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PECULIARITIES OF VALUES TRANSFER AMONG COUNTRIES VIA ARTS DIGITALIZATION

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Abstract. The aesthetic experience digitalisation influences the capacity of artistry and creativity of the artwork and the quality of participation in arts. Due to cultural differences between post-communist and non-communist countries' citizens in perception qualities, this research aims to evaluate the influence of the participation form (in-real or digital) in the aesthetic situation by the receivers from post-communist and non-communist societies on artistry and creativity potential in the context of cultural and social sustainability. The quality of participation in five arts types (musical, performing, literary, audio-visual, visual) was evaluated using the same ten criteria. Qualitative data analysis based on an international sample from 38 countries ($n = 221$) concludes that the participation form in arts determines participation quality level in the aesthetic situation by post-communist and non-communist countries' receivers differently. There are significant cultural determinants among post-communist and non-communist countries' citizens between participation in particular arts and between particular forms of participation in particular types of arts. The reasons for these differences cannot be drawn from this research; however, future comparative qualitative research directions are set. The research results, in the context of the political system transformation theory as one of the sustainable development features, should gain the interest of: 1) Art creators looking for the optimal and sustainable way of distributing artworks among receivers from post-communist and non-communist countries; 2) Art managers and marketers for deeper understanding of post-communist and non-communist art receivers' perspectives and their preferences about participation in arts in-real or digitally towards sustainable development; 3) Art receivers to compare their opinion about the ways of sustainable participation in arts with the preferences of art receivers from post-communist and non-communist countries

Keywords: cultural differences; sustainability; creativity; artistry loss; participation in arts; arts management; aesthetics; aesthetic situation; receiving process; art perception

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Additional disciplines: sociology, psychology, aesthetics, creativity

1. Introduction

As a broad global public discourse policy concept, sustainability concentrates on environmental, economic, and social dimensions. Undoubtedly, arts belong to the social pillar; however, due to the attraction of the majority of global citizens, it generates an essential input to the economy and, on this basis, influence the environment as well. Moreover, differences between communist (or freshly post-communist) economies and free-of-communism economies confirm the arts' impact on social capital and, consequently, on the environment. Based on the above, digitalisation of the aesthetic situation plays a role in sustainable developments - its importance needs to be still investigated (Jovanovic et al., 2019; Modliński & Pinto, 2020; Mondejar et al., 2021; Sacco et al., 2021).

For centuries, the content of human activities has been relatively fixed, although their forms change endlessly – in-real activities are transferred to digital forms or changed by them. Because the form of participation affects participation content and accordingly switches contributions and outcomes (Karayilanoğlu & Arabacıoğlu, 2020), we cannot forget that culture diversifies them even more (Hofstede, 2011; Vollero et al., 2020). Furthermore, digitalisation progressively changes the culture in its wholeness: along with technological advancement comes a transformation of social contacts, aesthetic experiences and forms of expression (Kröner et al., 2021). In constantly-evolved circumstances, also management requires new approaches and new tools.

The COVID-19 pandemic touched all processes and sped up digital participation in numerous areas, including the arts (Lei & Tan, 2021). Considering the participation in arts from the aesthetic situation perspective, the exploration should be undertaken from two sides: the creators' and the receivers' (Gołaszewska, 1984; Szostak, 2020, 2021a; Szostak & Sułkowski, 2020a). Therefore, the spine of this investigation is a function of the combination of "aesthetic situation" and "digital technologies" to get information about the change of creativity and artistry potential. The primary research problem is analysing the impact of "digital technologies" on particular "aesthetic situation" components in optics of creativity and artistry loss or gain, adding the lens of cultural dimensions. Therefore, the central investigation on this issue must be separated into two levels: 1) creator-artwork (creative process) and 2) artwork-receiver (receiving process). This article emphasises the artwork-receiver stage, and its goals are: 1) assessment of the influence of digital technologies on the perception of each type of art by the communist and non-communist countries' citizens; 2) assessment of the scale of the influence of digital technologies on the perception of each type of arts by the communist and non-communist countries' citizens; 3) assessment of the scale of creativity and artistry loss or gain because of the use of digital technologies in each type of art seen by the communist and non-communist countries' citizens. Therefore, based on cultural differences, the following research hypothesis was created to achieve these goals: The form of participation (in-real or digital) in arts shapes participation quality in the aesthetic situation by the communist and non-communist countries' arts receivers differently. Therefore, the following research questions were set to verify this hypothesis: RQ1) How do the communist and non-communist countries' arts receivers perceive the quality of participation in particular types of arts regarding the form of participation (in-real or digitally)? RQ2) What are the differences among the communist and non-communist countries' arts receivers between particular forms of participation in particular types of arts? RQ3) What are the differences among the communist and non-communist countries' arts receivers between participation in particular types of arts regarding the form of participation? This research does not intend to explain differences in assessing the quality of the aesthetic situation, which can be described only after comparative qualitative research. However, this investigation's results can be a central basis of indicators for forming the model for this kind of roots research.

2. Literature review

Being a framework for cross-cultural communication, Hofstede's cultural dimensions theory indicates the impact of a society's culture on its members' values and how these values relate to members' behaviour (Hofstede, 2011). Following this theory, communist and post-communist societies equipped with different values structures should assess participation in arts differently compared to societies without communist history; this statement is based on the research about cultural differences in perception of creative identities like artists, creators, managers, leaders and entrepreneurs (Szostak, 2021b, 2021c). We cannot forget that the communism burden had (or still has) been having diverse shapes and powers; also, the length of the influence plays a vital role: the Chinese society will be differently influenced by its version of communism compared to Polish or Czech ones after 30+ years of freedom (Bartlová, 2019; Koziel, 2019; Tan, 2012). The annals of art history are full of theories created by communist or fascist dictators who used culture as an essential factor in their domination over society (Gupta, 2010; Rasmussen, 2021). However, when the Iron Curtain fell in Europe in the 1990s, post-communist countries started a new era of changes in the world of art. After the Cold War ended, profound political, social, economic, and cultural transformations in the former Eastern Bloc – forces started back to the balance (Kaljula, 2015). These political and economic changes may be performed spontaneously, focused on current trends and needs of receivers or considering long-term sustainability of systems, environment and culture. In this context, digitalisation is perceived as a process in line with sustainable goals and standards (Jovanovic et al., 2019; Mondejar et al., 2021; Sacco et al., 2021); however, it is evident to art receivers and creators that not all arts are equally capable of being created, performed, and received in a digitalised way (Schiuma, 2017; Zorita-Aguirre, 2020). For some groups of the society, digitalisation creates new positive dimensions but also, at the same time, barriers or exclusion (Fancourt et al., 2020; Kuc-Czarnecka, 2020; Rivas-Carmona, 2020).

Art in human existence has been present since the earliest times, and through the centuries, the roles of arts and creativity have changed, mixed, and evolved. Although aesthetics as a separate discipline has split off relatively late, it was present from the beginning of abstract thought within philosophical discourses (Gołaszewska, 1984; Szostak & Sułkowski, 2020a; Tatarkiewicz, 2015). Art is a way of transferring the artist's will into the artwork to affect the receivers, and the artist's role is to communicate inner states; artists express their states of mind allowing recipients to achieve particular states (Szostak & Sułkowski, 2020a). From the aesthetic situation point of view, the creator generates his artwork reflecting the natural world and the world of universal values, and the creator departs this ready-made result (artwork) for the receiver. The receiver selects the way of participation in the receiving process fitting to particular conditions. On the other side, the unadjusted-to-the-circumstances choice of the perception form determines the content of the receiving process. More-experienced receivers may be supplementary fluent in using a less efficient form of participation without the quality of the content. Opposing, even the most efficient participation form may not be sufficient to distribute the entire content to the less-experienced receiver (Gołaszewska, 1984; Szostak, 2020).

From the aesthetic point of view, the most noticeable sign of creativity is the artwork itself; in the creator's personality, the fundamental processes making up the phenomenon of creativity happen. The work of art is a carrier of creativity and artistry (Szostak, 2020); simultaneously, the level of creativity and artistry (including universal values) located in the artwork varies on the art receiver's attitude and the form of participation in arts (Szostak, 2021a). The activity of artistic creation is shaped by specified factors like personality conditions, social conditions, and a wealth of experience. However, a straightforward creative attitude is insufficient to start the creative process. Creativity itself is also necessary. The motifs of creative activity may be divided into assigned – straightforwardly affecting the shaping of the work realised with the participation of creative work and unassigned – marked in work indirectly, possible to implement using additional actions and to trigger creative forces: economic thoughts, social coercion, accordance with stereotypes (Szostak, 2020, 2021a).

Participation in arts requires senses (Ekmekçi et al., 2014; Sosnowska, 2015); that is why non-communist and communist countries' citizens use their senses differently (Doğan et al., 2019). However, despite arts' digitalisation being regulated by the technical possibilities to transmit the analogue senses' experience into virtual dimensions (Mao & Jiang, 2021), it is justified that digital participation in arts plays the role of 'digital mediation'. This concept locates the role of digital technology in a proper position, i.e., in 'between' the artwork and the receiver (Jarrier & Bourgeon-Renault, 2019). Furthermore, senses allow for physical, emotional (Buravenkova et al., 2018), intellectual, and spiritual (Rivas-Carmona, 2020; J. C. Wu, 2020) participation in art. Examination of the receiving process on all levels in the context of cultural differences exposes the investigated problem's complexity level.

Advanced IT tools, digitalisation, social media, and constantly-developing business skills forced arts to take a sharp turn (Handa, 2020). In the digital age, performative arts have especially undergone a radical shift since ephemeral performance may be stopped, replayed and repeated (Dunne-Howrie, 2020). Even though the escalation of digitalisation use in arts has been faster, more comprehensive, and more intense year by year, the COVID-19 pandemic added additional stimuli to this process like lockdowns and social distancing (Lei & Tan, 2021; Raimo et al., 2021; Szostak & Sułkowski, 2021a). Parallely, aside from the digital transformation of the participation in arts, there are complementary trends among artists like their shift in the direction of entrepreneurship (Szostak & Sułkowski, 2021a) or new problems with artists' auto-identification (Szostak & Sułkowski, 2021b, 2021c). That is why digitalisation may be seen as a revolution or evolution. Digital technologies allow redesigning the environment and historical attempts to numerous issues. Therefore, it can be said that today's culture is ordered by digitalisation (Roberge & Chantepie, 2017). Because the digital transformation affects and is shaped by specific cultures differently, it also amplifies spirituality from its real context in the socio-cultural interpretation of the natural world to current digitally-mediated settings (Sosnowska, 2015). Mediatisation of cultural practices has been changing the processes of cultural memory construction, and online interaction skills have become the basis of education to equalise tradition and modernisation (Arkhangelsky & Novikova, 2021). The goal of using the Internet as a participating platform engaging the public in creating artwork is to showcase the relationship between the shared imagination and the specific artistic sensibilities of its participants (Literat, 2012).

Digitalisation, broadening horizons for art receivers, unlocks other concerns simultaneously. First, the mass receivers' attitude decreases the artwork's artistic quality. Second, the digitalisation of arts develops the serving role of arts to make them more understandable and customer-friendly (Pöppel et al., 2018; Szostak, 2021a). Third, digital exclusion – significant in communist countries – limits participation in the receiving process (Hracs, 2015; Rikou & Chaviara, 2016). Still, a vital question is the relationship between value and quality, which is used to measure and compare various objects encountered (Fortuna & Modliński, 2021). E.g., considering musical arts, during the reception of a concert in in-real form, the receiver meets the artwork in its desired-by-artist appearance: no volume adjustments, no pauses. On the contrary, the digital form of participation in musical arts allows for these adjustments and – if made arbitrarily – the artwork affects the receiver differently from the creator's desire. In performing arts perceived in-real, a receiver is also a form of a hostage of the artwork; he must keep the regimes of the artwork (its length, volume, visibility). Among all arts, performing arts are probably the most shaped by digitalisation (Dube & İnce, 2019). Finally, the concept of self-historicisation, merging with the contemporary artistic language of performance, supports the artists' recognition in the international art context; a long period of communism shaping the culture of participation in art plays a vital role here (Proksch-Weilguni, 2019).

Audio-visual arts are tightly fixed to the digital form of participation. However, receivers of audio-visual artwork, in-real or digitally, can imagine meaningful dissimilarities between these forms. E.g., the receiver cannot pause or modify the volume of a movie at the cinema; at home, it is entirely possible. Furthermore, at the cinema, the receiver is influenced by the audience's feedback; at home, he is isolated. Additionally, the use of visual image

technology in art also permits the growth of digital media art (Mao & Jiang, 2021) and, accordingly, a never-ending cycle of mutual inspiration. The form of the receiving process of visual arts profoundly affects the shape of the receiving process: a painting is determined by its content and form (e.g. size), environment, emotions shaped by these issues and linked to the receiver's approach towards the artwork. Based on that, digital collaboration in art, digital marketing and digital performance can differentiate and include audiences as authentic arts co-producers (Fortuna & Modliński, 2021). It seems interesting to examine how art receivers of different cultures (post-communist and non-communist) perceive artworks created in this process because the effectiveness and sustainability of the aesthetic situation digitisation are not apparent (Nawa & Sirayi, 2014; Rusinko, 2020).

From the management point of view, organisations can gain from aesthetics on many levels: 1) utilising artistic interventions for individual and group creativity development or problem-solving (Schnuugg, 2019; Skoldberg Johansson et al., 2015); 2) interpreting arts into executive action using the effectiveness of art forms (Pöppel et al., 2018); 3) utilising abstract concepts of aesthetics into management theory and practice (Szostak, 2021a; Szostak & Sułkowski, 2020a, 2020b). Based on this, management – perceived as achieving goals efficiently – is about selecting and regulating the optimal type of participation in each type of art, considering the acceptable grade of creativity and artistry loss or gain for art creators and receivers. Furthermore, art creators work differently in the digital environment needing assistance from co-workers, contractors, and managers, playing a significant role in connecting, harmonising and curating projects and processes (Hracs, 2015). Also, marketers attempting to adjust to constant changes in the market may gain from this research. Cultural differences determine all these optics, and the communism factor plays an important role here.

It is worth asking what may be the reasons for differences between communist and post-communist citizens compared to non-communist citizens in the assessment of the receiving process of arts. The first trace may lead to political system transformation theory focusing on time perspective for changes in culture and identity of society; more extended period and power of communist burden, more significant changes and a more extended period of forgetting about the past and achieving free perspective of non-communist societies (Pavlica & Thorpe, 1998; Szostak, 2021b, 2021c). These results were observed by researchers of many European post-communistic countries like the Czech Republic (Hornat, 2019), Estonia, Latvia, Lithuania (Kreuzer & Pettai, 2003), Slovakia (Mikloš, 2021), and currently communist countries like China (Xue et al., 2021). There are three transformation strategies of countries from communism: 1) gradualist, 2) radical, and 3) spontaneous (Mikloš, 2021), and each of them determines the cultural results differently. In addition, education system quality and governments' priorities are crucial (Birch, 2003; Golob & Makarovič, 2017; Hornat, 2019). In this context, the sustainability issue in this transformation is crucial for all three pillars of sustainable development; each of the mentioned strategies has different consequences on economics, the environment and societies (Mikloš, 2021).

3. Methods and materials

Research in reviewing literature focused on a qualitative choice of the content of Google Scholar, Mendeley, EBSCO, JSTOR, and Scopus databases, especially from the last five years (2018-2022) and data using NVivo Pro software was undertaken. The methodological approach to the literature review was based on an interdisciplinary approach blending aesthetic theory, cultural and reception studies, sustainable development, information visualisation, human-computer interaction, arts and management. For the purpose of this research, arts were divided into five separate categories: 1) musical arts (instrumental and vocal concert and performance, oratorio), 2) performing arts (ballet, dance, mime, opera, performance, theatre), 3) literary arts (drama, fiction, non-fiction, prose, poetry), 4) audio-visual arts (clip, movie, video game) and 4) visual arts (architecture, ceramics, comics, design, drawing, fashion, painting, photography, sculpture). After the literature review, ten aspects were set for the participation quality in each type of art assessment: 1) satisfaction from the participation (Guo et al., 2020; Quattrini et al., 2020; Zollo et al., 2021), 2) participation pleasure (Dunne-Howrie, 2020), 3) participation engagement (Dube & Ince, 2019; Quattrini et al., 2020; Y. Wu et al., 2017), 4) catharsis-experiencing possibility

(Craig et al., 2020; Lee, 2011), 5) contact with the artwork itself (Habbersberger & Bhansing, 2021), 6) contact with the performer itself (Y. Wu et al., 2017), 7) participation comfort (Guidry, 2014), 8) shaping-the-aesthetical-experience possibilities (Jackson, 2017; Park & Lim, 2015), 9) own motivation to participate (Hobbs & Tuzel, 2017; Pianzola et al., 2021), 10) participation easiness (Dunne-Howrie, 2020; Fancourt et al., 2020).

In the second step, a quantitative investigation was made to estimate culturally-differentiated receivers' participation quality in each type of art analysed based on the ten criteria described above. Furthermore, this step aimed to conclude the results about possibly different artistic activities being comprehensible simultaneously. IBM SPSS and MS Excel software executed data analysis; however, complex statistics were not conducted due to the small sample size ($n = 221$). Therefore, this article exhibits a limited number of conclusions from the entire investigation. The quantitative investigation was held between May and December 2021, applying digital tools by SURVIO company. The survey, arranged in English, was disseminated by social media, direct requests and official announcements. It contained 71 questions and was divided into six parts. The first five parts regarded each type of art. All questions were closed-type; respondents could select prepared answers only. While assessing the level of quality of a factor, the respondents used a 5-step Lickert scale: *very low* (1), *rather low* (2), *neutral* (3), *rather high* (4), and *very high* (5). The sixth part of the survey permitted categorising the respondents regarding age, gender, nationality (the respondents were divided into communist and post-communist countries and no communist burden countries based on nationality) and education level. 28.4% out of 777 visits concluded in 221 responses. The oldest participant was born in 1931 (90 y.o.) and the youngest in 2005 (16 y.o.). The majority of respondents (60.1%) graduated bachelor's, master's, or engineer studies; 28.2% had a doctorate, habilitation, or professorship; 9.4% graduated from a technical college or high school, and 2.3% from primary school or junior high school. Respondents (55.2% men and 44.8% women) came from 38 countries: 37.2% from Poland, 11.2% from the USA, 7.4% from Ukraine, 7.4% from Finland, 3.7% from Germany, 3.7% from India, 2.7% from Turkey, 2.7% from the UK. This paper describes only a fraction of the research results.

4. Findings

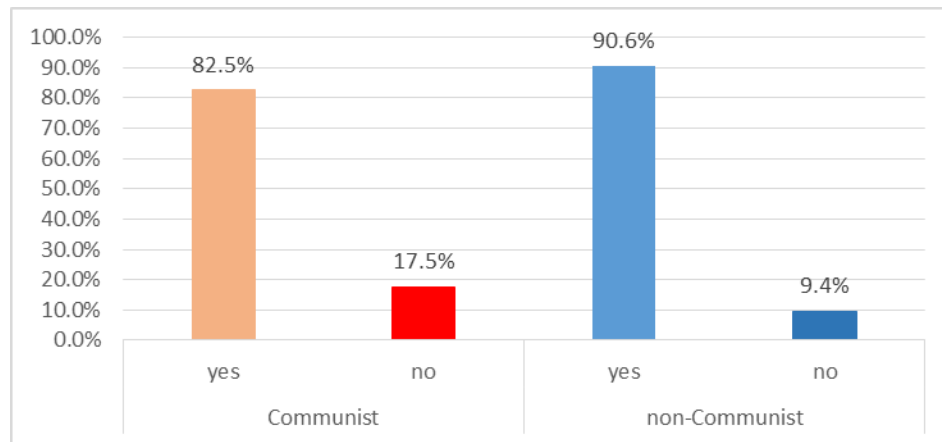


Figure 1. Participation in all types of arts by communist and non-communist countries' citizens.

Source: own elaboration.

86.2% of all respondents, i.e. 82.5% of communist countries' citizens and 90.6% of non-communist countries' citizens, participate in cultural life (music, theatre, literature, painting, sculpture, video game, architecture, fashion) in opposition to 13.8% of all respondents (17.5% of communist countries' citizens and 9.4% of non-communist countries' citizens) who do not do it at all. This information allows the prediction of higher demand for arts participation by communist and post-communist citizens in the context of the transfer of the political

system towards non-communist solutions; this transfer should be performed in a possibly sustainable way. See: Figure 1. Communist countries' citizens participate in cultural life by selecting musical arts in 68.2%, performing arts in 70.6%, literary arts in 45.9%, audio-visual arts in 52.9% and visual arts in 41.2%. Communist countries' citizens participate in cultural life by choosing musical arts in 74.0%, performing arts in 68.8%, literary arts in 50.6%, audio-visual arts in 63.6% and visual arts in 51.9%. See: Figure 2. It can be said that more non-communist countries' citizens participate in arts than communist and post-communist countries' citizens (in descending order): 26.2% more in visual arts, 20.2% more in literary arts, 10.4% in audio-visual arts, 8.5% more in musical arts. Only performing arts are 2.5% more often participated by communist and post-communist countries' citizens than non-communist countries' citizens. See: Figure 3. These results indicate the detailed arts where a sustainable transfer of values and solutions should be focused and performed.

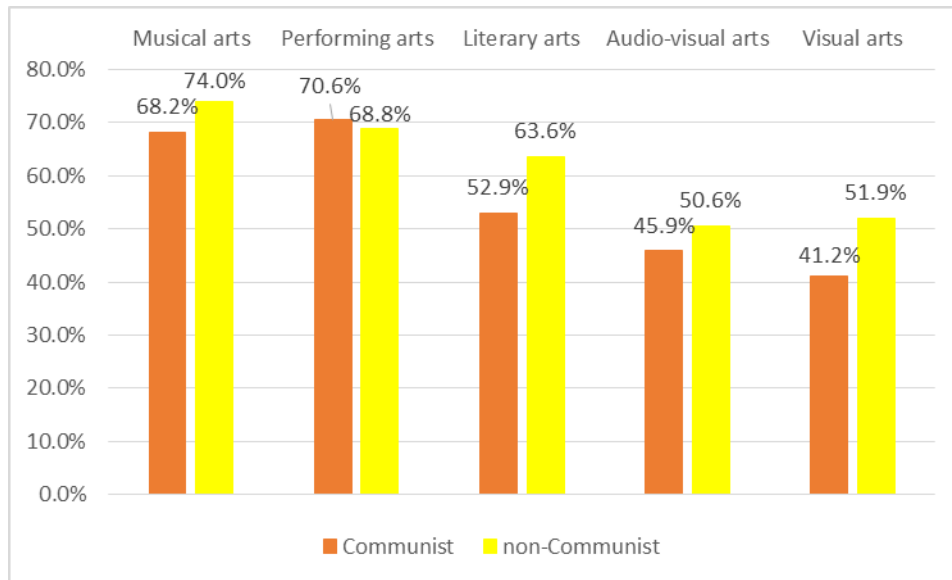


Figure 2. Participation in each type of art by communist and non-communist countries' citizens.

Source: own elaboration.

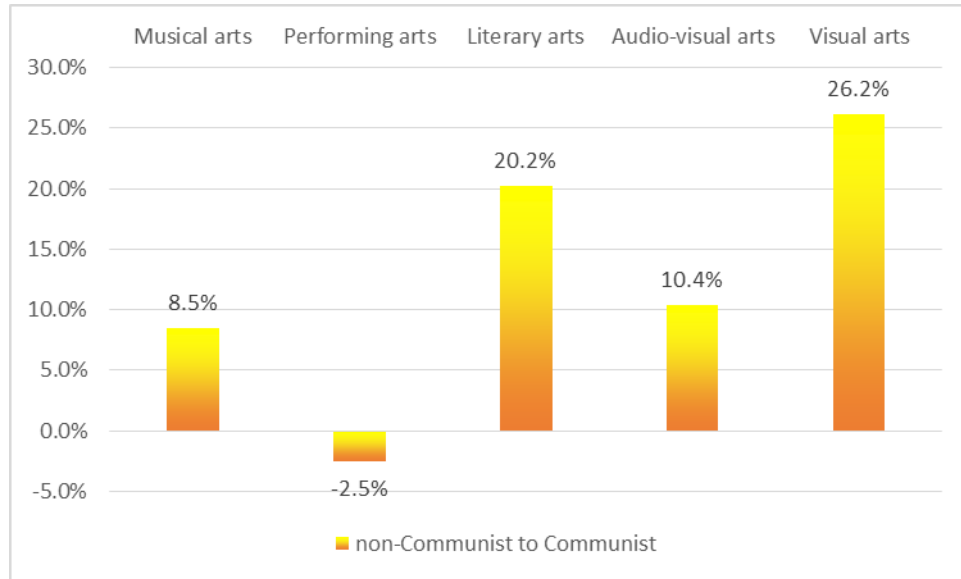


Figure 3. Differences between communist and non-communist countries' citizens in participation in each type of arts.

Source: own elaboration.

4.1. Regarding the type of arts

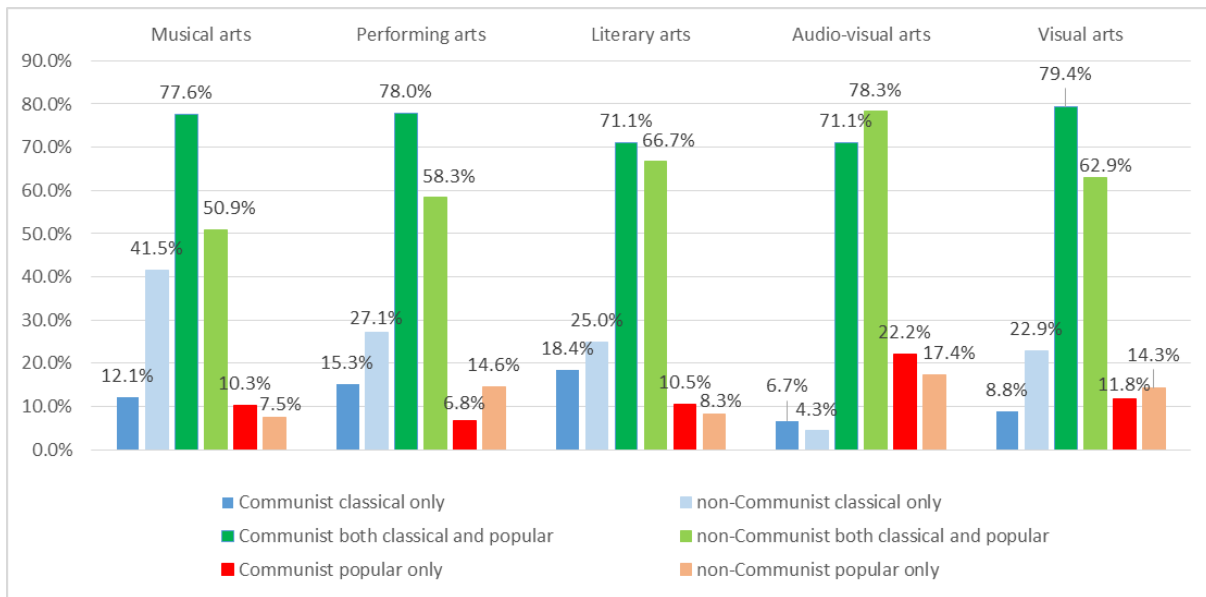


Figure 4. Participation in particular arts regarding arts types (classical only, both classical and popular, popular only) by communist and non-communist countries' citizens.

Source: own elaboration.

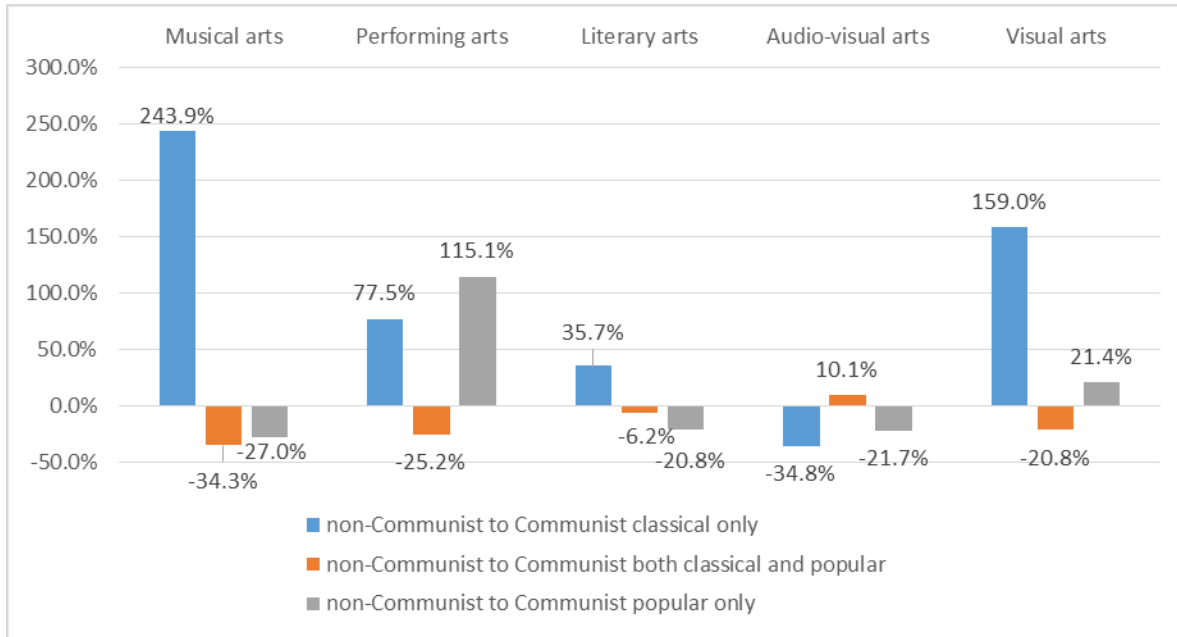


Figure 5. Differences between communist and non-communist countries' citizens in participation in different arts regarding arts types (classical only, both classical and popular, popular only).

Source: own elaboration.

The vast majority of all types of arts receivers are involved both in classical and popular forms of arts: 77.6% of communist countries' citizens and 50.9% of non-communist countries' citizens in musical arts, 78.0% of communist countries' citizens and 58.3% of non-communist countries' citizens in performing arts, 71.1% of communist countries' citizens and 66.7% of non-communist countries' citizens in literary arts, 71.1% of communist countries' citizens and 78.3% of non-communist countries' citizens in audio-visual arts, and 79.4% of communist countries' citizens and 62.9% of non-communist countries' citizens in visual arts. However, only the classical form is attended by: 12.1% of communist countries' citizens and 41.5% of non-communist countries' citizens in case of musical arts, 15.3% of communist countries' citizens and 27.1% of non-communist countries' citizens in case of performing arts, 18.4% of communist countries' citizens and 25.0% of non-communist countries' citizens in case of literary arts, 6.7% of communist countries' citizens and 4.3% of non-communist countries' citizens in case audio-visual arts, and 8.8% of communist countries' citizens and 22.9% of non-communist countries' citizens in case of visual arts. On the other hand, only the popular form of arts is attended by: 10.3% of communist countries' citizens and 7.5% of non-communist countries' citizens in case of musical arts, 6.8% of communist countries' citizens and 14.6% of non-communist countries' citizens in case of performing arts, 10.5% of communist and 8.3% of non-communist in case of literary arts, 22.2% of communist countries' citizens and 17.4% of non-communist countries' citizens in case audio-visual arts, and 11.8% of communist countries' citizens and 14.3% of non-communist countries' citizens in case of visual arts. See: Figure 4 and Figure 5.

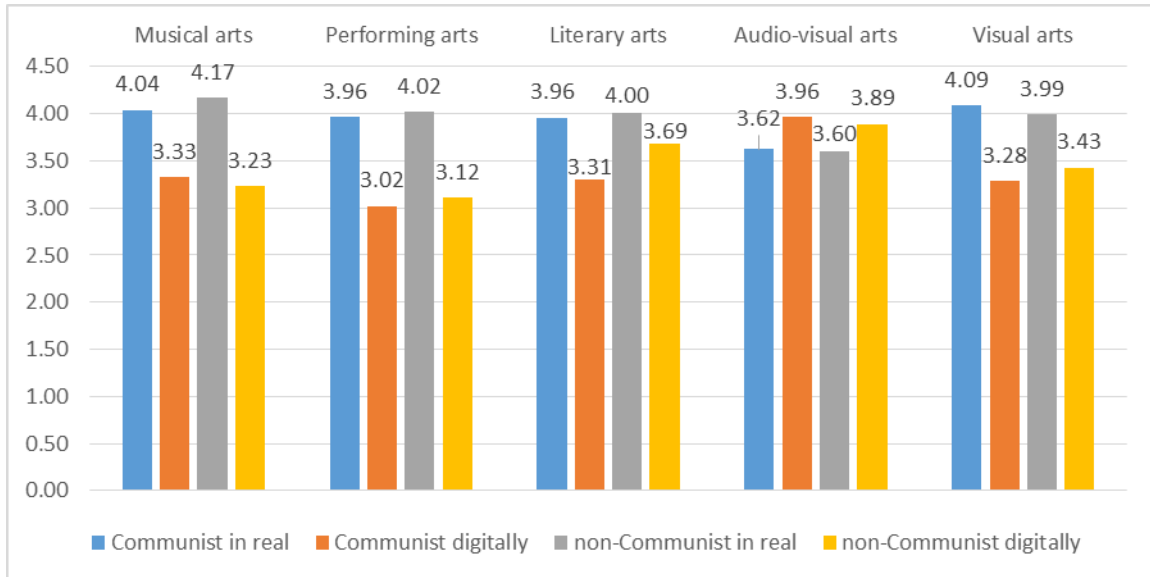


Figure 6. Assessment of the whole aesthetic situation quality regarding the form of participation in the receiving process of a particular type of arts between citizens of communist and non-communist countries.

Source: own elaboration.

The research exposes the following variances between citizens of communist and non-communist countries in the form of participation in each type of art. Musical arts receivers assess the quality of the whole aesthetic situation concerning the form of participation in the following distribution: in-real – 4.04 by communist countries' citizens and 4.17 by non-communist countries' citizens (difference 3.1%), digitally – 3.33 by communist and 3.23 by non-communist countries' citizens (difference 2.8%). Performing arts receivers assess the quality of the whole aesthetic situation as follows: in-real – 3.96 by communist countries' citizens and 4.02 by non-communist (difference 1.4%), digitally – 3.02 by communist countries' citizens and 3.12 by non-communist (difference 3.1%). Literary arts receivers assess the quality of the whole aesthetic situation as follows: in-real – 3.96 by communist countries' citizens and 4.00 by non-communist (difference 1.2%), digitally – 3.31 by communist countries' citizens and 3.69 by non-communist (difference 11.5%). Audio-visual arts receivers assess the quality of the whole aesthetic situation: in-real – 3.62 by communist and 3.60 by non-communist countries' citizens (difference 0.7%), digitally – 3.96 by communist countries' citizens and 3.89 by non-communist (difference 1.8%). Finally, visual arts receivers assess the quality of the whole aesthetic situation: in-real – 4.09 by communist and 3.99 by non-communist countries' citizens (difference 2.4%), digitally – 3.28 by communist countries' citizens and 3.43 by non-communist (difference 4.4%). See: Figure 6 and Figure 7. These results can be used as a map of differences that will be diminished by countries with the communist burden on their way toward the free market. The concern of sustainable transformation in these areas can benefit from using this information.

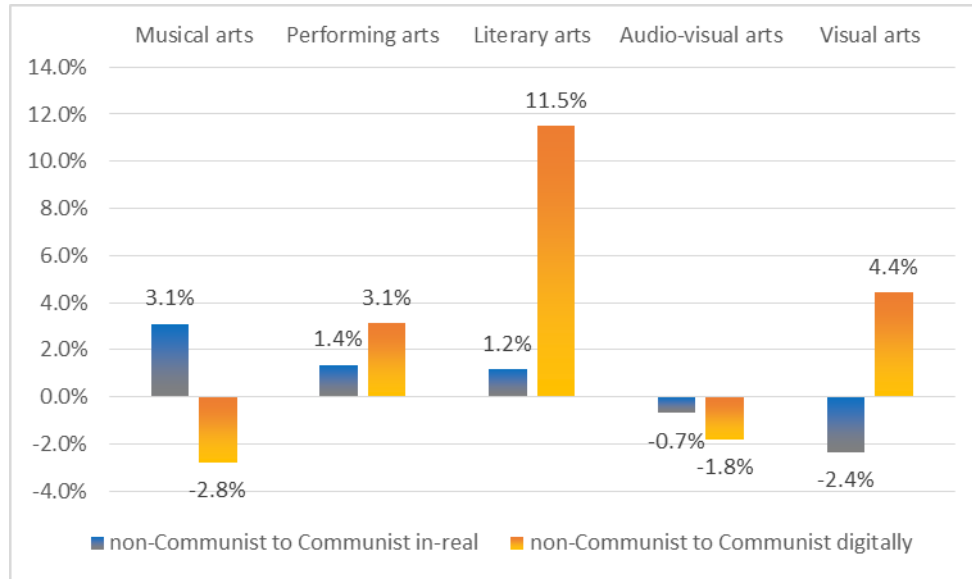


Figure 7. Differences between communist and non-communist countries' citizens in assessing the whole aesthetic situation quality regarding the in-real and digital form of participation in the receiving process of a particular type of art.

