eco-innovations are most often financed from the own resources of an economic unit. The second most common form of financing (or co-financing) eco-innovation are bank loans (Fig. 11). The list of financing methods also lists funds received from the state budget and funds obtained from a foreign institution.

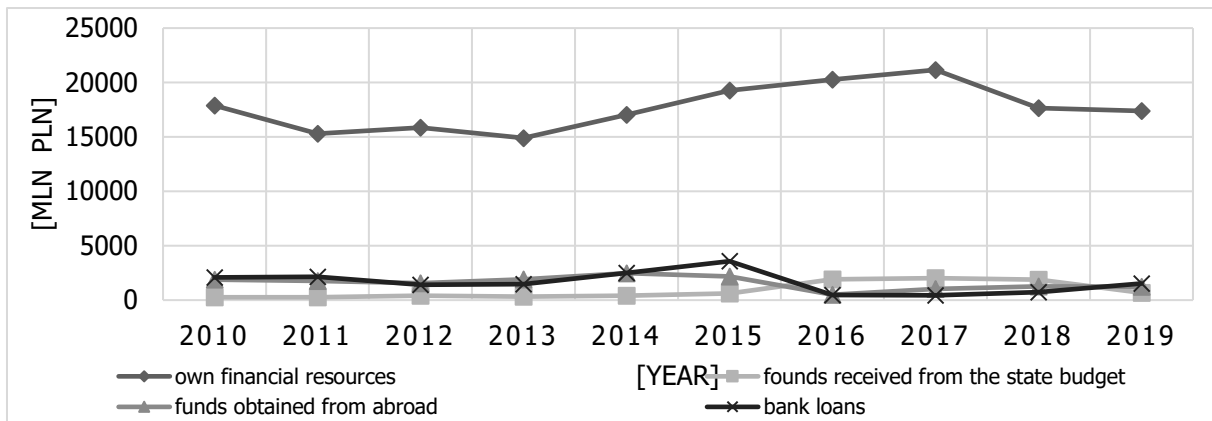


Fig. 11 – Funds obtained by industrial enterprises in Poland for innovative activities in 2010-2019 (in mln of PLN). Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

Among service enterprises, eco-innovations are most often financed (similarly as in the group of industrial enterprises) also from the own resources of an economic unit. The second most common form of financing (or co-financing) eco-innovation are funds obtained from an abroad institution (Fig. 12).

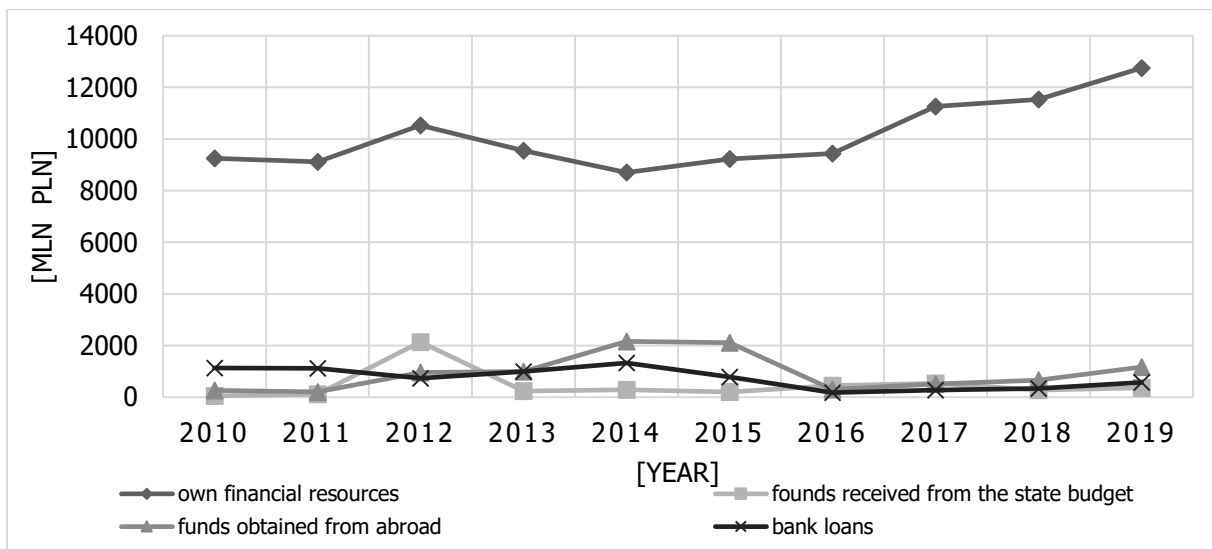


Fig. 12 – Funds obtained by service companies in Poland for innovative activities in 2010-2019 (in mln of PLN). Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

Eco-innovation stimulates the development of new processes and products. Products can be new technologies or services. It is thanks to them that enterprises become more environmentally friendly. Adaptation of eco-innovation in enterprises helps to reduce the costs of running a business. They also allow you to start taking advantage of new opportunities. Moreover, they have a positive impact on the company's image (Fig. 2). The use of eco-innovations makes it possible to meet the current challenges of everyday life, which include climate change, a gradual increase in the shortage of mineral resources and limiting biodiversity.

## 7 DISCUSSION

*“Given the disastrous climate change due to the industrialization and increasingly growing demands for energy, countries around the globe are devising strategies to curb the release of greenhouse gases”* (Ali, Dogan, Chen & Khan, 2010). *“Eco-innovation has become an essential driver of business to alleviate environmental problems and achieve sustainable growth”* (Amara & Chen, 2010). *“Eco-innovation strategies are effective mechanisms for improving the sustainability of products, processes, and systems. Managers, however, often lack a full understanding of what drives and facilitates eco-innovations and, to some extent, underestimate their benefits”* (Afshari, Searcy & Jaber, 2020). It is necessary to popularize the benefits of eco-innovation. It should also be accompanied by constant monitoring of the growth rate of eco-innovation. It is supported by statistical data that are periodically collected, compiled and published by various types of institutions. For this reason, access to data can be described as easy. However, there are no developed standards for the interpretation of this data or the habit of paying attention to it. There is still much to be done on this field.

## 8 CONCLUSION

Pollution of the environment is a side effect of economic development. It follows that economic development is inextricably linked with the exploitation of natural resources. As a part of implementing the idea of sustainable development, measures are taken to reduce external costs accompanying economic changes. Eco-innovations play an important role in this task from the economic and ecological point of view, while bringing real value to society. Also in Poland, the share of eco-innovation in the group of industrial and service enterprises is constantly growing. This is due to the growing expenditure on eco-innovation (Fig. 13 - linear trends) and the growing awareness of the society in the country on the Vistula river, which may be confirmed by Poland's promotion to the EcoInnovation Scoreboard (Fig. 1). The unpleasant consequences of not taking care of the natural environment are the result of social choices. Growing awareness of people means that society perceives sustainable development not as one of the options to choose from, but as a need. In recent years (which are available at the end of the first quarter of 2021 are available), i.e. from 2018 and 2019, there has been an increase in the share of high technique and medium high technique in the structure of production sold in Poland in the area of industrial processing (Fig. 3). This is mainly due to the improvement of the situation in manufacture of air and spacecraft, and stable situation in manufacture of computer, electronic and optical products, and manufacture of pharmaceutical products (Fig. 4). An interesting fact is that in medium low-tech area, increase in the share of manufacture of electrical equipment in the list from 2019 was so large that it was ahead in terms of the share manufacture, chemicals and chemical products manufacture. This can be interpreted as a premise suggesting the transformational model of the Polish economy (Fig. 5). Eco-innovations in industrial enterprises definitely exceeded the amount of eco-innovations in service enterprises. This trend in Poland has been unchanged for nearly 10 years (Fig. 8). In industrial enterprises dominated process and product eco-innovations, but in service enterprises are product eco-innovation (Fig. 9). The share of eco-innovation products introduced to the market in recent years (2018-2019) has increased to nearly 1/3 (Fig. 10). In recent years, expenditure on ecological innovations in the area of service enterprises (as opposed to industrial enterprises) has been growing. This may be a premise suggesting a transformation of the eco-innovation dimension in Poland (depending on the ranking still aspiring or recently joining the group of highly developed countries) towards their greater share in the service sector than in processing. The financing structure of eco-innovation is shown in the Figure 11 and 12. The importance of eco-innovation is constantly growing and is evident in reducing the pressure of the economic unit's impact

on the environment, combined with better management and use of available natural resources. The results of the research are in line with global trends.

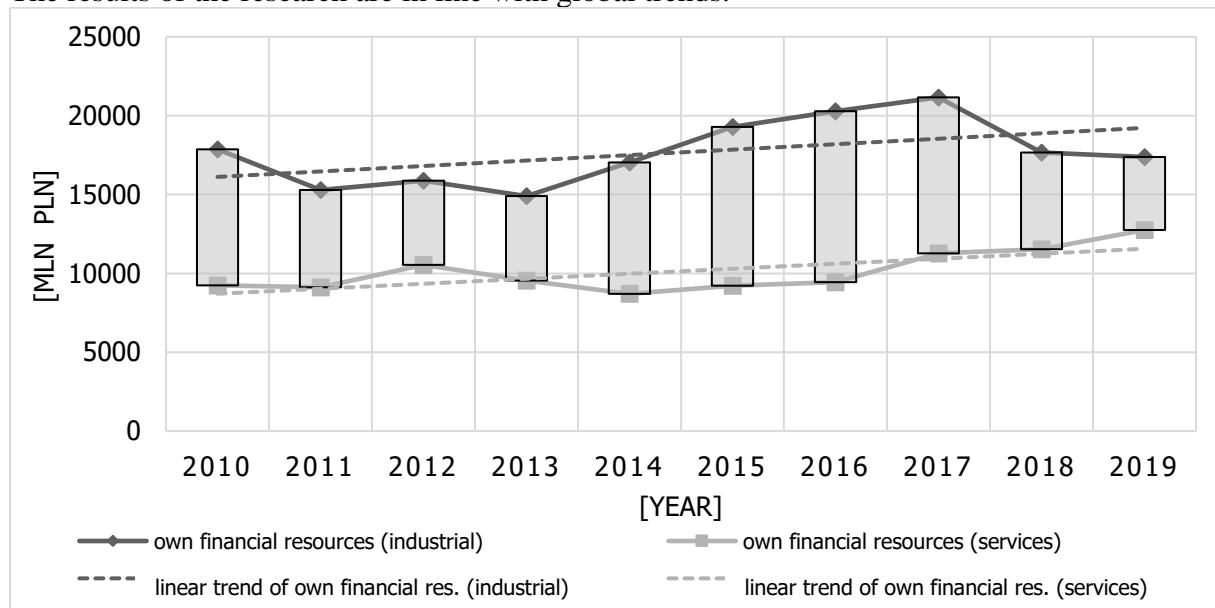


Fig. 13 – Trend line of the level of expenditure on obtained by industrial and service companies in Poland for innovative activities in 2010-2019. Source: own study based on Statistical Yearbook of Industry – Poland – 2012, 2014, 2018, 2020.