Source: own elaboration.

According to communist countries' citizens, musical arts comparing digital to in-real participation lose 17.7% of the receiving process quality and 22.4% according to non-communist countries' citizens. Performing arts lose accordingly 23.8% to the communist and 22.5% to non-communist countries' citizens. Literary arts lose 16.5% to the communist and 8.0% to non-communist countries' citizens. Audio-visual arts, comparing digital to in-real participation, gain 9.3% to the communist countries' citizens and 8.1% to the non-communist. Visual arts lose 19.7% to the communist countries' citizens and 14.1% to the non-communist. See: Figure 8.

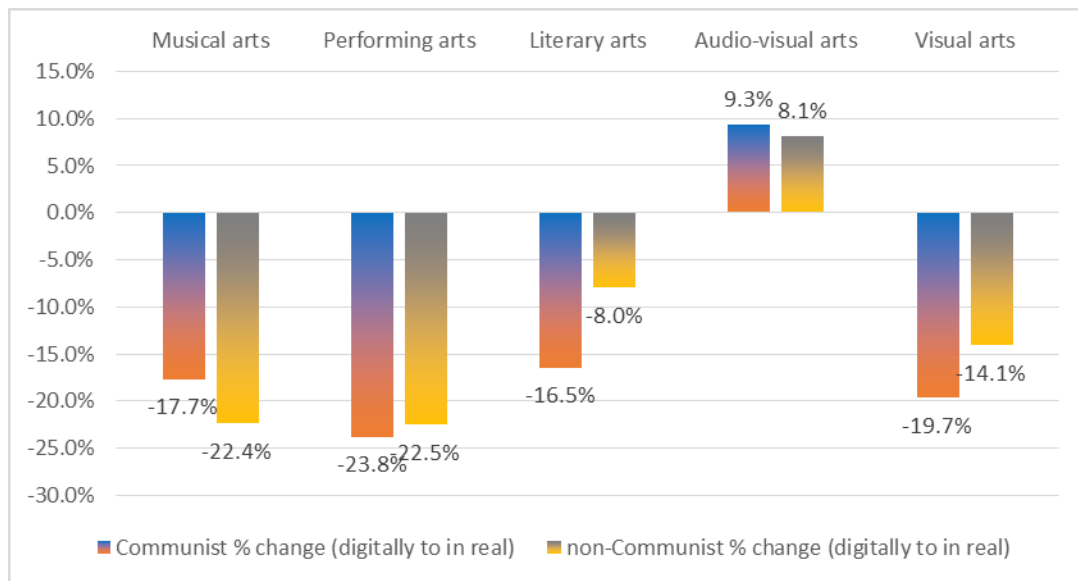


Figure 8. Differences between communist and non-communist countries' citizens' assessment of the receiving process regarding the whole aesthetic situation quality of a particular type of art considering the form of participation (in-real or digital).

Source: own elaboration.

4.2. Regarding qualities of the aesthetic situation

After analysing general variances between the forms of participation in each type of art by the communist and non-communist countries' citizens, it is worth verifying how particular components of the aesthetic situation behave regarding the type of participation in each type of art concerning the cultural roots of arts receiver. Understanding these differences can be essential in planning and performing sustainable development on many levels – primarily cultural and artistic.

4.2.1. Satisfaction

Musical arts receivers from the communist and non-communist countries assess their satisfaction concerning the form of participation in the receiving process in the following distribution: in-real – 4.33 by communist countries' citizens and 4.44 by non-communist countries' citizens, digitally – 3.20 by communist countries' citizens and 3.24 by non-communist. Performing arts receivers assess their satisfaction as follows: in-real – 4.25 by communist countries' citizens and 4.08 by non-communist, digitally – 2.89 by communist countries' citizens and 3.09 by non-communist. Literary arts receivers assess their satisfaction as follows: in-real – 4.11 by communist countries' citizens and 4.06 by non-communist, digitally – 3.11 by communist countries' citizens and 3.63 by non-communist. Audio-visual arts receivers assess their satisfaction: in-real – 3.84 by communist countries' citizens and 3.62 by non-communist, digitally – 4.02 by communist countries' citizens and 3.91 by non-communist. Finally, visual arts receivers assess their satisfaction: in-real – 4.24 by communist countries' citizens and 4.08 by non-communist, digitally – 3.28 by communist and 3.51 by non-communist countries' citizens. See: Figure 9.

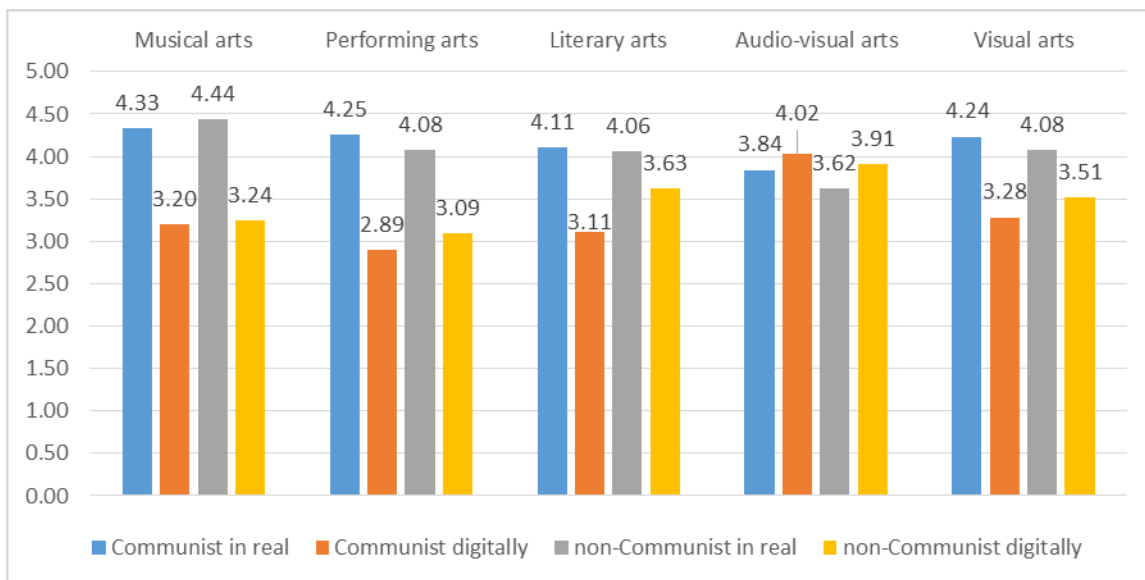


Figure 9. Assessment of communist and non-communist countries' citizens' satisfaction flowing from a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

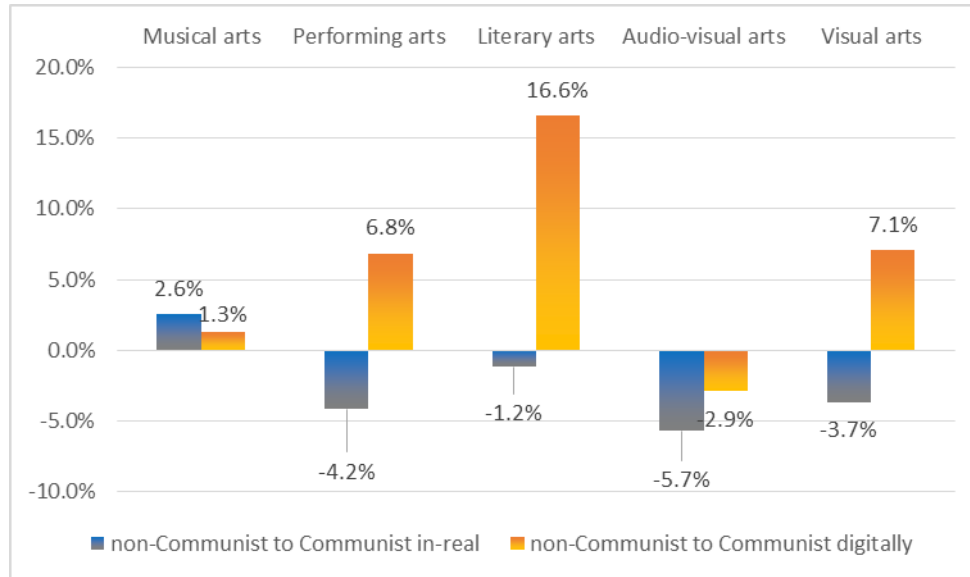


Figure 10. Differences between communist and non-communist countries' citizens' in assessing their satisfaction regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

Regarding the variances between the communist and non-communist countries' citizens in assessing their satisfaction regarding the form of participation in the receiving process of a particular type of art, the results are the following. First, non-communist countries' citizens assessed their satisfaction flowing from in-real participation in musical arts as 2.6% higher than communist; however, digital participation in musical arts is 1.3% more satisfactory by non-communist to communist countries' citizens. Second, non-communist countries' citizens assessed in-real participation in performing arts as 4.2% less satisfactory to communist countries' citizens; however, digital participation in performing arts is seen as 6.8% more satisfactory by non-communist than communist countries' citizens. Third, non-communist countries' citizens assess in-real participation in literary arts as 1.2% less satisfactory than communist countries' citizens; digital participation in literary arts is seen as 16.6% more satisfactory by non-communist than communist countries' citizens. Fourth, non-communist countries' citizens assessed in-real participation in audio-visual arts as 5.7% less satisfactory than communist countries' citizens; however, digital participation in audio-visual arts is seen as 2.9% less satisfactory by non-communist than communist countries' citizens. Finally, non-communist countries' citizens assessed in-real participation in visual arts as 3.7% less satisfactory than communist countries' citizens; digital participation in visual arts is seen as 7.1% more satisfactory by non-communist to communist countries' citizens. See: Figure 10.

We can see the following variances between the form of participation in the receiving process by the communist and the non-communist countries' citizens regarding their satisfaction flowing from a particular type of art. First, the communist countries' citizens assess digital participation in musical arts as 26.1% less satisfactory than in-real; for non-communist countries' citizens, this difference is slightly higher, i.e. 27.0%. Second, the communist countries' citizens assess digital participation in performing arts as 32.0% less satisfactory than in-real; this difference is 24.2% for non-communist countries' citizens. Third, the communist countries' citizens assess digital participation in literary arts as 24.3% less satisfactory than in-real; this difference is 10.7% for non-communist countries' citizens. Fourth, the communist countries' citizens assess digital participation in audio-visual arts as 4.8% more satisfactory than in-real; this difference is 7.9% for non-communist countries' citizens. Finally, the communist countries' citizens assess digital participation in visual arts as 22.5% less satisfactory than in-real; this difference is 13.9% for non-communist countries' citizens. See: Figure 11.

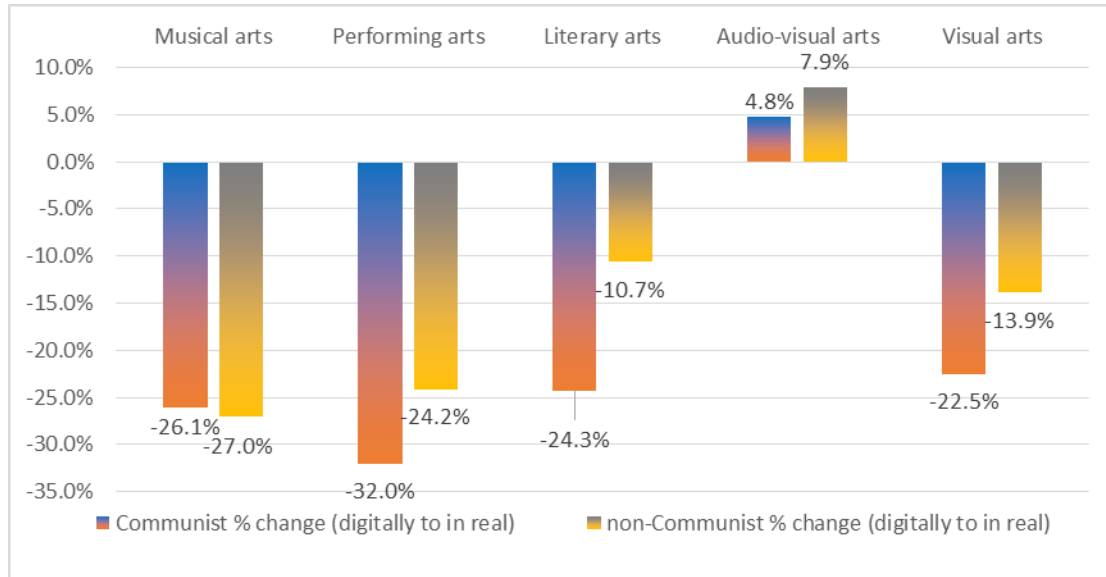


Figure 11. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens' regarding their satisfaction flowing from a particular type of art.

Source: own elaboration.

4.2.2. Pleasure

Musical arts receivers from the communist and the non-communist countries assess their pleasure concerning the form of participation in the receiving process in the following distribution: in-real – 4.38 by the communist countries' citizens and 4.44 by the non-communist countries' citizens, digitally – 3.35 by communist countries' citizens and 3.27 by non-communist. Performing arts receivers assess their pleasure as follows: in-real – 4.38 by communist countries' citizens and 4.35 by non-communist, digitally – 3.18 by communist countries' citizens and 3.05 by non-communist. Literary arts receivers assess their pleasure as follows: in-real – 4.21 by communist countries' citizens and 4.19 by non-communist, digitally – 3.42 by communist countries' citizens and 3.63 by non-communist. Audio-visual arts receivers assess their pleasure as follows: in-real – 3.81 by communist countries' citizens and 3.85 by non-communist, digitally – 3.93 by communist countries' citizens and 3.91 by non-communist. Finally, visual arts receivers assess their pleasure as follows: in-real – 4.26 by communist countries' citizens and 4.13 by non-communist, digitally – 3.31 by communist countries' citizens and 3.51 by non-communist. See: Figure 12.

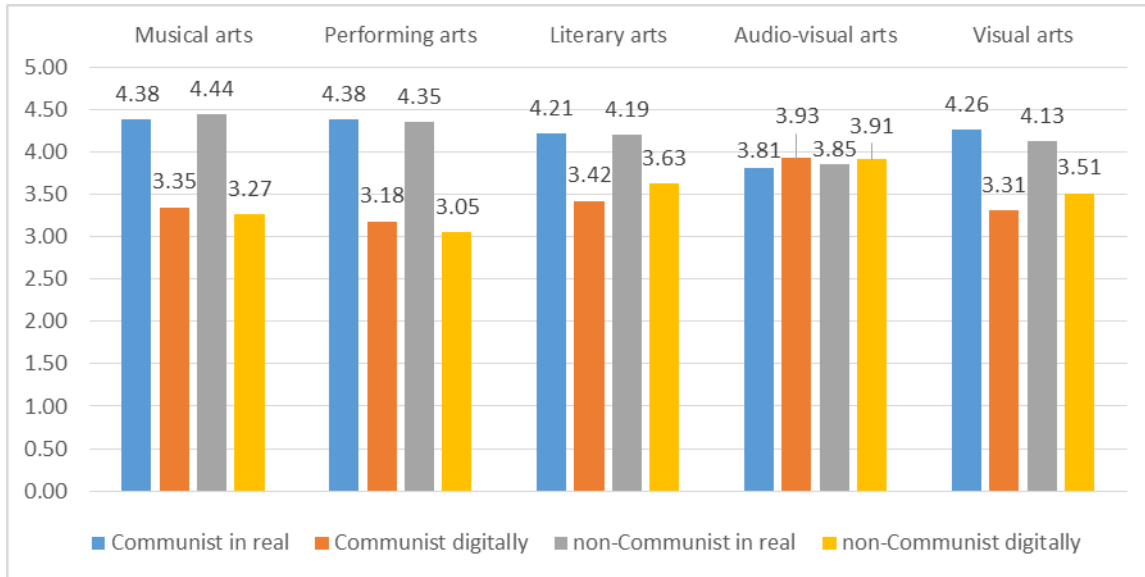


Figure 12. Assessment of communist and non-communist countries' citizens' pleasure flowing from a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

Speaking about the variances between communist and non-communist countries' citizens in assessing their pleasure regarding the form of participation in the receiving process of a particular type of art, the results are the following. First, non-communist countries' citizens assessed their pleasure flowing from in-real participation in musical arts as 1.4% higher than communist countries' citizens; digital participation in musical arts is seen as 2.3% less pleasing for non-communist countries' citizens than communist. Second, non-communist countries' citizens assessed in-real participation in performing arts as 0.7% less pleasing to communist countries' citizens; however, digital participation in performing arts is seen as 4.2% less pleasing for non-communist countries' citizens than communist. Third, non-communist countries' citizens assess in-real participation in literary arts as 0.4% less pleasing than communist countries' citizens; digital participation in literary arts is seen as 6.0% more pleasing for non-communist countries' citizens than communist. Fourth, non-communist countries' citizens assessed in-real participation in audio-visual arts as 1.0% more pleasing than communist countries' citizens; however, digital participation in audio-visual arts is seen as 0.5% less pleasing for non-communist countries' citizens than communist. Finally, non-communist countries' citizens assessed in-real participation in visual arts as 3.0% less pleasing than the communist; however, digital participation in visual arts is seen as 6.1% more pleasing for non-communist countries' citizens than communist. See: Figure 13.

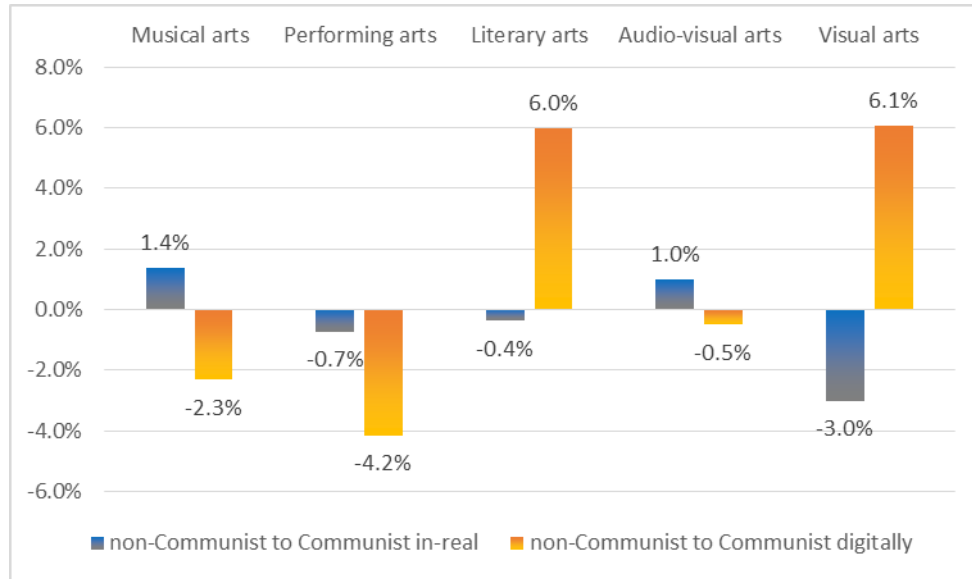


Figure 13. Differences between communist and non-communist countries' citizens in assessing their pleasure regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

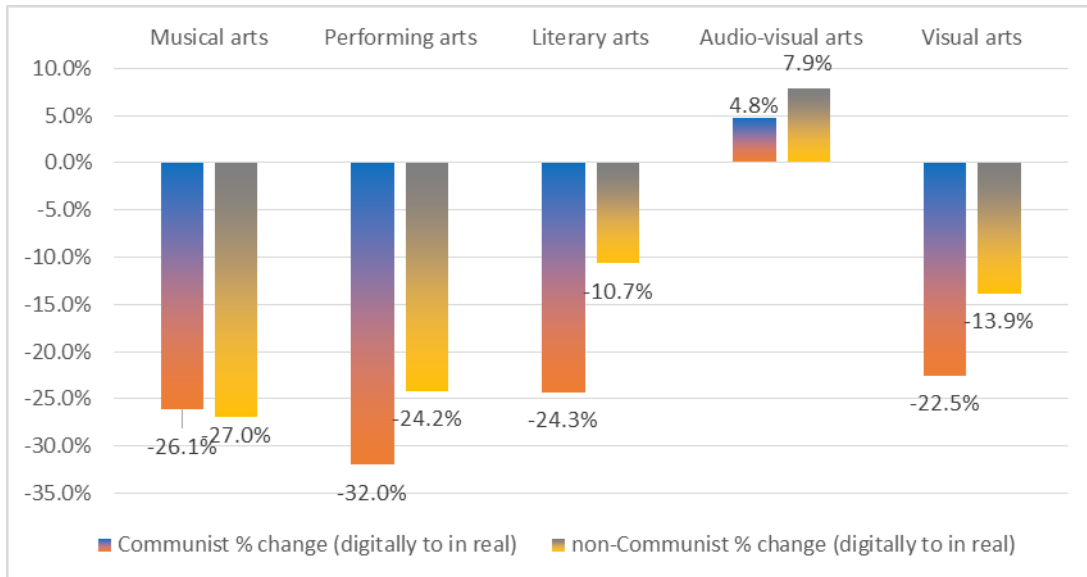


Figure 14. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding their pleasure flowing from a particular type of art.

Source: own elaboration.

We can see the following variances between the form of participation in the receiving process by communist and non-communist countries' citizens regarding their pleasure flowing from a particular type of art. First, communist countries' citizens assess digital participation in musical arts as 26.1% less pleasing than in-real; for non-communist countries' citizens, this difference is 27.0%. Second, communist countries' citizens assess digital participation in performing arts as 32.0% less pleasing than in-real; this difference is 24.2% for non-communist countries' citizens. Third, communist countries' citizens assess digital participation in literary arts as 24.3% less

pleasing than in-real; this difference is 10.7% for non-communist countries' citizens. Fourth, communist countries' citizens assess digital participation in audio-visual arts as 4.8% more pleasing than in-real; this difference is 7.9% higher for non-communist countries' citizens. Finally, communist countries' citizens assess digital participation in visual arts as 22.5% less pleasing than in-real; this difference is 13.9% for non-communist countries' citizens. See: Figure 14.

4.2.3. Engagement

Musical arts receivers from communist and non-communist countries assess their engagement concerning participation form in the receiving process in the following distribution: in-real – 4.09 by communist countries' citizens and 4.32 by non-communist countries' citizens, digitally – 3.07 by communist countries' citizens and 3.09 by non-communist. Performing arts receivers assess their engagement: in-real – 4.15 by communist countries' citizens and 4.16 by non-communist, digitally – 2.91 by communist and 3.02 by non-communist countries' citizens. Literary arts receivers assess their engagement: in-real – 3.87 by communist countries' citizens and 4.00 by non-communist, digitally – 3.24 by communist countries' citizens and 3.65 by non-communist. Audio-visual arts receivers assess their engagement: in-real – 3.84 by communist countries' citizens and 3.68 by non-communist, digitally – 3.95 by communist countries' citizens and 4.00 by non-communist. Finally, visual arts receivers assess their engagement: in-real – 4.17 by communist countries' citizens and 4.03 by non-communist, digitally – 3.12 by communist countries' citizens and 3.37 by non-communist. See: Figure 15.

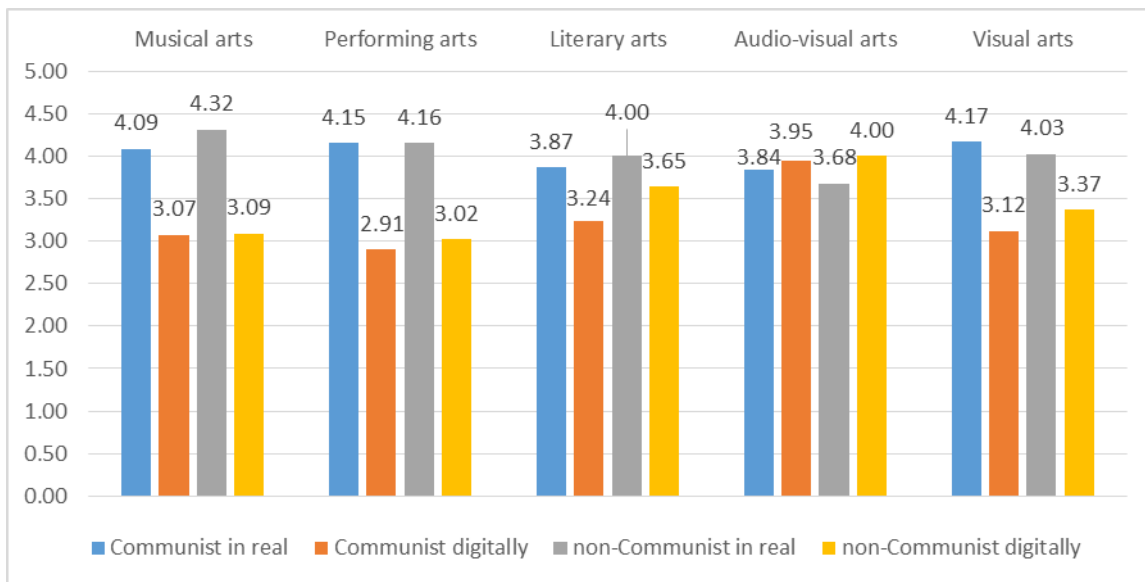


Figure 15. Assessment of communist and non-communist countries' citizens' engagement flowing from a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

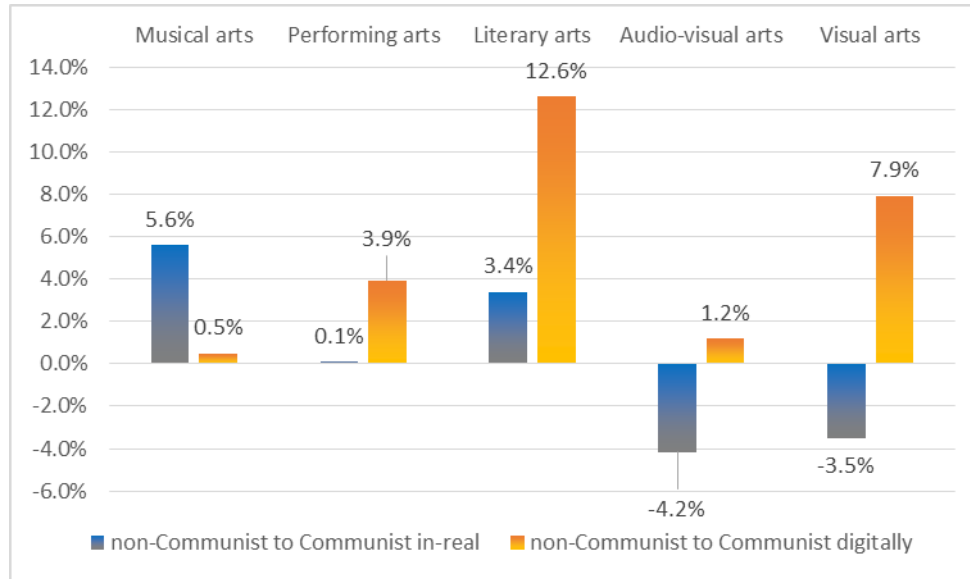


Figure 16. Differences between communist and non-communist countries' citizens in assessing their engagement regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

The variances between the communist and the non-communist countries' citizens in assessing their engagement regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed in-real participation in musical arts as 5.6% more engaging than communist countries' citizens; digital participation in musical arts is seen as 0.5% more engaging by non-communist than communist countries' citizens. Second, the non-communist countries' citizens assessed in-real participation in performing arts as 0.1% more engaging than the communist; however, digital participation in performing arts is seen as 3.9% more engaging by non-communist countries' citizens than communist. Third, the non-communist countries' citizens assess in-real participation in literary arts as 3.4% more engaging than communist countries' citizens; digital participation in literary arts is seen as 12.6% more engaging by non-communist countries' citizens than communist. Fourth, the non-communist countries' citizens assessed in-real participation in audio-visual arts as 4.2% less engaging than the communist; however, digital participation in audio-visual arts is 1.2% more engaging by non-communist countries' citizens than communist. Finally, the non-communist countries' citizens assessed in-real participation in visual arts as 3.5% less engaging than communist countries' citizens; digital participation in visual arts is seen as 7.9% more engaging by the non-communist countries' citizens to the communist. See: Figure 16.

We can see the following variances between the form of participation in the receiving process by the communist and the non-communist regarding their engagement flowing from a particular type of art. First, communist countries' citizens assess digital participation in musical arts as 24.8% less engaging than in-real; for non-communist countries' citizens, this difference is 28.4%. Second, the communist countries' citizens assess digital participation in performing arts as 30.0% less engaging than in-real; this difference is 27.3% for non-communist countries' citizens. Third, the communist countries' citizens assess digital participation in literary arts as 16.3% less engaging than in-real; this difference is 8.9% for non-communist countries' citizens. Fourth, the communist countries' citizens assess digital participation in audio-visual arts as 2.9% less engaging than in-real; non-communist countries' citizens assess digital participation in audio-visual arts as 8.7% more engaging. Finally, the communist countries' citizens assess digital participation in visual arts as 25.2% less engaging than in-real; this difference is 16.3% for the non-communist countries' citizens. See: Figure 17.

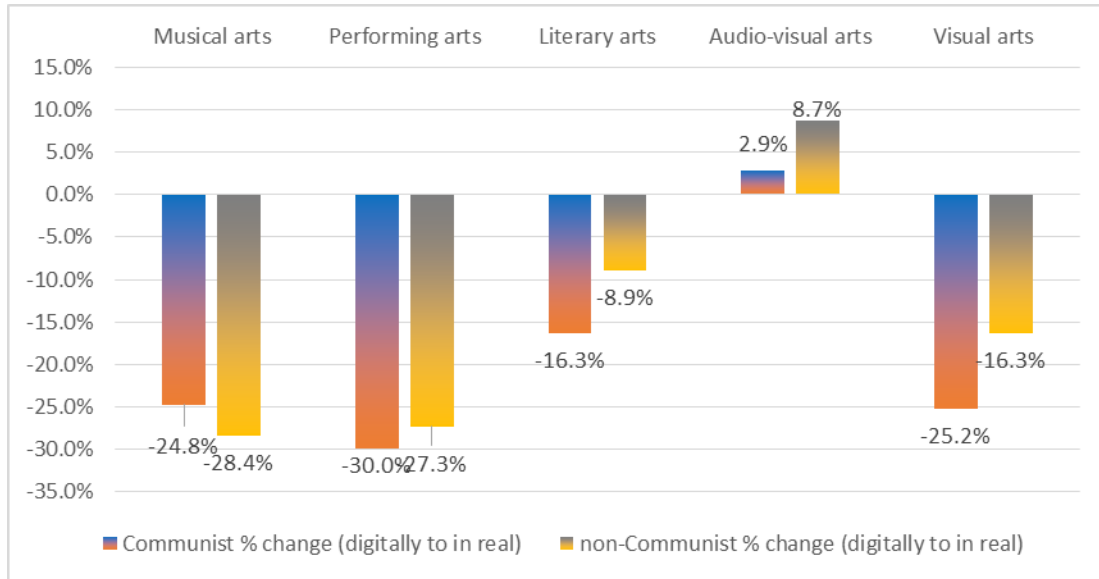


Figure 17. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding their engagement flowing from a particular type of art.

Source: own elaboration.

4.2.4. The possibility of experiencing catharsis

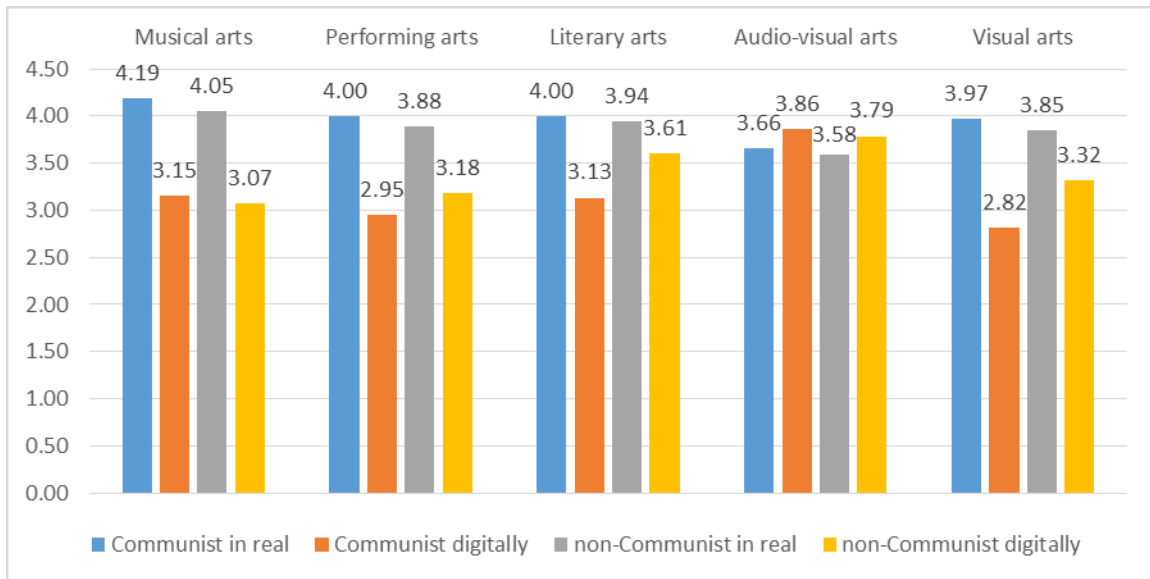


Figure 18. Assessment of communist and non-communist countries' citizens' possibility of experiencing catharsis in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

Musical arts receivers from the communist and the non-communist countries assess their possibility of experiencing catharsis concerning the form of participation in the receiving process in the following distribution: in-real – 4.19 by the communist countries' citizens and 4.05 by the non-communist countries' citizens, digitally – 3.15 by the communist countries' citizens and 3.07 by the non-communist. Performing arts receivers assess their

possibility of experiencing catharsis as follows: in-real – 4.00 by communist countries’ citizens and 3.88 by non-communist, digitally – 2.95 by the communist countries’ citizens and 3.18 by non-communist. Literary arts receivers assess their possibility of experiencing catharsis as follows: in-real – 4.00 by the communist countries’ citizens and 3.94 by non-communist, digitally – 3.13 by the communist countries’ citizens and 3.61 by the non-communist. Audio-visual arts receivers assess their possibility of experiencing catharsis: in-real – 3.66 by the communist countries’ citizens and 3.58 by non-communist, digitally – 3.86 by the communist countries’ citizens and 3.79 by non-communist. Finally, visual arts receivers assess their possibility of experiencing catharsis: in-real – 3.97 by communist countries’ citizens and 3.85 by non-communist, digitally – 2.82 by communist and 3.32 by non-communist countries’ citizens. See: Figure 18.

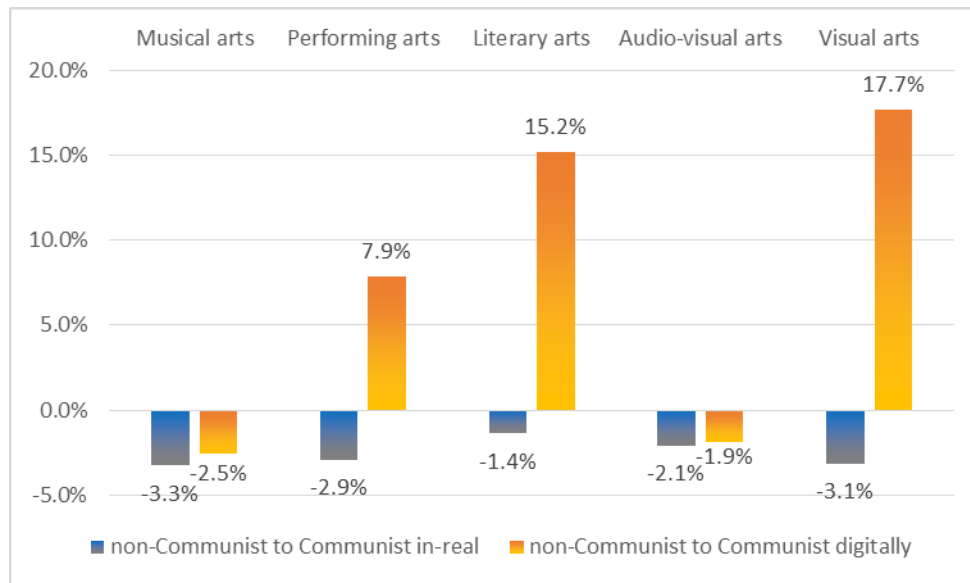


Figure 19. Differences between communist and non-communist countries’ citizens in assessing the possibility of experiencing catharsis regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

The variances between communist and non-communist countries’ citizens in assessing the possibility of experiencing catharsis regarding the form of participation in the receiving process are the following. First, the non-communist countries’ citizens assessed in-real participation in musical arts as 3.3% less catharsis-generating than the communist countries’ citizens; digital participation in musical arts is seen as 2.5% more catharsis-generating for the non-communist countries’ citizens than the communist. Second, the non-communist countries’ citizens assessed in-real participation in performing arts as 2.9% less catharsis-generating; digital participation in performing arts is seen as 7.9% more catharsis-generating for non-communist countries’ citizens than the communist. Third, the non-communist countries’ citizens assess in-real participation in literary arts as 1.4% less catharsis-generating than communist; digital participation in literary arts is seen as 15.2% more catharsis-generating by the non-communist countries’ citizens than the communist. Fourth, non-communist countries’ citizens assessed in-real participation in audio-visual arts as 2.1% less catharsis-generating than communist; however, digital participation in audio-visual arts is 1.9% less catharsis-generating by non-communist than the communist countries’ citizens. Finally, the non-communist countries’ citizens assessed in-real participation in visual arts as 3.1% less catharsis-generating than the communist; digital participation in visual arts is seen as 17.7% more catharsis-generating by the non-communist countries’ citizens than the communist. See: Figure 19.

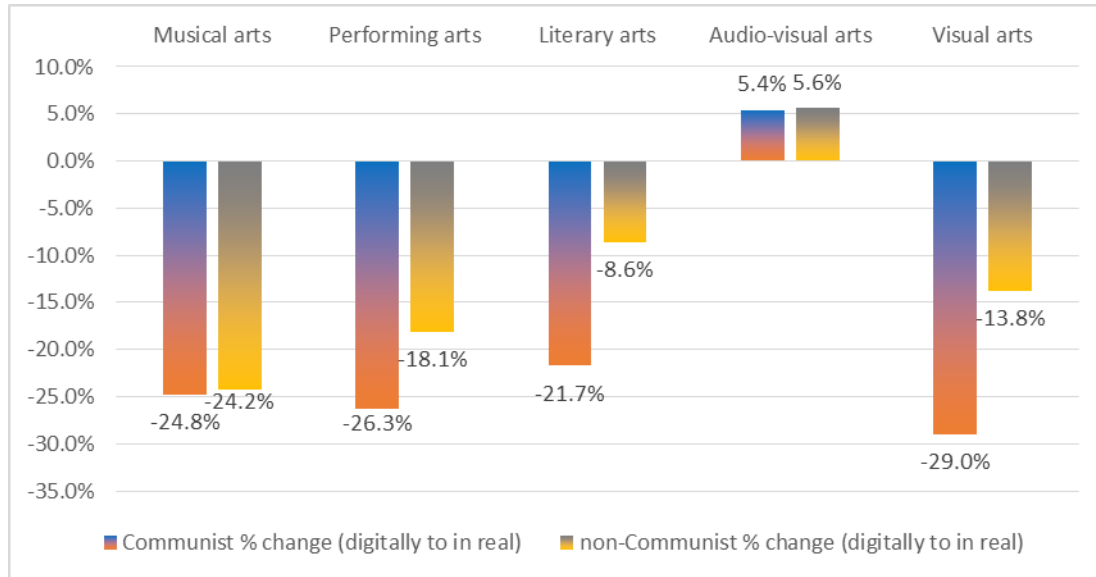


Figure 20. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the possibility of experiencing catharsis in a particular type of art.

Source: own elaboration.

We can see the following variances between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the possibility of experiencing catharsis from a particular type of art. First, communist countries' citizens assess digital participation in musical arts as 24.8% less enabling experiencing catharsis than in-real; this difference is 24.2% for non-communist countries' citizens. Second, communist countries' citizens assess digital participation in performing arts as 26.3% less enabling experiencing catharsis than in-real; this difference is 18.1% for non-communist countries' citizens. Third, communist countries' citizens assess digital participation in literary arts as 21.7% less enabling experiencing catharsis than in-real; this difference is 8.6% for non-communist countries' citizens. Fourth, communist countries' citizens assess digital participation in audio-visual arts as 5.4% more enabling experiencing catharsis than in-real; non-communist countries' citizens assess digital participation in audio-visual arts as 5.6% more enabling experiencing catharsis. Finally, communist countries' citizens assess digital participation in visual arts as 29.0% less enabling experiencing catharsis than in-real; this difference is 13.8% for non-communist countries' citizens. See: Figure 20.

4.2.5. Contact with the artwork itself

Musical arts receivers from communist and non-communist countries assess their contact with the artwork itself concerning the form of participation in the receiving process in the following distribution: in-real – 4.33 by communist countries' citizens and 4.18 by non-communist countries' citizens, digitally – 3.25 by communist and 3.09 by non-communist countries' citizens. Performing arts receivers assess their contact with the artwork itself as follows: in-real – 4.10 by communist countries' citizens and 4.14 by non-communist, digitally – 2.88 by communist countries' citizens and 2.98 by non-communist. Literary arts receivers assess their contact with the artwork itself as follows: in-real – 4.11 by communist countries' citizens and 4.06 by non-communist, digitally – 3.34 by communist countries' citizens and 3.55 by non-communist countries' citizens. Audio-visual arts receivers assess their contact with the artwork itself: in-real – 3.66 by communist countries' citizens and 3.55 by non-communist countries' citizens, digitally – 3.86 by communist countries' citizens and 3.88 by non-communist. Finally, visual arts receivers assess their contact with the artwork itself: in-real 4.20 by communist countries'

citizens and 4.10 by non-communist, digitally – 3.15 by communist and 3.29 by non-communist countries' citizens. See: Figure 21.

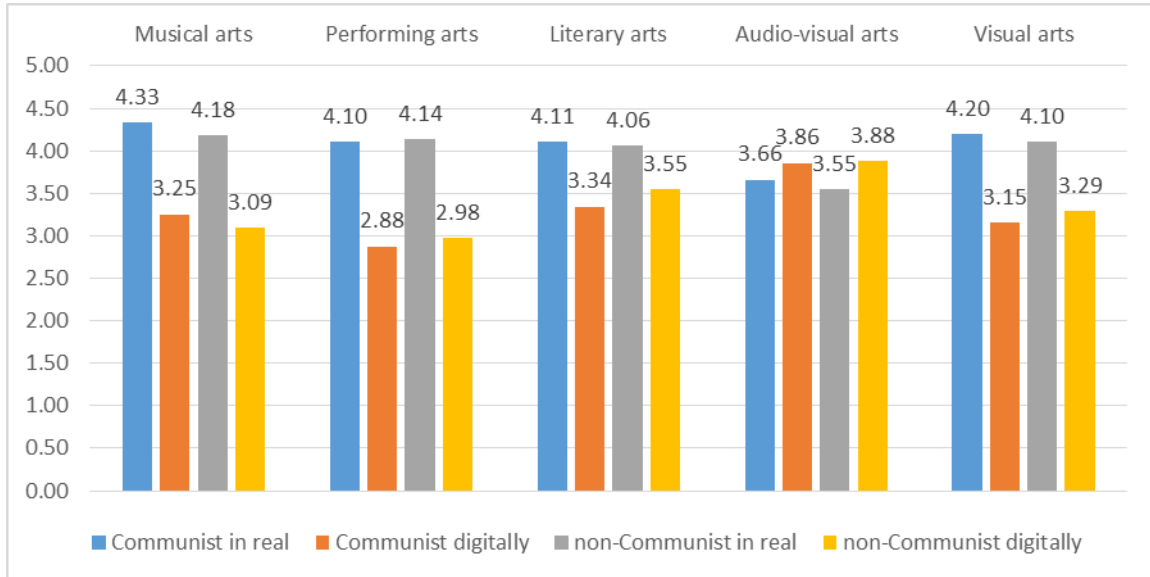


Figure 21. Assessment of communist and non-communist countries' citizens' contact with the artwork itself in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

The variances between the communist and the non-communist countries' citizens in assessing their contact with the artwork itself regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed in-real participation in musical arts as 3.4% lower than the communist countries' citizens regarding the contact with the artwork itself; digital participation in musical arts gives 5.1% less contact with the artwork itself to the non-communist than the communist countries' citizens. Second, the non-communist countries' citizens assessed in-real participation in performing arts as allowing 0.9% more contact with the artwork itself than the communist countries' citizens; however, digital participation in performing arts allows 3.6% more contact with the artwork itself for the non-communist than the communist countries' citizens. Third, the non-communist countries' citizens assess in-real participation in literary arts as allowing 1.2% less contact with the artwork itself than the communist countries' citizens; digital participation in literary arts allows 6.1% more contact with the artwork itself for the non-communist countries' citizens than the communist. Fourth, the non-communist countries' citizens see in-real participation in audio-visual arts as allowing 2.9% less contact with the artwork itself than the communist countries' citizens; however, digital participation in audio-visual arts allows 0.7% more contact with the artwork itself for the non-communist than the communist countries' citizens. Finally, the non-communist countries' citizens assessed in-real participation in visual arts as allowing 2.3% less contact with the artwork itself than the communist countries' citizens; digital participation in visual arts allows 4.4% more contact with the artwork itself for the non-communist than the communist countries' citizens. See: Figure 22.

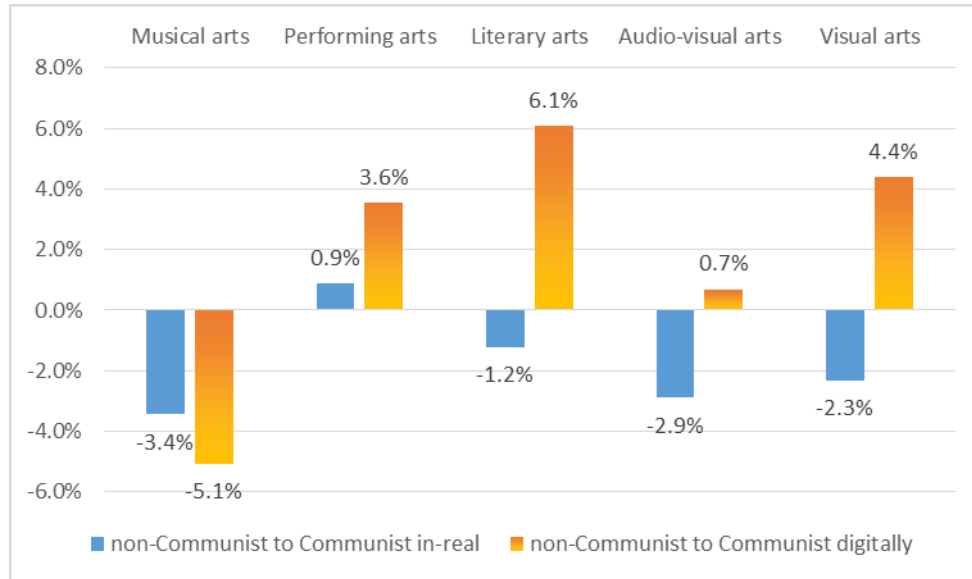


Figure 22. Differences between communist and non-communist countries' citizens in assessing contact with the artwork itself regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

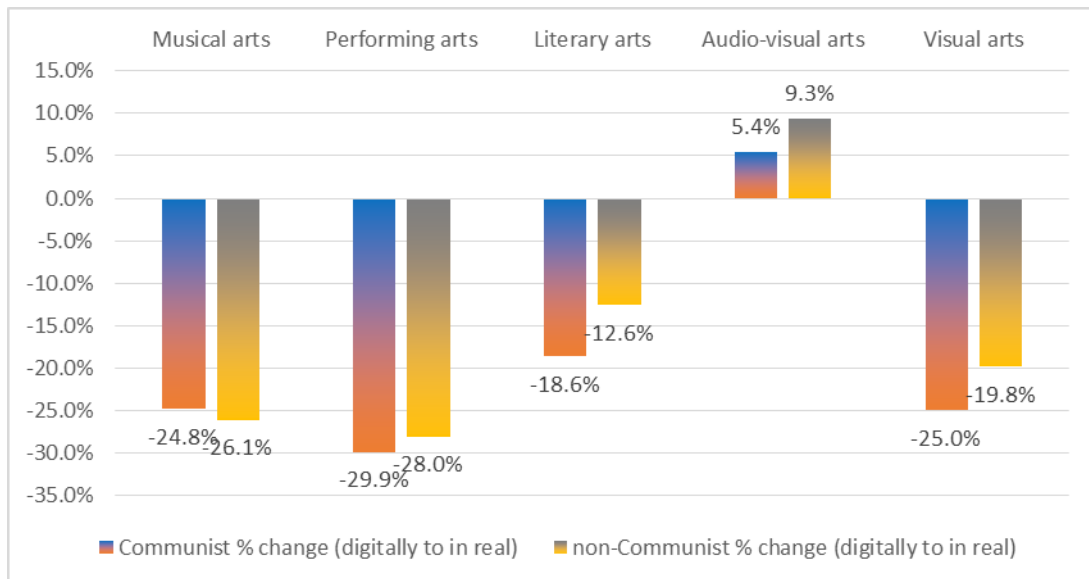


Figure 23. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding contact with the artwork itself flowing from a particular type of art.

Source: own elaboration.

We can see the following about the variances between the form of participation in the receiving process by the communist and the non-communist countries' citizens regarding contact with the artwork itself in a particular type of art. First, the communist countries' citizens assess digital participation in musical arts as allowing 24.8% less contact with the artwork itself than in-real; this difference is 26.1% for non-communist countries' citizens. Second, the communist countries' citizens assess digital participation in performing arts as allowing 29.9% less contact with the artwork itself than in-real; this difference is 28.0% for the non-communist countries' citizens.

Third, the communist countries' citizens assess digital participation in literary arts as allowing 18.6% less contact with the artwork itself than in-real; this difference is 12.6% for non-communist countries' citizens. Fourth, the communist countries' citizens assess digital participation in audio-visual arts as allowing 5.4% more contact with the artwork itself than in-real; the non-communist countries' citizens assess digital participation in audio-visual arts as allowing 9.3% more contact with the artwork itself than in-real. Finally, the communist countries' citizens assess digital participation in visual arts as allowing 25.0% less contact with the artwork itself than in-real; this difference is 19.8% for non-communist countries' citizens. See: Figure 23.

4.2.6. Contact with the performer itself

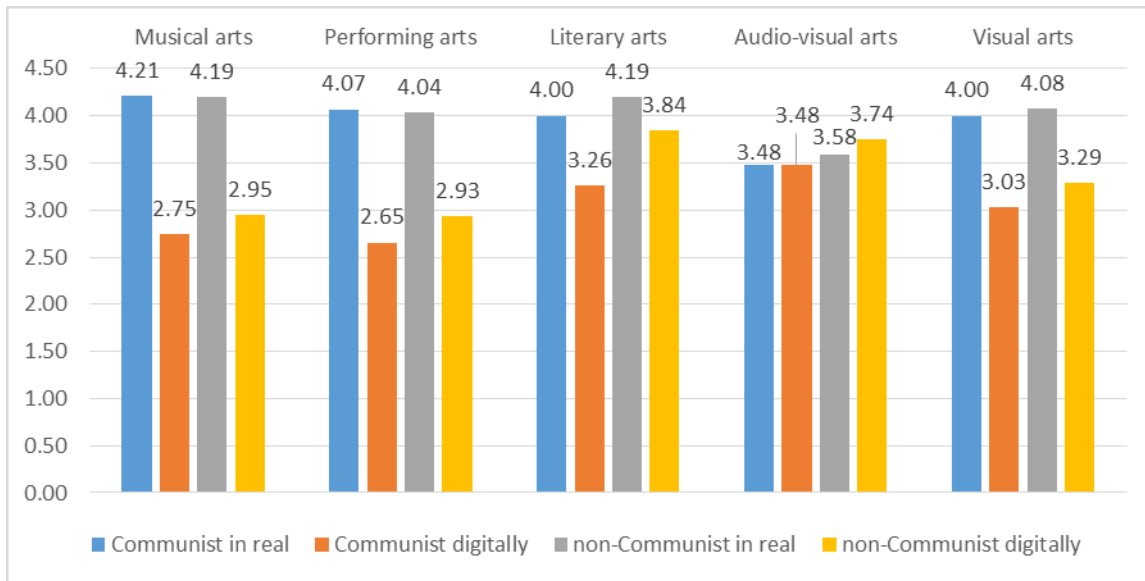


Figure 24. Assessment of communist and non-communist countries' citizens' contact with the performer itself in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

Musical arts receivers from communist and non-communist countries assess their contact with the performer itself concerning the form of participation in the receiving process in the following distribution: in-real – 4.21 by communist countries' citizens and 4.19 by non-communist countries' citizens, digitally – 2.75 by communist and 2.95 by non-communist countries' citizens. Performing arts receivers assess their contact with the performer itself as follows: in-real – 4.07 by communist countries' citizens and 4.04 by non-communist, digitally – 2.65 by communist countries' citizens and 2.93 by non-communist. Literary arts receivers assess their contact with the performer itself as follows: in-real – 4.00 by communist countries' citizens and 4.19 by non-communist countries' citizens, digitally – 3.26 by communist countries' citizens and 3.84 by non-communist. Audio-visual arts receivers assess their contact with the performer itself: in-real – 3.48 by communist and 3.58 by non-communist countries' citizens, digitally – 3.48 by communist countries' citizens and 3.74 by non-communist. Finally, visual arts receivers assess their contact with the performer itself: in-real – 4.00 by communist countries' citizens and 4.08 by non-communist countries' citizens, digitally – 3.03 by communist and 3.29 by non-communist countries' citizens. See: Figure 24.

The variances between the communist and non-communist countries' citizens in assessing their contact with the performer itself regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed in-real participation in musical arts as allowing

0.3% less contact with the performer itself than the communist countries' citizens; however, digital participation in musical arts allows 7.3% more contact with the performer itself for the non-communist than communist countries' citizens. Second, the non-communist countries' citizens assessed in-real participation in performing arts as allowing 0.7% less contact with the performer itself than the communist countries' citizens; digital participation in performing arts allows 10.5% more contact with the performer itself for the non-communist than the communist countries' citizens. Third, the non-communist countries' citizens assess in-real participation in literary arts as allowing 4.9% more contact with the performer itself than the communist; digital participation in literary arts allows 17.8% more contact with the performer itself for the non-communist than the communist countries' citizens. Fourth, the non-communist countries' citizens assessed in-real participation in audio-visual arts as allowing 3.1% more contact with the performer itself than the communist countries' citizens; however, digital participation in audio-visual arts allows 7.7% more contact with the performer itself for the non-communist than the communist countries' citizens. Finally, the non-communist countries' citizens assessed in-real participation in visual arts as allowing 1.9% more contact with the performer itself than the communist countries' citizens; digital participation in visual arts allows 8.6% more contact with the performer itself by non-communist to the communist countries' citizens. See: Figure 25.

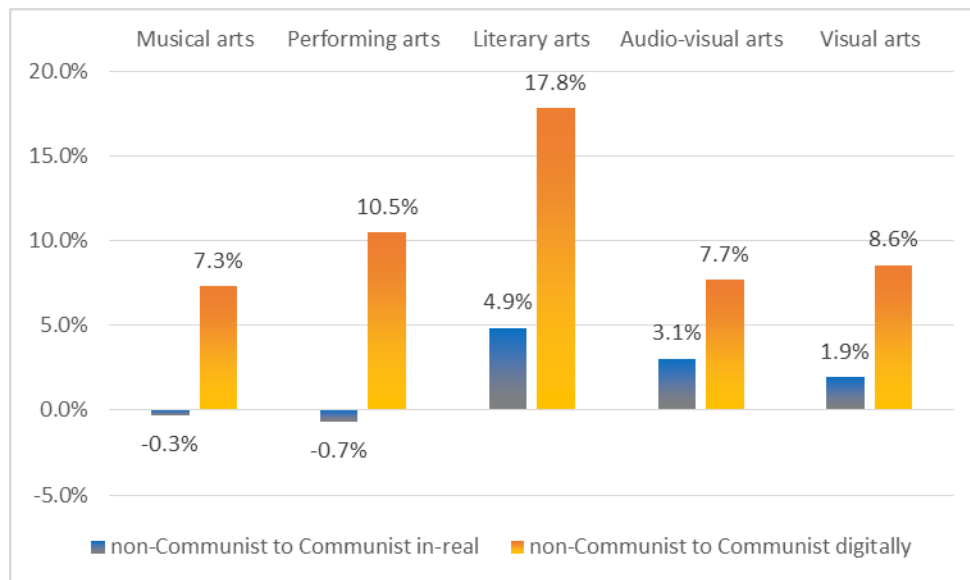


Figure 25. Differences between communist and non-communist countries' citizens in assessing contact with the performer itself regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

We can see the following variances between the form of participation in the receiving process by the communist and the non-communist countries' citizens regarding their contact with the performer itself flowing from a particular type of art. First, the communist countries' citizens assess digital participation in musical arts as allowing 34.7% less contact with the performer itself than in-real; for non-communist countries' citizens, this difference is 29.8%. Second, the communist countries' citizens assess digital participation in performing arts as allowing 34.7% less contact with the performer itself than in-real; this difference is 27.4% for non-communist countries' citizens. Third, the communist countries' citizens assess digital participation in literary arts as allowing 18.4% less contact with the performer itself than in-real; this difference is 8.4% for the non-communist countries' citizens. Fourth, the communist countries' citizens assess digital and in-real participation in audio-visual arts equally regarding contact with the performer itself than; the non-communist countries' citizens assess digital participation in audio-visual arts as allowing 4.5% more contact with the performer itself than in-real. Finally, the

communist countries' citizens assess digital participation in visual arts as allowing 24.2% less contact with the performer itself than in-real; this difference is 19.3% for the non-communist countries' citizens. See: Figure 26.

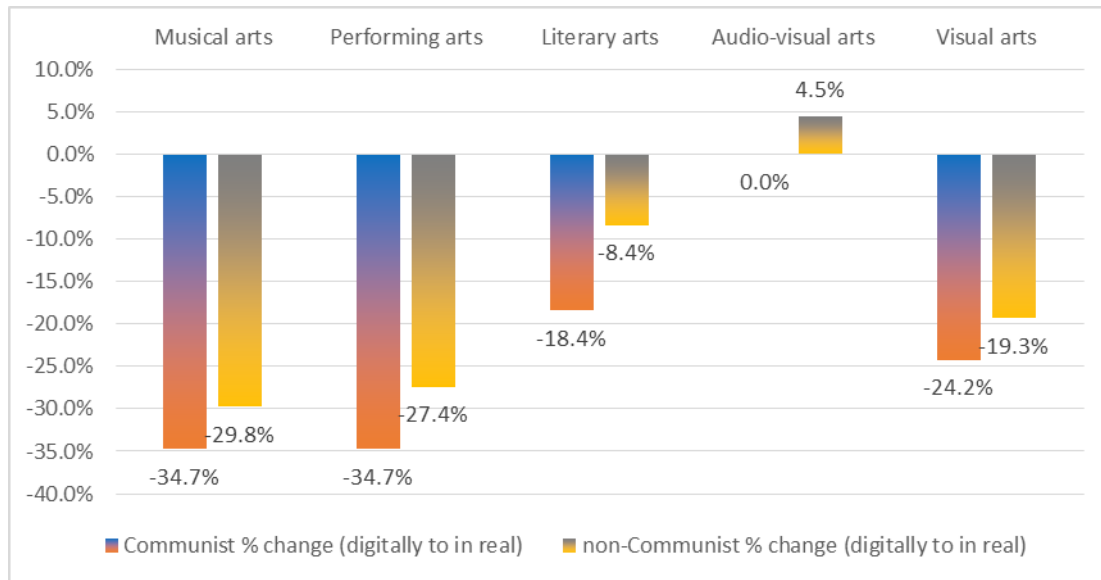


Figure 26. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding contact with the performer itself in a particular type of art.

Source: own elaboration.

4.2.7. Comfort of participation

Musical arts receivers from communist and non-communist countries assess their comfort of participation concerning the form of participation in the receiving process in the following distribution: in-real – 3.98 by communist countries' citizens and 4.28 by non-communist countries' citizens, digitally – 3.59 by communist and 3.35 by non-communist countries' citizens. Performing arts receivers assess their participation comfort as follows: in-real – 3.78 by communist countries' citizens and 3.98 by non-communist, digitally – 3.15 by communist countries' citizens and 3.35 by non-communist. Literary arts receivers assess participation comfort as follows: in-real – equally 4.08 by communist and non-communist countries' citizens, digitally – 3.32 by communist and 3.82 by non-communist countries' citizens. Audio-visual arts receivers assess their participation comfort: in-real – 3.61 by communist countries' citizens and 3.58 by non-communist, digitally – 4.17 by communist countries' citizens and 3.86 by non-communist countries' citizens. Finally, visual arts receivers assess their participation comfort: in-real – 4.09 by communist and 4.00 by non-communist countries' citizens, digitally – 3.45 by communist countries' citizens and 3.63 by non-communist. See: Figure 27.

The variances between the communist and the non-communist countries' citizens in assessing their comfort of participation regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed comfort of in-real participation in musical arts as 7.5% higher than communist countries' citizens; however, digital participation in musical arts regarding the comfort of participation is 6.9% lower for non-communist than the communist countries' citizens. Second, the non-communist countries' citizens assessed comfort of in-real participation in performing arts as 5.4% higher than the communist; the comfort of digital participation in performing arts is 6.3% higher for non-communist than the communist countries' citizens. Third, the non-communist countries' citizens assess the comfort of in-real participation in literary arts as 0.1% higher than the communist; digital participation in literary arts is 15.2% more

comfortable for non-communist than the communist countries' citizens. Fourth, the non-communist countries' citizens assessed the comfort of in-real participation in audio-visual arts as 0.8% lower than the communist; the comfort of digital participation in audio-visual arts is seen as 7.3% lower for the non-communist than the communist countries' citizens. Finally, the non-communist countries' citizens assessed comfort of in-real participation in visual arts as 2.1% lower than the communist countries' citizens; the comfort of digital participation in visual arts is 5.1% higher for non-communist than the communist countries' citizens. See: Figure 28.

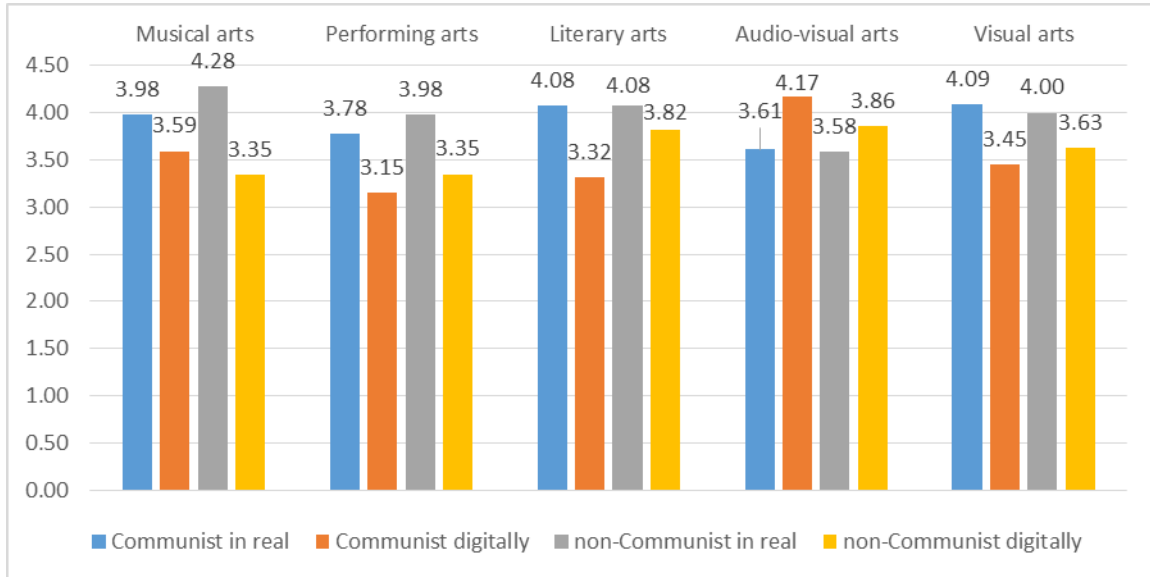


Figure 27. Assessment of communist and non-communist countries' citizens' comfort of participation flowing from a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

We can see the following differences between the form of participation in the receiving process of a particular type of art by the communist and the non-communist countries' citizens regarding their comfort level. First, the communist countries' citizens assess the comfort of digital participation in musical arts as 9.8% lower than in-real; this difference is 21.8% lower for non-communist. Second, the communist countries' citizens assess the comfort of digital participation in performing arts as 16.6% lower than in-real; this difference is 15.9% lower for non-communist countries' citizens. Third, the communist countries' citizens assess the comfort of digital participation in literary arts as 18.7% lower than in-real; this difference is 6.5% for non-communist countries' citizens. Fourth, the communist countries' citizens assess the comfort of digital participation in audio-visual arts as 15.3% higher than in-real; the non-communist countries' citizens assess the comfort of digital participation in audio-visual arts as 7.7% higher than in-real. Finally, the communist countries' citizens assess the comfort of digital participation in visual arts as 15.4% lower than in-real; this difference is 9.2% lower for non-communist countries' citizens. See: Figure 29.

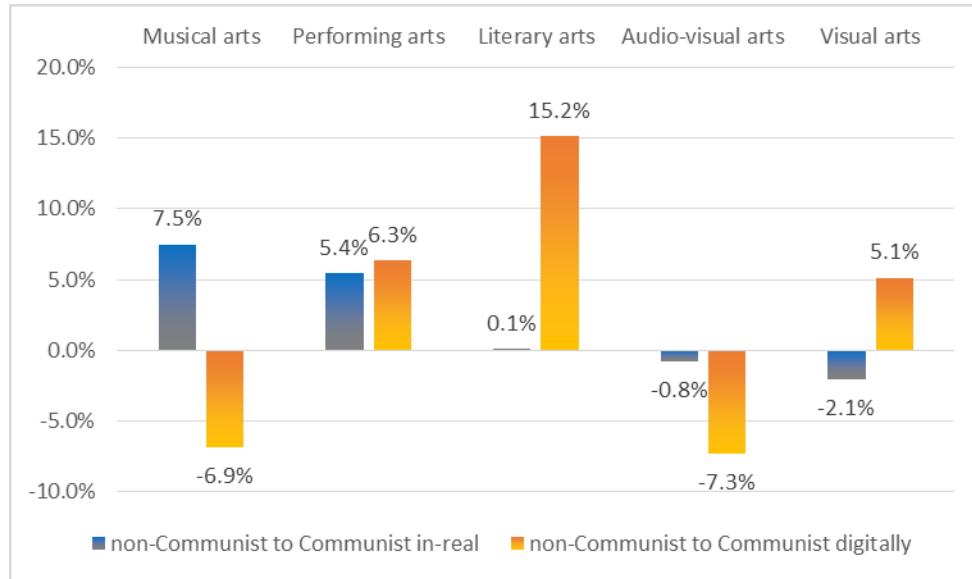


Figure 28. Differences between communist and non-communist countries' citizens in assessing their comfort of participation regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

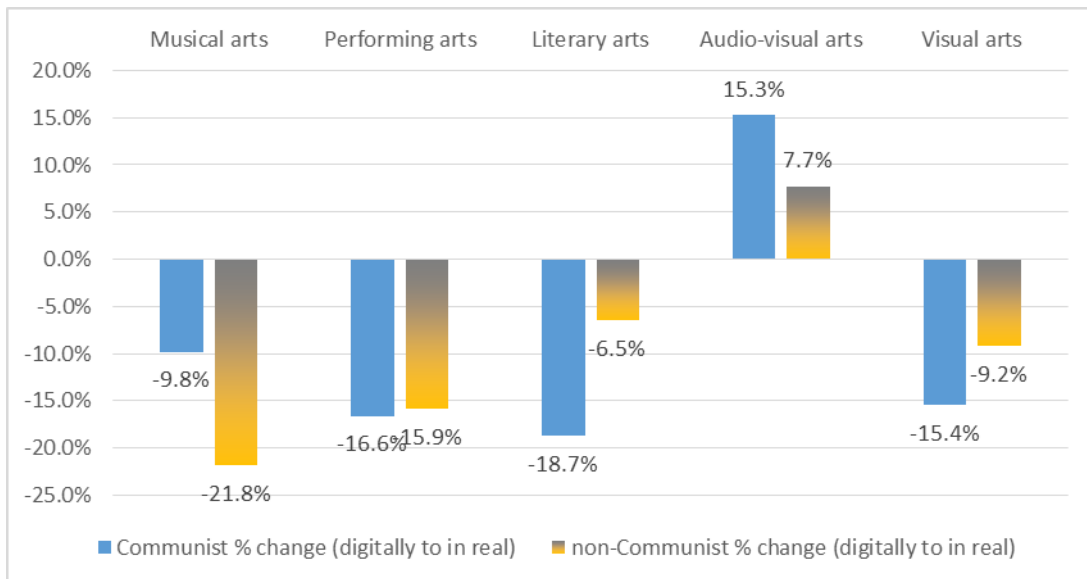


Figure 29. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the comfort of participation flowing from a particular type of art.

Source: own elaboration.

4.2.8. Possibilities of shaping the aesthetical experience

Musical arts receivers from communist and non-communist countries assess their possibilities of shaping the aesthetical experience concerning the form of participation in the receiving process in the following distribution: in-real – 3.55 by communist countries' citizens and 3.68 by non-communist countries' citizens, digitally – 3.49 by communist and 3.44 by non-communist countries' citizens. Performing arts receivers assess their possibilities of

shaping the aesthetical experience as follows: in-real – 3.86 by communist and 3.65 by non-communist countries' citizens, digitally – 3.14 by communist and 3.20 by non-communist countries' citizens. Literary arts receivers assess their possibilities of shaping the aesthetical experience as follows: in-real – equally 3.74 by communist and non-communist countries' citizens, digitally – 3.37 by communist and 3.50 by non-communist countries' citizens. Audio-visual arts receivers assess their possibilities of shaping the aesthetical experience: in-real – equally 3.39 by communist countries' citizens and 3.49 by non-communist, digitally – 4.02 by communist and 3.81 by non-communist countries' citizens. Finally, visual arts receivers assess their possibilities of shaping the aesthetical experience: in-real – 4.03 by communist countries' citizens and 3.87 by non-communist, digitally – 3.61 by communist and 3.46 by non-communist countries citizens. See: Figure 30.

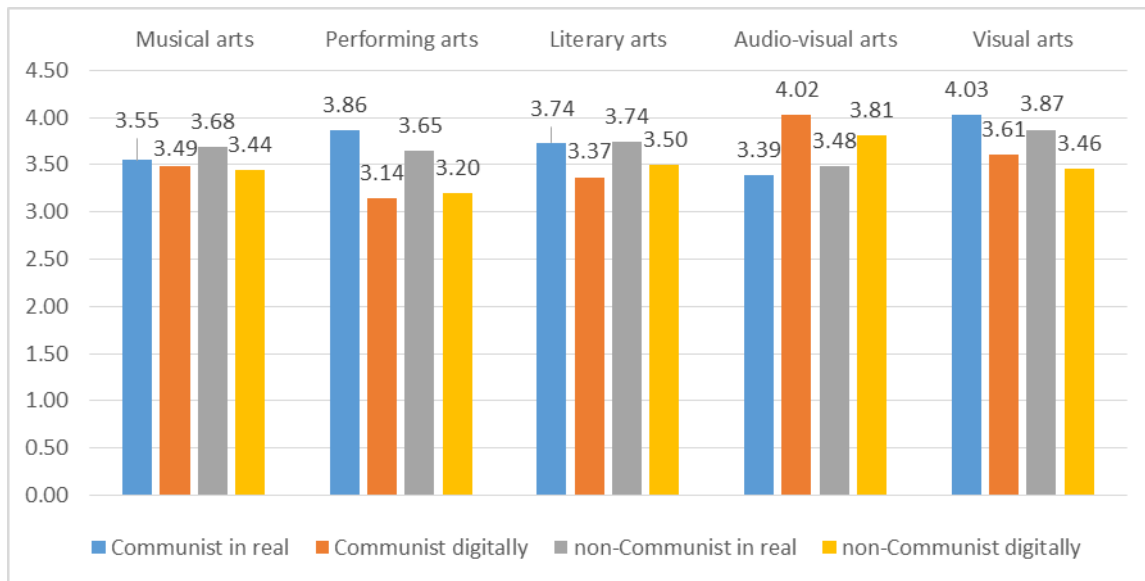


Figure 30. Assessment of communist and non-communist countries' citizens' possibilities of shaping the aesthetical experience in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

The variances between communist and non-communist countries' citizens in assessing their possibilities of shaping the aesthetical experience regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed their possibilities of shaping the aesthetical experience in in-real participation in musical arts as 3.7% higher than the communist countries' citizens; however, digital participation in musical arts allows 1.5% fewer possibilities of shaping the aesthetical experience by the non-communist to the communist countries' citizens. Second, in-real participation in performing arts allows 5.6% fewer possibilities of shaping the aesthetical experience for the non-communist than the communist countries' citizens; digital participation in performing arts allows 1.8% more possibilities of shaping the aesthetical experience for the non-communist than the communist countries' citizens. Third, the non-communist countries' citizens assess in-real participation in literary arts as allowing 0.2% more possibilities of shaping the aesthetical experience than the communist; digital participation in literary arts allows 3.9% more possibilities of shaping the aesthetical experience for the non-communist than the communist countries' citizens. Fourth, the non-communist countries' citizens assessed in-real participation in audio-visual arts as allowing 2.7% more possibilities of shaping the aesthetical experience than communist; however, digital participation in audio-visual arts gives 5.2% fewer possibilities of shaping the aesthetical experience by non-communist than the communist countries' citizens. Finally, the non-communist countries' citizens see 3.9% fewer possibilities of shaping the aesthetical experience in in-real participation in visual arts than the communist; digital participation in

visual arts gives 4.1% fewer possibilities of shaping the aesthetical experience for the non-communist than the communist countries' citizens. See: Figure 31.