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## Contact information

### Rafał Śpiewak (BEng, PhD)

WSB University, Faculty of Finance and Management in Bydgoszcz  
ul. Fordońska 74, 85-739 Bydgoszcz (Poland)  
E-mail: rafal.spiewak@wsb.bydgoszcz.pl  
ORCID: 0000-0002-8030-4818

### Aleksandra Seroka

University of Gdańsk, Faculty of Economics  
ul. Armii Krajowej 119/121, 81-824 Sopot (Poland)  
E-mail: aleksandra.seroka@vp.pl  
ORCID: 0000-0002-1191-8015

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# PHYSICIANS ON SOCIAL MEDIA – THE PERCEPTION OF YOUNG USERS

*Małgorzata Szwed*

## **Abstract**

Social media are increasingly entrenched in everyday life communication. This challenges people to anticipate the changes that social media trigger in life. Furthermore, in the field of healthcare we can observe some changes as interactions between physicians and patients on social media platforms. This paper provides an overview of young users' perception of physicians' activities on their public profiles on social media. The objective of the paper is to identify factors that influence those perceptions. To obtain the purpose qualitative research method was adopted that involved semi-structured interviews with eight young users. Respondents were Polish students with different educational background. Only two social media platforms were considered in the study - Facebook and Instagram. Based on Goffman (1959) self-presentation theory, frontstage and backstage of physicians' activities were described. The results reveal the importance of sharing medical knowledge, clear and reliable presentation of information, which should be trusted and scientifically proven. Moreover, the findings show that presenting a part of everyday life has an impact on perception of medical specialists, but also overload of this kind of content are affecting perception. Scope of research focused on perception of physicians' social media activities is a novel. The results suggest directions for further research.

*Keywords: personal branding, social media, physicians, personal marketing, user perception, on-line image*

## **1 INTRODUCTION**

The ongoing development of an Internet-based toolset, especially in the field of daily communication, offers increasing opportunities for self-presentation. There is no need to have a website to build personal recognition on the Internet (Rui & Stefanone, 2013). It is enough to use the tools provided by social media platforms available to both organizations and individuals. Internet websites and social media platforms (e.g. Facebook, Instagram) have become important channels by which a person can express or present oneself to others. Data shows that the number of social media users is still increasing (We are social & Hootsuite, 2020). However, the effective building of a personal brand requires active use of social media (Peters, 1997). Nowadays it is easier than ever before. The area of social media presence is experiencing more attention because communication between people was transferred to the Internet. Online image creation concerns not only ordinary individuals but also professionals. Physicians expressed discomfort on public forums about patients asking them to join friends' network on social media platforms (Jain, 2009; Mishra, 2019). A possible solution is for physicians to run public profiles where they can publish content related to their profession without fear of privacy. This paper presents young users' perception of physicians on social media and main factors which affect that perception.

The first part of this paper introduces the concepts of social media and self-presentation theory. Then research gap and the purpose of the study are described. The second part presents research methodology and background characteristics of respondents. The next two sections explore

interview results with the discussion. In the final part of the paper, conclusions, limitations and some future research directions are presented.

## **2 LITERATURE REVIEW**

### **Social Media**

Social media provide an opportunity for communication between users, turning a one-way transmission of information into a dialogue. The interactive form of social media also increases the importance of collaboration and relationships built in the virtual space. Kaplan and Haenlein (2010) define social media as Internet-based applications that provide users with the opportunity to create, exchange, and share content using technological foundations of Web 2.0. Mangold and Faulds (2009) state that social media include a variety of different formats, such as personal blogs, discussion forums, product or service user reviews and various social networks. Kietzmann and Hermkens (2011) relate the concept of social media to the interactivity of applications that allow users to share, develop, discuss and modify the content they have created themselves. Evans (2008, p. 37) uses the term social media to refer to "*participatory online media where news, photos, videos, and podcasts are made available via social media websites*". The defining elements of social media are their interactivity, the ability to create and share content, opinions and images, and the unlimited number of topics and size of the social networks.

### **Self-presentation Theory**

Self-presentation theory (Goffman, 1959) is related to the control of information about oneself. It points out that individuals can manage their image to deliver wanted information to others. Goffman (1959) compared individuals to actors in a theatre, claiming that self-presentation usually tends to be either on the front stage, which means that it occurs in front of others, or backstage, where individuals are either alone or with a better-known audience. Goffman's work draws on the concept of symbolic interactions, which perceives the self as a product of interactions including language, gestures and actions. Self-presentation theory has been applied to the research on social media concerning how people use their functionalities such as the possibility to post text, pictures and other content to present a personal brand (e.g. Chen, 2013; Geurin-Eagleman & Burch, 2016; Geurin, 2017; Green, 2016; Labrecque et al., 2011).

### **Research Gap and Purpose of Study**

Despite this interest in self-presentation on social media, only few researchers explored the activities performed by physicians' using social media (Hudson & French, 2018; Mishra, 2019). There are also theoretical publications that describe functionalities of social media which can be useful for physicians (Attai et al., 2017; Kalia et al., 2017). Moreover, the perspective of physicians on benefits and challenges of being connected to patients on Facebook were explored by Mishra (2019). Most research regarding social media and self-presentation topics focused on journalists (Hedman, 2014; Hedman & Djerf-Pierre, 2013; Molyneux, 2015; Molyneux et al., 2019; Molyneux & Holton, 2015; Schultz & Sheffer, 2012) or celebrities (Baccarella et al., 2019; Johns & English, 2016; Kucharska, 2018; Kucharska et al., 2018; Kucharska & Firgolska, 2018; Marwick & boyd, 2011; Wróblewski & Grzesiak, 2020).

Therefore, the purpose of this study is to (1) examine young social media users' perception of physicians' social media use for self-presentation and (2) to identify the most important interactions which influence the perception. Two research questions are posed to address the above-mentioned research gap and the purpose of the study:

RQ1: How do young users perceive physicians on social media?



RQ2: What are the most important components that impact the perception of physicians' self-presentation among young users of social media?

### 3 METHODOLOGY

Given the exploratory nature of the study, a qualitative research method was used. Semi-structured in-depth individual interviews were conducted with 8 students who represent a wide variety of educational backgrounds. Participants' characteristics are presented in Table 1.

Tab. 1 – Participants' characteristics. Source: own research

	Gender	Age	Field of study	Social media
R1	Female	22	Resocialization (BA student)	Facebook, Instagram
R2	Male	23	Public health (MA student)	Facebook, Instagram, Twitter, TikTok
R3	Female	26	Biotechnology (PhD student)	Facebook, Instagram
R4	Female	25	Psychology (MA student)	Facebook, Instagram, Twitter, TikTok, LinkedIn
R5	Female	26	Psychology (PhD student)	Facebook, Instagram
R6	Female	19	Management (BA student)	Facebook, Instagram
R7	Female	23	Medicine (MA student)	Facebook, Instagram, Twitter, TikTok
R8	Female	20	Medicine (MA student)	Facebook, Instagram, YouTube

All interviews took place online (through video-conference applications, such as ZOOM and MS Teams), took from 40 to 50 minutes and were audio-recorded. Interviews were conducted between March 22 and April 1, 2021 and in the language was Polish. The scenario consisted of 4 sections that covered: (1) user engagement on doctors' profiles, (2) perceptions of published content on profiles and in stories, (3) general use of social media by physicians and (4) the most significant activities performed by them. All interviews were transcribed verbatim and analysis of recurring themes was conducted by the author.

### 4 RESULTS

All of the interviewed respondents observed physicians on Instagram. Additionally, three people followed physicians' accounts on Facebook and two followed them on Twitter. When asked why they observed physicians on social media, the interviewees mentioned several reasons. All respondents mentioned the opportunity to obtain reliable medical knowledge presented in an accessible and simple way. This knowledge ranged from specific daily cases, through cured patients showed by physicians on their social media to preventative health information.

*"On Instagram I usually follow what they do, sometimes they sneak something in and they do it in a more accessible way. Sometimes a bit of knowledge, and I also look at stories to see what their lives look like as doctors, because they put a lot of it on Instagram. On Facebook, the*

*doctors I follow often post summaries of their research or scientific news, and this form is certainly lengthier, so you can read it for more time." [R7]*

*"It's mainly because this is my work environment and academics and so on, so I like to know what they have to say. Also, because often these things are just processed by them, so I also do not have to spend so much time analysing all articles because I know that when they put something in, it is already checked by them, so it makes it a bit easier for me." [R2]*

The second reason mentioned was the possibility to observe the work of a physician from the "backstage" and to see how their everyday life looks like and to what extent it differs from the one presented in the TV. Physicians should show and talk about diseases, prevention and the specificity of their work. Respondents also paid attention to elements of physicians' private lives shown in social media. They tend to consider a doctor more trustworthy when information on his/her profile was consistent with what he/she says. However, the private life content was considered to be only an addition to the medical knowledge content.