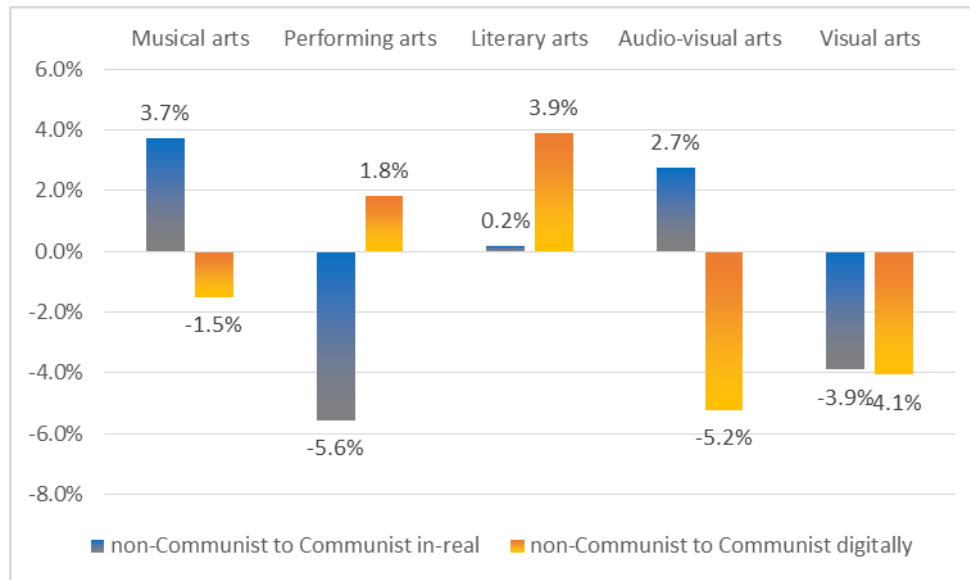


Figure 31. Differences between communist and non-communist countries' citizens in assessing the possibilities of shaping the aesthetical experience regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

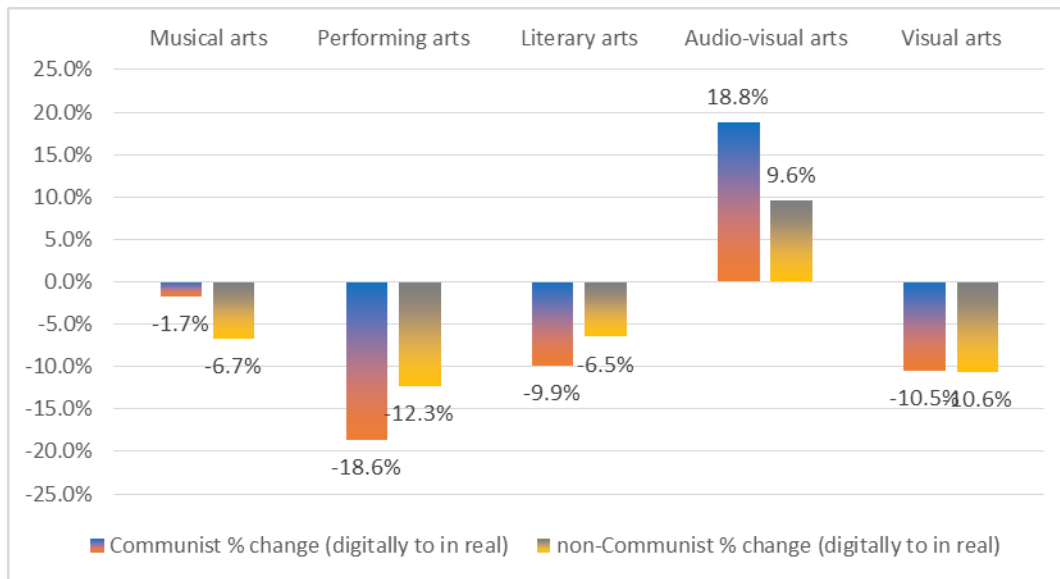


Figure 32. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the possibilities of shaping the aesthetical experience in a particular type of art.

Source: own elaboration.

We can see the following differences between the form of participation in the receiving process by the communist and the non-communist countries' citizens regarding the possibility of shaping the aesthetical experience in particular types of art. First, the communist countries' citizens assess the possibility of shaping the aesthetical

experience in digital participation in musical arts as 1.7% lower than in-real; for non-communist countries' citizens, this difference is 6.7% lower. Second, the communist countries' citizens assess the possibility of shaping the aesthetical experience in digital participation in performing arts as 18.6% lower than in-real; this difference is 12.3% for non-communist. Third, the communist countries' citizens assess the possibility of shaping the aesthetical experience in digital participation in literary arts as 9.9% lower than in-real; this difference is 6.5% for non-communist countries' citizens. Fourth, the communist countries' citizens assess the possibility of shaping the aesthetical experience in digital participation in audio-visual arts as 18.8% better than in-real; this difference is 9.6% for non-communist countries' citizens. Finally, the communist countries' citizens assess the possibility of shaping the aesthetical experience in digital participation in visual arts as 10.5% lower than in-real; this difference is 10.6% for non-communist countries' citizens. See: Figure 32.

4.2.9. Own motivation to participate

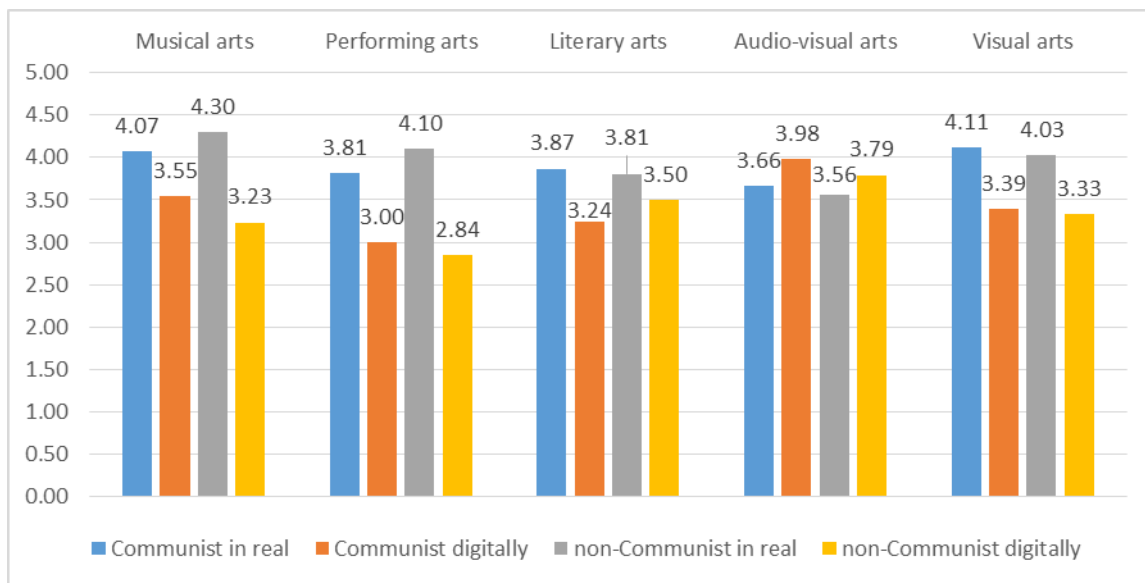


Figure 33. Assessment of communist and non-communist countries' citizens' own motivation to participate in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

Musical arts receivers from communist and non-communist countries assess their motivation to participate concerning the form of participation in the receiving process in the following distribution: in-real – 4.07 by communist countries' citizens and 4.30 by non-communist countries' citizens, digitally – 3.55 by communist and 3.23 by non-communist countries' citizens. Performing arts male receivers assess their motivation to participate in-real as 3.81 and 4.10 by non-communist countries' citizens, digitally – 3.00 by communist and 2.84 by non-communist countries' citizens. Literary arts receivers assess their motivation to participate as follows: in-real – 3.87 by communist and 3.81 by non-communist countries' citizens, digitally – 3.24 by communist and 3.50 by non-communist countries' citizens. Audio-visual arts receivers assess their motivation to participate: in-real – 3.66 by communist and 3.56 by non-communist countries' citizens, digitally – 3.98 by communist and 3.79 by non-communist countries' citizens. Finally, visual arts receivers assess their motivation to participate: in-real – 4.11 by communist and 4.03 by non-communist countries' citizens, digitally – 3.39 by communist and 3.33 by non-communist countries' citizens. See: Figure 33.

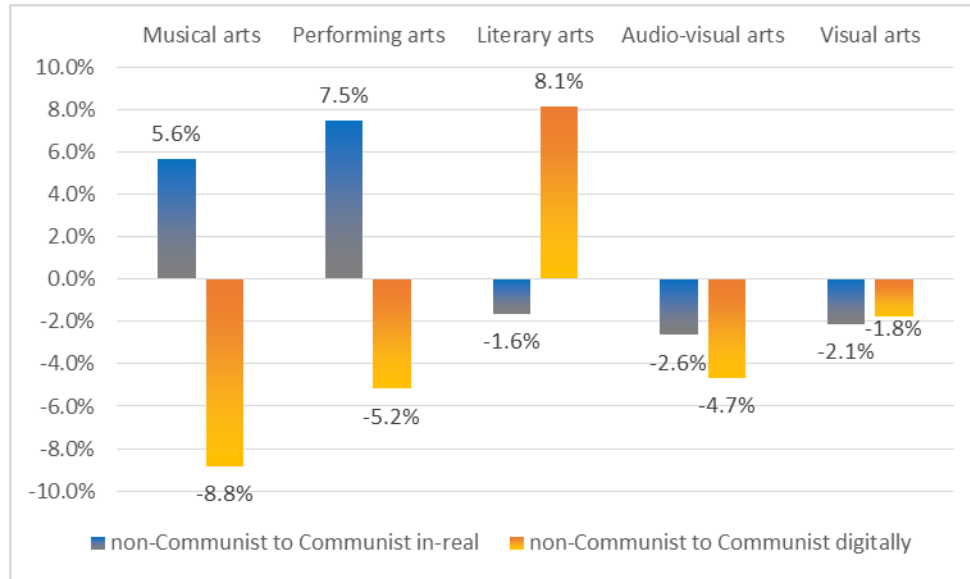


Figure 34. Differences between communist and non-communist countries' citizens in assessing their motivation to participate regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

The variances between the communist and non-communist countries' citizens in assessing their motivation to participate regarding the form of participation in the receiving process of a particular type of art are the following. First, the non-communist countries' citizens assessed their motivation to participate in-real in musical arts as 5.6% higher than the communist; however, motivation to participate digitally in musical arts is seen as 8.8% lower by non-communist than the communist countries' citizens. Second, the non-communist countries' citizens assessed their motivation to participate in-real in performing arts as 7.5% higher than the communist; motivation to participate digitally in performing arts is seen as 5.3% lower for the non-communist than communist countries' citizens. Third, the non-communist countries' citizens assess their motivation to participate in-real in literary arts as 1.6% lower than the communist; motivation to participate digitally in literary arts is 8.1% higher for the non-communist than the communist countries' citizens. Fourth, the non-communist countries' citizens assessed their motivation to participate in-real in audio-visual arts as 2.6% lower than the communist; however, motivation to participate digitally in audio-visual arts is 4.7% lower for non-communist than the communist countries' citizens. Finally, the non-communist countries' citizens assessed their motivation to participate in-real in visual arts as 2.1% lower than the communist; motivation to participate digitally in visual arts is seen as 1.8% lower for the non-communist than the communist countries' citizens. See: Figure 34.

We can see the following about the differences between the form of participation in the receiving process by the communist and the non-communist countries' citizens regarding their motivation to participate in particular types of art. First, the communist countries' citizens assess their motivation to participate digitally in musical arts as 12.9% lower than in-real; for non-communist countries' citizens, this difference is 24.8%. Second, the communist countries' citizens assess their motivation to participate digitally in performing arts as 21.3% lower than in-real; this difference is 30.6% for non-communist. Third, the communist countries' citizens assess their motivation to participate digitally in literary arts as 16.3% lower than in-real; this difference is 8.0% for non-communist countries' citizens. Fourth, the communist countries' citizens assess their motivation to participate digitally in audio-visual arts as 8.7% higher than in-real; this difference is 6.4% higher for non-communist. Finally, the communist countries' citizens assess their motivation to participate digitally in visual arts as 17.5% lower than in-real; this difference is 17.2% for non-communist countries' citizens. See: Figure 35.

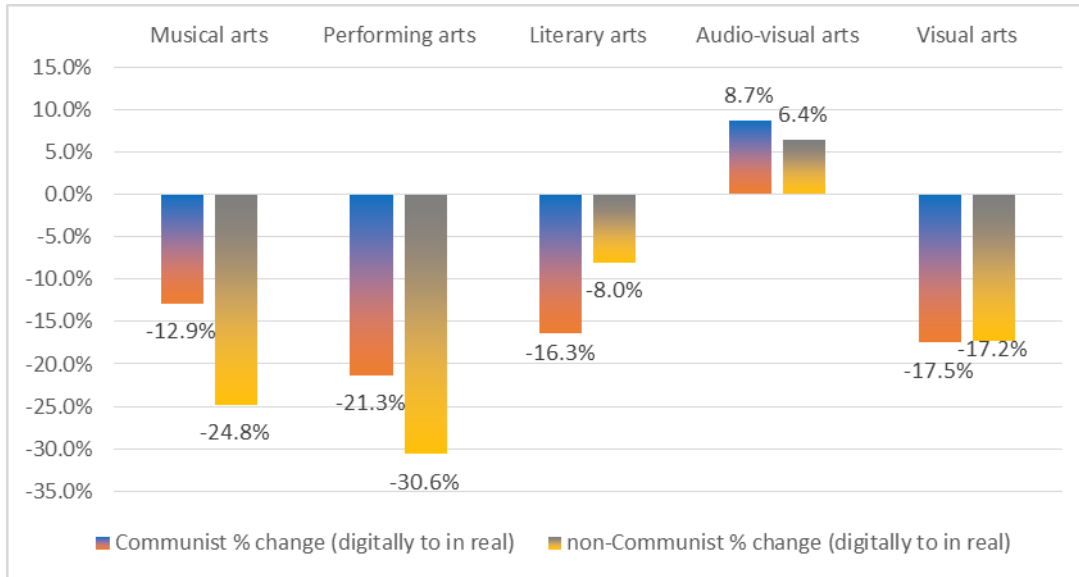


Figure 35. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding their motivation to participate in a particular type of art.

Source: own elaboration.

4.2.10. Easiness of participation

Musical arts receivers from communist and non-communist countries assess their easiness of participation concerning the form of participation in the receiving process in the following distribution: in-real – 3.28 by communist countries' citizens and 3.77 by non-communist countries' citizens, digitally – 3.85 by communist and 3.61 by non-communist countries' citizens. Performing arts receivers assess the easiness of participation as follows: in-real – 3.24 by communist and 3.82 by non-communist countries' citizens, digitally – 3.46 by communist and 3.51 by non-communist countries' citizens. Literary arts receivers assess the easiness of participation as follows: in-real – 3.61 by communist and 3.97 by non-communist countries' citizens, digitally – 3.63 by communist and 3.84 by non-communist countries' citizens. Audio-visual arts receivers assess the easiness of participation: in-real – 3.30 by communist and 3.50 by non-communist countries' citizens, digitally – 4.36 by communist and 4.12 by non-communist countries' citizens. Finally, visual arts receivers assess the easiness of participation: in-real – 3.79 by communist and 3.74 by non-communist countries' citizens, digitally – 3.66 by communist and 3.64 by non-communist countries' citizens. See: Figure 36.

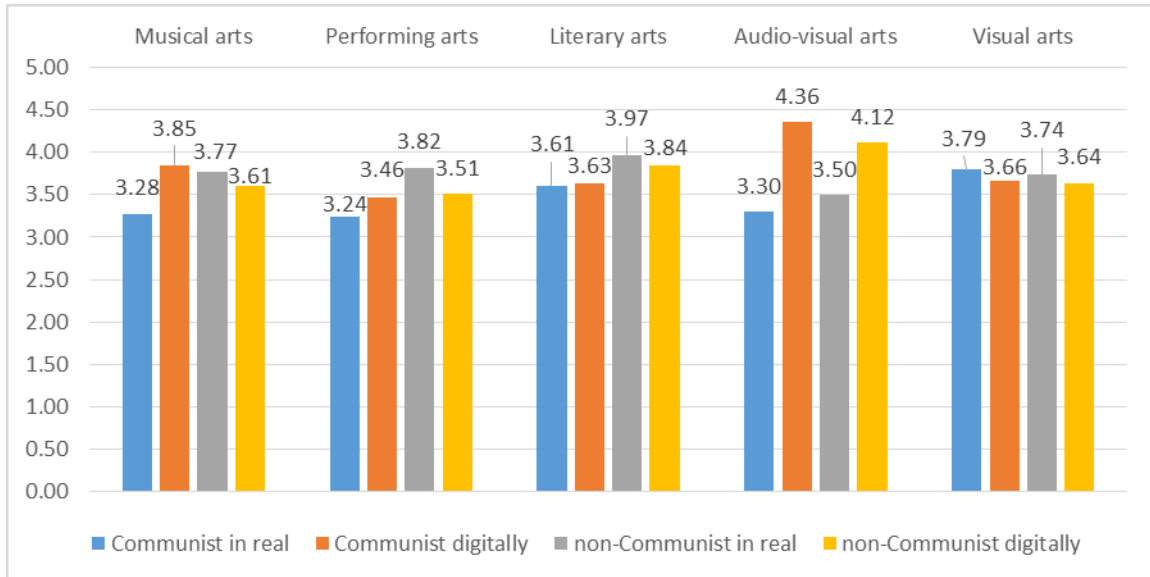


Figure 36. Assessment of communist and non-communist countries' citizens' easiness of participation in a particular type of art concerning the form of participation in the receiving process.

Source: own elaboration.

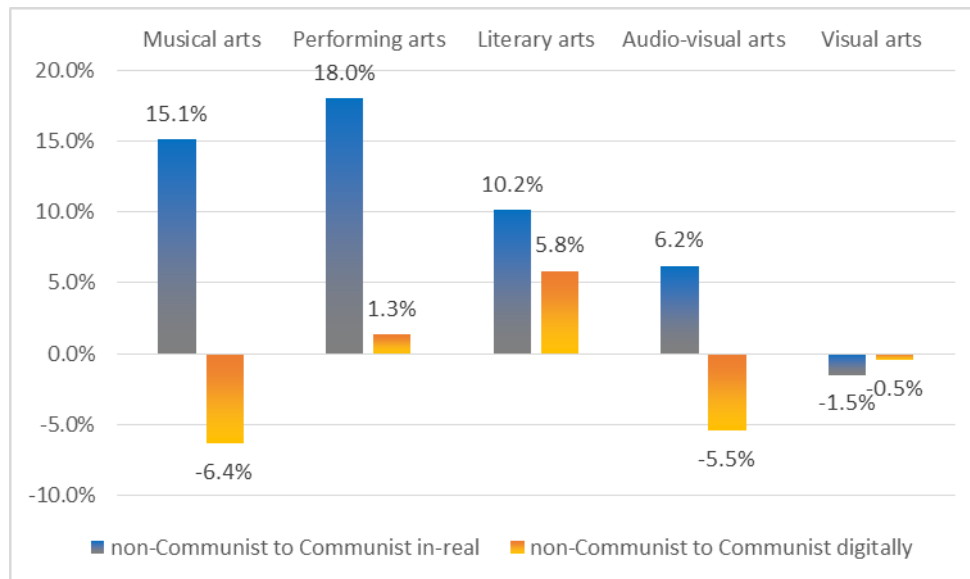


Figure 37. Differences between communist and non-communist countries' citizens in assessing the easiness of participation regarding the form of participation in the receiving process of a particular type of art.

Source: own elaboration.

Regarding the variances between the communist and non-communist countries' citizens in assessing the easiness of participation regarding the form of participation in the receiving process of a particular type of art, the results are the following. First, the non-communist countries' citizens assessed the easiness of in-real participation in musical arts as 15.1% higher than the communist countries' citizens; the easiness of digital participation in musical arts is seen as 6.4% lower for non-communist than the communist countries' citizens. Second, the non-communist countries' citizens assessed the easiness of in-real participation in performing arts as 18.0% higher

than the communist; the easiness of digital participation in performing arts is seen as 1.3% higher for the non-communist than the communist countries' citizens. Third, the non-communist countries' citizens assess the easiness of in-real participation in literary arts as 10.2% higher than communist; the easiness of digital participation in literary arts is 5.8% higher for non-communist than communist countries' citizens. Fourth, non-communist countries' citizens assessed the easiness of in-real participation in audio-visual arts as 6.2% higher than communist; however, the easiness of digital participation in audio-visual arts is 5.5% lower for non-communist than communist countries' citizens. Finally, non-communist countries' citizens assessed the easiness of in-real participation in visual arts as 1.5% lower than communist; the easiness of digital participation in visual arts is 0.5% lower for non-communist than communist countries' citizens. See: Figure 37.

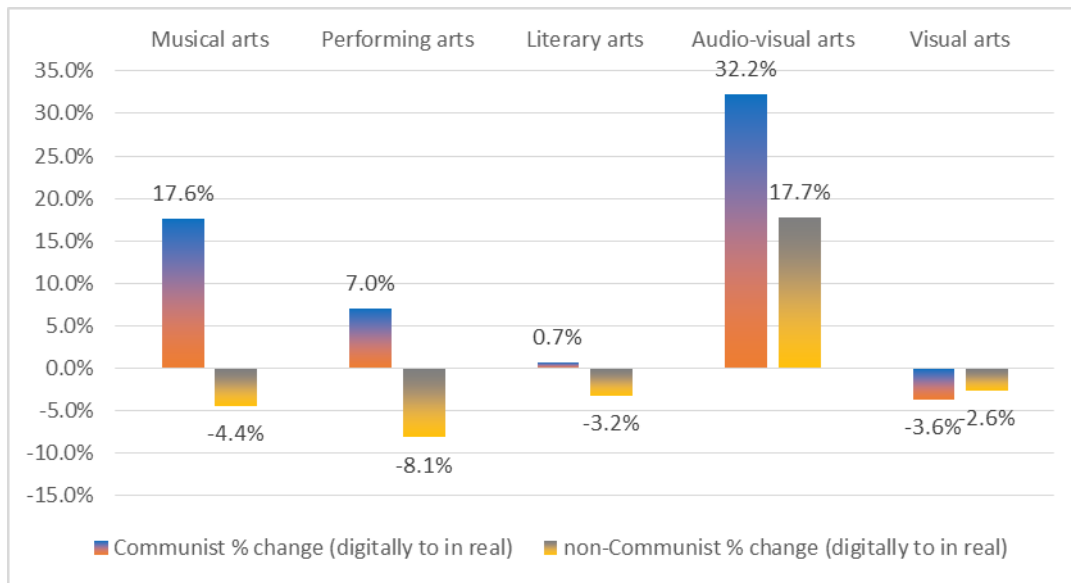


Figure 38. Differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the easiness of participation in a particular type of art.

Source: own elaboration.

We can see the following about the differences between the form of participation in the receiving process by communist and non-communist countries' citizens regarding the easiness of participation in a particular type of art. First, communist countries' citizens assess the easiness of digital participation in musical arts as 17.6% higher than in-real; non-communist countries' citizens assess the easiness of digital participation in musical arts as 4.4% lower than in-real. Second, communist countries' citizens assess the easiness of digital participation in performing arts as 7.0% higher than in-real; this difference is 8.1% lower for non-communist countries' citizens. Third, communist countries' citizens assess the easiness of digital participation in literary arts as 0.7% higher than in-real; this difference is 3.2% lower for non-communist countries' citizens. Fourth, communist countries' citizens assess the easiness of digital participation in audio-visual arts as 32.2% higher than in-real; this difference is 17.7% for non-communist countries' citizens. Finally, communist countries' citizens assess the easiness of digital participation in visual arts as 3.6% lower than in-real; non-communist countries' citizens assess the easiness of digital participation in visual arts as 2.6% lower than in-real. See: Figure 38.

Conclusions

It can be concluded that the form of participation (in-real or digital) in arts culturally influences the level of participation quality in the aesthetic situation by the post-communist and non-communist countries receivers differently. The confirmation of the hypothesis followed the answers to the research questions showing cultural variances between participation in particular types of arts and cultural differences between particular forms of participation in particular types of arts by the post-communist and non-communist countries' receivers. Finally, extrapolating the conclusions, it can be said that these cultural differences are based on fundamental cultural dimensions, e.g. individualism-collectivism or uncertainty avoidance and arise strictly from history (Hofstede, 2011) and confirm the consequences of the political system transformation theory being one of the features of the sustainable development. In addition, different assessments of the qualities of the aesthetic situation in the digitalised way between post-communist and non-communist citizens show particular spaces for a sustainable approach.

As limitations of the research may be seen: 1) The vast majority of the sample (88.3%) was represented by persons with Bachelor's, Engineer's, Master's, Doctoral and Professorship diplomas, who are more conscious of their behaviour and better equipped to describe their perception of intangible assets and features in comparison to the rest of society; 2) The sample set was relatively small for general conclusions (n = 221).

The results of this investigation should be stimulating for: 1) Art creators looking for the optimal and sustainable way of distributing artworks among receivers from post-communist and non-communist countries; 2) Art managers and marketers for a deeper understanding of post-communist and non-communist art receivers' perspectives and their preferences about participation in arts in-real or digitally, especially in the sustainability context; 3) Art receivers to compare their opinion about the ways of sustainable participation in arts with the preferences of art receivers from post-communist and non-communist countries.

Potential research questions for additional research in the sustainable transfer of societies from (post-)communism to free-market ones may be the following: 1) How do the post-communist and non-communist countries' art creators perceive the artistry and creativity loss or gain regarding diverse forms of artwork distribution? 2) What are the post-communist and non-communist countries' variances in artistry and creativity loss or gain regarding diverse forms of receiving process between diverse cultures? 3) What are the variances in artistry and creativity loss or gain regarding diverse forms of receiving process by the post-communist and non-communist countries' citizens? 4) How long does it take to "forget" the post-communist burden influencing assessing the aesthetic situation's components? 5) How to use the differences in participation in arts towards sustainable development of society, economy and environment?

References

- Arkhangelsky, A. N., & Novikova, A. A. (2021). A Transmedia Turn in Educational Strategies: Storytelling in Teaching Literature to School Students. *Voprosy Obrazovaniya*, 2021(2), 63–81. <https://doi.org/10.17323/1814-9545-2021-2-63-81>
- Bartlová, M. (2019). 1968: In Search of "Socialism with Human Face" in Czech Art History. *Artium Quaestiones*, 30, 225–236. <https://doi.org/10.14746/aq.2019.30.11>
- Birch, S. (2003). Electoral Systems and Political Transformation in Post-Communist Europe. In *Electoral Systems and Political Transformation in Post-Communist Europe*. <https://doi.org/10.1057/9781403938763>
- Buravenkova, Y., Yakupov, R., Samsonovich, A. V., & Stepanskaya, E. (2018). Toward a virtual composer assistant. *Procedia Computer Science*, 123, 553–561. <https://doi.org/10.1016/j.procs.2018.01.084>
- Craig, S. L., Eaton, A. D., Pascoe, R., Egag, E., McInroy, L. B., Fang, L., Austin, A., & Dentato, M. P. (2020). QueerVIEW: Protocol for a technology-mediated qualitative photo elicitation study with sexual and gender minority youth in Ontario, Canada. *JMIR Research*

Protocols, 9(11). <https://doi.org/10.2196/20547>

- Doğan, Y. B., Akar, H., & Üstüner, M. (2019). Examining the measurement invariance of the teachers' sense of self-efficacy scale in terms of gender. *International Journal of Evaluation and Research in Education*, 8(2), 213–220. <https://doi.org/10.11591/ijere.v8i2.18694>
- Dube, T. J., & İnce, G. (2019). A novel interface for generating choreography based on augmented reality. *International Journal of Human Computer Studies*, 132, 12–24. <https://doi.org/10.1016/j.ijhcs.2019.07.005>
- Dunne-Howrie, J. (2020). Documenting performance: the contexts & processes of digital curation and archiving. *International Journal of Performance Arts and Digital Media*, 16(2), 217–218. <https://doi.org/10.1080/14794713.2020.1778840>
- Ekmekçi, A. K., Teraman, S. B. S., & Acar, P. (2014). Wisdom and Management: A Conceptual Study on Wisdom Management. *Procedia - Social and Behavioral Sciences*, 150, 1199–1204. <https://doi.org/10.1016/j.sbspro.2014.09.135>
- Fancourt, D., Baxter, L., & Lorencatto, F. (2020). Barriers and enablers to engagement in participatory arts activities amongst individuals with depression and anxiety: Quantitative analyses using a behaviour change framework. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-8337-1>
- Fortuna, P., & Modliński, A. (2021). A(I)rtist or Counterfeiter? Artificial Intelligence as (D)Evaluating Factor on the Art Market. *Journal of Arts Management Law and Society*, 51(3), 188–201. <https://doi.org/10.1080/10632921.2021.1887032>
- Gołaszewska, M. (1984). *Zarys estetyki*. PWN.
- Golob, T., & Makarović, M. (2017). Self-organisation and Development: A Comparative Approach to Post-communist Transformations from the Perspective of Social Systems Theory. *Europe - Asia Studies*, 69(10), 1499–1525. <https://doi.org/10.1080/09668136.2017.1399198>
- Guidry, K. R. (2014). Non-Response Bias on Web-Based Surveys as Influenced by the Digital Divide and Participation Gap Kevin R. Guidry Submitted to the faculty of the University Graduate School in partial fulfillment of the requirements for the degree Doctor of Philosophy in. In *ProQuest Dissertations and Theses*.
- Guo, L., Lu, R., Zhang, H., Jin, J., Zheng, Z., Wu, F., Li, J., Xu, H., Li, H., Lu, W., Xu, J., & Gai, K. (2020). A Deep Prediction Network for Understanding Advertiser Intent and Satisfaction. *International Conference on Information and Knowledge Management, Proceedings*, 2501–2508. <https://doi.org/10.1145/3340531.3412681>
- Gupta, S. (2010). Conceptualising the art of communist times. *Third Text*, 24(5), 571–582. <https://doi.org/10.1080/09528822.2010.502775>
- Habelsberger, B. E. M., & Bhansing, P. V. (2021). Art Galleries in Transformation: Is COVID-19 Driving Digitisation? *Arts*, 10(48), 1–23. <https://doi.org/10.3390/arts10030048>
- Handa, J. (2020). Impact of Social Media and Digitalization on The Growth of Fashion Designers. *International Journal of Textile and Fashion Technology (IJTFT)*, 10(1), 1–12. http://www.tjprc.org/view-archives.php?keyword=&from_date=&to_date=&id=&jtype=2&journal=29&page=11
- Hobbs, R., & Tuzel, S. (2017). Teacher motivations for digital and media literacy: An examination of Turkish educators. *British Journal of Educational Technology*, 48(1), 7–22. <https://doi.org/10.1111/bjet.12326>
- Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. *Online Readings in Psychology and Culture*, 2(1), 3–26. <https://doi.org/10.9707/2307-0919.1014>
- Hornat, J. (2019). Democratization through education? Theory and practice of the Czech post-revolution education system and its reforms. *Communist and Post-Communist Studies*, 52(3), 271–281. <https://doi.org/10.1016/j.postcomstud.2019.08.003>
- Hracs, B. J. (2015). Cultural Intermediaries in the Digital Age: The Case of Independent Musicians and Managers in Toronto. *Regional Studies*, 49(3), 461–475. <https://doi.org/10.1080/00343404.2012.750425>
- Jackson, K. (2017). Where qualitative researchers and technologies meet: Lessons from interactive digital art. *Qualitative Inquiry*, 23(10), 818–826. <https://doi.org/10.1177/1077800417731086>
- Jarrier, E., & Bourgeon-Renault, D. (2019). The role of digital mediation devices in the satisfaction of art museum audiences. *Le Rôle Des Dispositifs Numériques de Médiation Dans La Satisfaction Des Publics de Musée d'art.*, 5(3), 67–84. <https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=146420604&lang=es&site=ehost-live>

- Jovanovic, M., Dlacic, J., & Okanovic, M. (2019). How does the digitalization impact society's sustainable development? Measures and implications. *Economics of Digital Transformation*, 299–316.
- Kaljula, L. (2015). Art and Democracy in Post-communist Europe. *European Journal of Cultural and Political Sociology*, 2(1), 83–87. <https://doi.org/10.1080/23254823.2015.1081827>
- Karayilanoğlu, G., & Arabacıoğlu, B. C. (2020). Digital interactive experiences in contemporary art museums. *Turkish Online Journal of Design Art and Communication*, 10(4), 423–440. <https://doi.org/10.7456/11004100/007>
- Kozieł, A. (2019). Under the Pressure of 'Polonization' Ideology: Renaissance and Baroque Art in Silesia in the Works of Polish Art Historians after 1945*. *RIHA Journal*, 2019(SpecialIssue1), 1–22. <https://doi.org/10.11588/RIHA.2019.1.70046>
- Kreuzer, M., & Pettai, V. (2003). Patterns of political instability: Affiliation patterns of politicians and voters in post-communist Estonia, Latvia, and Lithuania. *Studies in Comparative International Development*, 38(2), 76–98. <https://doi.org/10.1007/BF02686269>
- Kröner, S., Christ, A., & Penthin, M. (2021). Digitalization in aesthetics, arts and cultural education—a scoping review. *Zeitschrift Fur Erziehungswissenschaft*, 24(1), 9–39. <https://doi.org/10.1007/s11618-021-00989-7>
- Kuc-Czarnecka, M. (2020). COVID-19 and digital deprivation in Poland. *Oeconomia Copernicana*, 11(3), 415–431. <https://doi.org/10.24136/OC.2020.017>
- Lee, H. J. (2011). Book Reviews: Joystick Soldiers: The Politics of Play in Military Video Games. *Journal of Communication Inquiry*, 35(3), 295–299. <https://doi.org/10.1177/0196859911415408>
- Lei, P., & Tan, E. B. (2021). Applying Digital Arts Experience to Strengthen the Organizational Culture in Higher Education During the Pandemic. *International Journal for Innovation Education and Research*, 9(5), 169–173. <https://doi.org/10.31686/ijer.vol9.iss5.3080>
- Literat, I. (2012). The Work of Art in the Age of Mediated Participation: Crowdsourced Art and Collective Creativity. *International Journal of Communication*, 6, 2962–2984.
- Mao, T., & Jiang, X. (2021). The Use of Digital Media Art Using UI and Visual Sensing Image Technology. *Journal of Sensors*, 2021. <https://doi.org/10.1155/2021/9280945>
- Mikloš, I. (2021). Three Models of Post-Communist Transformation and Lessons Learned. *Central European Business Review*, 10(2), 43–61. <https://doi.org/10.18267/J.CEBR.277>
- Modliński, A., & Pinto, L. M. (2020). Managing substitutive and complementary technologies in cultural institutions: Market/mission perspectives. *Management (Croatia)*, 25(Special Issue), 1–10. <https://doi.org/10.30924/mjcmi.25.s.2>
- Mondejar, M. E., Avtar, R., Diaz, H. L. B., Dubey, R. K., Esteban, J., Gómez-Morales, A., Hallam, B., Mbungu, N. T., Okolo, C. C., Prasad, K. A., She, Q., & Garcia-Segura, S. (2021). Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet. In *Science of the Total Environment* (Vol. 794). <https://doi.org/10.1016/j.scitotenv.2021.148539>
- Nawa, L. L., & Sirayi, M. (2014). Digital technology and cultural heritage sites in the city of Tshwane. *Journal of Arts Management Law and Society*, 44(4), 246–257. <https://doi.org/10.1080/10632921.2014.964384>
- Park, H. J., & Lim, K. H. (2015). A study on experiential digital art user experience. *International Journal of Multimedia and Ubiquitous Engineering*, 10(4), 379–386. <https://doi.org/10.14257/ijmue.2015.10.4.36>
- Pavlica, K., & Thorpe, R. (1998). Managers' Perceptions of their Identity: A Comparative Study between the Czech Republic and Britain. *British Journal of Management*, 9(2), 133–149. <https://doi.org/10.1111/1467-8551.00079>
- Pianzola, F., Toccu, M., & Viviani, M. (2021). Readers' engagement through digital social reading on Twitter: the TwLetteratura case study. *Library Hi Tech*, 1–17. <https://doi.org/10.1108/LHT-12-2020-0317>
- Pöppel, J., Finsterwalder, J., & Laycock, R. A. (2018). Developing a film-based service experience blueprinting technique. *Journal of Business Research*, 85, 459–466. <https://doi.org/10.1016/j.jbusres.2017.10.024>
- Proksch-Weilguni, S. (2019). Performing art history: continuities of Romanian art practices in post-communist performance. *Journal of Contemporary Central and Eastern Europe*, 27(1), 99–120. <https://doi.org/10.1080/25739638.2019.1643076>

- Quattrini, R., Pierdicca, R., Paolanti, M., Clini, P., Nespeca, R., & Frontoni, E. (2020). Digital interaction with 3D archaeological artefacts: evaluating user's behaviours at different representation scales. *Digital Applications in Archaeology and Cultural Heritage*, 18. <https://doi.org/10.1016/j.daach.2020.e00148>
- Raimo, N., De Turi, I., Ricciardelli, A., & Vitolla, F. (2021). Digitalization in the cultural industry: evidence from Italian museums. *International Journal of Entrepreneurial Behaviour and Research*. <https://doi.org/10.1108/IJEBr-01-2021-0082>
- Rasmussen, M. B. (2021). The Aestheticisation of Late Capitalist Fascism: Notes for a Communist Art Theory. *Third Text*, 35(3), 341–354. <https://doi.org/10.1080/09528822.2021.1916268>
- Rikou, E., & Chaviara, I. (2016). “Crisis” as art: Young artists envisage mutating Greece. *Visual Anthropology Review*, 32(1), 47–60. <https://doi.org/10.1111/var.12092>
- Rivas-Carmona, M. del M. (2020). The power of (Re)creation and social transformation of binomial “art-technology” in times of crisis: Musical poetic narrative in Rozalén’s “lyric video” “aves enjauladas.” In *Cultura. International Journal of Philosophy of Culture and Axiology* (Vol. 17, Issue 2, pp. 217–231).
- Roberge, J., & Chantepie, P. (2017). The Promised Land of Comparative Digital Cultural Policy Studies. In *Journal of Arts Management Law and Society*, 47(5), 295–299. <https://doi.org/10.1080/10632921.2017.1398584>
- Rusinko, M. (2020). In the “public interest”? Dispossession art collections in communist Czechoslovakia between 1948 and 1965. *Acta Historiae Artis Slovenica*, 25(1), 233–252. <https://doi.org/10.3986/AHAS.25.1.10>
- Sacco, P., Gargano, E. R., & Cornella, A. (2021). Sustainable Digitalization: A Systematic Literature Review to Identify How to Make Digitalization More Sustainable. *IFIP Advances in Information and Communication Technology*, 635 IFIP, 14–29. https://doi.org/10.1007/978-3-030-86614-3_2
- Schiama, G. (2017). Arts catalyst of creative organisations for the fourth industrial revolution. *Journal of Open Innovation: Technology, Market, and Complexity*, 3(4). <https://doi.org/10.1186/s40852-017-0072-1>
- Schnuugg, C. (2019). *Creating ArtScience Collaboration. Bringing Value to Organizations*. Palgrave Macmillan.
- Skoldberg Johansson, U., Woodilla, J., & Antal Berthoin, A. (2015). Artistic Interventions in Organizations Research, theory and practice. In *Routledge*. <https://www.routledge.com/Artistic-Interventions-in-Organizations-Research-Theory-and-Practice/Skoldberg-Woodilla-Antal/p/book/9781138497436%0A>
- Sosnowska, E. (2015). Touch, Look and Listen: The Multisensory Experience in Digital Art of Japan. *Journal of Science and Technology of the Arts*, 7(1), 63. <https://doi.org/10.7559/citarj.v7i1.147>
- Szostak, M. (2020). Creativity and Artistry in Organ Music. *The Organ*, 391, 24–31. <https://depot.ceon.pl/handle/123456789/19170>
- Szostak, M. (2021a). Artistry, Management, and Creativity: Links and Common Denominators. *Discourses on Culture*, 16(1), 23–54. <https://doi.org/10.36145/DoC2021.08>
- Szostak, M. (2021b). Does Polish Post-communist Cultural Burden Influence the Perception of Creative Identities? *Journal of Intercultural Management*, 13(2), 29–58. <https://doi.org/10.2478/joim-2021-0060>
- Szostak, M. (2021c). Post-communist burden influence on the perception of creative identities: consequences for managers and leaders. *European Research Studies Journal*, 24(3), 282–302. <https://doi.org/10.35808/ersj/2354>
- Szostak, M., & Sułkowski, Ł. (2020a). Manager as an artist: Creative endeavour in crossing the borders of art and organizational discourse. *Creativity Studies*, 13(2), 351–368. <https://doi.org/10.3846/cs.2020.11373>
- Szostak, M., & Sułkowski, Ł. (2021a). Identity crisis of artists during the COVID-19 pandemic and shift towards entrepreneurship. *Entrepreneurial Business and Economics Review*, 9(3), 87–102. <https://doi.org/10.15678/EBER.2021.090306>
- Szostak, M., & Sułkowski, Ł. (2021b). The Challenges in Identification of Artists-Managers: Consequences for creativity. *Creativity Studies*, 14(1), 112–124. <https://doi.org/10.3846/cs.2021.13822>
- Szostak, M., & Sułkowski, Ł. (2021c). The Identity and Self-Perception of Artists-Managers. *Problems and Perspectives in Management*, 19(1), 372–386. [https://doi.org/10.21511/ppm.19\(1\).2021.32](https://doi.org/10.21511/ppm.19(1).2021.32)

- Szostak, M., & Sułkowski, L. (2020b). Kitsch in Management: characteristic forms, carriers and propagators. *Education Excellence and Innovation Management: A 2025 Vision to Sustain Economic Development during Global Challenges: Proceedings of the 35th International Business Information Management Association Conference (IBIMA)*, 1-2 April 2020, 7584–7598. <https://depot.ceon.pl/handle/123456789/19173>
- Tan, C. (2012). Art for/of the masses: Revisiting the Communist legacy in Chinese art. *Third Text*, 26(2), 177–194. <https://doi.org/10.1080/09528822.2012.663974>
- Tatarkiewicz, W. (2015). *Historia estetyki*. PWN.
- Vollero, A., Siano, A., Palazzo, M., & Amabile, S. (2020). Hoftsede's cultural dimensions and corporate social responsibility in online communication: Are they independent constructs? *Corporate Social Responsibility and Environmental Management*, 27(1), 53–64. <https://doi.org/10.1002/csr.1773>
- Wu, J. C. (2020). From Physical to Spiritual: Defining the practice of embodied sonic meditation. *Organised Sound*, 25(3), 307–320. <https://doi.org/10.1017/S1355771820000266>
- Wu, Y., Zhang, L., Bryan-Kinns, N., & Barthet, M. (2017). Open Symphony: Creative Participation for Audiences of Live Music Performances. *IEEE Multimedia*, 24(1), 48–62. <https://doi.org/10.1109/MMUL.2017.19>
- Xue, E., Li, J., Li, T., & Shang, W. (2021). How China's education responses to COVID-19: A perspective of policy analysis. *Educational Philosophy and Theory*, 53(9), 881–893. <https://doi.org/10.1080/00131857.2020.1793653>
- Zollo, L., Rialti, R., Marrucci, A., & Ciappei, C. (2021). How do museums foster loyalty in tech-savvy visitors? The role of social media and digital experience. *Current Issues in Tourism*. <https://doi.org/10.1080/13683500.2021.1896487>
- Zorita-Aguirre, I. (2020). Mutations in performing arts space in the digital age. *Arte, Individuo y Sociedad*, 32(2), 503–518. <https://doi.org/10.5209/aris.65437>

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RESEARCHING DIGITALIZATION OF THE EDUCATION: A CASE STUDY OF BULGARIAN UNIVERSITIES*

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Abstract. Digitization in education is a process formed because of the general digitization of society and all its sectors. Digitization improves the education quality and methods. Digital technologies are an integral part of any field of education. The following criteria defining the level of digitization of the learning process in the universities are essential. The first criterion, we think, is expanding learning opportunities by providing electronic materials (slides from lectures, videos, exercises, projects, etc.); acceptance and evaluation of materials related to the learning process in digital form based on already existing and popular technologies allow training from any location, regardless of the physical location of the university. The second criterion is the education interactivity; the increasing and massive entry of audio and visual devices helps for this. The third criterion is the demand for new digital skills from businesses - creating websites, mobile applications, cyber security and more. Another criterion could be the digital expansion of the competence of the university - the increase in the number and attractiveness of the offered digital services (enrollment, education, exam process, practices, etc.), which are tailored to the interests and preferences of students based on their digital experience and digital expectations. All these questions will be the subject of research in this article.

Keywords: education; e-learning; digitalization; learning process

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JEL Classifications: M12, M15, J24

1. Introduction

The Pandemic related to COVID-19 from 2020 has revealed new opportunities for applying online training approaches that are otherwise known and used for many years. The need to comply with the rules on isolation and distance allowed the development and entering into the practice of some new platforms, information systems and accompanying learning methods in an electronic environment. As part of digitization, traditional training patterns

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are transformed into e-learning models. Although not entirely, universities and schools began to have the characteristics of electronic universities and electronic schools. After 2020, it can be considered that in developed countries (and those with a high network and mobile connectivity), pupils and students not only use e-learning opportunities, but in specific periods they entirely rely upon and work in remote training mode. It is this very fast, mass transition in a remote training regime in the last year with the mass application of digital technologies at all levels and stages, it cannot yet clearly identify and with the respective weights the risks that arise in the learning process. In this regard, the purpose of this article is to present the essence of digitization and its specificity to the educational process, to develop a methodology and carry out a study on digital training in Bulgarian higher education institutions

2. Literature Review

The term "digitization" has been very widely used in recent years. There are different definitions for it. According to Ochs and Riemann (2018), it is related to integrating digital technologies in everyday life by digitizing everything that can be digitized. Scuotto, Serravalle, Murray and Viasone (2019) claim that digital technology is adopted to modify the business model to create value using new, modern technologies. For Abubotain and Chamakiotis (2019), it is the use of digital technologies which upgrades the processes. Botella-Carrubi and Torras (2019) study how companies reorganize their methods and work strategies to get more incredible benefits, thanks to introducing new technologies.

According to Gupta, Kishor, Mishra and Gupta (2021), it is a process of transforming information into digital (bit - 0.1) format (i.e. readable by computers). This allows any information to be stored, processed and transmitted easily using a network of computers. Romdhane, Loukil and Kammoun (2021) state that digitization is a trendy phenomenon that transfers the economy from the era of the physical world to the virtual, Internet-based, big data and mobile devices. Angelova (2020) claims that business and social life are rapidly changed due to COVID-19 social isolation, and one possible working solution is the digitization of organizations.

Or digitization can be seen on the one hand as a process of switching from analogue to digital strategies. On the other hand, this concept can be seen as a technological revolution related to the change in society, particularly in the economy, culture, education, politics, health and others (Hofmann et al., 2018). Digitization is the increasing use of connected digital technologies in society. This covers machine management, Internet communications, robotization, change in the work environment, and a different way of learning (Wasserman, 2018).

To take advantage of emerging technologies and their rapid expansion in human activities, organizations must be adaptive and flexible and transform all their processes. For this reason, digitalization requires a change of focus and involves innovating in technology and modifying the institutional culture to guarantee the evolution of digital transformation (Abad-Segura et al., 2020).

Specific case for digitalization in universities can be considered as overall policy, covering many aspects – starting with typical educational and scientific processes of one university, but also including digitalization for: university business incubators (Chan, Krishnamurthy, & Sadreddin, 2022), digitization in libraries and secure digital resources (Islam et al., 2022), connection and different intermediates between universities and industries (Albats et al., 2022; Roig-Marín & Prieto, 2021), possibilities for digital certification (Litoussi et al., 2022), the role of Massive Online Open Courses in the university activities (Guerrero, Heaton & Urbano, 2021; Krasnov et al., 2018), simulation models in the e-learning environment (Boumiza et al., 2018). Researchers also consider already working models for improving university digitalization—such as the Agile model (Kerroum et al., 2020). Some scholars even further view Artificial Intelligence as the future development of digitization (Anguelov, 2021).

3. Methodology of the study

Empirically few studies to date have introduced much on the digitalization of higher education. Pu, Tanamee and Jiang (2022) provided research on 22 students and 9 instructors to understand the attitudes towards digitalization. Based on their survey results, scholars described three major attitudes - teaching and educational attitudes, which compose the first level, and the second level is the digital platform attitude, technology use attitude, and resource attitude. They also claim that the third level is network attitude, service attitude, and development attitude. Stoyanova, Stoyanov, Remnova and Kushniruk (2021) define the scientific provisions on the feasibility and effectiveness of using e-learning under conditions of quarantine restrictions related to the COVID-19 Pandemic. Ugur (2020) explores the assumptions by instructors and students concerning why and how multimodal and digital technologies are incorporated into undergraduate classes under a qualitative approach. Islam and Nusrat (2018) surveyed various students to understand the effect of digitalization on educational purposes. Machine learning was applied to classify happy and unhappy students with digitalization, where focused time was spent on educational goals. Shana and Abulibdeh (2022) think that the applications of cloud computing for educational efficiency are vital today because they maximize educational outcomes and allow students to benefit from technologies while gaining a greater understanding of the latest technological advancements. Viberg and Mavroudi (2018) present online learning opportunities applicable to the Swedish context. Bejinaru (2019) presents the current state of the phenomenon of digitalization in Europe and discusses the existing strategies to increase the degree of digitalization in the field of education. Bygstad, Ovrelid, Ludvigsen and Daehlen (2022) focus on two streams of digitization in higher education; digitization of education and digitization of academic subjects. Tang, Chen, Law, Wu et al. (2021) explored several critical factors in the research framework related to learning motivation, learning readiness and student's self-efficacy in participating in live online learning during the coronavirus outbreak, taking into account gender differences and differences among sub-degree (SD), undergraduate (UG) and postgraduate (PG) students. Toader, Safta, Titirișcă and Firtescu's (2021) present study also aims to harness the university experience of these times from some of the leading Romanian university centres; the method used was quantitative and qualitative research based on a questionnaire. Toader, Safta, Titirișcă and Firtescu (2021) present the process of online learning in some of the prominent Romanian university centres using quantitative and qualitative research based on a questionnaire. Man, Liao and Sun (2020) provide a research-based analysis of 782 articles and prove that it is essential to implement digital technologies in the educational process, suggesting the increasingly important role of organizations and people in adopting digital technologies. Zancajo, Verger and Bolea (2022) analyze three preponderant areas of response: the digitalization of the educational system, educational inequalities, and teachers' development.

The general understanding of the authors of the current study is that digitization transformation is not only in the working environment where we most often face it but also in all other aspects of our personal and public life. Education is no exception - digitization occurs in teaching and learning, which is not a novelty. Still, in recent decades the rapid rate of technology development has made the process much more visible and significant. And this is due to the penetration of computers, mobile phones and the Internet in classrooms and at home. The potential of digitization in education is enormous and provides many opportunities and challenges.

Digitization in education is a process formed due to the general digitization of society and all its sectors. With the help of digitization, education methods and quality improvement. Digital technologies are no longer subject to study and implementation from relatively narrow areas of the past electronics, computing machines and communications. Still, they are an integral part of any field of education. A definition that, in essence, does not differ from the others says that digitization in education refers to using desktops, mobile devices, the Internet, software applications and other types of digital training for students of all ages. Doing tests using a computer and

an electronic exam platform, online teaching and presentation of materials for training, e-books, and interactive and video materials represent only a few examples of digitization in education these days.

The criteria defining the level of digitization of the learning process in the HEIs are also critical:

- The first criterion we think of is expanding learning opportunities. Providing electronic materials (slides from lectures, videos, exercises, projects, etc.), acceptance and evaluation of materials related to the learning process in digital form based on already existing and popular technologies allows training from any location, regardless of the physical location of the university;

- Another criterion is the education interactivity. The increasing and massive entry of audio and visual devices helps for this.

- The third criterion is the demand for new digital skills from businesses - creating websites, mobile applications, cyber security and more.

- Another criterion could be the digital expansion of the competence of the university - the increase in the number and attractiveness of the offered digital services (enrollment, education, exam process, practices, etc.), which are tailored to the interests and preferences of students based on their digital experience and digital expectations.

The Pandemic related to COVID-19 from 2020 has revealed new opportunities for applying online training approaches. The need to comply with the rules on isolation and distance allowed us to develop and enter into the practice of several new platforms, information systems and accompanying learning methods in an electronic environment.

Based on the above, we can bring out the introductory statements in the present study, namely:

The education process in higher education institutions (HEIs) is a comprehensive and systematically organized process containing the following components:

1. Knowledge, skills and the presence of staff teachers

2. Knowledge, skills and capability of the HEI in the information and administrative servicing of the process of education of ICT specialists to create and maintain infrastructure for a dynamic relationship between "student - lecturer" and of specialists from the administrative and management structure of the HEI, serving the education process in the HEI -inspectors, informational document administration information centre, enrollment, submitting applications for choice of disciplines, enrollment for state exams and others.

1. Knowledge, skills and securing teachers

- 1.1. Knowledge and skills for work with training platforms: MOODLE, TEAMS, BBB, ZOOM, others

- 1.2. Presence of a set of prepared lectures in a format suitable for the digital environment;

- 1.3. Digital skills - Information competence for work in a digital environment in the course of lectures conducted online

- 1.4. Knowledge and skills for entering lecturing and exams with students at accessible and established official sites of institutions, organizations, companies and their sub-sites with databases and reports - annual, analytical, and statistical.

- 1.5. Presence of hardware with accompanying software product and Internet connection

2. Knowledge, skills and provision of the HEI in the informational and administrative servicing of the process of education - of ICT specialists to create and maintain infrastructure for dynamic relationship "student - lecturer" and of specialists from the organizational structure of the HEI, serving the education process in the HEI - inspectors, informational document administration information centre, enrollment, submitting applications for choice of disciplines, sign up for state exams and others.

- 2.1. Internet connectivity of the HEI - examines connectivity and provision of wired and wireless Internet and Intranet access in classrooms, laboratories, cabinets, centres, and WiFi connections within the university campus.

2.2. Platforms used, access and storage models for Internet-based content provided by the HEI and its lecturers for the learning process - created and maintained platforms, a unit to service the method of access and use of educational platforms from students and lecturers.

2.3. Competence of administrative staff in the learning process:

- In the educational process - a level of digitization of education in the traditional and remote form concerning lectures, ongoing control and exams.

- in concomitant activities - the digitization of the curriculum timetable; digital services for students, digitization of library activity;

- in the administrative process - digitization of processes of applying and enrollment of students at the university -digital submission of documents, approval, admission to the examination and conducting an examination; processing the results of the exams and ranking of accepted students.

This methodology allows for a comprehensive and multi-aspect assessment of the state of digitization of the learning process. It helps the higher education management to make reasoned decisions for optimal process management in the short and medium term.

To determine the level of digitization of the educational process under COVID-19, we carried out a study among higher education institutions in Bulgaria, which covered a variety of questions on the way they conduct their learning process over the past two years. One part of the results we will provide further in this article.

The study was conducted in the period 10-12.2021. It covered 51 accredited higher education institutions in Bulgaria. The questions were addressed to managers and higher and medium managerial level administration. The profile of the participants is relatively balanced by gender and age, with a slight predominance over the rest of the respondents: respondents-women at the age of 50-55. In the comparatively uniform distribution of other participants, the most significant percentage are respondents in the age group 40-45 by 16.2%, and the smallest share is that of participants between 20-25.

Respondents with the highest percentage are those with over 20 years of internship in specific higher education institutions. They ranked those with training between 10 and 20 years, the positions and professional experience of the participants are diverse - rector, deputy rector, director of the study and centre for distance learning, program coordinator, department manager, chief expert in the department, administrative secretaries, teachers.

4. Summarized survey results and comments

4.1. Knowledge, skills and the presence of staff teachers

In this part, the survey questions are grouped to obtain information regarding:

- hardware provision with concomitant software product and Internet connectivity on the one hand, for the digital environment in the HEIs - available equipment, software solutions and others, and on the other hand, how teachers appreciate their knowledge and skills to work in a digital environment; results are presented in Fig 1.

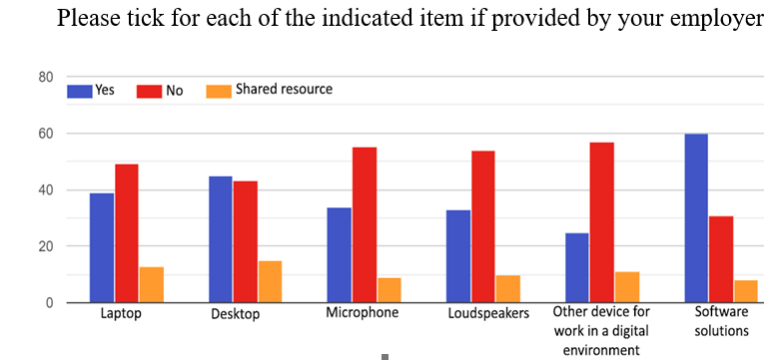


Fig. 1. Software and hardware equipment of the teachers

As can be seen from the graph, for the most part, the equipment is personal, in some cases, shared. Higher schools generally provide information software solutions.

Teachers give high self-assessment for their laptop and desktop skills during online lectures, seminars and exams. They encounter some difficulties in working with specific software products. The teaching staff's most famous work platforms are Teams, Zoom, Moodle, and Skype. Answers are summarized in Fig. 2.

Please, indicate to what extent you can use the following software products

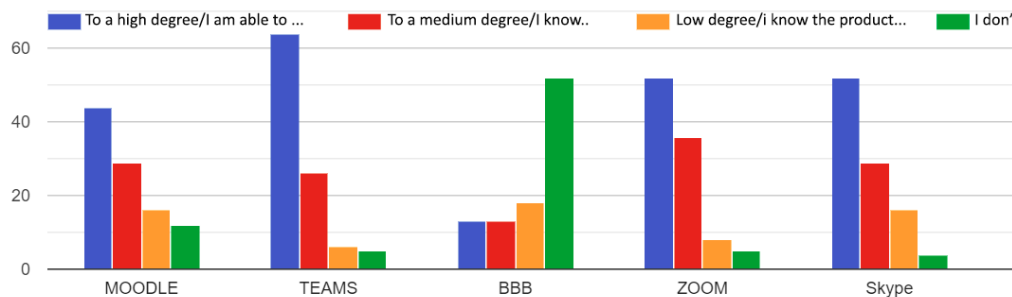


Fig. 2. Degree of knowledge of software platforms

Against this high self-assessment in terms of skills to work with digital devices and software solutions, the high percentage - 62.5 of negative answers to the question "Have you attended a course of work in a digital environment over the past two years?" are expected. The high percentage of negative responses may result from the lack of need for the teaching staff to pass training in a digital environment.

From another point of view, the rapid transition to education in a digital environment as a consequence of the Covid-19 Pandemic left not many opportunities for teaching staff to do additional training, go smoothly through training or improve existing competencies in the field of digital technologies (Fig. 3).

Have you attended training for developing digital skills for the last two years?

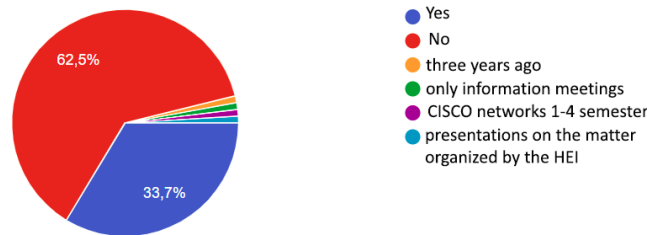


Fig. 3. Participation in training to improve digital skills

Out of the comments that the participants in the survey have made, it can be concluded that in the last two years, they have undergone various pieces of training to increase their digital skills organized by the management of the higher education institutions and self-learning which individual lecturers have taken using the resources in the Internet space.

Regarding the presence of a set of prepared lectures in a format suitable for the digital environment: 88, 3 % responded positively (Fig. 4).

Do you have ready-made PPT lectures in a form suitable for a digital environment?

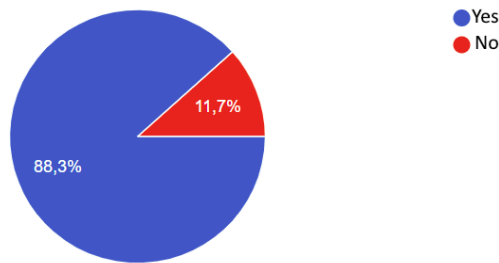


Fig. 4. Presentations adapted for online learning

The high percentage can be a logical consequence that much of the learning materials, whether lecture courses or seminars are also used to attend school hours before moving into a digital environment. The equipment of many higher education institutions allows for presentation equipment, which implies ready-made materials in different disciplines, the transformation of which digital training is not time-consuming.

Skills to work in a digital environment in lectures and exercises conducted online.

93.3% of respondents have experience and skills in teaching online. This high percentage may also result from introducing new technologies into the teaching staff's everyday life before the digital training environment (see Fig. 5).

Have you held lectures, exercises, pieces of training, etc., in digital format?

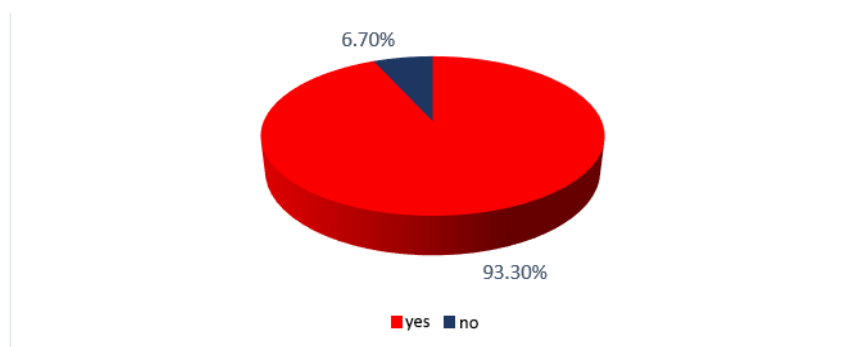


Fig. 5. Skills to work in a digital environment

Online participation in international conferences, symposiums, round tables and others is a practice for many higher education teachers that provides them with the necessary experience, knowledge, and habits to conduct online training (Fig. 6).

Do you have the necessary knowledge and skills to teach in an online environment?

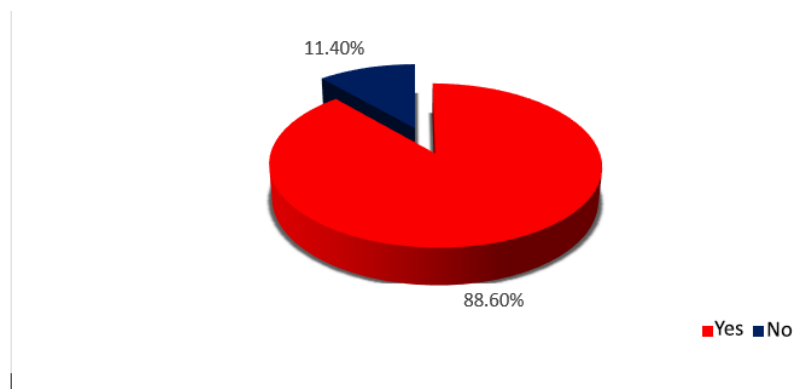


Fig. 6. Online participation in international conferences, symposiums, round tables and others

It is necessary to note the high self-assessment of digital work competencies, developed lectures and materials applicable to online education, as a top place for the best-known product is assigned to the Teams platform. It was also one of the first to be massively introduced for daily activities in the digital form of training.

The second part of the survey covers the evaluation of knowledge, skills and equipment of the HEIs in information and administrative services of ICT specialists to create and maintain infrastructure for dynamic relationships between "student - lecturer" and specialists from the executive and management structure of the HEI, serving the education process in the HEI -inspectors, informational document administration information centre, enrollment, submitting applications for choice of disciplines, enrollment for state exams, etc. the subject of study here is:

- Internet connectivity of the HEI - examines connectivity and provision of wired and wireless Internet and Intranet access in classrooms, laboratories, cabinets, centres, and WiFi connections within the university campus.

The level of connectivity also includes the provision of broadband Internet access, mobile broadband access, and broadband speed.

- About 80% reply that wired and wireless Internet is provided in the HEIs (Fig. 7).

Is there access to wireless Internet in all classrooms, laboratories, offices, and centres where online training is being held?

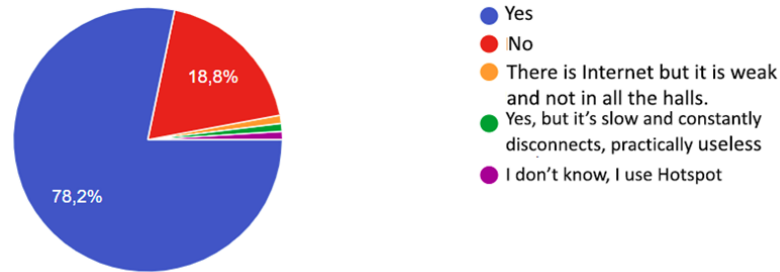


Fig. 7. Availability of Internet in the classrooms

On a question of what Internet-based access and storage platforms provide the HEI to its teachers for the learning process, there is quite a variety of answers.

Teams, Google Drive, One Drive, and Dropbox are the most popular storage platforms. Over 80% of respondents indicate that they are updated promptly (see Fig. 8).

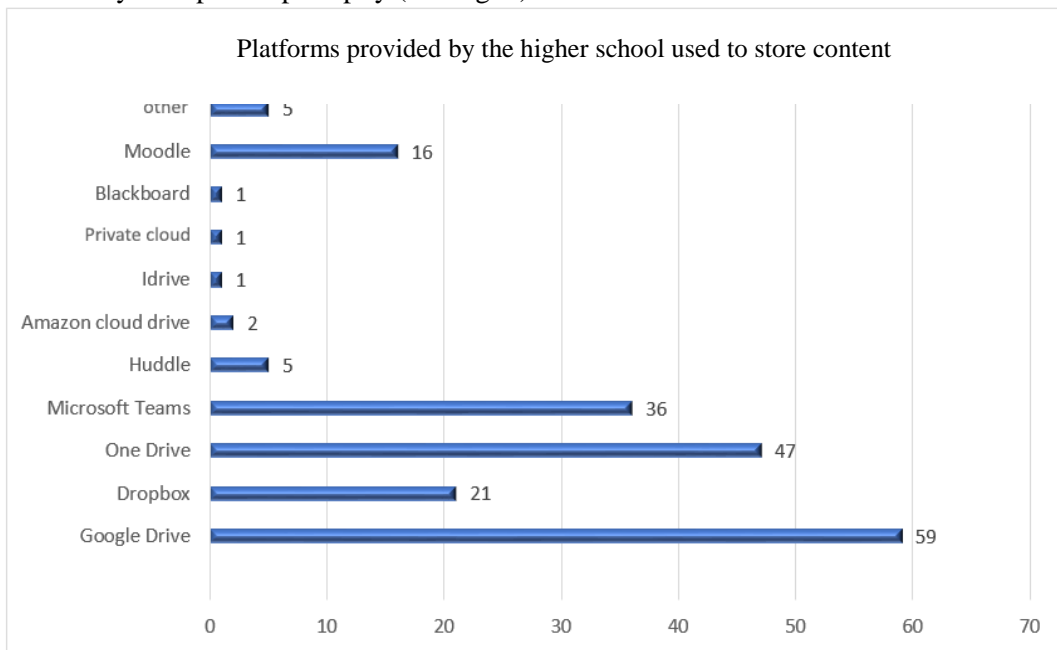


Fig. 8. The most popular storage platforms

- Competence of administrative staff in the learning process:

In the educational process - a level of digitization of education in regular and remote form; level of digitalization during an ongoing control; exams level of digitalization.

There are no significant differences in the digitization of individual processes - over 50% reply that it is high (Fig. 9).

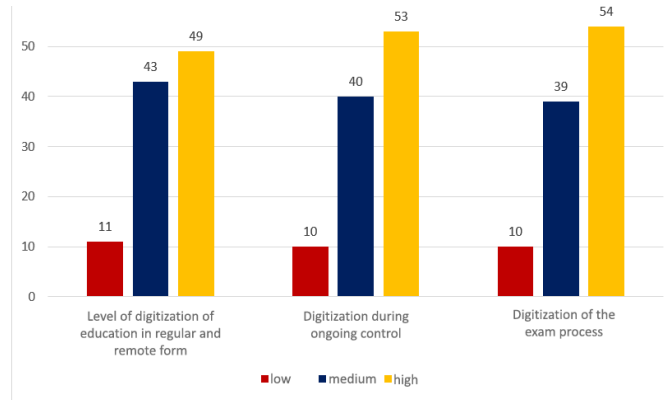


Fig. 9. Level of digitalization of the learning process (103 respondents)

- In concomitant activities - digitization of the library activity. The analysis of the results shows that more than half defined it as a low and medium, which significantly hinders students in lectures and exercises held from a distance (Fig. 10).

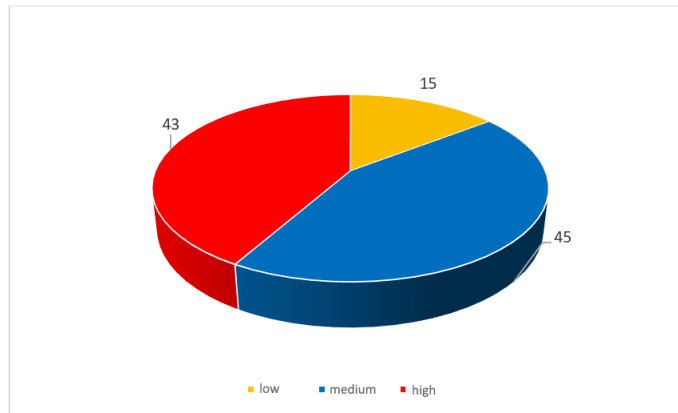


Fig. 10. Digitalization of the library fund (103 respondents)

- in the administration - digitization of processes of applying and enrollment of students at the university - includes digital submission of documents, approval, admission to the examination and conducting an examination; processing of the exams results and ranking of accepted students (Fig. 11).

What is the degree of digitalization of the university student application and enrollment process?

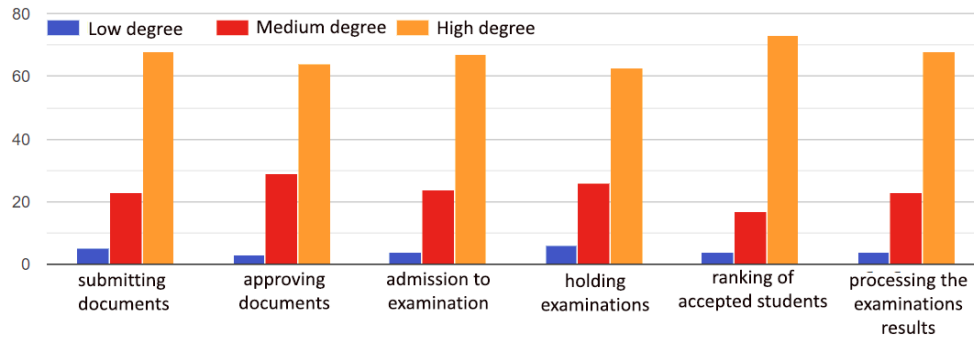


Fig. 11. Digitization of processes of applying and enrollment students at the university

- Ethical norms, regulations and rules for the content provided in the digital environment, incl. lecture materials, PPP, information and reference materials. /the presence of documents in HEI providing the absence of plagiarism, originality and credibility of students and lecturers/.

66.3% responded positively, meaning that respondents are familiar with ethical norms and rules, a prerequisite for correctness and loyalty in a digital environment (Fig. 12).