*" I wasn't studying medicine at that time - it was probably even 2 years ago, when I started to observe him, I was interested in this topic in general, the work of the hospital. And he shares such information. Additionally, being able to identify with a particular doctor through his posts, the views he shares, situations from his life and experiences, also makes trust greater." [R8]*

*"Showing your life, because for example, Mum the gynaecologist often does that, just shows there that she is cooking something. It's when there's too much of this lifestyle content that I get bored. I have to have this medical content" [R7]*

*"I don't insist that someone should show their life, but it's nice to include everyday things. You know, your interests or the other side of yourself, that you're not just this professor and you're always serious on TV, but you also like doing something else." [R2]*

The respondents felt that the content provided by physicians is perceived as reliable if it meets two main conditions. Firstly, it had to be written in a language comprehensible to a person without a medical background. Secondly, published content had to include references to other sources and scientific studies. At the same time, respondents felt that the doctors they observed on social media provided reliable knowledge and the content they shared was trustworthy not only to them, but also other doctors working in hospitals.

*"Reliable... I would think that there are some sources. It doesn't have to be a very long bibliography, but just a link to other study at the end, so I will have possibility to check it myself. Also, if someone simply follows some guidelines, if a source is given that I can verify it myself, or if they have many years of experience, then I can trust to some extent that such a person knows what they are talking about." [R2]*

It is noteworthy that two individuals (R1 and R8) pointed out the motivation of physicians to manage their profiles. They mentioned that if physicians promoted some products in a paid collaboration or advertised services, they became less trustworthy and thus their perception became more negative, also towards their professional competence.

*"The second thing is that immediately something is not very reliable for me if underneath it there is an advertisement for, for example, some sponsored thing or something that this person performs." [R1]*

Another aspect highlighted by the respondents was a graphic aspect of the presented content. They shared the view that graphics serving as a summary for long posts were very useful and that the presented content should be visually attractive. What is more, it was mentioned that consistent graphics show the work put into maintaining a social media profile.

*"That it would be graphically well done, for example, bullet points of the most important things or the substance of the matter, because I don't want to read when someone writes too long descriptions." [R7]*

## **5 DISCUSSION**

The current study sought to qualitatively explore young users' perception of the use of social media by physicians and the main factors influencing thereof. The results helped to identify some factors that influence young users' perceptions of physicians. The themes of content that relate to the frontstage and backstage from Goffman's (1959) theory of self-presentation were also identified.

These interviews suggest that young social media users perceive doctors based on their social media behaviour. According to the theory of self-presentation (Goffman, 1959), respondents notice both the frontstage and backstage of the self-presented content. The term frontstage can be used to describe elements related to the medical profession, doctors' work in hospitals, showing the everyday reality of providing treatment to people and presenting patients' diseases that have been cured (Mishra, 2019). At the same time, users have the opportunity to take a look at backstage, where physicians uncover a bit of their private lives by sharing content about their hobbies, family or the way they spend their time outside work (Green, 2016). The combination of both perspectives has a positive effect on the perception of physicians, however, over-presenting the backstage sphere may have negative consequences related to user perception.

The results of this study suggest four components, which have an impact on young's perception of physicians' self-presentation on social media. First among the factors is the reliability of the published information. References to sources which allow readers to check independently whether the information is true are perceived positively and translate into greater trust towards physicians. Another factor is the accessibility of the medical knowledge provided. A simple and understandable message in communication is one of the aspects which influence the way young people perceive specialists. If they understand the communicated content, they will be able to trust them, but the lack of understanding of the shared information also leads to a decrease in the perceived reliability of the posts. Thus, it can be seen that it is important to know the profile's audience. The third factor identified is the clear presentation of the content. Both the inclusion of graphics, photos and videos, as well as taking care of the aesthetic record and good text positioning and formatting are important for the positive perception of the physician. Finally, the perception of doctors in social media is also influenced by showing private aspects of life, which enables the audience to identify with what is presented on the profile and have a sense of their own relationship and a feeling that they know the observed physician somehow.

## **6 CONCLUSION**

The power of social media and impact on all society segments is indisputable. It is changing the way companies do business, people communicate and how information spreads. There are also consequences for medicine. This study suggests that challenges faced by physicians in their online interactions with audience need to be addressed urgently. In the result of social media use there are opportunities to educate patients and to build trust towards medical specialists. However, some negative aspects can be seen. When users consider shared information as unreliable, perception of all physicians can decrease. The findings of this study have several implications for doctors. They must be aware of the published content and the way that information, knowledge and backstage of private life are presented.

Despite the contribution to the body of science related to physicians' self-presentation on social media, this study has a few limitations. Despite the diversity of the sample in terms of educational background of the students interviewed for this study and their use of different social media platforms, one of the limitations of the study is that it based on a relatively small sample. However, it may also be pointed out that use of the semi-structured interview method facilitated the collection of rich data and realization of the objectives of this study even with a relatively small group of respondents. The goal of this study was not to gain universal generalization of findings across populations but to show how young users perceive self-presentations of physicians on social media and to identify some factors influence those perceptions. Additional quantitative studies are needed to examine if identified factors are significant to the generation and what is the perception of different age users of physicians' activities and presence on social media.

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### **Contact information**

**Małgorzata Szwed, MA**

University of Warsaw, Faculty of Management

Szturmowa 1/3, 02-678 Warsaw, Poland

E-mail: [mz.szwed@uw.edu.pl](mailto:mz.szwed@uw.edu.pl)

ORCID: 0000-0002-8138-4733

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# MANIPULATIVE METHODS AS INVISIBLE “COMPONENTS” OF SECTARIAN AGITATION ON THE INTERNET

*Hedviga Tkáčová*

## **Abstract**

The article deals with the current issue of the existence of manipulative methods of so-called "sectarian movements" on the Internet. The theoretical part of the paper points out that the Internet is proving to be an ideal platform for sectarian movements (both religious and secular), which seek to reach online audiences. We observe the mechanism and the operation of “sectarian movements” on the Internet in the theoretical part of the article. In the practical part we follow the offer of selected sectarian movements on their official websites. Using quantitative-qualitative content analysis, the research aims to identify manipulative methods in seven of the basic sectarian movements in Slovakia. The cognitive value of research is represented by a set of manipulative methods as well as the presented theoretical context of reciprocity, reminding us that findings in the online environment are inherently present in our everyday reality. In the manipulation by the most important sectarian movements in Slovakia, a set of manipulative methods is appealed to strengthen media literacy and a public discussion about the negative consequences of manipulative methods present in contemporary sectarian movements in Slovakia.

*Keywords:* media manipulation, manipulative methods, content analysis, reciprocity, websites, research

## **1 INTRODUCTION**

Thanks to their role in spreading information to a wide audience, the new media focus on the new „sectarian movements“. Media and new technologies are extensively used by sectarian movements to spread their messages and reach a wider audience and validate themselves as a highly modern and up-to-date form of life appropriate for a human being. ‘Sectarian movements’ have used various media forms for training, communicating with members, presenting their messages, reinforcing or protecting the leader's image, and, potentially, attracting converts. Moreover, some movements came into prominence, especially via media (initially publications, but also ritual broadcasts, advertising campaigns, and public media events); thus, the new modes of ritual engagement and new ways of interactions between sectarian movements the audience has been created. We observe that research has repeatedly confirmed that the interest in sectarian religious and secular movements is supported above all by the nature of the online environment in which these movements present themselves to their audience (Baffelli, 2016; Schorey, 2016; Campbell, 2013).

The official website of the sectarian movements contains not only a presentation of the group and its activities (including engaging stories and a detailed overview of activities) but also various offers (advice for young people, creative tasks) and topics (Bible and science, marriage and family), closely linked to learning and practice in these groups. As S. Brečka said, the information shared to its audience through the media represents a message that is waiting for human action. Only human action attaches some meaning or validity to this fact, the psychological point of viewpoints to the fact that any information is considered primarily in the context of human interest (Brečka et al., 2010, p. 204). According to J. Jiráček and R. Wolák, the

relationship between the medium (in this article it is the website) and the person perceiving it turns out to be reciprocal, as media information and media purposes are influenced minimally by the interest and disinterest of recipients (who choose what to use from the media offer). Reciprocity is also shown that the media also influence the recipients because their contents co-create the meaning of things, inspire individuals to activity, create habits, etc. (Jiráček & Wolák, 2007).

We can agree with A. Campbell's statement, who sees how digital „religion“ studies has grown into a unique area of inquiry informed by both internet studies and media, religion, and culture studies (Campbell, 2016). The question is, what do the articles and related literature say about the development of internet studies, and about the relationship between the Internet and sectarian movements or the relationship between the Internet, sectarian movements and reality. T. Schorey noticed that highlighted within the online environment are the negotiations and intersections of consumer practices, popular culture, information control and religious pluralism. Therefore she pointed, that as the field continues to develop, “theoretical approaches that emphasize entanglement will help disclose the various relationships of power by which the material practices of religion, media, and technology are produced” (Schorey, 2016, p. 264). Through a critical overview of religion online, A. Campbell also interestingly introduces five central research areas related to social practices, online-offline connections, community, identity, and authority online. The author also argued that observations about these themes „point to specific trends within religious practice online and mirror concerns and findings within other areas of Internet Studies and other areas of reality“ (Campbell, 2013, p. 680). This seems to be interesting because as we see an influence of religion into understanding of community, identity or authority in the offline environment, we see it also in the online environment and vice versa; in both environments, the sectarian movements might have the same impact on the wide range of contexts in our contemporary social world. It is aligned with the experts' opinion of the 'Radical Online Education' project, stating that „the main threat does not stem from the ideologies available on the Internet, but rather from how online and offline influences are linked“ (Radical Online Education, p. 5).