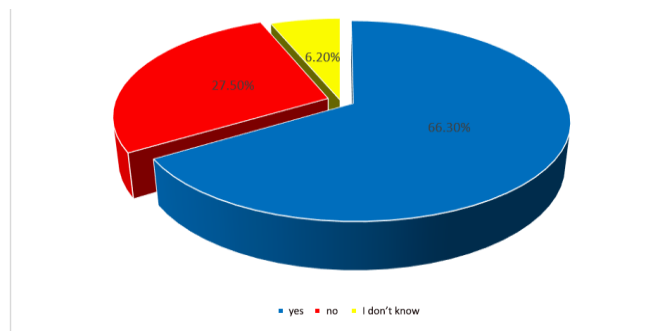


Fig. 12. Existence in universities of regulation and rules for the content used in a digital environment

The future digital generation is related to the development of revolutionary technologies, which links education and technology more important than ever. Providing an environment that activates and motivates learners for efficient work is related to introducing modern educational technologies. Still, they are only a means by which the school/university implements interactive methods based on the individual approach to work. Using these technologies in the learning process allows for the transition from a lecturer- to a learner-oriented educational policy.

Conclusions

For the first time since the COVID 19 pandemic, such a representative study is being conducted, which covers all universities in Bulgaria and shows the level of digitization of their educational process. Unlike other research that has been done in recent years and refers to individual universities in Bulgaria, this gives an idea of the education systems used, the level of digital skills of the teachers, administration and students, the presence of intellectual property protection systems in an online environment and the preparedness with learning materials for this type of learning.

Our general findings based on the empirical research could be summarized as follows: the central part of Bulgarian universities did not provide special technical equipment for their staff in the period of home office work during COVID-19 restrictions and social isolation. The support role of universities could be found only in software solutions. Our results also show that most Bulgarian universities did not provide their staff with special training to improve their computer and digital skills. At the same time, almost all have to conduct online lectures. The most well-known platform for Bulgarian HEIs is Teams, followed by ZOOM and Skype. Traditionally, Bulgaria and educational institutions have good Internet infrastructure, including classrooms.

In conclusion, Bulgarian universities must reconsider and implement specific policies to support their staff (including administration and academics) by providing exceptional training and equipment to prepare them for the next step of digitization.

Today's education faces major transformations caused by integrating new digital technologies into academic activity and the active demand for effective training models. Digitization undoubtedly changed our educational system, but we cannot say that the value of old classroom education has been reduced. The best part of the digitization of education in the 21st century is that the two forms of education can be successfully combined. Digitization in education also appears to be the proper method of saving resources; thus, digitizing the education system in the 21st century also proved to be a grace for our society.

References

- Abubotain, F., & Chamakiotis, P. (2020). FinTech in the Saudi Context. *Advances in Business Strategy and Competitive Advantage*, 188-208. <https://doi.org/10.4018/978-1-5225-9550-2.ch009>
- Abad-Segura, E., González Zamar, M.-D., Infante-Moro, J. C., & Ruipérez García, G. (2020). Sustainable management of digital transformation in higher education: Global research trends. *Sustainability*, 12(5), 2107. <https://doi.org/10.3390/su12052107>
- Albats, E., Alexander, A.T., & Cunningham, J.A. (2022). Traditional, virtual, and digital intermediaries in university-industry collaboration: exploring institutional logics and bounded rationality. *Technological Forecasting and Social Change*, 177, 2022, 121470, ISSN 0040-1625 <https://doi.org/10.1016/j.techfore.2022.121470>
- Angelova, M. (2020). Methodology of Evaluation Effectiveness of E-Platforms for Business Meetings, *2020 III International Conference on High Technology for Sustainable Development (HiTech)*, 2020, 1-5. <http://doi.org/10.1109/HiTech51434.2020.9363993>
- Anguelov, K. (2021). Applications of Artificial Intelligence for Optimization of Business Processes in Enterprise Resource Planning Systems, *2021 12th National Conference with International Participation (ELECTRONICA)*, 2021, pp. 1-4, <http://doi.org/10.1109/ELECTRONICA52725.2021.9513677>
- Bejinaru, R. (2019) Impact of Digitalization on Education in the Knowledge Economy. *Management Dynamics in the Knowledge Economy*, 7 (3), 367-380. <http://doi.org/10.25019>
- Botella-Carrubi, D., & Torras, M. (2019). Talent Revolution: New Challenges in People Management. In book: *Analyzing the Relationship between Innovation, Value Creation, and Entrepreneurship* (pp.247-267) Publisher: IGI GLOBAL

<http://doi.org/10.4018/978-1-7998-1169-5.ch012>

Boumiza, A. Bekiarski, S. Pleshkova and D. Souilem, (2018). Development of Simulation Models for Interactive Audiovisual Control of Students in the E-Learning Environment, *2018 International Conference on High Technology for Sustainable Development (HiTech)*, 2018, pp. 1-4. <http://doi.org/10.1109/HiTech.2018.8566328>

Bygstad, B., Ovrelid, E., Ludvigsen, S., & Daehlen, M. (2022) From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education*, 182, 104463 <https://doi.org/10.1016/j.compedu.2022.104463>

Chan, Y. E., Krishnamurthy, R., & Sadreddin, A. (2022). Digitally-enabled university incubation processes, *Technovation*, 102560, ISSN 0166-4972, <https://doi.org/10.1016/j.technovation.2022.102560>

Guerrero, M., Heaton, S., & Urbano, D. (2021). Building universities' intrapreneurial capabilities in the digital era: The role and impacts of Massive Open Online Courses (MOOCs), *Technovation*, 99, 102139 <https://doi.org/10.1016/j.technovation.2020.102139>

Gupta, S.L, Kishor, N., Mishra, N., Mathur, S., & Gupta, U. (2021) Digitalization of Higher Education using Cloud Computing: Implications, Risk, and Challenges, Chapman and Hall/CRC, New York, 1st Edition, <https://doi.org/10.1201/9781003203070>

Hofmann, C. Lauber, S., Haefner, B., & Lanza, G. (2018) Development of an agile development method based on Kanban for distributed part-time teams and an introduction framework, *Procedia Manufacturing*, 23, <https://doi.org/10.1016/j.promfg.2018.03.159>

Islam, S., & Nusrat, J. (2018) Digitalization and Education System: A Survey. *International Journal of Computer Science and Information Security (IJCSIS)*, 16(1), 70-71.

Islam, M.M., Islam, M.N., Munshi, M.N.U., & Haider, M.S. (2022), An effective digital safeguarding system in university libraries: A model plan. *Data and Information Management*, 6(1), 100007 <https://doi.org/10.1016/j.dim.2022.100007>

Kerroum, K., Khiat, A., Bahnasse, A., Aoula, E.-S., & Khiat, Y. (2020) The proposal of an agile model for the digital transformation of the University Hassan II of Casablanca 4.0, *Procedia Computer Science*, 175, 403-410. <https://doi.org/10.1016/j.procs.2020.07.057>

Krasnov, S.V., Kalmykova, S.V., Abushova, E.E., & Krasnov, A.S. (2018). Problems of Quality of Education in the Implementation of Online Courses in the Educational Process, *2018 International Conference on High Technology for Sustainable Development (HiTech)*, 2018, 1-4. <http://doi.org/10.1109/HiTech.2018.8566618>

Loukil, Y.B.R., Kammoun, S., & Loukil, S. (2021) Fintech Development, Digital Infrastructure and Institutions in the MENA Zone, World Scientific Book Chapters, in: Zied Ftiti & Hachmi Ben Ameer & Waël Louhichi (ed.), *Financial and Economic Systems Transformations and New Challenges*, chapter 17, 481-506, World Scientific Publishing Co. Pte. Ltd

Litoussi, M., Fartitchou, M., Makkaoui, K.E., Ezzati, A., & Allali, Z.E. (2022), Digital Certifications in Moroccan Universities: Concepts, Challenges, and Solutions, *Procedia Computer Science*, 201, 95-100. <https://doi.org/10.1016/j.procs.2022.03.015>

Man, Z., Han-Teng Liao, H.-T., & Sun, S.-P. (2020) An Education Literature Review on Digitization, Digitalization, Datafication, and Digital Transformation, *Advances in Social Science. Education and Humanities Research*, 435, <https://doi.org/10.2991/assehr.k.200428.065>

Ochs, T., & Riemann, U.A. (2018) *Encyclopedia of Information Science and Technology*, Fourth Edition, IT Strategy Follows Digitalization: Computer Science & IT Book Chapter | IGI Global (igi-global.com) (accessed April 10, 2022)

Pu, R., Tanamee, D., & Jiang, S. (2022). Digitalization and higher education for sustainable development in the context of the Covid-19 Pandemic: A content analysis approach. *Problems and Perspectives in Management*, 20(1), 27-40, [http://doi.org/10.21511/ppm.20\(1\).2022.03](http://doi.org/10.21511/ppm.20(1).2022.03)

Roig-Marín, A., & Prieto, S. (2021). English literature students' perspectives on digital resources in a Spanish university. *The Journal of Academic Librarianship*, 47(6), 102461, ISSN 0099-1333, <https://doi.org/10.1016/j.acalib.2021.102461>

Scuotto, V., Serravalle, F., Murray, A., & Viassone, M. (2019) The Shift towards a Digital Business Model: A Strategic Decision for the Female Entrepreneur, 24p. <https://www.igi-global.com/chapter/the-shift-towards-a-digital-business-model/220028>

Shana, Z., & Abulibdeh, E.S. (2022) Cloud Computing Issues for Higher Education: Theory of Acceptance Model. <https://core.ac.uk/download/pdf/234942177.pdf>

Stoyanova, Ts, Stoyanov. Ph., Remnova, A., & Kushniruk, S. (2021) System-cluster technology of E-learning improvement under the conditions of COVID-19, *Sustainability*, 13(24), 14024; <https://doi.org/10.3390/su132414024>

Tang, Y.M., Chen, P.C., Law, K.M.Y., Wu, C.H., Lau, Y., Guan, J., He, D., & Ho, G.T.S. (2021) Comparative analysis of Student's live online learning readiness during the coronavirus (COVID-19) pandemic in the higher education sector. *Computers & Education*, 168, 104211 <https://doi.org/10.1016/j.compedu.2021.104211>

Toader, T., & Safta, M., Cristina Titirișcă, C., & Firtescu, B. (2021) Effects of Digitalisation on Higher Education in a Sustainable Development Framework—Online Learning Challenges during the COVID-19 Pandemic. *Sustainability*, 13(11), 6444; <https://doi.org/10.3390/su13116444>

Ugur, N.G. (2020). Digitalization in higher education: A qualitative approach. *International Journal of Technology in Education and Science (IJTES)*, 4(1), 18-25. <http://doi.org/10.46328/ijtes.v4i1.24>

Viberg, O., & Mavroudi, A. (2018) Digitalisation of Education: Application and Best Practices <http://www.diva-portal.org/smash/get/diva2:1296964/FULLTEXT01.pdf>

Wasserman, S. (2018). SAE to Create Standards for IoT, Big Data and the Digital Twin in the Aerospace Industry. Retrieved 16 March 2018, from <https://www.engineering.com/IOT/ArticleID/16278/SAE-to-Create-Standards-for-IoT-Big-Dataand-the-Digital-Twin-in-the-Aerospace-Industry.aspx>

Zancajo, A., Verger, A., & Bolea, P. (2022) Digitalization and beyond: the effects of Covid-19 on post-pandemic educational policy and delivery in Europe. *Policy and Society*, 41(1), 111–128. <https://doi.org/10.1093/polsoc/puab016>

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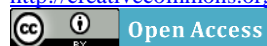
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FACTORS AFFECTING THE WORKING LIFE LENGTH OF OLDER PEOPLE IN THE EUROPEAN UNION *

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Abstract. Despite the fact that population ageing in the European Union is in full swing, and policy makers are pushing for extending of working lives, there is a group of older people, whose employment potential in labor market ends up dormant. The phenomenon of early retirement is worthy of a deeper research from the point of view of human resources management, as employers facing issues of digital economy often lose a skilled workforce and labor market is depleted of the potential of this group. The article is focused on the research of three factors in relation to the desire to retire early: "job satisfaction", "job physical demands" and "afraid health limits ability to work before regular retirement in job". The influence of selected factors on the desire of workers to retire early is specified through quantitative analysis of data from the SHARE - Survey of Health, Aging and Retirement in Europe. Chi-squared test of independence, Cramér's V for dependence tightness and standardized (adjusted) Pearson residuals are used for analyzes. Results show the strongest intensity of dependence in relation to the desire to retire early with the job satisfaction factor. There is a weak dependence tightness in factors of the job physical demands and the individuals' health limits within professional performance. The analysis shows that it is very important that employers try to make their employees satisfied with job, because the consequences of such an effort are reflected in the employees' decision making whether to stay in job or to leave labor market through early retirement.

Keywords: early retirement; older people; questionnaires

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1. Introduction

There are various reasons for extending the working lives of older people in the European Union (EU). The aging of countries' populations (Belloni et al. 2019) and retirement policies (Stiller et al. 2021) that take this phenomenon into account are probably the initial impulses for the growing proportion of economically active people in the labor market. On the one hand, in addition to policies to prolong working lives, gradual retirement or active aging, there is a group of people whose employment potential remains untapped in the labor market and prefers early retirement. Monitoring the early retirement phenomenon is important from the point of view of human resources management to identify trends and causalities of older people's learning and development to keep them competitive in the digital economy and to capture the changes in the labor market structure as well. What are the factors and motives influencing the working life of older people who opt for this non-mainstream solution?

This article is focused on the research of factors of job satisfaction, physical demands of work performed and individuals' health limits within professional performance in relation to the decision to early retirement in selected EU countries. The presumption of the chosen relationships is based on the assertion that job dissatisfaction (Jackson et al. 2018), physical demands (Sundstrup et al. 2021) and deteriorating health (Axelrad 2018; Qvist 2021) result in early retirement. Data for this research come from the SHARE database - Survey of Health, Aging and Retirement in Europe. The aim of the article is to specify the impact of selected factors on the desire of workers to retire early through quantitative analysis. The paper continues as follows: theoretical background, research objective and methodology, results and discussion, conclusions.

2. Theoretical background

The employment of older people is at the heart of researchers' attention, mainly due to the global phenomenon of population aging. The very phenomenon of longevity (European Commission, Eurostat 2020) or age structure (Kumar et al. 2021) is an essential factor with regard to active economic life. Literature review is focused on factors related to the extending of working lives of older people in the labor market and on factors influencing early retirement.

The factors and reasons for extending the working life of older people in retirement age are diverse. On the one hand, there is a group that indicates the lower importance of factors of financial motivation and job stability (Łaszkiewicz, Bojanowska 2017) and higher job satisfaction, and on the other one that needs to ensure or increase a sufficient income and pension base (European Commission, Eurostat 2020), or preferring the well-being of state-guaranteed social benefits: financial benefits, health care, the opportunity to reconcile work and family responsibilities (Aidukaite, Blaziene 2021). The decision to work at an older age may stem from self-confidence in one's own work performance in conjunction with adequate health (You, Lee 2021; Kalenkoski, McCarty 2021), in flexibility of work attendance (Principi et al. 2018), in a vision of qualified, decent and sustainable work that makes sense (Fournier et al. 2018), but also for fear of losing dignity by acquiring retired status for men (Daye 2005) or lower income (Principi et al. 2018; Moskvina 2022). One reason may be financial incentives for employers to employ older people (Focarelli, Zanghieri 2005). Older people who choose to work in retirement age are mainly employed part-time (Vodopivec, Arunatilake 2011; European Commission, Eurostat 2020; Mao, Normand 2022) or decide to start a business (Wahrendorf et al. 2017; European Commission, Eurostat 2020) when they experience a higher level of life satisfaction (Axelrad et al. 2020). Education and training (McNair 2006; Fuchs 2013; Rutkiene, Lengvinienė 2016; Kadlecova 2018; Midtsundstad, Nielsen 2019; Ambarova, Zborovsky 2019; Blien, Hirschenauer 2020) is an important and supportive prerequisite for older people remaining economically active in the labor market. Another decisive factor in prolonging the working life of older people is their health status (Wahrendorf et al. 2016; Wahrendorf et al. 2017; Ćwirlej-Sozańska et al. 2018; Neary

et al. 2019; Cristea et al. 2020). Older people in European countries, where GDP growth and unemployment are higher, retire later (Axelrad 2018). The reasons for extending the working life of women from a gender perspective are colleagues, job description, opportunity for development and advancement, positive contribution to the running of the organization, challenging work challenges, flexible working conditions, small group work (Edge et al. 2017) and fertility (Stafford et al. 2019).

On the contrary, non-extension of older people's working lives is reflected in the most common reasons for leaving the last job, such as normal retirement, end of service, dismissal or redundancy, illness or disability, early retirement, childcare or incapacity for adults, personal or family reasons (European Commission, Eurostat 2020). The low participation of older people in the labor market is strongly linked to the culture of retirement (Jansen 2013; Jansen 2018), but also to the desire to remain on well-deserved rest and a sense of moral responsibility for vacating the younger generation of workers (Principi et al. 2018). Discrimination of older people in the labor market is a significant demotivating factor in working life (Brazienė, Mikutavičienė 2015; Sobolewska-Poniedzialek, Niewiadomska 2016; Topgul 2016; Pawera, Jančíková 2017; Krajňáková, Vojtovič 2017; Kozina, Zangieva 2018; Amorim et al. 2019; You, Lee 2021). The cause (Edge et al. 2017) and consequence (Whitley, Popham 2017) of deciding not to continue working life in old age tends to deteriorate, but mental decline has not been reported in the cognitive abilities of retired individuals who have acquired a difficult career working with people (Meng et al. 2017). Widowing plays an important role in not prolonging working life (Schreiber 2018) as well. From a gender perspective, the reasons for not prolonging the working life of older women are social and leisure activities, caring for relatives, level of education and employment, social class, status, negative social norms and prejudices about aging (Edge et al. 2017), traditional gender role in employment (Van der Horst et al. 2017; European Commission, Eurostat 2020) and increased early retirement (Fischer, Müller 2020). Groups of low-skilled women working in industry or occupations who require low or average skills and those living with a non-working partner are less likely to prolong working lives (Hardy et al. 2018).

Early retirement in European countries is preferred where there is a low gross domestic product growth and / or deteriorating health conditions (Axelrad 2018). The low and middle income classes of Norway are stimulated by the tax system for early retirement (Hernoes et al. 2000) and for males it is caused by low autonomy in their job as well (Blekesaune, Solem 2005). In Croatia, the reasons for early retirement are employment in the private sector, low quality of life, lower education and deteriorating health (Badun, Smolic 2018). Topa et al. (2018) point to the importance of reasons for early retirement such as the timing of the employer's pension, organizational pressure, financial security, deteriorating health. Rheumatoid arthritis is a specific reason for early retirement due to medical conditions in Portugal (Luis et al. 2020). Moreira et al. (2018) found that the most likely reason for early retirement is a disproportionate effort and appreciation at work. Risk factors for early retirement in Denmark are working in poor health, previous periods of unemployment and poor quality of work (Qvist 2021).

3. Research objective and methodology

The EU labor market is beginning to show labor shortages at present. Based on forecasts of population development and aging, it can be assumed that labor shortages in the EU will increase in the future (Eurostat 2022). Approaches that allow employers to keep employees in their jobs for as long as possible will therefore become increasingly important. The work skills, abilities and competences of employees who retire early are not fully used. It is possible to assume that a significant part of employees who retire early would be willing to stay in work if certain conditions are met. A change in their decision could be positive for both the employer and the labor market.

The research is focused on the quantitative analysis of the data of the SHARE (2022) questionnaire - Survey of Health, Aging and Retirement in Europe. The aim of the article is to specify the influence of selected factors on the desire of workers to retire early. Selected factors are: "satisfied with (main) job", "job physically demanding",

"job afraid health limits ability to work before regular retirement in (main) job". These factors are included in the SHARE questionnaire survey in the form of questions. The rationale for the choice of factors is given in the section below. The quantitative analysis is aimed for verification of dependencies between the desire to retire early and selected factors. There is expressed the intensity of the dependence between them in the next step. Finally, the analysis is focused on the relationships significance. Thus, based on the answers to the questions related to the factors, it is found out whether it is possible to anticipate what the answers will be to the desire to retire early. Research can provide employers with important information related to influencing employees' desire to retire early.

The source of the data researched is the answers within the systematic questionnaire survey SHARE - Survey of Health, Aging and Retirement in Europe, which is aimed at people aged 50 and over in Europe. The survey is organized regularly and the answers are published. The first wave of research was conducted in 2004. This research is primarily based on a questionnaire survey focused on Employment and Pensions. Data from the Wave 8 are used, which was conducted in 2019 and 2020 (Börsch-Supan et al. 2013; Gruber et al. 2014; Bergmann, Börsch-Supan 2021, Börsch-Supan 2022; Börsch-Supan, Gruber 2022). The research is limited to the EU countries that were involved in the SHARE survey. Thus, the answers of respondents are used from the following EU countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain and Sweden. Switzerland and Israel are European countries in which a questionnaire survey is also conducted. However, focus is on EU countries, so the results of the questionnaire survey from both countries are not used.

This is process how the dependent random variable is chosen. Initial focus in the survey is on respondents' desire to retire early. It is found out from the answer to the question from the questionnaire "Employment and pensions": "Are you looking for early retirement in (main) employment?". Respondents' answers could be: "Rejection", "I don't know", "Yes" and "No".

This is process how the independent random variables are chosen. There are many factors that affect the desire to retire early. Job satisfaction is important when making decisions. This is determined in various ways. One of them is "the balance between efforts and rewards in the last job" (Schnalzenberger et al. 2014). Another option is to evaluate job satisfaction based on the subjective feeling of workers. The research is focused on the subjective feelings of workers. It is used the answer to the question "satisfied with (main) job. Job satisfaction may depend on a variety of factors. It is limited both by the employee and by the type of work. Thus, the intention is to find out whether satisfaction or dissatisfaction with job directly depend on the physical abilities of the worker or on the complexity of the job. Because of this reason, it is paid attention to the health possibilities of workers and the physical demands of job as well.

The research is focused on three factors:

- "satisfied with (main) job",
- "job physically demanding",
- "afraid health limits ability to work before regular retirement in (main) job", which are evaluated on the basis of the subjective feeling of workers.

It can summarized from the mentioned above that the following research issues are addressed:

- 1/ How does "satisfied with (main) job" affect the desire to retire early?
- 2/ How does "job physically demanding" affect the desire to retire early?
- 3/ How does "job afraid health limits ability to work before regular retirement in (main) job" affect the desire to retire early?

The procedure is as follows:

- Null and alternative hypotheses are formulated.
- Null hypotheses are verified by the Chi-squared test of independence. The p-value is expressed in addition and conclusion of hypothesis testing is made.
- The dependence tightness (intensity) is expressed by the Cramér's V coefficient.
- It is identified where the relationship is occurred by using standardized (adjusted) Pearson residuals (Vomáčka 2022).

Part of the quantitative analysis of the questionnaire results is the testing of statistical hypotheses using Chi-squared test of independence, Cramér's V for dependence tightness and standardized (adjusted) Pearson residuals, which are used to determine how the relationships indicate.

Chi-squared (χ^2) test of independence is used to analyze the relationship between the nominal random variable: "satisfied with (main) job", which has the values "Refusal", "Don't know", "Yes" and "No" and other random variables. The null hypothesis of H_0 is that there is no dependence between the random variables. An alternative hypothesis H_1 is that there is a dependence between random variables. The statistics of χ^2 shall be expressed on the basis of empirical figures in a contingency table and on the basis of expected numbers based on the relationship

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

where R is the number of rows and S is the number of columns, n_{ij} are empirical numbers in the i -th row and in the j -th column of the contingency table, m_{ij} are the expected (theoretical) values. Statistics of χ^2 take values from the interval $\langle 0, n(q-1) \rangle$, where q is the minimum of the number of rows and the number of columns in the contingency table, n is the file range. Statistics of χ^2 have $(R-1)(S-1)$ degrees of freedom (df). A prerequisite for the use of Chi-squared test of independence is that the expected numbers do not have a value of less than 5 in at least 80% of the fields and values of at least 1 occurred in the other fields (Řezanková 2007).

The dependence tightness (intensity) is expressed on the basis of the coefficient ϕ , which can be derived from the Bravais-Pearson correlation coefficient r (Claus, Ebner 1988). If at least one random variable is dichotomous, then the coefficient ϕ is equal to the Cramér's V (Řezanková 2007). It is applied that:

$$\phi = \sqrt{\frac{\chi^2}{n}},$$

$$V = \sqrt{\frac{\chi^2}{n(q-1)}},$$

where q is the minimum of the number of rows and the number of columns in contingency table, n is the number of units. Statistical hypotheses testing is evaluated on the basis of the p-level. The analyzes are made in the Statistica and SPSS programs.

Standardized (adjusted) Pearson residuals are used to find out where the relationship is. It allows to find out in which parts of the contingency table the relationship between random variables indicates itself. Adjusted residuals are residuals divided by standard error of estimate. Standardized residuals are expressed in units of standard deviation above or below the average.

4. Results and discussion

Regarding the goal of the research:

- Null and alternative statistical hypotheses are formulated. Their aim is to verify the relationship between the desire to retire early and the three selected factors.
- In the next step dependence tightness (intensity) is verified.
- More detailed indication of relationship itself is defined if there is a relationship between the random variables. Conclusions are drawn by comparing the number of actual responses with the counts of expected values.

In the case of "satisfied with (main) job", it is assumed that if respondents are dissatisfied with job, it leads to earlier retirement (Jackson et al. 2018). More precisely, if the respondents are not satisfied with the job, then to the question "Early retirement" the actual values of the answers "Yes" are more frequent than expected and less often than expected are the answers "No". At the same time, it is assumed that if the respondents are satisfied with the work, they answer "Yes" to the question "Early retirement" less often than expected and answer "No" more often than expected.

In the case of "physically demanding job", it is assumed that when respondents answer "Strongly agree" and "Agree", they answer "Yes" to the question "Early retirement" more often, that they want to retire early and less often answer "No" as is expected.

In the case of "afraid health limits ability to work before regular retirement in (main) job", it is assumed that when respondents answer "Yes" they answer "Yes" to the question "Early retirement" more often, they want to retire early and less often they answer "No" as expected.

Null hypothesis 1H0

There is no dependence between the random variables "Satisfied with (main) job" and "Early retirement".

Alternative hypothesis 1H1

There is a dependence between the random variables "Satisfied with (main) job" and "Early retirement".

"Satisfied with (main) job" has the following answer options: "Strongly agree", "Agree", "Disagree", "Strongly disagree", "Refusal" and "Don't know".

Table 1. Contingency table

Satisfied with (main) job	Early retirement		Sum
	Yes	No	
Strongly agree	636	1792	2428
Agree	1312	1186	2498
Disagree	287	63	350
Strongly disagree	55	11	66
Sum	2290	3052	5342

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

There are excluded answers where respondents did not know or did not want to comment. The answers: "Refusal" and "Don't know" are excluded for both random variables. The research is based on the answers from 5342 respondents. 2925 for females (54.75%) and 2417 for males (45.25%) of the total number of respondents.

The number of responses is given in the contingency table (Table 1.). None of the expected values is less than 5. The lowest expected value is 28.293. The condition for using the Chi-squared test of independence is met. There are expressed contingency tables in the Statistica program from the data, calculated the expected value (Table 2.), calculated the chi-squared statistic value (Table 2.) and the p-level (Table 2.).

Table 2. Expected values

Pearson's χ^2 : 633.633, df=3, p=0.000			
Satisfied with (main) job	Early retirement		Sum
	Yes	No	
Strongly agree	1040.831	1387.169	2498.000
Agree	1070.839	1427.161	2428.000
Disagree	150.037	199.963	66.000
Strongly disagree	28.293	37.707	350.000
Sum	2290.000	3052.000	5342.000

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

Based on the p-level, the null hypothesis H_0 is rejected and the alternative hypothesis H_1 is accepted. There is a dependence between the random variables "Satisfied with (main) job" and "Early retirement". Cramér's V is used to express the dependence tightness (intensity). Its value is 0.344. The p-level is less than or equal to 0.001. The coefficient ϕ is statistically significant. It can be stated that there is a weak to medium dependence between the random variables "Satisfied with (main) job" and "Early retirement".

Based on standardized (adjusted) Pearson residuals (Table 3.), it can be concluded that respondents who answered the question "Satisfied with (main) job" that they are "Strongly agree" to the question "Early retirement" answered "Yes" less often than expected and more often as expected they answered "No". For the other positive answers (i.e. "Agree") to the question "Satisfied with (main) job", the actual values of the answers "Yes" to the question "Early retirement" were more frequent than expected and the answers "No" were less often than expected. Similar tendencies were observed when respondents answered "Satisfied with (main) job" with "Disagree" or "Strongly disagree".

Table 3. Adjusted residuals/Standardized residuals

Adjusted Residual/Standardized residual		
Satisfied with (main) job	Early retirement	
	Yes	No
Strongly agree	-22.5/-12.5	22.5/10.9
Agree	13.4/7.4	-13.4/-6.4
Disagree	15.3/11.2	-15.3/-9.7
Strongly disagree	6.7/5.0	-6.7/-4.3

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

It can be concluded from the stated above that workers who are dissatisfied with job in both levels tend to retire early to a greater extent, respectively to a lesser extent not to retire early than expected.

The degree of statement is important for workers who are satisfied with their job. Only workers who are "Strongly agree" with their job tend to retire less often than expected or more often not to retire early. In the case of "Agree" answers, the tendencies are similar to those in which the workers are not satisfied with the work.

It follows that employers should care about employees being significantly satisfied ("Strongly agree") with their job. If employees are dissatisfied with job of various degrees, then for the employer, this means that employees will want to leave to early retirement more than expected.

Null hypothesis 2H0

There is no dependence between "Job physically demanding" and "Early retirement".

Alternative hypothesis 2H1

There is a dependence between "Job physically demanding" and "Early retirement".

"Job physically demanding" has the following answer options: "Strongly agree", "Agree", "Disagree", "Strongly disagree", "Refusal" and "Don't know".

Table 4. Contingency table

Job physically demanding	Early retirement		Sum
	Yes	No	
Strongly agree	591	530	1121
Agree	691	736	1427
Disagree	619	981	1600
Strongly disagree	390	806	1196
Sum	2291	3053	5344

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

The answers where respondents did not know or did not want to comment are excluded. The answers: "Refusal" and "Don't know" are excluded for both random variables. There are used answers total of 5344 respondents (Table 4.). None of the expected values is less than 5. The minimum expected value is 480.58. The condition for using the Chi-squared test of independence is met.

Based on the p-level (Table 5.), the null hypothesis 2H0 is rejected and the alternative hypothesis 2H1 is accepted. There is a dependence between the random variables "Job physically demanding" and "Early retirement". Cramér's V is used to express the intensity of the dependence. Its value is 0.280. The p-level is less than or equal to 0.001. The coefficient ϕ is statistically significant. It can be stated that there is a weaker intensity of dependence between the random variables than in the case of the dependence between the random variables "Satisfied with (main) job" and Early retirement ".

Table 5. Expected values

Pearson's χ^2 : 125.229, df=3, p=0.000			
	Early retirement		
Job physically demanding	Yes	No	Sum
Strongly agree	480.578	640.422	1121.000
Agree	611.762	815.238	1427.000
Disagree	685.928	914.072	1600.000
Strongly disagree	512.731	683.269	1196.000
Sum	2291.000	3053.000	5344.000

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

Based on standardized (adjusted) Pearson residuals (Table 6.), it can be concluded that respondents who answered "Strongly agree" and "Agree" in connection with "Job physically demanding" answered the question "Early retirement" "Yes" more often than expected and instead answered "No" less often than expected. The opposite situation was with the answers "Disagree" and "Strongly disagree".

Table 6. Adjusted residuals/Standardized residuals

Adjusted residual/Standardized residual		
Job physically demanding	Early retirement	
	Yes	No
Strongly agree	7.5/5.0	-7.5/-4.4
Agree	5.0/3.2	-5.0/-2.8
Disagree	-4.0/-2.6	4.0/2.2
Strongly disagree	-8.1/-5.4	8.1/4.7

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

Null hypothesis 3H0

There is no dependence between "Afraid health limits ability to work before regular retirement in (main) job" and "Early retirement".

Alternative hypothesis 3H1

There is a dependence between "Afraid health limits ability to work before regular retirement in (main) job" and "Early retirement".

"Afraid health limits ability to work before regular retirement in (main) job" has the following answer options: "Strongly agree", "Agree", "Disagree", "Strongly disagree", "Refusal" and "Don't know".

Table 7. Contingency table

Afraid health limits ability to work before regular retirement in (main) job	Early retirement		Sum
	Yes	No	
Yes	1326	2133	3459
No	649	3449	4098
Sum	1975	5582	7557

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

The answers where respondents did not know or did not want to comment are excluded. The answers: "Refusal" and "Don't know" are excluded for both random variables. There are used answers total of 7557 respondents (Table 7.). None of the expected values is less than 5. The minimum expected value is 904. The condition for using the Chi-squared test of independence is met.

Table 8. Expected values

Pearson's χ^2 : 491.807 df=1, p=0.000			
Afraid health limits ability to work before regular retirement in (main) job	Early retirement		Sum
	Yes	No	
Yes	904.000	2555.000	3459.000
No	1071.000	3027.000	4098.000
Sum	1975.000	5582.000	7557.000

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

Based on the p-level (Table 8.), the null hypothesis H_0 is rejected and the alternative hypothesis H_1 is accepted. There is a dependence between the random variables "Afraid health limits ability to work before regular retirement in (main) job" and "Early retirement". Cramér's V is used to express the intensity of the dependence. Its value is 0.255. The p-level is less than or equal to 0.001 (Table 8.). The coefficient ϕ is statistically significant. It can be stated that between the random variables there is a weaker intensity of dependence than in the case of "Satisfied with (main) job" and "Job physically demanding".

Table 9. Adjusted residuals/Standardized residuals

Adjusted Residual/Standardized residual		
Afraid health limits ability to work before regular retirement in (main) job	Early retirement	
	Yes	No
Yes	22.2/14.0.	-22.2/-8.3
No	-22.2/-12.9	22.2/7.7

Source: own calculations based on data from Börsch-Supan et al. (2013), Gruber et al. (2014), Bergmann, Börsch-Supan (2021), Börsch-Supan (2022), Börsch-Supan, Gruber (2022), SHARE (2022)

Based on standardized (adjusted) Pearson residuals (Table 9.), it can be concluded that respondents who answered "Yes" in relationship with "Afraid health limits ability to work before regular retirement in (main) job" answered the question "Early retirement" "Yes" more often than expected and less often said "No". The opposite situation

was when the respondents answered "No" to the question "Afraid health limits ability to work before regular retirement in (main) job".

The strongest intensity of dependence is in the case of "Satisfied with (main) job" and "Early retirement" from the analyzes above. Satisfaction with job therefore appears to be an important factor that influences respondents' desire to retire early. In the other two cases, the intensity of dependence is weak.

The relationship assumed was based on the statement: dissatisfaction with job leads to earlier retirement by Jackson et al. (2018). The results of research confirm the statement. However, the opposite statement that job satisfaction does not lead to early retirement was not confirmed. The degree of satisfaction (consent) is important for respondents who are satisfied with their work. Only respondents who are "Strongly agree" with their job tend to retire early less often than expected or more often not retire early than expected. In the case of "Agree" answers, the tendencies are similar to those in which the respondents are not satisfied with their job. Thus, respondents are influenced by other factors when deciding to retire early in this case. The disadvantage for employers is that if employees are not satisfied with the job, then in both response intensities they want to retire more than expected, but if they are satisfied with the job, then only in the case of "Strongly agree" they have the desire less often retire early than expected. What leads employees to say that their job satisfaction claim is "Strongly agree" will be the subject of the further research.

The article is focused on early retirement. It is affected by several factors. One of them is the minimum retirement age and the minimum number of years of service, which vary from one EU country to another. It is assumed that the higher the retirement age, the more employees will want to retire early. However, specifics of individual countries are not taken into account. As part of the analyzes, respondents who did not answer the question or answered I do not know or did not want to answer are excluded. Such exclusion may cause distortion.

4. Conclusions

The research is focused on the factors that influence employees in their decision to retire early. Early retirement can affect both the employer and the labor market. Suddenly, when an employee retires early, the employer may lack his knowledge, skills and competences. The retirement of a large proportion of employees can significantly reduce the size of the workforce and thus have a negative impact on the labor market.

SHARE - Survey of Health, Aging and Retirement in Europe questionnaires were used to research the influence of factors on the decision to retire early and the results of respondents from EU countries were evaluated by quantitative analysis. The aim of our paper was to specify the influence of selected factors on the desire of workers to retire early. The selected factors were: "satisfied with (main) job", " job physically demanding ", "job afraid health limits ability to work before regular retirement in (main) job". The research used the Chi-squared (χ^2) test of independence and Cramér's V is used to express the intensity of the dependence. Standardized (adjusted) Pearson residuals were used to find out how the relationships indicate.

Based on the quantitative analysis, it can be summarized that the strongest intensity of dependence is in the case of "Satisfied with (main) job" and "Early retirement". Job satisfaction is a significant factor that influences respondents in their decision to retire early. The analyzes confirm the statement that dissatisfaction with job leads to early retirement. The argument that job satisfaction does not lead to early retirement was not confirmed. The degree of satisfaction is important for respondents who are satisfied with their work. Respondents who are "Strongly agree" with their jobs thus tend to retire early less often than expected or more often not retire early than expected. However, in the case of "Agree" answers, the tendencies are similar to those in which the respondents are not satisfied with their work. The analysis shows that it is very important that employers try to make their employees very satisfied with their job. Ultimately, such an effort for job satisfaction will be return to

employers back. The phenomenon of early retirement is to be researched in a more detailed way from the perspective of human resources management, because at the time of digital economy change (Szeles, Simionescu 2020; Herman 2022), employers cannot afford to let productive employees leave and labor markets to lose skilled workforce as one of the pillars of competitiveness of economies (Navarro et al. 2017).

References

- Aidukaite, J., & Blaziene, I. (2021). Longer Working Lives – What Do They Mean in Practice – a Case of the Baltic Countries. *International Journal of Sociology and Social Policy*. <http://doi.org/10.1108/IJSSP-02-2021-0049>
- Ambarova, P., & Zborovsky, G. (2019). Vocational Education for People of «Silver Age»: Strategy for Preserving Elderly Employees on the Labor Market. In T. Loster, & T. Pavelka (Ed.), *The 13th International Days of Statistics and Economics* (pp. 20-29). Prague (Czech Republic): Melandrium. DOI: <http://doi.org/10.18267/pr.2019.los.186.3>
- Amorim, W., Fischer, A., & Bitencourt Fevorini, F. (2019). Workers Age 50 and Over in the Brazilian Labor Market: Is There Ageism? (A. M. de Mello, Ed.) *Revista de Gestão*, 26 (2), 161-179. <http://doi.org/10.1108/REGE-09-2018-0092>
- Axelrad, H. (2018). Early Retirement and Late Retirement: Comparative Analysis of 20 European Countries. *International Journal of Sociology*, 48 (3), 231-250. <http://doi.org/10.1080/00207659.2018.1483004>
- Axelrad, H., Sherman, A., & Luski, I. (2020). The Effect of Employment on the Subjective Well-Being of 60–80 Years Old People. *International Journal of Social Economics*, 47 (12), 1481-1497. <http://doi.org/10.1108/IJSE-04-2020-0212>
- Badun, M., & Smolic, S. (2018). Predictors of Early Retirement Intentions in Croatia. *Drustvena Istrazivanja*, 27 (4), 671-690. <http://doi.org/10.5559/di.27.4.05>
- Belloni, M., Buia, R. E., Kovacic, M., & Meschi, E. (2019). Working conditions and health of older workers. In Börsch-Supan, A., J. Bristle, K. Andersen-Ranberg, A. Brugiavini, F. Jusot, H. Litwin, G. Weber (Eds.), *Health and Socio-Economic Status over the Life Course. First Results from SHARE Waves 6 and 7*. Berlin: De Gruyter. <http://doi.org/10.1515/9783110617245-016>
- Bergmann, M. & Börsch-Supan, A. (Eds.) (2021). *SHARE Wave 8 Methodology: Collecting Cross-National Survey Data in Times of COVID-19*. Munich: MEA, Max Planck Institute for Social Law and Social Policy.
- Blekesaune, M., & Solem, P. E. (2005). Working conditions and early retirement - A prospective study of retirement behavior. *Research on Aging*, 27 (1), 3-30. <http://doi.org/10.1177/0164027504271438>
- Blien, U., & Hirschenauer, F. (2020). Labour Supply and Regional Labour Market Situation. *Raumforschung und Raumordnung-Spatial Research and Planning*, 78 (6), 595-613. <http://doi.org/10.2478/rara-2020-0033>
- Börsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbacher, J., Malter, F., Schaan, B., Stuck, S., & Zuber, S. (2013). *Data Resource Profile: The Survey of Health, Ageing and Retirement in Europe (SHARE)*. *International Journal of Epidemiology*. DOI: [10.1093/ije/dyt088](https://doi.org/10.1093/ije/dyt088)
- Börsch-Supan, A. (2022). *Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 8*. Release version: 8.0.0. SHARE-ERIC. Data set. DOI: [10.6103/SHARE.w8.800](https://doi.org/10.6103/SHARE.w8.800)
- Börsch-Supan, A., & Gruber, S. (2022). *easySHARE*. Release version: 8.0.0. SHARE-ERIC. Data set DOI: [10.6103/SHARE.easy.800](https://doi.org/10.6103/SHARE.easy.800)
- Brazienė, R., & Mikutavičienė, I. (2015). The Expression of the Age Discrimination in the Lithuanian Labour Market. *Filosofija Sociologija*, 26 (2), 87-98. Retrieved November 25, 2021, from <http://etalpykla.lituanistikadb.lt/fedora/objects/LT-LDB-0001:J.04~2015~1481293034037/datastreams/DS.002.0.01.ARTIC/content>
- Claus, G., & Ebner, H. (1988). *Základy štatistiky*. Bratislava: Slovenské pedagogické nakladateľstvo.
- Cristea, M., Noja, G. G., Stefea, P., & Sala, A. L. (2020). The Impact of Population Aging and Public Health Support on EU Labor Markets. *International Journal of Environmental Research and Public Health*, 17 (4), 1439. <http://doi.org/10.3390/ijerph17041439>

Ćwirlej-Sozańska, A., Wiśniowska-Szurlej, A., Wilmowska-Pietruszyńska, A., Sozański, B., & Wołoszyn, N. (2018). Assessment of Psychological Capacities for Professional Work in Late Middle Age and at the Beginning of Old Age. *Medycyna Pracy*, 69 (4), 375-381. <http://doi.org/10.13075/mp.5893.00680>

Daye, G. (2005). Care of Europe's Older People. *Quality in Ageing and Older Adults*, 6 (2), 21-25. <http://doi.org/10.1108/14717794200500012>

Edge, C. E., Cooper, A. M., & Coffey, M. (2017). Barriers and Facilitators to Extended Working Lives in Europe: a Gender Focus. *Public Health Reviews*, 38 (2), 1-27. <http://doi.org/10.1186/s40985-017-0053-8>

European Commission, Eurostat. (2020). *Ageing Europe: Looking at the Lives of Older People in the EU: 2020 edition*. (L. Corselli-Nordblad, editor, H. Strandell, editor) Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2785/628105>

Eurostat. (2022). Population on 1st January by Age, Sex, and Type of Projection. Retrieved March 28, 2022, from https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_19np&lang=en

Fischer, B., & Müller, K.-U. (2020). Time to Care? The Effects of Retirement on Informal Care Provision. *Journal of Health Economics*, 73, 102350. <http://doi.org/10.1016/j.jhealeco.2020.102350>

Focarelli, D., & Zanghieri, P. (2005). Labour Force Participation of Older Workers in Italy: Trends, Causes and Policy Issues. *The Geneva Papers*, 30, 711-723. <http://doi.org/10.1057/palgrave.gpp.2510047>

Fournier, G., Zimmermann, H., Masdonati, J., & Gauthier, C. (2018). Job Loss in a Group of Older Canadian Workers: Challenges in the Sustainable Labour Market Reintegration Process. *Sustainability*, 10 (7), 2245. <http://doi.org/10.3390/su10072245>

Fuchs, J. (2013). Demography and Labor Shortage. Future Challenges of Labor Market Policy. *Bundesgesundheitsbl*, 56 (3), 399-405. <http://doi.org/10.1007/s00103-012-1616-y>

Gruber, S., Hunkler, C. & Stuck, S. (2014). *Generating easySHARE: guidelines, structure, content and programming*. SHARE Working Paper Series (17-2014). Munich: MEA, Max Planck Institute for Social Law and Social Policy.

Hardy, W., Kielczewska, A., Lewandowski, P., & Magda, I. (2018). Job Retention Among Older Workers in Central and Eastern Europe. *Baltic Journal of Economics*, 18 (2), 69-94. <http://doi.org/10.1080/1406099X.2018.1514562>

Herman, E. (2022). The Interplay between Digital Entrepreneurship and Sustainable Development in the Context of the EU Digital Economy: A Multivariate Analysis. *Mathematics*, 10 (10), 1682. <http://doi.org/10.3390/math10101682>

Hernoës, E., Sollié, M., & Strom, S. (2000). Early retirement and economic incentives. *Scandinavian Journal of Economics*, 102 (3), 481-502. <http://doi.org/10.1111/1467-9442.00211>

Jackson, T. N., & Percy, C. P., Khorgami, Z., Agrawal, V., Taubman, K. E., Truitt, M. S. (2018). The Physician Attrition Crisis: A Cross-Sectional Survey of the Risk Factors for Reduced Job Satisfaction Among US Surgeons. *World Journal of Surgery*, 42 (5), 1285-1292. <http://doi.org/10.1007/s00268-017-4286-y>

Jansen, A. (2013). Kulturelle Muster des Altersübergangs: Der Einfluss kultureller Normen und Werte auf die Erwerbsbeteiligung älterer Menschen in Europa. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 65, 223-251. <http://dx.doi.org/10.1007/s11577-013-0202-0>

Jansen, A. (2018). Work-Retirement Cultures: A Further Piece of the Puzzle to Explain Differences in the Labour Market Participation of Older People in Europe? *Ageing & Society*, 38, 1527-1555. <http://dx.doi.org/10.1017/S0144686X17000125>

Kadlecova, M. (2018). Older Persons on the Labour Market. In T. Loster, J. Langhamrova, & J. Vrabcova (Ed.), *Reproduction Of Human Capital - Mutual Links and Connections* (Relik 2018), (pp. 151-162). Prague (Czech Republic): Univ Econ, Fac Informat & Stat, Dept Demog. Retrieved November 25, 2021, from <https://relik.vse.cz/2018/download/pdf/183-Kadlecova-Michaela-paper.pdf>

Kalenkoski, C., & McCarty, S. (2021). In or Out or Somewhere in Between? The Determinants of Gradual Retirement. *Journal of Family and Economic Issues*, 1-8. <http://doi.org/10.1007/s10834-020-09734-4>

Kozina, I., & Zangieva, I. (2018). State and Market Regulation of Labour Activity of Old-Age Pensioners. *The Journal of Social Policy Studies*, 1 (16), 7-22. <http://doi.org/10.17323/727-0634-2018-16-1-7-22>

- Krajňáková, E., & Vojtovič, S. (2017). Struggles of Older Workers at the Labour Market. *Economics and Sociology*, 10 (1), 319-333. <http://dx.doi.org/10.14254/2071-789X.2017/10-1/23>
- Kumar, D., Nitin, B., & Kumar, I. (2021). The Role of Age Structure and Occupational Choices in the Indian Labour Market. *International Journal of Social Economics*, 48 (12), 1718-1739. <http://doi.org/10.1108/IJSE-01-2021-0067>
- Łaskiewicz, E., & Bojanowska, A. (2017). The Future of Polish Labour Market and the Issue. *Folia Oeconomica, Acta Universitas Lodzensis*, 328 (2), 75-89. <http://doi.org/10.18778/0208-6018.328.05>
- Luis, M., Garcia, S., Guimaraes, F., Antonio, M., Fernandes, A. L., Araujo, F., . . . Duarte, C. (2020). Early retirement attributed to rheumatoid arthritis and its predictors. *Acta Reumatologica Portuguesa*, 45 (3), 177-182. Retrieved May 23, 2022, from <https://pubmed.ncbi.nlm.nih.gov/33139676/>
- Mao, L., & Normand, C. (2022). The effect of volunteering on employment: Evidence from The Irish Longitudinal Study on Ageing (TILDA). *The Journal of the Economics of Ageing*, 21 (100350), 1-12. <http://doi.org/10.1016/j.jeoag.2021.100350>
- McNair, S. (2006). How Different is the Older Labour Market? Attitudes to Work and Retirement among Older People in Britain. *Social Policy & Society*, 5 (4), 485-494. <http://doi.org/10.1017/S1474746406003198>
- Meng, A., Andersen Nexø, M., & Borg, V. (2017). The Impact of Retirement on Age Related Cognitive Decline – a Systematic Review. *BMC Geriatrics*, 17, 160, 1-10. <http://doi.org/10.1186/s12877-017-0556-7>
- Midtsundstad, T., & Nielsen, R. O. (2019). Lifelong Learning and the Continued Participation of Older Norwegian Adults in Employment. *European Journal of Education*, 54, 48-59. <http://dx.doi.org/10.1111/ejed.12322>
- Moreira, A., Azevedo, A. B., & Botelho, L. P. (2018). Reducing Early Retirement in Europe: Do Working Conditions Matter? *Journal of Population Ageing*, 11(3), 265-284. <http://doi.org/10.1007/s12062-017-9186-2>
- Moskvina, J. (2022). Work after Retirement: The Evidence of Sustainable Employment from Lithuanian Enterprise. *Insights into Regional Development*, 4(2), 52-62. [https://doi.org/10.9770/IRD.2022.4.2\(4\)](https://doi.org/10.9770/IRD.2022.4.2(4))
- Navarro, T. M., Duran, F. M., & Santos, J. S. (2017). A Regional Competitiveness Index for Spain. *Revista De Estudios Regionales*, 109, 67-94. Retrieved June 08, 2022, from <http://www.revistaestudiosregionales.com/documentos/articulos/pdf-articulo-2520.pdf>
- Neary, J., Katikireddi, S. V., Brown, J., Macdonald, E. B., & Thomson, H. (2019). Role of Age and Health Perception of Returning to Work: a Qualitative Study. *BMC Public Health*, 496 (19), 1-10. <http://dx.doi.org/10.1186/s12889-019-6819-9>
- Pawera, R., & Jančíková, E. (2017). An Issue of Age in the Labour Market in Slovakia. *Economic Annals-XXI*, 168 (11-12), 93-99. <http://dx.doi.org/10.21003/ea.V168-19>
- Principi, A., Santini, S., Socci, M., Smeaton, D., Cahill, K. E., Vegeris, S., & Barnes, H. (2018). Retirement Plans and Active Ageing: Perspectives in Three Countries. *Ageing & Society*, 38, 56-82. <http://dx.doi.org/10.1017/S0144686X16000866>
- Qvist, J. Y. (2021). The Working Class and Early Retirement in Denmark: Individual Push Factors. *Ageing & Society*, 41 (9), 2118-2142. <http://doi.org/10.1017/S0144686X20000203>
- Řezanková, H. (2007). *Analýza dat z dotazníkových šetření*. Praha: Professional Publishing.
- Rutkienė, A., & Lengvinienė, S. (2016). Learning as Precondition to Stay Active in Labour Market for Elder People. In V. Lubkina, S. Usca, & A. Zvaigzne (Ed.), *Society, Integration, Education, Proceedings of the International Scientific Conference*, Volume IV, May 27th - 28th (pp. 132-143). Rēzekne (Latvia): Rēzeknes Tehnoloģiju Akadēmija. DOI: <http://dx.doi.org/10.17770/sie2016vol4.1536>
- SHARE. (2022). Questionnaire - Survey of Health, Aging and Retirement in Europe. Retrieved March 08, 2022, from <https://releases.sharedatportal.eu/releases>
- Schnalzenberger, M., Schneeweis, N., Winter-Ebmer, R., & Zweimüller, M. (2014). Job Quality and Employment of Older People in Europe. *Labour-England*, 28 (2), 141- 162. <http://dx.doi.org/10.1111/labr.12028>

- Schreiber, P. (2018). Widowhood and Retirement Timing: Evidence from the Health and Retirement Study. *B E Journal of Economic Analysis & Policy*, 18 (3), 20170178. <http://doi.org/10.1515/bejeap-2017-0178>
- Sobolewska-Poniedzialek, E., & Niewiadomska, A. (2016). Dyskryminacja Osób Starszych na Polskim Rynku Pracy - Wyniki Badań. *Problemy Zarządzania-Management Issues*, 14 (2), 73-92. . <http://dx.doi.org/10.7172/1644-9584.59.5>
- Stafford, M., Lacey, R., Murray, E., Carr, E., Fleischmann, M., Stansfeld, S., . . . McMunn, A. (2019). Work – Family Life Course Patterns and Work Participation in Later Life. *European Journal of Ageing*, 16, 83-94. <http://dx.doi.org/10.1007/s10433-018-0470-7>
- Stiller, M., Garthe, N., & Hasselhorn, H. M. (2021). Job Quality Trajectories Among Baby-boomers in Germany and Their Consequences for the Motivation to Work - Results from the lidA Cohort Study. *Age & Society*, PII S0144686X21001343. <http://doi.org/10.1017/S0144686X21001343>
- Sundstrup, E., Thorsen, S. V., Rugulies, R., Larsen, M., Thomassen, K., & Andersen, L. L. (2021). Importance of the Working Environment for Early Retirement: Prospective Cohort Study with Register Follow-Up. *International Journal of Environmental Research and Public Health*, 18 (18), 9817. <http://doi.org/10.3390/ijerph18189817>
- Szeles, M. R., & Simionescu, M. (2020). Regional Patterns and Drivers of the EU Digital Economy. *Social Indicators Research*, 150 (1), 95-119. <http://doi.org/10.1007/s11205-020-02287-x>
- Topa, G., Depolo, M., & Alcover, C.-M. (2018). Early Retirement: A Meta-Analysis of Its Antecedent and Subsequent Correlates. *Frontiers in Psychology*, 8, 2157. <http://doi.org/10.3389/fpsyg.2017.02157>
- Topgul, S. (2016). Ageism or Discrimination against Older Adults in Work Life. *Turkish Journal of Sociology-Sosyoloji Dergisi*, 36 (2), 385-391. <http://dx.doi.org/10.16917/iusosyoloji.284541>
- Van der Horst, M., Lain, D., Vickerstaff, S., Clark, C., & Baumberg Geiger, B. (2017). Gender Roles and Employment Pathways of Older Women and Men in England. *SAGE Open*, 7 (4), 1-17. <http://dx.doi.org/10.1177/2158244017742690>
- Vodopivec, M., & Arunatilake, N. (2011). Population Aging and Labour Market Participation of Old Workers in Sri Lanka. *Population Ageing*, 4, 141-163. <http://dx.doi.org/10.1007/s12062-011-9045-5>
- Vomáčka, A. (2022). How to Analyse Contingency Tables. In: Katedra sociologie: Katedra sociologie [online]. Praha: Karlova univerzita, Retrieved Jun 08, 2022, from <https://ksoc.ff.cuni.cz/wp-content/uploads/sites/76/2018/09/Jak-analyzovat-kontingen%C4%8Dn%C3%AD-tabulky.pdf>
- Wahrendorf, M., Blane, D., Matthews, K., & Siegrist, J. (2016). Linking Quality of Work in Midlife to Volunteering During Retirement: a European Study. *Population Ageing*, 9, 113-130. <http://dx.doi.org/10.1007/s12062-015-9129-8>
- Wahrendorf, M., Akinwale, B., Landy, R., Matthews, K., & Blane, D. (2017). Who in Europe Works Beyond the State Pension Age and under which Conditions? Results from SHARE. *Population Ageing*, 10, 269-285. <http://dx.doi.org/10.1007/s12062-016-9160-4>
- Whitley, E., & Popham, F. (2017). Leaving the Labour market Later in Life: How Does it Impact on Mechanisms for Health? *Occup Environ Med*, 74, 877-886. <http://dx.doi.org/10.1136/oemed-2016-104258>
- You, Y. L., & Lee, H. S. (2021). Understanding the Perspectives and Experiences of Employed Older People on Active Ageing in Their Later Working Life (Biographical Narrative Approach). *Int. J. Environ. Res. Public Health*, 18 (6916), 1-19. <http://dx.doi.org/10.3390/ijerph18136916>

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THE MOTIVATION OF DIFFERENT EMPLOYEE GENERATIONS: A CASE STUDY OF THE SPA INDUSTRY*

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Abstract. The spa industry is one of the sectors of economic activities that react sensitively to natural, political, economic, legislative, and social changes. Even today, in the era of digitization, it is challenging to find the possibility of replacing human labor. Their live work realizes the preparation of the facilities and the offer of the services themselves. Social contact is essential to maintain the high quality of services provided in the spa, which requires high staff engagement. Employees create a real business relationship with the customer. This study's primary goal is to identify the motivation preferences of different employee generations in spa industry. The research methods used in the paper are general theoretical methods of scientific knowledge - induction, deduction, analysis, comparison, synthesis of available bibliographic sources, and scientific abstraction for generalization of results. Furthermore, we used the methods of descriptive statistics. The survey was an essential source of information. We tackled spa industry employees in Slovakia and the Czech Republic.

Keywords: employee motivation; retention; generation X; generation Y; generation Z; baby boomer generation; workforce; Covid; SPA industry

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1. Introduction

The spa industry is a set of activities of specific infrastructure and human resources in the fields of knowledge and practice, which are focused on the knowledge of natural healing resources and the implementation of techniques and procedures for the treatment of various somatic, psychosomatic and psychological problems. The spa industry aims to prevent and cure human diseases, regenerate powers, and relax. It is associated with the use of the power of natural healing resources and the beauty of the natural and compositional cultural environment. Spa services require high employee commitment. Their diligent work implements the preparation of the facilities and the offer of the services themselves. Employees create a real business relationship with the customer. It is necessary to fulfill the substantive side of the business, to provide the means to produce the service. The quality of personnel determines the success of the valorization of inputs and resources of production. The quality of personnel is mainly their qualifications, ability to adapt to requirements, and motivation to produce quality goods or services (Ližbetinová & Hitka, 2016; Popescu & Surcel, 2017; Lee et al., 2022). A capable and competent worker should be broadly educated (Senkova et al., 2016); education must not only be narrowly specialized but must also focus on developing associated skills in modern times. These abilities and competencies are individual characteristics that reflect a person's expression in particular situations and behavior. If a person is competent, it is because abilities act together. Using knowledge, abilities, and individual skills at the right moment guarantees the solution of a problem situation, position, or function (Dale & Robinson, 2001; Lyu & Liu, 2021). Education and the associated quality of human potential have an important role in tourism. In this regard, Baum, Amoah, and Spivack (1997) state that the human factor is one of the crucial points in the tourism supply. We include creativity - the ability to break with established dogmas, to bring about the possibility of unusual combinations of thought processes that have not been used before, facilitating surprising solutions among the core competencies of tourism personnel (Suwannarat, 2021; Vu et al., 2021). The ability to work independently is also important - it represents coherent work in a given position and awareness of a clear goal of a satisfied customer. To use the acquired information in a focused and planned manner to make decisions and solve the situations and problems encountered (Ibrahim et al. 2022). Collaboration with colleagues and work units - is essential in tourism services as it is collective work. Transferring individual skills to group work processes is extremely important. Common thoughts, opinions, and ideas combined with a common goal mean effective teamwork. Critical thinking is the most valued quality of today's managers. The ability to think to develop ideas critically is a unique competitive advantage for a company. Critical thinkers are the most valued capital of a company as they bring innovative thoughts and ideas. The ability to evaluate and justify is the ability of an employee to systematically and factually evaluate the results of their work, joint work, and other people's work, using adequate weighting. Developed learning skills are thinking in context and a systematic approach to learning. This ability seems to be the most important for the future, given the constant changes and rapid development of the world around us (Vu, Nguyen & Nguyen, 2021). Performance is the ability to perform and persevere as performance needs to be given consistently throughout the work or increased. A high-performing employee makes good use of his time and the resources entrusted to him, adding value to the enterprise. The innate ability to communicate is not only the active transmission of information but also the ability to listen and understand. Good communication is the basis for solving problems and conflicts that arise. In management positions, it is necessary as it is associated with delegating tasks. Responsibility is a characteristic of employees who approach tasks conscientiously and successfully try to bring them to a solution or goal. It is about adhering to the rules, regulations and standards that are in place in the company and taking care of entrusted objects, company information, customers, colleagues, or superiors. The ability to solve problems that arise comes to the fore at the most difficult times. This type of employee prevents financial or material losses and is an added value to the company (Penalba-Aguirrezabalaga et al., 2021). The person can analyze the situations that arise and make the right decision. Although the behavioral patterns we discussed should be universal, the scientists claim that motivational drivers are different for different generations (Mahmoud et al., 2020a, 2020b; Timilsina et al., 2021). Below we will discuss the peculiarities of different generations' attitudes (see Findings section).

2. Objective and methods of work

The right leader and manager are needed to awaken the above-mentioned desired qualities. Motivating employees in the spa industry is essential in terms of constant contact with the guest. Properly motivated employees are ready to work at the required intensity and performance. We can encourage employees in two ways. First is the reason itself, where people seek work that fulfills their motives and needs; the primary motivating factor is money to meet the standard of living. The second form of motivation is motivation by the management of the enterprise. The primary motivational tools in modern society are the creation of good interpersonal relations and fair treatment of all employees in all areas of employment policy.

The present study aims to identify the motivation preferences of different employee generations in the example of spa industry based on the analysis of data from a questionnaire survey.

We conducted a questionnaire survey in four joint-stock companies engaged in offering spa services from December 2021 to January 2022. The questionnaire was developed based on the employers' requirements to determine employee satisfaction as an essential feedback tool for creating a suitable motivational environment for developing the required competencies and staff stabilization. We evaluated the data using descriptive statistical methods, comparison, and synthesis. For our study, we present selected questions.

3. Findings

Important identifying feature of the sample was age. There are four generations of employees in the labor market, each with a different value orientation, loyalty to the employer, willingness to work extra hours, etc. In our survey, we captured the clash of all four generations of employees. The issue of motivation of different ages has been dealt with by many authors in their works (Smola & Sutton 2002; Arsenault, 2004; Kyles, 2005; Burke & Ng, 2006; Howe & Strauss, 2009; Chou, 2012; Ng et al., 2017; Fritsch et al., 2018; Hanafi et al., 2020; Angel, 2022; Moskvina, 2022).

The Baby Boomer generation is the generation born in the post-war period. Baby boomers were characterized by attitudes that changed or re-evaluated the definitions of traditional values. This generation was about continuity between the older and the following demographic cohort. Boomers are associated with their privilege. Many grew up in a period of rising prosperity following the massive postwar subsidies to housing and education in Europe and North America. This generational group in their era was profiled as the wealthiest, most active, and most physically fit compared to previous generations. They were the first generation to both expect and grow into better times. Indeed, this generation was reaching peak income levels, had convenient access to food and clothing, was programmatically working towards retirement, and recognized what the mid-life crisis brings. Their behavior toward a consumerist way of life is regularly criticized for inadequacy. Some members of this generation are still active in the labor market.

Members of Generation X were children who grew up in a period of shifting social values and were sometimes nicknamed "kids with a key around their necks" because of a lack of adult opportunities for supervision. This lack is due to changes in generational cohabitation, the increase in divorce rates, and the rising proportion of employed mothers prioritizing work careers over home-based childcare. These individuals were also referred to as the "MTV Generation" in adolescence and emerging adulthood due to their influences. They have been characterized as lazy, cynical, and disaffected individuals. In middle age, they are active, happy, and achieve work-life balance, according to research findings. This demographic cohort has been attributed to strong entrepreneurial tendencies.

The characteristics of Generation Y differ depending on each region's social and economic status. In the broader sense, this cohort is marked by a favorable attitude towards communications, media, and digital technologies.

Their upbringing has been marked by a more liberal approach to politics and economics in much of the world. The effects of this environment on them are contested. The great economic crisis that began in 2007 has significantly impacted this generation because it has affected them to the greatest extent. It has caused historically high levels of unemployment, leading to speculation about the possible long-term economic and social damage to this generation.

Generation Z is the first social generation that did not experience life before the internet and was given access to portable digital technology from an early age; despite not necessarily being digitally literate, its members have been nicknamed "digital natives." The adverse effects of the time spent in front of screens are most pronounced in the adolescents of this generation. Compared to previous generations, members of Generation Z in developed countries have a stronger tendency towards good manners, restraint, and risk aversion. Compared to their predecessors, they are slower for their age, have a lower propensity for teenage pregnancies, and are less likely to consume alcohol, but not necessarily addictive drugs. Teenagers seem more focused on achieving academic degrees and job perspectives, prioritizing them over immediate satisfaction of needs. Despite initial misgivings, they are much better than the generations of the 1960s in this regard. On the other hand, this generation is prone to sexting, i.e., sending, receiving, or forwarding sexually explicit messages, photographs, or videos for incomprehensible reasons.

The issue of preferences and differences across generations has been studied by many authors (Hill 2002, Bergh & Behrer 2012; Kudins, 2022). However, there is no consistency across generations, so the distribution of generations and the timing may be reported differently by different sources. As noted above, the traditional division of ages originated in the Americas. Research on the generations has mainly concerned their relationship to and use of modern technologies. For our survey in spa facilities, we defined the ages of the generations as follows, in line with the authors: baby boomers aged 56 and over, Generation X aged 46-55, Generation Y aged 26-45, Generation Z aged 18-25. In our survey sample, the largest generation was Generation Y (45%). The results are shown in the following Figure 1. More women are working in the spa segment (79% of respondents in our survey) than men (21% of respondents) due to the jobs in demand and the low average salary.

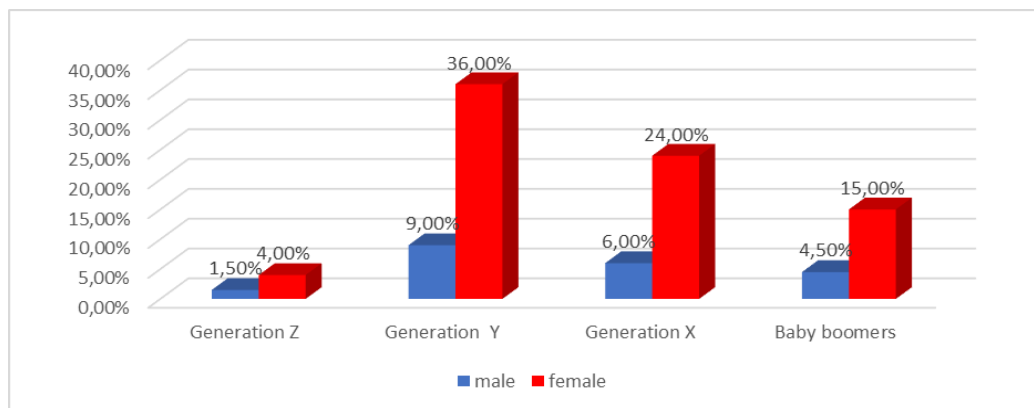


Figure 1. The age structure of respondents
Source: own processing based on survey results

Education is a process in which an individual acquires knowledge and skills and develops their abilities so that they are primarily employable in the labor market and can realize job offers. Preparing the workforce is quite demanding because of the constantly changing conditions that affect the production of goods and services and thus also affect the requirements of the force. We assumed that most employees in the spa sector have a high school education (65% of respondents) which is also based on the need for the positions. These respondents

mainly work in housekeeper, physiotherapist, nurse, and receptionist positions. 33% of the respondents have a university education and primarily work in physiotherapist, doctor, supervisor, and facility manager positions.

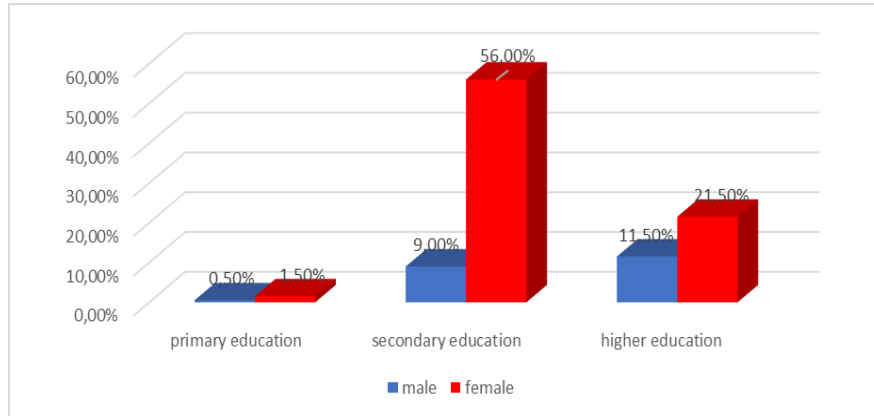


Figure 2. The educational structure of respondents

Source: own processing based on survey results

The number of years of work for an employer reflects the employee's loyalty to the employer and is particularly characteristic of older generations. Younger generations are not as loyal to their employers, so it is necessary to create motivation programs to stabilize the younger generation of employees. It is noticeable that Generation Z members have worked for employers for the least number of years. This generation is a precarious workforce, and its stabilization and recruitment programs will need to be addressed from a sustainability perspective.

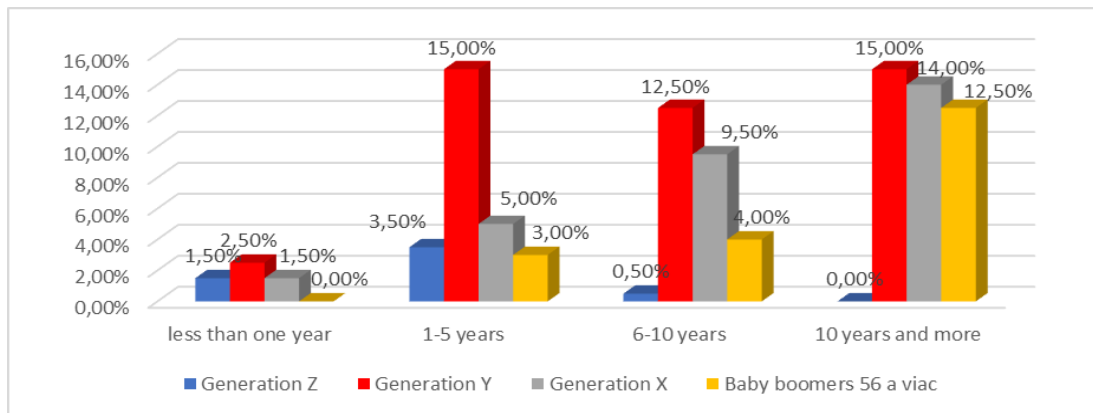


Figure 3. Years worked in spa institutions

Source: own processing based on survey results

Furthermore, in our survey, we were interested in the satisfaction of the different generations with the working conditions and working environment, which of course, has a significant influence on the stabilization of the workforce in the future. Generation Z is the least satisfied, which may also result from the overall value orientation of young people in this generation. They do not see a perspective for themselves in these institutions and may find the work boring. Surprisingly, Generation Y is quite satisfied and is currently the largest generation in the spa industry. This share is mainly explained by the fact that these are primarily women who are mothers and are comfortable working in these facilities, mainly because of family care. The spa facilities are located in less densely populated villages, so commuting could also cause a problem in finding employment in a competitive environment. Surprisingly, the Baby Boomers (10.26%) are relatively dissatisfied, the workers employed by the

employer for the most extended period and are therefore a stable workforce. Exploring the reasons for dissatisfaction among this generation would require a deeper analysis. It may also be a case of fatigue from the stereotype of the environment and the post-covid situation. This is a generation whose children are already becoming independent, relationships are breaking down, and they may appear disillusioned with life. The results are shown in Figure 4.

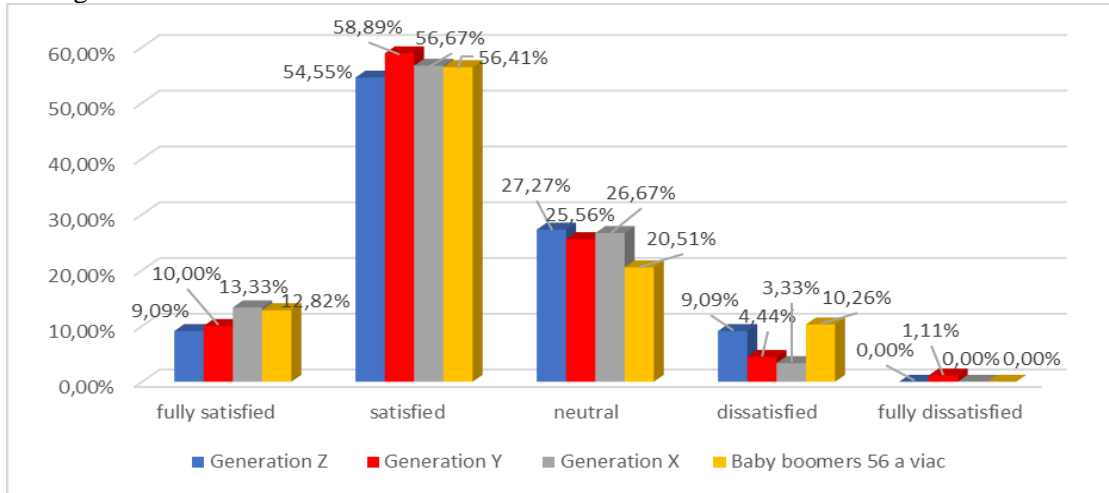


Figure 4. Generations' satisfaction with working conditions and working environment

Source: own processing based on survey results

Communication with employees is an essential factor affecting employee performance and the quality of service provided in this sector. From our findings, it is evident that members of Generation Z are the most dissatisfied with communication (completely dissatisfied and dissatisfied together 18.8%). Again, this may be a generational issue to different value orientations among young people and other ideas about the guidelines for the work to be done. This generation is typical in that most of their communication is done in the online space. They are more focused on applications and, possibly, do not understand communication from senior managers. This problem is also evident in other employers, so it needs more attention. Overall, however, the level of communication in the establishments surveyed can be considered satisfactory.