In the context of reciprocity, we can declare, together with S. Šverha, that the „cultural invasion of the media“, especially of the Internet, is undeniable (Šverha, 2007, p. 20). The so-called “new media“, i.e., digitally delivered media as a modern way of sharing information or providing entertainment (Cambridge dictionary, online); create new content in our culture, closely connected with new meanings. It is one reason why the Internet is proving to be an ideal platform for sectarian movements (both religious and secular), which seek to reach audiences through many tools and methods. We also observe the operation of “sectarian movements” on the Internet in the practical part of the article, where we follow the offer of selected sectarian movements on their official websites. Using quantitative-qualitative content analysis, the research aims to identify manipulative methods in seven of the basic sectarian movements in Slovakia. The cognitive value of research is represented by a set of manipulative methods as well as the presented theoretical context of reciprocity, reminding us that findings in the online environment are inherently present in our everyday reality. In the manipulation by the most important sectarian movements in Slovakia, a set of manipulative methods is appealed to strengthen media literacy and a public discussion about the negative consequences of manipulative methods present in contemporary sectarian movements in Slovakia.



## 2 THEORETICAL BACKGROUND, TERMINOLOGY AND MANAGEMENT OF SECTARIAN MOVEMENTS

Within academic research and professional language, free use of terminology is insufficient. In today's media, which strive for impartiality and non-secularism, both controversial and less controversial sectarian groups are associated with the terms such as alternative religiosity, new religious movements, non-traditional religions or new religiosity. The media use similar terms in connection with 'new religious movements'. This "terminological mixture" is pointed out by the prominent religionist I. Štampach. He mentions what the media understand as sects and sectarian movements are not understood by the term of new religious movements. The core of both groups is not the same and it is necessary to distinguish between those two in the media discourse. According to Štampach, the perception of sects and new religious movements as synonyms is certainly a mistake. Many of the new movements do not show the character of sects at all, and many sects are not new movements (they are the result of separation from traditional religions; i.e., they are deviations of established traditional religions, note). The 'new religious movements' include various Christian and non-Christian spiritualities that have emerged and are emerging in the last two to three decades and may not pose any risk. They are generally characterized by a comprehensive ecumenical openness, although we also observe those that seem closed, even fundamentalist (Štampach, 1998).

In this paper, "new religious movements" are beyond our interest. We focus on sectarian movements, expressing the belief that the current way of life (possibly spiritual life, and thus life according to traditional churches' teachings and practice) is not sufficient and does not meet expectations. On the contrary, it can be much better, more spiritual, more evaluated, more satisfied, etc., which these groups also openly declare (also on their websites, which we research contentwise in the practical part of the paper, note). Z. Vojtíšek points that sectarian movements tend to believe that they bring new values, a new lifestyle and are therefore a protest against what is considered "standard" compared to established social phenomena (Vojtíšek, 2007). It is also why these groups strive to differentiate themselves from traditional churches and bring various sociological, socio-cultural and other features to the "spirituality market" (Hardoňová, 2010; Rehák, 2007; Procházka, 2004). An example of such thinking can be found in the Church of Jesus Christ of saint latter days (i.e., Mormons) or the Religious Society of Jehovah's Witnesses, considering themselves to be the only representatives of Christianity and thus the only "heirs of heaven" (Tižík, 2006, p. 200). The brief example also shows what K. Hardoňová points out, and thus that each sectarian movement is more or less anti-social and always in sharp conflict with its religious tradition. The author adds that a sectarian group would not have emerged without a dispute with the "tradition" from which it arose (Hardoňová, 2010). Vojtíšek (2007) points out the reason for the pejorative labeling of these groups - t. j. label "sect" - therefore also connected with the sensitivity of society and established churches to these new "new religious paths" and their self-presentation.

Within the framework of professional research and professional language, even pejorative handling of terminology is insufficient. Labeling someone as "the sectarian" or something "sectarian" turns out to be incorrect. Experts, therefore, emphasize the need to rely on etymology in the case of sectarian movements, i.e., etymological explanation of the use of the term "sect". Experts derive the term sect from the Latin *secta*, which has its origin either in the verb *sequor*, *sequi* (i.e., to follow), or *seco*, *secare* (i.e., to cut, chop). The possible dual etymology also implies a dual possible literary meaning:

- (1) A sect as a community, based on following a personality or idea;
- (2) A sect as a community resulting from separation, secession or independence from another religious group (Dojčár, 2008; Vojtíšek, 2007; Štampach, 1998).

In a broader sense, the term “sect” is an expression denoting any ideological differentiation from the majority society (Štampach, 1998, p. 163). In connection with controversial groups that degrade the established way of life in society, present themselves as elitist, think of each other exclusively and are a source of protests; finally, it also leads experts such as religionists and sociologists of religion to the choice of the pejorative term ‘sect’, as determined by the etymological justification of this term (Dojčár, 2008, p. 56–57).

Other experts present several typologies of religious and non-religious movements (in order to keep this text clear and concise, we refer to them simply as “sectarian movements”, note). We distinguish, for example, sectarian movements based on a dichotomous point of view, with the author of M. Weber (Weber, 1988, as cited in Reháč, 2007); based on the type of organization developed by A. Sekot (1985); based on the sect’s attitude to the world according to R. Enroth (1994) and the like. Similarly, there are many classifications of sectarian movements; not all classifications are considered appropriate for our territory and culture. After a thorough analysis, we follow the opinion of I. Škodová (Integra - Center for Prevention in Sects, civic association), P. Procházka (Faculty of Education, Matej Bel University) or B. Rakovský (Rozmer magazine, a specialized magazine for Christian spiritual orientation); by comparing their classifications, we get an overview of the basic sectarian movements in Slovakia. We divide them according to the following criteria:

- They origin in Christianity - *Christian churches, the Word of life, the Blue Cross*;
- They follow Christianity - *The Church of Jesus Christ of saint latter days, The Church of Unification, The Religious Society of Jehovah’s Witnesses*;
- They operate on the border beyond the framework of Christianity - *The Community of Christians*;
- They origin in the east - *Hare Krishna, Sri Chinmoy, Yoga in daily life*;
- They are based on esotericism - *Freemasons, Waldorf School*;
- They origin from paganism - *The Grail Movement*;
- They form a group of Personal Development Movement - *Herbalife, Amway International*;
- They represent a syncretistic movement - especially the *New Age*.

Sects characterize a “control management”, which are exercises over peoples ’thinking and behavior. It starts with recruitment, where people are screened for their “fit.” Once in, they are tending to reinforce the need for alignment. This drives the way people communicate, make decisions, evaluate each other, etc. In such a climate, individualism is discouraged, and group-think prevails. Some of sects go so far as replacement for family and community, isolating their members (deliberately) from those support networks. They encourage people to center their lives around their new group and its goals, which leaves little time for leisure, entertainment, or former relationships.

According to experts, there may or may not be present typical features of the sect in the current sectarian groups. These are characterized by the religionist Vojtíšek as charismatic leadership, subject to the temptation to manipulate, a simple picture of the world, a sense of the uniqueness of time, immediacy of relationships, exclusivity and fundamentalism (Vojtíšek, 2007, p. 60–76). From the point of view of the sociologist Enroth, the typical features of the sect are authoritarianism, opposition, exclusivity in the spread of dogma, legality, subjectivity, feeling of persecution, emphasis on sanctions, manipulation, esotericism and anti-priesthood attitude Enroth (1994) or Štampach (1998) describes as the essential characteristics of the sect:

authoritative leadership, fundamentalism, closeness, and secrecy of structures, teachings, and information. It is possible to continue with other authorities, but this is not our goal. We only point out that these groups are characterized by different degrees of self-sociological, socio-cultural and other characteristics.

In the researched groups, it is true that they skillfully use the character of mass culture to their advantage. Their creation of media content on their own website aims to arouse the interest of the audience. At the same time, mass production is complemented by marketing production, because the sale of products or services also represents a certain source of income for these groups. The marketing goal of these groups is not only to reach the audience on the Internet, but above all to reach the public and public opinion. In the field of massmedia communication, we call it „public relation“. J. Matúš calls the final and desired reaction in the context of Public Relations as „a motivation of people to trust in something (product) or someone (society)“ (Matúš, 2008, p. 12–13).

## 2.1 Literature review

In a broader sense, the presence of religious and non-religious elements in the population (i.e., the religiosity) is mentioned by M. Stríženec, P. Halama, J. Bunčák, I. Štampach, interesting ideas in a broader context are presented by D. Lužný or T. Halík and other authors. M. Tižík maps sectarian movements in the context of new spiritual currents (Tižík, 2006). We know relatively little about the specific processes of the existence of sectarian movements in Slovakia. Non-governmental organizations bring more significant knowledge from the “inside” of sectarian movements; it is primarily knowledge from practice. There are many significant works, one of the most crucial is the „Prevention Center in the field of sects“ (Integra), „the Institute for Relations between the State and Churches in Slovakia“ and the Czech association “Center for the Prevention of Religious Sects”. Among active individuals - experts we recommend T. Rusnáková, S. Hassan, B. Kuzyšin, M. Bratská, P. Ondrejko, E. Poliaková and others. Finally, the magazine Rozmer, a specialized magazine for Christian spiritual orientation, focused on developing sects and new religiosity to spread the knowledge.

It is a particular surprise that we do not find empirical research that would consider manipulation methods concerning sectarianism in the Internet environment, even though not only worldwide, but also in Slovakia, there has been a high increase in interest in “sectarian movements” (Vojtíšek, 2007), which are increasingly expanding their activities into the environment of new media (Hoskins & O'Loughlin, 2011; Homeland Security Institute, 2009). Therefore this topic requires one's own more profound research. We try to do it in the practical part of this article. However, it can be stated now that the media portrayal of the issue of sectarian movements in the Slovak media is rather negative. To support this statement (together with a reminder of the media's co-responsibility) can be seen in interpreting the still unexplained (violent) death of English teacher Viola Macáková. The media first associated the young Viola with Scientology, which was supporting the school where Viola worked, and later the term “sect” was strongly associated with the religious community that V. Macáková attended in the last years of her life (Plus 1 deň, 2020). An example of “discrediting” an individual through the media was the former President of the Slovak Republic, A. Kiska, with the Scientology movement (Nový čas, 2014). In a nutshell, many individuals and the media consider the widespread influence of sectarian groups in society to be dangerous; it reflects how sectarian groups' activities are predominantly presented in the majority media (i.e., not in the media administered by sectarian groups, note).

### 3 METHODOLOGY

In this article, we regard the term 'medium' / media as mediating, transmitting texts from creator to participant, i.e., from creator of web pages (i.e., sectarian movements) to participants (i.e., audience) (McLuhan, 2011). Transmitting texts between participants (basically seen in social media), we are only marginally interested.

As was mentioned above, as part of our research, we note the "sectarian movements", which are currently experiencing a high increase in demand and activity worldwide, including Slovakia, and are increasingly expanding into the media environment. A perfect example of this growth can be the "Church of Jesus Christ of saint latter-day", which from 1999 to 2011 in Slovakia recorded an increase in the number of members by up to 1575.86%; the group also has numerous activities in the media (Population of the Slovak Republic by religion, online) (the latest data will be available based on the census in the middle of 2021, note).

Nevertheless, there is no research on manipulative methods on the Internet within "sectarian movements" in the context of Slovakia. Our own research's primary goal is to describe and analyze the manipulative methods of selected sectarian groups, which can be found on their official websites. The research method was quantitative-qualitative content analysis.

In the context of the categorization of the most numerous radical sectarian groups presented in Slovakia above, the research group was narrowed down to seven groups, with each group representing a separate category. A brief sum-up of the character of selected sectarian groups can be described based on the following features: Except for two (i.e., the Church of Jesus Christ of saint latter days and the Religious Society of Jehovah's Witnesses) – these are the groups not registered by the state (the state does not „involve“ them into statistics), the members participate on the voluntary basis, they have their leaders, they create the impression of exclusivity (of their teaching, practice) that prevails. Nevertheless, the visible polarization of radical sectarian groups concerning the rest of society is based on „the belief that social norms are an obstacle to the complete and authentic development of these groups and their members.“ The offer of these groups is therefore based on the realization of their religious-ethical ideals, as is detected by Václavík (2007). Dojčár characterizes these features in the context of manipulative communities with a severe impact on a person's physical and mental health, on private and professional life, on freedom of thought and decision-making (Dojčár, 2008). Within the principle of reciprocity, we recall that the elements creating the reality (i.e., teaching and practice) of sectarian movements are also inherently present in the online environment in which these movements present themselves (Campbell, 2013; Radical Online Education, online).

We have explored manipulative methods of reaching the audience on the seven groups' official websites. Researched groups are shown in Tab. 1.

Tab. 1. – Researched groups' official websites. Source: Own research

The Word of Life	<a href="https://www.slovozivota.sk/">https://www.slovozivota.sk/</a>
The Church of Jesus Christ of saint latter days	<a href="https://sk.cirkevjezisakrista.org/">https://sk.cirkevjezisakrista.org/</a>
The Religious Society of Jehovah's Witnesses	<a href="https://www.jw.org/sk/">https://www.jw.org/sk/</a>
Hare Krishna (ISKCON)	<a href="http://www.iskcon.org/">http://www.iskcon.org/</a>

Freemasons	<a href="http://www.vls.sk/vls.html">http://www.vls.sk/vls.html</a>
The Grail Movement	<a href="http://www.hnutiegralu.sk/">http://www.hnutiegralu.sk/</a>
Herbalife	<a href="http://www.herbalife.com/">http://www.herbalife.com/</a>

We have compiled the research sample from the texts on those official websites. Data collection took place in the period from January 2021 to March 2021. The research sample included 128 texts.

Using content analysis, we identified and recorded media content using numerical values - codes. We have included each coding unit (text on the website) in relation to each relevant variable. Categories, resp. variables in the content analysis, we marked the individual elements of the research subject, which we transformed into measurable sizes and features. These were randomly selected parts of the text in which we examined manipulative methods, i.e., there were a total of ten categories. The ten categories of manipulative methods were intended to follow a clearly expressed opinion on: Immediate decision; Contradictions between the learning and understanding of the majority society; The manipulative ways of recruiting new members in the online environment; Emphasizing the financial generosity and economic interests; Polarization of vision; claims and fabulation; Incorrectness of sources; Elite statements; Hidden manifestations of radicalization. Within the subcategories, we also noticed manifestations of non-verbal communication (friendly smiles, sense of cohesion, willingness and so on). We classified the examined texts into a table according to their affiliation to individual categories. We quantified the occurrence of categories with manipulative content; their overview from the most represented to the least represented category is shown in Tab. 2.

Tab. 2 - Occurrence of content with manipulative methods on the examined websites. Source: Own research

<b>Categories: manipulative contents</b>	<b>Occurrence in% on all researched sites</b>
Elite statements	56.16%
Immediate decision	53.04%
Polarization of vision	52.25%
Claims and fabulation	49.92%
Emphasis on financial generosity and economic interests	47.58%
Manifestations of non-verbal manipulation	28.08%
Incorrectness of sources	25.74%
The manipulative ways of recruiting new members	23.4%

Contradictions between the learning and understanding of the majority society	17.16%
Hidden manifestations of radicalization	13.26%

Tab. 2 brings the occurrence of contents that can be marked as manipulative in the examined period January 2021 to March 2021 on the basis of specified categories. We can state that in terms of the occurrence of manipulative content, the following categories are the most represented: Elite statements (56.16%), immediate decision (53.04%), polarization of vision (52.25%), claims and fabulation (49.92%) and emphasis on financial generosity or others economic interests (47.58%).

## 4 RESULTS

As stated above in the text, we do not identify empirical research focused on the nature of media content in the Slovak media in relation to sectarian movements operating (also) in Slovakia. Since this is an unresearched „grey area“ of this topic and we have not found an argumentative methodology in the context of Slovakia in the literature published so far, the research was connected by an attempt to create a methodology. The method of content analysis proved to be the most suitable tool for the research of media content. The analysis of this type and scope had to be divided into categories, i.e. create ad hoc argumentation categories and also an appropriate set of subcategories that would qualitatively complement the main categories, which in turn were assessed quantitatively. After creating main categories and subcategories of the researched issues, we were able to proceed to the analysis of textual content on the researched websites.

On the official websites of seven selected sectarian groups, we have identified the following ten manipulative methods:

- *Immediate decision equals immediate change for the better:* Sectarian groups on the Internet really express the belief that the current way of life is not sufficient and does not meet the expectations of members of sectarian groups. Part of the media content is an open manifestation of opinions, based on the belief in a possible better, more spiritual, more valued and happier life, already experienced by the group members. An important addition is the mention that the same life is already available to all "seekers". The offer is available at the moment of the decision (i.e. "now") and immediately sets up satisfactory results and, as Vojtíšek notes, also new values and a new lifestyle (Vojtíšek, 2007). As a manipulative tactics, we evaluate the emphasis on immediate decision ("now", "decide by yourself"), immediate results ("try a new form", "new evangelization") and experience ("experience yourself", "become part of a new vision").
- *Emotional involvement:* On the researched websites, we find emotionally colored content such as short videos, interviews with authorities, celebrities, supporting the group's learning, as well as magazines and articles bringing information about attractive events or the benefits of the group's activities for other society members. Friendly smiles, a sense of cohesion and willingness are tempting, but in practice, and in their absolute form, difficult to be transformed into reality. At this point, too, we are talking about manipulation, because if a manipulator is sitting next to you, his "family" can always be only half-truths and lies, although he embraces you energetically and smiles at you with the brightest smile. In the context of the available literature, Z. Vybiral (2003) also describes this method as manipulative.
- *Hidden manifestations of radicalization:* Websites attract attention and address individuals, and on the other hand hide any manifestations of radicalization that is empirically

present in these groups due to their learning and practice. Although radicalization is not obvious at first sight on the researched websites, after a more thorough research we find controversial content, representing ideological contradictions between the learning and understanding of the majority society. As an example, we cite the authorities' belief in the Word of Life group that the belief in healing can be so strong that it is not necessary to get medical treatment, i. e. there is nothing that cannot be solved by faith or belief.

- *The three-level psychological tactics of "sects"*: The ways of recruiting new members in the online environment are fundamentally similar to the methods of classical recruitment of new members (present on the Life Movement website, the Jehovah's Witnesses Religious Society, and the Herbalife commercial cult, note). According to J. Kotrč, in the general communication but also in the media context, these groups use the sophisticated psychological tactics, consisting of three steps: (1) Inducing fear (for example, of not being salvaged or a future without financial security); (2) inducing envy (presenting other people's abilities or wealth) and (3) offering an one and only "lifetime" opportunity (promises to solve any personal issues or assurance of success and recognition) (Kotrč, 1999).
- *Emphasis on sacrificing funds*: Emphasizing the financial generosity of members is underlined by pointing to the development of the group. The fact that the members have to consider the financing of the group as a priority of their own financial management can be assessed as manipulation.
- *Polarization of vision and evaluation*: Sectarian groups present themselves on their websites using opposites representing those thoughts and facts that exist outside "in the world" from those inside the group. J. Abgrall also describes the polarization of vision as a manipulative method: „Everything inside is experienced as positive, constructive and life-dynamic, while what is outside is seen as negative, destructive and deadly.“ The result is often for a person being suspicious and even get the negative approach to everything that arises outside the group (including the cultural values of the majority society) (Abgrall, 2000). Therefore, experts from various fields of the social spectrum warn against such forms of thinking (Yinger, 1960; Thomas & Foster, 1972; Mitchell et al., 2016; Moule & Fox, 2020).
- *Incomplete claims, fabulation*: the websites researched provide arguments and obviously convincing claims (even supported by evidence). However, it is often an incomplete presentation. Arguments tend to be taken out of context, distorted or only partially true. This can suit users, paradoxically, because finding the whole truth is more time consuming and intellectually demanding.
- *Incorrectness in citing and acknowledging sources of "truth"*: Like the teachings of the groups researched, their messages on the Internet are a compilation of various sources and teachings. The inexperienced user can, while believing that he reads biblical verses on the website, also look into the texts of other religious groups, old teachings (Orient, Egypt) but also new cults (UFO cults, alternative medicine). The "fiction" of the group's founder is no exception on the website; it is often a matter of combining several teachings at once; well known as syncretism. An example is the teaching of The Church of Jesus Christ of saint latter days, which partly represents Christian truths about the divine Trinity (although, for example, it denies the unity of the Trinity), to which it adds the revelations of the founder Joseph Smith; at the age of 14, the angel Moroni appeared to him and allegedly brought him a new gospel.
- *Clarity of "instructions" for controversial problems*: sects usually provide very simple concepts of solving personal, spiritual, work, social but also global problems, which is sometimes welcomed in today's dynamically changing and confusing world as a "real solution", most "clear" even an "obvious" solution. These phenomena can be considered manipulative, especially in the context of the known method of brainwashing, representing a psychological

technique of suppressing critical thinking and the subsequent acceptance of imposed opinions, values or attitudes. We refer manipulatively, for example, to the clarity of the instructions for use of Herbalife herbal products, the daily use of which is accompanied by assurances about the treatment of serious or even clinical diseases. A sick or suffering person is a person “in crisis“ and the literature has repeatedly pointed out that it is an endangered group, easily susceptible to manipulation.

- *Elite statements:* The researched groups on their websites present a relatively wide range of offers with the same solutions. It is in particular active participation in the life of the group. Moreover, the researched groups do not hide the fact that they offer a single path to salvation (the Religious Society of Jehovah's Witnesses) or to solving various human problems (Herbalife). It is elitism and exclusivity, typical features of the sect, which in the context of sociology are considered as manifestations of intolerance and in the context of religion as manifestations of manipulation (Lužný, 1997).

## 5 CONCLUSION

The paper consisted of two parts, a theoretical part and own research. In the theoretical part, our base was that the new media are a critical tool for the development of the “sectarian movements”. In the space of new media, what one attaches importance to becomes essential. Therefore the relationship between the medium (in this article, we were interested in the official website) and the person (following this website) turns out to be reciprocal, i.e., media information and media purposes are influenced by the (non) interest of the recipients. In the context of reciprocity, we further recalled that the findings of research in the online environment are inherently present in the everyday reality of the human community; media content influences the individual, so they co-create or even determine the meaning of issues, invite the individual to be active, inspire them to get new interests, create habits, etc. (Jiráček, Wolák, 2007). The cultural „invasion of the media“ (Šverha 2007), especially of the Internet, also contributes to creating an unlimited amount of new content in our culture and new meanings and experiences. The Internet is therefore proving to be an ideal platform for sectarian movements, which seek to reach audiences through various tools and methods.

As part of the article's practical part, we researched the offer of seven sectarian movements on their official websites. Using quantitative-qualitative content analysis, the research aimed to describe and analyze manipulative methods. The seven sectarian movements in Slovakia manage websites where we have recorded a total of 10 manipulative methods, the identification (description and analysis) of which represents the benefit of the research's practical part. We can state that in terms of the occurrence of manipulative content, the following manipulative contents are the most represented on the examined websites of sectarian movements, possibly categories: Elite statements (56.16%), immediate decision (53.04%), polarization of vision (52.25%), claims and fabrication (49.92%) and emphasis on financial generosity or other economic interests (47.58%).

In this sense, the question of the positive functions of other (i.e., “non-sectarian”) media is raised. The function of informing and entertaining the audience should certainly include the function (or rather the media's desire) to act as an educational and preventive element in society (McQuail, 2009). Furthermore, together with experts on the researched issues of sects and the output counseling (from sects), the media may target victims of a malfunctioning system, i.e., those who are not helped or captured by the social system for various reasons. In addition to people in poverty, people with disabilities or socially excluded people, the media can (and should) focus on victims of sects and create positive motivation for greater personal balance and build media literacy.



We also see the cognitive value of research in the connection between the theoretical and practical part of this article, i.e., linking research findings with the theoretical context of reciprocity. As our findings from the online environment of websites are crucial, based on reciprocity, it can be assumed that manipulative methods will be inherently present in sectarian movements in offline reality. Therefore, the obtained set of manipulative methods is an appeal to greater human prudence in real communities of sects and an appeal to a more active public discussion about the negative consequences of manipulative methods present in the current sectarian movements in Slovakia. These challenges are rising in the growing interest in “sectarian movements” worldwide, including Slovakia (Vojtíšek, 2007).

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## **Contact information**

**PhDr. ThDr. Hedviga Tkáčová, PhD.**

University of Žilina in Žilina, Faculty of Humanities

Univerzitná 8215/1, 010 26 Žilina

E-mail: [hedwiga.tkacova@gmail.com](mailto:hedwiga.tkacova@gmail.com)

ORCID: 0000-0003-3062-2284

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# HOW DID COVID-19 RESHAPE THE ACCOMMODATION PREFERENCES AMONG TOURISTS

*Lukáš Vaľko, Martina Jantová, Eva Smolková*

## **Abstract**

COVID-19 pandemic has a significant impact on tourism industry. It causes high income drops but the change of customers' preferences as well. These preferences are the basis, which plays a vital role in customers' purchasing decision-making process. The idea behind this paper is to research and evaluate the decision-factors of booking and purchasing the accommodation services as one of the biggest sectors of the industry. The main aim of the paper is to analyse the change in tourists' preferences regarding the booking and/or purchasing of the accommodation services caused by COVID-19 pandemic. The data for our analysis were gathered via questionnaire regarding the tourists' preferences before and during the pandemic. Data were analysed and we have identified the main changes in the preferences, while we highlighted the most important decision-factors in both periods. As technology availability was identified as very potential factor, we aimed to identify a potential statistical influence of demographic and geographic factors on how people perceive them. For that analysis we used a Chi-square independence test and Fischer exact test.

*Keywords: tourism, preferences, purchasing behaviour, accommodation, technology*

## **1 INTRODUCTION**

Every industry has its own customers, attracts them in a specific way and treats them with a different approach. Tourism industry, as it is developing and changing every minute, must be very cautious when luring the customers into visiting a destination or purchasing a product or service (Rather, 2019). Therefore, businesses operating in tourism industry and destinations themselves have to be able to properly identify customers' needs, wishes and preferences (Cuculeski et al., 2016). All these characteristics, which need to be considered when creating a marketing strategy to attract customers, shape and develop customer motivation and purchasing behavior (Hudson & Hudson, 2017).

One of the most significant and most negative trends shaping the tourism and especially the accommodation sector is COVID-19 pandemic caused by the virus SARS-CoV-2 (WTTC, 2020). Several measures to slow down the spreading of the coronavirus were taken worldwide. In Slovakia, the most important regulations were e.g. use of safety masks and other tools, social distancing, borders closure, regulation of people movement, mandatory quarantine after return from abroad or prohibition of mass events and crowding (Public Health Authority of the Slovak Republic, 2021)

The main objective of the paper is to analyse the change in tourists' preferences regarding the booking and/or purchasing of the accommodation services caused by COVID-19 pandemic. We especially focused on the potential of modern technology as WTTC defined it as one of the possible solutions of recovering the tourism industry (WTTC & Wyman, 2020).

## **2 THEORETICAL BACKGROUND / LITERATURE REVIEW**

### **2.1 Tourists' purchasing behavior**

Purchasing behavior in general is defined as the group of reasons, why one or more persons (as a group or team) purchase products and/or services, what factors they consider and how they finally make a purchase decision (Swarbrooke & Horner, 1999).

At the beginning of the millennium, tourists were divided into two categories based on their travelling motivation – allocentric (venturers) and psychocentric (dependables). People who incline to be more allocentric (when a person is able to perceive the situation from the point of view of other people and is open to a new experience) prefer exotic destinations, contact with locals and spontaneous decisions. Psychocentric people (a person, who avoid new, unknown experience and is more self-oriented), on the other hand, prefer mass trips, organized tours and familiar destinations (Plog, 2002).

As we suggested before, customers differ from industry to industry. These differences are, naturally, reflected in the purchasing behavior of respective customers. In tourism, customers are mainly impacted and influenced by these seven main factors: motivation of purchase, demographic factors, social status, culture, life cycle, reference groups (reviews, recommendations and experience) and lifestyle (Hudson & Hudson, 2017). However, this implies mainly on individual customers. The situation is slightly different when the customer is a business or other legal entity. In such case, one person purchases the tourism product and/or services, but different person uses them (Gucik, 2011).

Nowadays, when a tourist decides to purchase a product or service of tourism industry, they expect much more than just pure product. They await a purchase of the experience and the story behind the product or service (Hollebeek & Macky, 2019). This mindset of experience marketing is a principle of the intangible experience economy concept (Le et al., 2019; Song et al., 2015). High-quality products and services are, of course, vital. But an extraordinary experience will stay in customer mind for a long time and thus influence their follow-up purchasing behavior (Rather, 2019).

This only sums up, how important is for tourism organizations to be aware of what customers really want, what are their wishes and desires. When they know the wants of their own customers and they realize which decision factors are the most important for them, then these organization can grow, eventually expand internationally, improve the quality of customer experience and strengthen their position in customers minds (Liao & Chuang, 2019).

### **2.2 Travelling preferences**

Purchasing behavior of customers in tourism is very complex and sophisticated process. Thus, it is very important to identify and thoroughly evaluate tourists' preferences and the main motivational factors which influence not only the destination choice, but the whole process of the planning of travelling activities (Kladou & Mavragani, 2015). Motivation to purchase is often influenced also by the personal characteristics of a tourist. However, these factors do not impact the behaviour directly, but through setting up the travelling preferences (McGuiggan, 1999).

Tourists, when planning a trip, must take a main decision, which destination(s) to visit and which not to. The result of such decision-making process is the creation of "the pattern of consumer behavior" regarding the tourism products and services, which is based right on their core preferences (Hsu, 2009). These preferences take a significant part in decision-making and

can be based on internal (needs, wishes, demand) and external (surroundings, culture, etc.) motivation (Goodall, 1991).

Throughout the previous decades, many different factors have been influencing tourists' preferences. Since the beginning of a millennium, internet and websites took a role. Few years later, the rise of social media, travel aggregators and HTORs (e.g. TripAdvisor) became the key element in shaping the touristic preferences (Briggs et al., 2007). The importance of web reviews and recommendations was highlighted by many studies and researches (Yoo & Gretzel, 2009; Chung & Buhalis, 2008, O'Connor, 2008). However, at the end of 2019, the COVID-19 pandemic suddenly became the crucial industry-shaping factor.

### **2.3 Changes in preferences of accommodation purchase caused by COVID-19 pandemic**

The most Covid-impacted sector of the tourism industry is the accommodation sector (Gursoy, 2020). It is proved by the deepest decrease of the accommodation facilities' revenues, the highest rise of the unemployment rate and in Slovakia also in very significant decrease in the number of businesses providing accommodation facilities – Slovak Statistical Office declared this fall the biggest fall since the economic recession in 2008 (Statistical Office of the Slovak republic, 2021).

COVID-19 pandemic significantly influences purchasing patterns and preferences of tourists. Mckinsey and Company studied the impacts of pandemic on tourists' consumer behavior globally. The majority of 45 researched countries declared enormous decline in tourists' expenditures, mainly in accommodation and transportation services. The significant change was identified also in travelling preferences regarding the choice of destination, accommodation provider and leisure activities in the destination (Mckinsey and Company, 2020). Customers' expectations changed dramatically, and many preferences have changed as well. In accommodation services, the most significant change was visible in the study of the decision factors of choosing a facility to stay at. Customers start to prefer less-known hotels with no crowds at a lobby and clean and secured facilities, where all the regulations and hygienic measures are taken (Marques Santos, 2020). The importance of C2C forms of accommodations (e.g. Airbnb) start to prosper and they are the travellers' target much more often these days (DNA, 2020).

In addition to these changes, several brand-new decision-factors were identified when planning a trip to the destination. Studies in Greece and Czech Republic researched that although the most important factor is still the price-quality ratio, customers began to follow and consider other factors such as health and safety, risk or security and hygienic measures in the destination and accommodation facilities (Pappas & Glyptou, 2021; Dusek & Sagapova, 2021).

Kock points out the specific implications of these preferential changes. The rate of xenophobia and ethnocentrism raised and customers start to search for the destinations, which are not tourist-crowded. They also confirmed that customers started to take safety measurements into account, while the influence of all the considered demographic factors was proclaimed negative (Kock, 2020). The study on Czech and Slovak customers supports these findings and add, that these customers markedly started to prefer domestic travelling connected to sightseeing and stay in nature (Dusek & Sagapova, 2021).

### 3 METHODOLOGY

The main objective of the paper is to analyse the change in tourists' preferences regarding the booking and/or purchasing of the accommodation services caused by COVID-19 pandemic. We have used a questionnaire containing Likert-scale question, where the respondents shall identify, how important a given decision factor is when they book or purchase an accommodation. The rating has seven points, where 1 (one) means 'very important' and 7 (seven) means 'not at all important'. The first phase of the research was conducted in Q1 of 2020, before the pandemic spreads in Europe and the second phase in Q1 of 2021, when the pandemic heavily impacts the tourism industry. The aim was to analyse and compare preferences of Slovak tourists and the tourists from the EU and other parts of the world. All the considered factors are shown in Tab. 9.

Tab. 9 - Decision factors by purchasing an accommodation. Source: own research

<b>Pre-pandemic factors</b>	<b>Pandemic factors</b>
Price of an accommodation	Price of an accommodation
Location/distance to my point of interest	Location/distance to my point of interest
Reviews, recommendations, own experience	Reviews, recommendations, own experience
Hotel restaurant/lobby, eating options	Hotel restaurant/lobby, eating options
Brand and category of an accommodation (hotel/hostel/private/number of ****, etc.)	Brand and category of an accommodation (hotel/hostel/private/number of ****, etc.)
Availability of modern/smart technology (virtual visit of a facility, mobile app, etc.)	Availability of modern/smart technology (virtual visit of a facility, mobile app, etc.)
options for extra leisure time activities (wellness, sport, etc.)	Options for extra leisure time activities (wellness, sport, etc.)
	Mandatory quarantine when entering/leaving the country
	Safety and hygiene of the accommodation to prevent the spread of the virus
	Destination safety (related to e.g. health, political situation etc.)

The questionnaire was created in Google Forms and distributed via social media. The target group were the active travellers and tourists, so we were aiming for the groups and pages dedicated for such users. The structure of the sample is the result of the chosen distribution channels. We managed to collect 350 responses in both phases consisting of respondents from Slovakia, other EU countries, Americas, APAC and Africa. In the first phase, we collected answers from 178 Slovak respondents, 146 respondents from the other EU countries and 26 respondents from other world regions. In the second phase, 200 respondents were from Slovakia, 96 from other EU countries and 54 from the rest of the world.

To identify the preferences, we have used simple descriptive statistics using MS Excel Pivot Tables to calculate means, medians, modus and counts. To identify, whether selected demographical and geographical factors have a significant influence on tourists' preferences, we have used Pearson Chi-Square and Fischer Exact testing in IBM SPSS Statistics software.

Based on the mentioned studies and our previous research we have developed three research questions:

Q1: The perception of the importance of the chosen decision factors when purchasing an accommodation has changed due to COVID-19 pandemic.

Q2: The importance of the availability of modern technology is perceived differently by men and women.

Q3: People from different world regions and from different generations perceive the importance of smart technology in accommodation selection process differently.

## 4 RESULTS

### 4.1 Accommodation services – preferences before the pandemic

#### Choice of accommodation service provider

Several factors are decisive when choosing an accommodation facility in which a tourist spends a stay or part of a stay. Based on previous research into customer preferences, we have ranked the following among the most significant: Price of an accommodation; Location/distance to my point of interest; Reviews, recommendations, own experience; Hotel restaurant/lobby, eating options; Brand and category of an accommodation (hotel/hostel/private/number of \*\*\*, etc.); Availability of modern/smart technology (virtual visit of a facility, mobile app, etc.); options for extra leisure time activities (wellness, sport, etc.). Respondents were asked to assign a value to these factors based on their preference. In Tab. 10, all factors are ranked based on the average of the achieved values, their median and the number of extreme values.

Tab. 10 - Decision factors sorted by their importance. Source: own research

Factor	Mean	Median	Modus	Total 1's	Total 7's
Price of an accommodation	2,13	1	1	146	18
Location/distance to my point of interest	2,00	2	2	84	2
Reviews, recommendations, own experience	2,47	3	3	74	2
Hotel restaurant/lobby, eating options	4,68	4	4	9	42
Brand and category of an accommodation	5,09	5	6	6	11
Availability of modern/smart technology	5,78	7	7	28	184
Options for extra leisure time activities	6,00	6	7	3	91

Based on the gathered data, the price of accommodation, the location of the accommodation facility and its reviews, recommendations of acquaintances or personal experience can be considered as the most important factors when choosing an accommodation service provider. Since the measured averages are in accordance with the medians and modes of the individual factors, these data can be considered relevant.

We can observe interesting results in the analysis and comparison of the number of extreme values - "Very important" (1) and "Not at all important" (7). "Availability of modern/smart technology" was identified by respondents 28 times as the most important factor, so for 28 people the availability of technology in accommodation facilities is vital (for comparison, this value is many times higher than the options "Brand and category of an accommodation"; "Hotel restaurant/lobby, eating options" and "Options for extra leisure time activities"). However, more than half of the respondents described this factor as unimportant. The number of extreme values at this factor is thus significantly highest, which can be attributed to the composition of the sample - geographical, demographic or social differences.



### Booking of an accommodation

In addition to the analysis and selection of the accommodation service provider, the important decision is also the purchase or reservation itself. As part of our research, we found out which method of booking respondents use most often. More than 53% of respondents prefer to book the accommodation services through travel aggregators (e.g. Booking.com) - of which up to 81% prefer web applications and only 19% mobile applications. Accommodation services are booked directly in the facility by 32% of respondents, most often in the form of a reservation made on the website or in the mobile application of the accommodation facility, the least often by personal or telephone order. Nine respondents (2.57%) have not yet booked accommodation services.

### **4.2 Accommodation services – preferences during the pandemic**

To identify differences in customer preferences in tourism, we researched in the second part of the research again, how important selected factors are when booking, buying or choosing an accommodation service provider. In this case, however, we had to take into account the so-called COVID-factor, i.e. the new criteria such as safety, hygiene or government regulations. In addition to the factors whose importance in the process of planning and booking accommodation services were examined in the first phase of the research, we also included the following in the second phase: Mandatory quarantine when entering/leaving the country; Safety and hygiene of the accommodation to prevent the spread of the virus; Destination safety (related to e.g. health, political situation etc.). The results and descriptive statistics are shown in Tab. 11

Tab. 11 - Decision factors sorted by their importance during the pandemic, Source: own research

Factor	Mean	Median	Modus	Total 1's	Total 7's
Safety and hygiene of the accommodation	1,84	2	1	163	3
Price of an accommodation	1,93	2	1	150	0
Destination safety (related to e.g. health, political situation etc.)	2,06	2	1	157	4
Reviews, recommendations, own experience	2,16	2	2	113	3
Location/distance to my point of interest	2,27	2	1	136	9
Options for extra leisure time activities	2,42	2	1	143	8
Mandatory quarantine when entering/leaving the country	2,44	2	1	145	14
Availability of modern/smart technology	2,89	2	1	139	29
Brand and category of an accommodation	3,15	3	2	44	21
Hotel restaurant/lobby, eating options	3,85	3	2	25	60

While in the pre-pandemic period the most important factor in booking of the accommodation services was the price significantly, during the pandemic there was a factor that is even more

important for travelers – security and hygiene measures of the accommodation facility, which aim to minimize the risk of spreading the disease. As „Very important“ indicated this factor 46.57% of respondents. The safety of the destination (health, political, etc.) is considered "Very important" by 44.86% of respondents. During the pandemic, respondents consider the brand / category of accommodation facility and eating options to be the least important factors. The last-mentioned option was described as "Not at all important" by 60 respondents, while only 25 respondents described it as "Very important".

It can therefore be said that the pandemic had a significant impact on customers' preferences when choosing a provider and booking of the accommodation services, as the "COVID-factor" became by far the most important decision-making factor. This statement is also supported by the fact that more than 78% of respondents answered affirmatively to the question, whether respondents started to monitor safety and hygiene measures in travel destinations as a result of the pandemic. 66.57% would be even willing to pay more for accommodation than in the pre-pandemic period if measures were complied with and possibly additional measures were introduced in accommodation facilities. Almost 85% of respondents answered positively to the simple question whether respondents lack the opportunity to use accommodation services during a pandemic.

There are many possibilities for the use and application of modern technologies when searching for, booking or purchasing accommodation services. Whether it is technologies that are aimed at improving the internal processes of accommodation service providers, at digitizing and recording visitors and residents, but above all at increasing the attractiveness in the eyes of customers.

From the results of the first phase of research, we can observe that the importance of the availability of modern technologies in the selection of providers, respectively. reservation and purchase of accommodation services is not significant in terms of customer preferences. However, as we have stated, of all the monitored factors, the highest number of extreme values was recorded with this factor, ie. most respondents cited the importance of the availability of modern technologies as a "very important" or "not at all important" factor. In the following analysis of the influence of selected demographic and geographical factors on preferences, we statistically proved that the high number of these extreme values depends, among other things, on the diversity of the sample. We examined the factors: Age, Gender, Residence / Region and Number of household members. The Chi-square test of independence (or Fischer test) confirmed the significance of the influence of all investigated factors. According to the assumptions, the importance of the availability of technologies in connection with accommodation services is perceived more positively by younger persons - as at least partially important technologies were identified by respondents under 34 in 15% of cases, in persons over 35 only once (0.29%). The result was also confirmed by Fischer exact test (see Table 10). The importance of technology is further perceived more intensely by women. We have identified that household size also has a significant impact - people living in a 3- and 4-member household perceive the importance of technology the most. People from smaller as well as larger households do not attach high importance to technology. We also compared the influence of the respondents' residence - while people from the Slovak Republic perceive technologies in accommodation services mostly as unimportant (85.9% of them), the situation in other European countries together is a bit more positive. People living in the Asia-Pacific region attach the highest importance to technology.

Tab. 12 - Importance of technology before pandemic; Chi-square test p-values and Fischer test p-values (in brackets). Source: own research

Importance of technology before pandemic	p-values			
	Age	Gender	Region	Household
Accommodation	0,005 (0,001)	0,000 (0,000)	0,000 (0,000)	0,000

Also in the second phase of the research, we focused on selected demographic and geographical factors and their impact on the perception of the importance of the availability of modern technologies in choosing a provider, respectively purchase of accommodation services. In contrast to the period before the pandemic, this time we have noticed only the influence of the respondents' residence. Paradoxically, the population of the American and APAC countries, which currently attaches a certain degree of importance to technology, is smaller (36.46%) than the population of countries within Europe (37.5%), but especially Slovakia (65,5%). Also, on the basis of the respondents' answers, this can be attributed, among other things, to the fact that the inhabitants of the Slovak Republic had to "focus more significantly on travel within Slovakia" and thus their expectations from foreign accommodation facilities were transferred to domestic ones. Often, however, as they said, these expectations remained unfulfilled. We evaluated the influence of other factors as statistically insignificant.

Tab. 13 - Importance of technology during pandemic; Chi-square test p-values and Fischer test p-values (in brackets), Source: own research

Importance of technology during pandemic	p-values			
	Age	Gender	Region	Household
Accommodation	0,173	0,914	0,000 (0,000)	0,964

## 5 DISCUSSION

Our findings consist of several interesting parts. The first one is, that COVID-19 pandemic really impacted the tourists' preferences when booking or purchasing the accommodation services. Although the price as the factor was still perceived as very important, several new factors popped up and became important decision-factors.

The next interesting finding is the fact, that modern or smart technology was perceived very poorly as a decision factor before pandemic. Although their importance have risen, they still don't belong among the most important factor. However, we identified that several factors influenced the perception of the importance of technology in accommodation choice process.

To answer our research questions, we have to look at the results of the study.

**The perception of the importance of the chosen decision factors when purchasing an accommodation has changed due to COVID-19 pandemic.** We can definitely answer positively. As can be seen on the factors rank in the Tables 2 and 3, the new factors related to COVID pandemic have become the crucial decision factors, compared to the factors COVID non-related.

**The importance of the availability of modern technology is perceived differently by men and women.** The role of gender was statistically proven only before the pandemic spread. During the pandemic, the difference of the perception of modern technology availability importance between women and men was statistically disproved. Before the pandemic, women tend to perceive its importance more.

**People from different world regions and from different generations perceive the importance of smart technology in accommodation selection process differently.** The same as gender, age was proven a significant differentiator only before a pandemic (younger people preferred technology availability more). Region, however, was statistically proven as a significant factor in both phases. Interesting fact is, that while before the pandemic APAC inhabitants had the highest score and Slovaks did not perceive technology importance much. However, during the pandemics it were Slovaks who perceived its importance the most.

This paper can act as a base, which could be later, after the pandemic ends, compared with another study to research the change of tourists' long-term preferences caused by the pandemic. It also brings an actual insight into the literature available to the topic. The main theoretical contribution is represented by the current data from pre- and pandemic state of tourism industry joined by the bibliographical inclusion tourists' preferences and purchasing behavior.

However, this research has several limitations. The most significant one is its sample, which consists only of 350 respondents, while the structure of the sample is not equal (more females, more younger respondents etc.). Another limitation can be the pandemic itself, because in some countries the virus was already spreading when we were collecting 1<sup>st</sup> phase data. This research is though meant to be further elaborated.

## 6 CONCLUSION

We aimed to better understand tourists' purchasing behaviour and their preferences, especially when booking or purchasing accommodation services. Purchasing behaviour and preferences differ from customer to customer, from the country to country and from the industry to industry. By this paper we have proved, that customers in tourism industry are a great example. We have identified the main differences in tourists' preferences before and during the pandemic. As a result, the price is very important factor in both periods, however, all the factors were perceived much more positively after the pandemic. There also appeared several new factors which consider the current pandemic situation and their importance was perceived very strongly regardless the age, gender or region of the respondents. The pandemic also deleted the differences between people's preferences regarding the importance of modern technology – as before the pandemic, all the factors' (age, gender, region and household size) influence on preferences was proven significant, after the pandemic the only significant factor was the region of the respondent. This opens an opportunity for the technology to help recover the industry after this unfortunate period. And businesses which will understand the customers better and which can identify their preferences, can survive this situation and if successful, even profit from it.

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## Contact information

### Mgr. Lukáš Vaľko

Comenius University, Faculty of Management, Department of Marketing  
 Odbojárov 10, P. O. BOX 95, 820 05 Bratislava 25, Slovak Republic  
 E-mail: valko29@uniba.sk  
 ORCID: 0000-0001-6468-6150

### Mgr. Martina Jantová

Comenius University, Faculty of Management, Department of Marketing  
 Odbojárov 10, P. O. BOX 95, 820 05 Bratislava 25, Slovak Republic  
 E-mail: jantova9@uniba.sk  
 ORCID: 0000-0002-4666-7682

**doc. PhDr. Eva Smolková, CSc.**

Comenius University, Faculty of Management, Department of Marketing  
Odbojárov 10, P. O. BOX 95, 820 05 Bratislava 25, Slovak Republic

E-mail: [eva.smolkova@fm.uniba.sk](mailto:eva.smolkova@fm.uniba.sk)

ORCID: 0000-0003-1450-8692

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**Expert guarantor:**

Ing. Pavel Ondra

**Manager and coordinator:**

Ing. Lukáš Zlámal

**Members of the organizing team:**

Ing. Radka Daňová

Ing. Michael Fafílek

Fortesa Haziri

Ing. Lucie Kopřivová

Sandeep Kumar Dey

Mark Ratilla