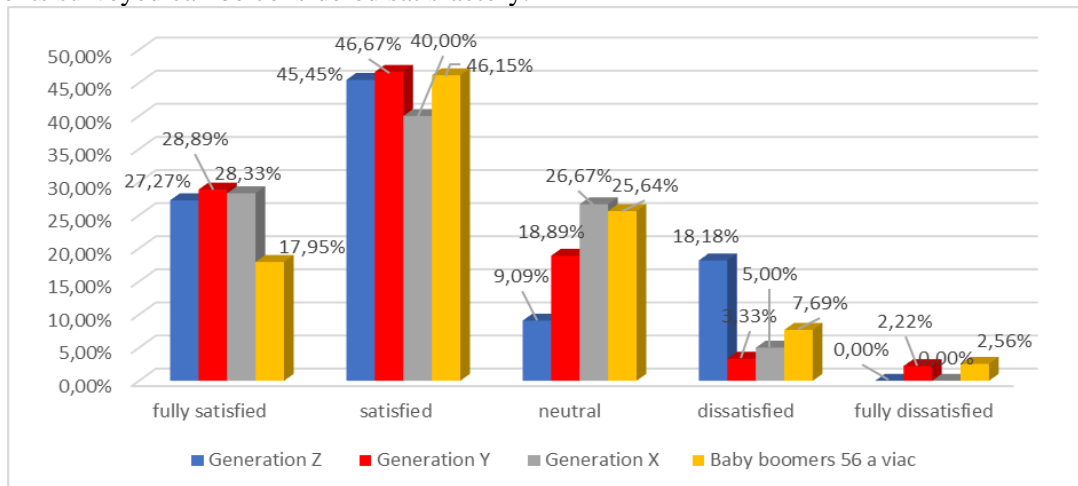


Figure 5. Level of satisfaction with the quality of communication with the supervisor

Source: own processing based on survey results

Remuneration is one of the most effective tools to motivate and stabilize employees. The spa industry is a labor market sector that belongs to the tourism industry. We know that the level of remuneration in this sector is

relatively low and cannot compete with that of the industrial sectors. Moreover, this sector has been the most affected by the anti-pandemic measures. Wages in the tourism industry ranged from €623 to €1,582 in 2021, depending on the job position, while the average salary in accommodation and food services was €688.

A well-defined remuneration strategy stabilizes the workforce and improves the organization's performance. It must often balance potentially conflicting objectives. For example, it may be necessary to reconcile the seemingly contradictory efforts to be externally competitive and internally fair. In our survey, there was considerable dissatisfaction in remuneration among all generations, but most of all among Generation Z, where not a single respondent indicated complete satisfaction, while up to 63.64% of respondents were dissatisfied. From the perspective of stabilizing the future workforce, we consider this to be a significant problem. We would recommend addressing this as a strategic issue for individual organizations. The remuneration system includes monetary and non-monetary benefits, so it would be advisable to look for opportunities in the non-monetary remuneration mode in particular. For example, a so-called cafeteria system could be developed where employees could choose their benefits. The total rewards package should be designed so that employees understand the total value of the remuneration they receive and not just the piecemeal elements of it. The system should attract, retain and develop the best talent. The benefits of this approach are that it enables them to contribute to the success of the company, that it facilitates their work-life balance, and helps them to care about their family. It is necessary to look for, e.g. flexible employment opportunities, especially since the younger generation sees leisure time as a reward, i.e., to create a different organization of working time. And bonuses concerning the use of spa services together with family members can also lead to greater employee satisfaction, especially among older employees.

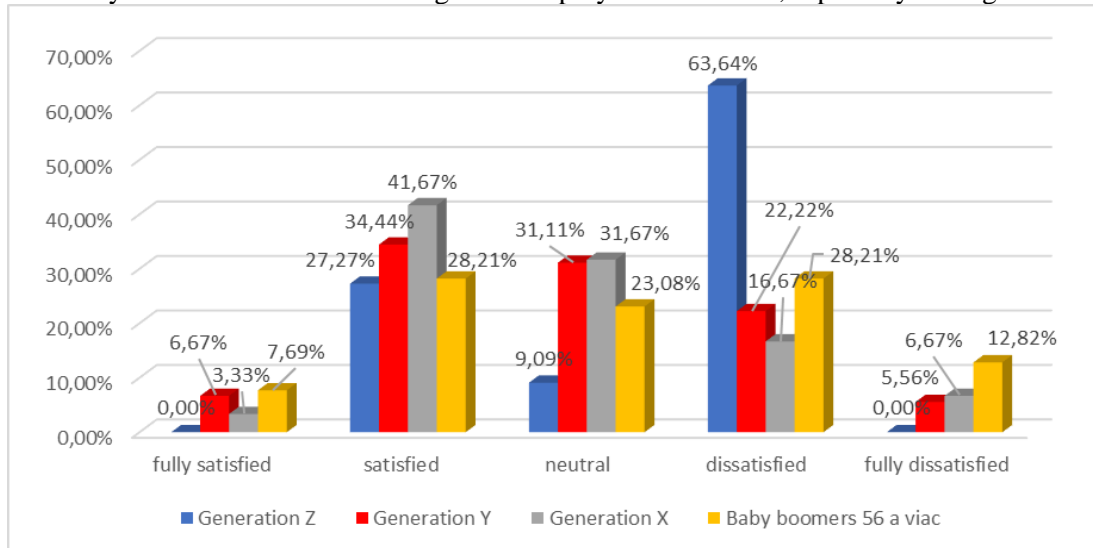


Figure 6. Employee satisfaction with the remuneration system

Source: own processing based on survey results

We could not present all the survey findings in the present study, so we have selected only some exciting areas. It seems that it is necessary to investigate employees' opinions not according to the classical age structure but rather according to their belonging to particular generations, which have their specific value orientation and as it seems to be different across the generational spectrum. We assume that such an approach can be more effective in setting up systems for remuneration, stabilization, and motivation of employees. However, new methods often meet resistance from generations of managers who are essential members of older generations and cannot understand the changes that take place as part of generational change.

Conclusions and further discussion

Expectations of different generations are a frequently discussed topic among recruiters, managers or business owners.

Each of the generations has a different approach to work, which employers can use to their advantage to avoid unnecessary problems. We focussed on how the motivation of different generations differs in the labour market. The aim is to find recommendations on how to motivate them to better work performance, how to retain a qualified workforce, or how to attract new employees.

In our research we examined spa sector, which is specific to the irreplaceability of human labour. The spa business is widely spread, since it is common practice for hotels to offer wellness services. Labour productivity presents a match between labor input and output in the form of service.

The managers intend to create an efficient and fair system that will objectively assess the range of work in terms of the service provided. This is the most critical task of stabilizing and motivating the workforce.

Our research showed that generation Z shows significant dissatisfaction, if to compare with other age groups, is more demanding overall. Despite the fact that members of this generation are often inexperienced and also have an unrealistic idea of financial remuneration in the current labour market, the amount of salary is the most important thing for them. It is important to note that they are proficient in social media communication, but less skilled in face-to-face communication, as confirmed by the results of our survey.

The shortage of employees accentuates topicality of the research. Taking into account the obtained results, it is inevitable to introduce elements of digitalization in this sector shortly. For example, self-service reception desks, chatbots for satisfaction assessment, and communication applications can increase the quality of service.

However, human work in this segment will be non-substitutable, so it will be necessary to rethink the current remuneration systems, stabilization, and motivation to meet customer requirements.

The results and findings of this study can serve as a basis for further research activities in the field of motivation of different generations of employees. Future research should focus on the expectations and willingness of different generations to adjust their labour market expectations, or it would be interesting and enriching to compare international analyses within this generation. The analysis could also be extended to include the expectations of the youngest generation, the Alpha generation, who will be entering the labour market. We anticipate that its perception will be the most different of all generations and the market itself will have to adapt to this.

References

- Angel, L. M. R. (2022). Characterization of Millennials in the Labor Context: A Literature Review. *Revista Universidad Empresa*, 24(42), <https://doi.org/10.12804/revistas.urosario.edu.co/empresa/a.8230>
- Arsenault, P. M. (2004). Validating generational differences: A legitimate diversity and leadership issue. *Leadership & Organization Development Journal*, 25(2), 124-141. <https://doi.org/10.1108/01437730410521813>
- Baum, T., Amoah, V., Spivack, S. (1997). Policy dimensions of human resource management in the tourism and hospitality industries. *International Journal of Contemporary Hospitality Management*, 9(5/6), 221-229. <https://doi.org/10.1108/09596119710172615>
- Bergh, D. V. J. & Behrer, M. (2012). *Jak cool značky zůstávají hot*. Brno: Bizbooks, p. 21. ISBN 978-80-265-0002-5
- Burke, R. J., & Ng, E. (2006). The changing nature of work and organizations: Implications for human resource management. *Human Resource Management Review*, 16(2), 86-94. <https://doi.org/10.1016/j.hrmr.2006.03.006>
- Cheung, E. (2007). *Baby Boomers, Generation X and Social Cycles*. USA: Longwave Press, p. 88. ISBN 9781896330068.
- Chou, S. Y. (2012). Millennials in the Workplace: A conceptual analysis of millennials' leadership and followership styles. *International Journal of Human Resource Studies*, 2(2). <https://doi.org/10.5296/ijhrs.v2i2.1568>
- Dale, C. & Robinson, N., (2001). The theming of tourism education: A three-domain approach. *International Journal of Contemporary Hospitality Management*, 13(1), 30-35. <https://doi.org/10.1108/09596110110365616>
- Fritsch, A., Rasmussen, C. M., & Chazdon, S. A. (2018). Old Concept, New Generation: Millennials and Community Leadership Programs. *Journal of Leadership Education*, 17(4). <https://doi.org/10.12806/V17/I4/R6>
- Hanafi, W. N. W., Daud, S., & Baharin, N. L. (2020). Leadership Attributes among Generation X and Millennials Leaders. In N. S. Othman, A. H. B. Jaaffar, N. H. B. Harun, S. B. Benjamin, N. E. A. B. Mohamad, I. B. M. Ali, N. H. B. A. Razali, & S. L. B. M. Hashim (Eds.), *Driving Sustainability through Business-Technology Synergy*, vol 100. European Proceedings of Social and Behavioural Sciences (pp. 779-787). European Publisher. <https://doi.org/10.15405/epsbs.2020.12.05.84>
- Hill, R. (2002). Managing Across Generations in 21st Century: Important Lessons from the Ivory Trenches. *Journal of Management Enquiry*, 11(1), 60-72. <https://doi.org/10.1177/1056492602111020>
- Howe, N. & Strauss, W. (2009). *Millennials Rising: The Next Great Generation*. New York: Knopf Doubleday Publishing Group, 2009, s. 54. ISBN 9780307557940.
- Ibrahim, M., Karollah, B., (...); Yunus, M. (2022). The Effect of Transformational Leadership, Work Motivation and Culture on Millennial Generation Employees Performance of the Manufacturing Industry in the Digital Era. *Frontiers in Psychology*, 13, Article Number 908966 <https://doi.org/10.3389/fpsyg.2022.908966>
- Kudins, J. (2022). Economic usefulness of older workers in terms of productivity in the modern world. *Insights into Regional Development*, 9(3), 40-56. [http://doi.org/10.9770/IRD.2022.4.1\(3\)](http://doi.org/10.9770/IRD.2022.4.1(3))
- Kyles, D. (2005). Managing your multigenerational workforce. *Strategic Finance*, 87(6), 52.
- Lee, C. C., Lim, H. S., Seo, D., & Kwak, D. H. A. (2022). Examining Employee Retention and Motivation: The Moderating Effect of Employee Generation. *Evidence-Based HRM*. <http://doi.org/10.1108/EBHRM-05-2021-0101>
- Ližbetinová, L., & Hitka, M. (2016). Selection of Most Suitable Candidates for the Talent Pool in a Furniture Manufacturing Company. *Drvena Industrija*, 67(4), 333-340. <https://doi.org/10.5552/drind.2016.1601>
- Lyu, W. J. & Liu, J. (2021). Soft skills, hard skills: What matters most? Evidence from job postings. *Applied Energy*, 300, Article Number 117307 <https://doi.org/10.1016/j.apenergy.2021.117307>
- Mahmoud, A. B. Grigoriou, N. (...), Mohr, I. (2020a). A generational study of employees' customer orientation: a motivational viewpoint in pandemic time. *Journal of Strategic Marketing* Nov 2020 (Early Acces) <http://doi.org/10.1080/0965254X.2020.1844785>

- Mahmoud, A. B., Reisel, W. D. (...); Mohr, I. (2020b). The reincarnation of work motivation: Millennials vs older generations. *International Sociology*, 35(4), 393-414. <http://doi.org/10.1177/0268580920912970>
- Moskvina, J. (2022). Work after retirement: the evidence of sustainable employment from Lithuanian enterprise. *Insights into Regional Development*, 4(2), 52-62. [https://doi.org/10.9770/IRD.2022.4.2\(4\)](https://doi.org/10.9770/IRD.2022.4.2(4))
- Ng, E. S., Lyons, S. T., & Schweitzer, L. (2017). Millennials in Canada: Young Workers in a challenging labor market. In *The Palgrave handbook of age diversity and work* (pp. 325-344). Springer. https://doi.org/10.1057/978-1-137-46781-2_13
- Penalba-Aguirrezabalaga, C; Saenz, J; (...); Vanhala, M. (2021). Putting knowledge to work: the combined role of marketing and sales employees' knowledge and motivation to produce superior customer experiences. *Journal of Knowledge Management*, 25(10), 2484-2505. <https://doi.org/10.1108/JKM-09-2020-0727>
- Popescu, C. & Surcel, R. (2017). Human resources' performance in career - a goal for a competitive organization. In: PROCEEDINGS OF THE 11TH INTERNATIONAL MANAGEMENT CONFERENCE: THE ROLE OF MANAGEMENT IN THE ECONOMIC PARADIGM OF THE XXIST CENTURY (IMC 2017), p. 863-870.
- Senkova, A., Sambronska, K. et al. (2016). Corporate culture as a tool for increasing employee motivation. *Polish Journal of Management Studies*, 13(2), 131-141. <https://doi.org/10.17512/pjms.2016.13.2.13>
- Smola, K., & Sutton, C. D. (2002). Generational differences: Revisiting generational work values for the new millennium. *The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 23(4), 363-382. <https://doi.org/10.1002/job.147>
- Suwannarat, P. (2021). Understanding the difference of values-based motivation of managerial workers in spa businesses in Thailand. *International Journal of Emerging Markets*. <https://doi.org/10.1108/IJOEM-03-2020-0310>
- Timilsina, R.R., Kotani, K. (...); Saijo, T. (2021). Concerns for future generations in societies: A deliberative analysis of the intergenerational sustainability dilemma. *Journal of Behavioral and Experimental Economics*, 90, Article Number 101628 <https://doi.org/10.1016/j.soccec.2020.101628>
- Vu, N. H., Nguyen, T. T. & Nguyen, H. T. H. (2021). Linking Intrinsic Motivation to Employee Creativity: The Role of Empowering Leadership. *Journal of Asian Finance Economics and Business*, 8(3), 595-604. <http://doi.org/10.13106/jafeb.2021.vol8.no3.0595>

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IMPACT OF DISTANT TEACHING DURING COVID-19 PANDEMIC ON CIVIC AND FINANCIAL LITERACY*

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Abstract. The global COVID-19 pandemic in 2020-2021 resulted in the most significant disruption to school attendance in the history of humanity. Subsequent anti-pandemic caregivers demanded a shift to distance learning from kindergartens to higher education. Slovakia was one of the European Union countries with the most extended closed schools – 28 weeks. The main aim of the research was to analyze the impacts of the COVID-19 pandemic on education in the Slovak Republic by teaching civic and financial literacy in secondary schools in 2020-2021. In the form of in-depth interviews with selected teachers, the authors analyzed the actual state of education during the ongoing COVID-19 pandemic. Among other things, the research showed that Slovakia was not prepared for the distance form of teaching. As a result, some children were educated in the form of self-study, some online, others combined, and some were not educated at all. Teachers used different didactic aids in online teaching; the competent state institutions published online textbooks only with hindsight. The global pandemic thus demonstrated shortcomings in the digitization of regional education. In the paper, the authors offer solutions for the future.

Keywords: civic education; financial literacy; Slovak Republic; secondary education; COVID-19; distant learning; distant teaching

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1. Introduction

The Covid-19 pandemic was confirmed to have spread to Slovakia on March 6, 2020. Shortly after the confirmation of the first positive case, the Slovak government, as the first in Europe, adopted some of the most substantial restrictions for the whole country. These preventative and emergency anti-epidemic strategies aim to save the health and lives of the population's most vulnerable or high-risk groups. All educational institutions, business offices, and event venues were closed. The public transport schedule was reduced. Only essential shops and facilities such as grocery stores remained open; mandatory 14 days of quarantine for everyone returning from abroad and compulsory use of face masks were introduced (Izakova, et al. 2020, p. 460)

According to the Institute for Strategies and Analyses of the Government Office, in Slovakia, schools were partially closed on 9.3.2020. Their closure was in response to the first case of a new coronavirus discovered on our territory. It was one of the fastest reactions to school closures in Europe, even though the numbers infected during this period did not indicate that it was an epidemic. The blanket closure of schools in our country with a relatively meager number of infected persisted until the end of May, 2020. As of 25.5.2020, almost a million pupils and students, i.e., a fifth of the population, were remotely educated (or not educated at all). The most affected group is high school students. (Gardoňová, Rybanská, 2021; Canals-Botines et al., 2021)

Due to restrictive measures, Slovakia had to use the distance form of education much more than before, from kindergartens to university students. We consider "distance learning through correspondence, telecommunications media and other means, without direct contact between the pedagogical employee and the self-studying pupil" (Act No. 245/2008 Coll., 2008, § 54 article 10). Some schools started using electronic information systems, but communication was intended mainly for parents. Ensuring an online teaching system with a timetable, dividing pupils into smaller groups and coordinating teachers, acquiring platforms for teaching, and forwarding teaching and educational materials have become a challenge for all schools. (Tomšík et al., 2020)

According to data from the Analysis Unit of the Supreme Audit Office, Slovakia had the most extended closing period of schools in the European Union – 28 weeks. Pupils only started returning to schools more than a year after the first Covid-19 case in Slovakia. Up to 128,000 children, representing more than 18% of whom did not learn online. (Vítáloš, 2021)

The main research goal of the article was to analyze the state of teaching of selected disciplines in secondary schools in the Slovak Republic during the ongoing COVID-19 pandemic in 2020-2021. **The secondary research goal** was to look for possibilities of streamlining lectures for pupils at secondary schools in the Slovak Republic.

2. Theoretical background

Before the Covid-19 pandemic, Slovakia hardly used a distance learning form of education. One of the reasons was the absence of available technical equipment (computers, internet access, etc.) not only on the part of pupils but also on the part of educators. Based on the decision of the Government of the Slovak Republic in spring 2020, Slovak education (primary schools, secondary schools, higher education institutions (universities)) went from classical attendance form to a distance form of education from day to day. Based on the above facts, neither the student nor the pedagogical component of Slovak education, not even the state institutions themselves, were prepared for this educational type at the time. Gradually, however, all schools in Slovakia have adapted not only in technical terms but also in terms of knowledge. In the spring of 2020, almost all countries had to move from a full-time form of education to distance learning.

Nevertheless, several years before the onset of Covid-19, distance education form was known. According to Turkish authors Nazime Tuncay and Zehra Özçınar, students in some schools perceived online courses, or distance learning forms, as a "valuable delivery" of various and useful information. As they further state, such a form of education has changed the dynamics of access to teaching materials that have become accessible from anywhere on the globe. They add that the distance form of education, or the online learning environment, can help build a community of students who would coordinate with each other different ideas, knowledge, or opinions. Based on the experience so far in the conditions of Slovak education, we can confirm their original hypothesis. The authors also rightly argued that the distance form of education is much more different from full-time classical teaching. (Tuncay, Özçınar, 2009) Other Turkish authors Semih Caliskan, Sibel Suzek, and Deniz Ozcan characterize the distance form of education as a specially developed system for students transitioning from solid educational practices (a full-time form of education) to mobile and flexible (distance form of education) in terms of time and space. In general, the authors define the distance form of education as interactive data exchange based on web and advanced technological tools and devices among students of pedagogical employees who are distant from each other. In their opinion, the use of technology within the distance form of education is a planned teaching system in which the pedagogue and the student meet in different ways in a mutually distant educational environment. (Caliskan, Suzek, Ozcan, 2017)

On the other hand, the distance form of education also brings many negatives. Its specificities and characteristics cannot fully replace the classic full-time form of education. A similar view is shared by most Slovak primary, secondary, and higher education teachers. However, the continuous development of information and communication technologies offers scope for reconsidering conventional teaching methods and gradually replacing classic didactic digital aids. In 2005, the Israeli author Sarah Guri-Rosenblit (2005), on the example of higher education, pointed out that the advent of new communication technologies would put pressure on the coming years to replace the classical attendance form of schooling with distance learning. We also accepted this reality. Since the onset of the Covid-19 pandemic in the spring of 2020, a distance form of education has taken place for some time in primary and secondary schools. In her article "Distance education" and 'e-learning': Not the same thing", Sarah Guri-Rosenblit quoted author Soren Nipper, who identified three generations of distance learning in his classical analysis in 1989. He ranked correspondent teaching among the first generation. The advent of multimedia characterized the second generation, i.e., integration of print use with broadcasts (media, cartridges, and, to a certain extent, computers). He identified the last third generation with the development of new interactive communication and information technologies. (Guri-Rosenblit, 2005)

The onset of the global Covid-19 pandemic in the spring of 2020 replaced the classic attendance form of education by distance one (primary schools, secondary schools, universities, and universities) in almost all countries of the world, including the Slovak Republic. At the same time, it has led to significant global changes in the field of education. (Bida et al., 2021) Turkish authors Furkan Tüzün and Nilay Yörük-Toraman also highlighted possible factors influencing the distance form of education during the pandemic, which included factors related to the standard of living of individual students during this period. They rightly recalled that students who did not have adequate means of communication and information could not be involved in the proper teaching process in the distance form of education. Although even if the scientists' research targeted just Turkish students, it does not mean that the findings could not be implemented in Slovakia. Notable that in the territory of the Slovak Republic, a certain part of the students did not have access to communication and information technologies during the Covid-19 pandemic in 2020 and 2021. Furkan Tüzün and Nilay Yörük-Toraman also found that students' lack of access to these technologies could affect their mental health and well-being. (Tüzün, Yörük-Toraman, 2021) Overall, the Covid-19 pandemic has affected all aspects of worldly life, judging from a social, economic, and psychological point of view. (Kaya, 2020) In the Kingdom of Spain, on March 15, 2020, according to the authors Marta García-Sampedro, Elsa Peña Suárez and Lucía Rodríguez Olay, 8 276 528 students and 724 803 teaching staff switched to distance learning. Similarly, as in the Slovak Republic, the education system in Spain was not prepared for distance education. Almost all the countries in the world fit the

same situation. (García-Sampedro, Peña-Suárez, Rodríguez-Olay, 2021) Iranian author Helia Nodeh adds that distance learning disrupted students' performance, education, and personal life during the Covid-19 pandemic. (Nodeh, 2021) Therefore, in 2020, The International Association of Student Affairs and Services (IASAS) declared the importance of addressing the primary personal needs of students through a comprehensive set of extracurricular student services. These services were designed to enable and strengthen students to focus more on their studies and personal growth, both cognitively and emotionally. (Bouchey, Gratz, Kurland, 2021) In addition to many positives, online teaching as part of the distance form of education has its negative aspects. As part of his research sample of university students, Turkish author Huseyin Kaya concluded that online education had a significant impact on the health of their eyes. (Kaya, 2020)

At the same time, the COVID-19 pandemic has brought about far-reaching changes in our social life. To this day, these consequences are difficult to predict and control. During this period, global social processes are constantly gaining their specific expression in all areas of social life, and in particular in the field of education. Adjusting and adapting the educational process during a pandemic requires new practical solutions. From this point of view, we can therefore identify three fundamental challenges for the distance form of education. Firstly, we include technical requirements that can be overcome by purchasing better technical equipment, provided this is financially possible. Secondly, the impossibility of a 'direct transition' from physical to virtual classroom due to a lack of contact with other students and educators is very complex and challenging to overcome. Thirdly, this includes the need to involve the students and their educators to find the best possible method for obtaining and understanding teaching materials in the digital environment. In the era of digitization, it is, therefore, possible to see the distance form of education as one possible solution to the problem of ensuring that students, on the one hand, remain healthy (physical distance) and, on the other hand, comprehensive digital didactic aids are provided at all levels of education. (Marković Krstić, Milošević Radulović, 2021; Kurbakova, 2021) The paper's authors are members of the research team KEGA No. 009 TnUAD-4/2021 "Creation of digital didactic aids to the subject "Civics" for the needs of secondary education in distance form. "Our goal is to create coherent and uniform digital didactic aids for the needs of distance, partly also attendance form of education of the subject "Civics" in secondary schools. Once created, we expect to improve the education quality of this subject in case of the need to return to the distance education form. At the same time, these digital didactic aids can also be helpful in the classical attendance form of education.

One of the main tasks of teaching the subject "Civics" within secondary education is educating students about patriotism, democracy, and tolerance. The Spanish author Nicanor Ramón Fuentes Laíño adds that civil education's primary objective in a liberal democracy and a pluralistic society is to offer access to public education issues. He, therefore, asks himself how liberal democracy can build a common civic identity between group diversity and which values could be shared by democratic citizens who are members of diverse religious, ethnic, and linguistic groups. In conclusion, he adds that the role of the subject 'Civics' is to educate students on ordinary civic virtues, especially in the context of society. (Ramón Fuentes Laíño, 2018; Lincényi, Mindár 2021; Ead et al. 2021) Within the education system of the Slovak Republic, in the subject "Civics", in addition to the basic aspects of liberal democracy, it is necessary to include the education of Slovak students to a healthy national awareness and pride that we are Slovaks who together with national minorities are a solid part of the independent and democratic Slovak Republic, which on January 1, 2023, celebrated the 30th anniversary of its founding. A particular example may be the teaching of "Civic Doctrine" in the United States of America. Of course, it is essential to take only positive models because its concept today faces two fundamentally conflicting problems. This includes, in particular, the traditional concept, designed primarily for younger students, which is often limited to nationalist patriotism and obedience. (Payne, Keys Adair et al. 2020) Based on the above facts, teaching the subject "Civics" in secondary education is essential to focus on creating democratically acceptable civic and political attitudes for students. According to Dutch authors Jacqueline Witschge, Jesper Rozer, and Herman G. van de Werfhorst, the positive relationship between a standardized and universal trust for democracy and civic and political engagement applies only if there is a threshold of faith in institutions and a level of democracy.

(Witschge, Rozer, van de Werfhorst, 2019) The development of civic literacy is also essential within the thematic whole of the subject 'Civics.' The Dutch author Jos van Helvoort considers promoting students' interest in civic and political issues a fundamental educational objective of civic literacy. He sees the term "civic literacy" as the ability and willingness of specific people to listen to the opinions of others. He believes civic literate people can perceive the right moral, economic, political, and scientific judgments. (van Helvoort, 2019) When teaching "Civics," it is essential to shape students' political literacy. Like all abstract concepts, political literacy cannot be measured directly. Still, we assume that if people (students) are politically literate, they understand party differences and know basic political concepts and facts. Political literacy is at the heart of empirical theories of democracy. (Cassel, Lo, 1997) When teaching the subject 'Civics,' it is also essential to consider issues relating to the global multicultural society. This fact brought the need for the development of the goals of civic education and the integration of modern knowledge, skills, and values of each personality. (Marsone, 2016)

With the development of political literacy within the subject "Civics" in secondary education, students should also be mindful of shaping financial literacy. Financial literacy is generally a set of knowledge, skills, and attitudes of citizens (students) necessary to financially secure themselves and their families in today's society. Money and financial products are an integral part of today's world. Therefore, 'Civics' students in secondary education must understand the market mechanisms that price all available commodities and services. (Tomášková, Mohelská, Němcová, 2011) According to Australian economist Andrew C. Worthington, interest in financial literacy issues has increased significantly globally over the past two decades. (Worthington 2013) In addition, financial literacy is also linked to the economic costs of households. Based on the research cited by the Turkish authors Kemer Karakurum-Ozdemir, Melike Kokkizil, and Gokce Uysal, we can learn that families with lower financial literacy, for example, have a higher mortgage and other economic costs. (Karakurum-Ozdemir, Kokkizil, Uysal, 2019)

3. Research objective and methodology

The authors of the research have chosen a qualitative research strategy. In the case of further planning and design of research, the authors preferred the concept of research questions rather than the establishment of research hypotheses. Two research questions (RQ) have been identified:

RQ1: What experience with online teaching of civics in secondary schools in the Slovak Republic did teachers have at the time of the COVID-19 pandemic (2020-2021)?

RQ2: What digital didactic aids would teachers of the subject civics in secondary schools in the Slovak Republic welcome for distance learning?

In the data collection framework, the interview method is one of the most used research methods. (Juszczyk 2003) It is mainly carried out by direct contact between the researcher and the studied person. At present, indirect forms, e.g., telephone or online interviews, are also increasingly applied. Because of the pandemic measures, we decided to use a controlled semi-structured interview, which we conducted indirectly, either by phone or online. The interview consisted of fifteen open questions. A comparative method and interpretation analysis were used to evaluate the research results.

Research sample

As part of our research, in the fourth quarter of 2021 and the first quarter of 2022, we conducted 16 managed semi-structured interviews with teachers who pedagogically provided teaching of civic education at secondary schools in the Slovak Republic. In total, the research sample consisted of 16 secondary school teachers. In each self-governing region in the Slovak Republic, we reached out to 2 respondents, one teacher from the gymnasium and one from the business academy, to ensure the representativeness of the research sample in terms of the type of secondary school.

4. Results and discussion

RQ1: What experience with online teaching of civics in secondary schools in the Slovak Republic did teachers have at the time of the COVID-19 pandemic (2020-2021)?

Question No. 1: How are you evaluating the launch of distance learning in spring 2020 at your school?

Nearly half of the teachers surveyed admitted at the beginning of the interview that distance teaching surprised them and meant a technical shock to them. "Spring 2020 - I rate this period as a "big leap into the unknown" or as "throwing in the water and swimming as you like." At that time, no one knew how long it would take how it would take", teacher Mgr. Ľuboslava Hrešková from the Gymnasium of Andrej Vrábel in Levice said in an interview. (Nitra Self-Governing Region) As the teacher, Beáta Pjonteková from the Gymnasium on The School Street in Spišská Nová Ves states, it was mainly a technical shock for teachers because they had never had such an experience before. "So we had to worry a little bit with the Internet and MS Teams. At first, the signal was falling out. But when I evaluate the distance form of education with hindsight today, I can say that we have all run around quite well with all teachers and students alike." According to the teacher from the Business Academy in Rožňava (Košice Self-Governing Region) JUDr. Petr Valný, distance education surprised the vast majority of teachers. "On the one hand, they were not prepared for it at all, and on the other hand, it was not ensured how to manage this form of education in the future. But gradually, each of us learned to expand various forms of teaching, from simply sending text documents, linking to videos, or launching PowerPoint presentations. Later, we started using videoconferencing, which marked a big step forward." Only four schools addressed were ready for distance learning and immediately switched to e-learning teaching, providing online and distance education. Teachers from the remaining schools rated the launch of distance learning either positively or, in hindsight, as a challenge and a good experience.

Question No. 2: To what extent have you personally been prepared for a distance form of education?

The vast majority of the teachers interviewed (9) were not personally prepared for the distance form of education because, in their words, they did not have sufficient technical equipment, and some even had to buy a new computer or laptop, as the old one did not take them. Only two teachers were personally prepared for teaching because they had sufficient experience in information and communication technologies, which allowed them to react relatively quickly and flexibly in distance learning. The remaining teachers could adapt to the situation without significant problems and learned to work relatively quickly in the online space and lead interactive teaching.

Question No. 3: What form did you communicate with students during the pandemic measures? Have you spoken with your students as part of distance teaching exclusively through online learning, offline teaching (e.g., email communication, assignments), or a combination of both?

Most teachers at the beginning of distance learning used a classic form of offline teaching and switched entirely to online education or benefited from a combination of offline and online instruction. As part of offline teaching, most teachers focused on sending tasks by email and then sending corrections to students, while some teachers also communicated with pupils by phone. Later, email and telephone communication was replaced by the school website Edupage, which was used for electronic communication with pupils and parents. In the case of online teaching, the instructors used several communication platforms, most often MS TEAMS, Google Meet, Zoom, while some also communicated via Facebook, messenger, or WhatsApp social networks.

Question No. 4: What was the course and organization of distance learning in the lessons you provided?

In 2021, the course and organization of online lessons were not different from the classes performed by the attendance form. Most teachers were aware of the need to involve pupils more in the teaching process during distance learning. The teachers used screen sharing, involving pupils in solving tasks in the classroom. Teachers who used MS TEAMS in an online class used separate rooms where pupils worked independently on

assignments. Teachers skipped oral exams during online hours as they did not see it as very effective and appropriate in the given teaching. “The use of videoconferencing has become an absolute breakthrough. This allowed me to organize an hour by confirming that it was 90% close to the quality of the attendance form. During the lesson, I could use frontal teaching (my interpretation for students or projected PowerPoint presentations that students could comment on simultaneously) or project short videos that clearly had the greatest resonance among students and reliably ensured students' attention. Videoconferencing also allowed the use of classic forms of teaching such as working with text (textbook or other printed material)“, said the lecturer from the Business Academy in Rožňava JUDr. Petr Valný.

Question No. 5: If you provided offline learning, was it because, for example, you or your students did not have additional technical security and Internet connection, or did you have other problems?

After online teaching was launched in secondary schools, teachers approached offline education minimally. Teachers accessed offline teaching due to technical problems such as power outages or the Internet. Instead, students from socially weaker families, who were dealt with individually by schools, had issues. As stated by Mgr. Ľuboslava Hrešková from the Gymnasium of Andrej Vrábla in Levice, many students had to share their computers with their siblings or their parents at the home office during online education. Often students were connected via mobile phone at online lessons. Therefore, the school then offered pupils and teachers the opportunity to borrow the technique. According to the teacher Mgr., most pupils were technically well equipped. Marcela Hollá from the Gymnasium of Michal Miloslav Hodža in Liptovský Mikuláš. “If anyone had a problem with the technique, the school immediately responded. The pupil was offered a laptop“. Teacher Mgr. Lenka Krištofiková from Gymnasium of Ladislav Novomeský in Senica occasionally went offline for an hour after students had many online hours and complained that they could not cope because they were sick and their heads hurt.

Question No. 6: How did secondary school students receive distance learning? What was the involvement of pupils in distance learning in terms of overall participation in teaching?

At first, according to the teacher PhDr. Miroslava Marčeková from the Business Academy of Milan Hodža in Trenčín, pupils were very pleased that they were “at home,” gradually they were often less communicative, they began to invent excuses such as “connection problems“ etc., but this could be solved very quickly, if the teacher made it clear that fraud on the part of the pupils did not give them a chance. The teacher PaedDr. Emília Černeková from the commercial academy of Dušan Methodius Janota in Čadca thinks that the first wave of pupils was evaluated positive rather than negative. “But then, during the second wave, from October 12, 2020, to May 2021, it was already too much for the pupils themselves. They lacked personal contact and could not concentrate as fully on teaching as necessary. Of course, this includes health reasons because looking at your computer for six hours a day will very quickly manifest itself in your health. So far, the ongoing third wave has only brought about the closure of some classes. Also, on this basis, students gradually realize that the distance form of education is not fully fully-fledged for them. You can't write typing or rehearsing. You never know what that pupil is open about, whether someone personally advises him, etc. To this day, it can't be checked“, Černeková said. Mgr. Erik Chalupský taught at the gymnasium and primary school in Detva. He noted that the pupils in secondary school joined the online teaching in much greater quantities and more regularly than in primary school. Even the performance of duties was at an excellent level compared to pupils at primary school.

Question No. 7: What personal experience has distance learning brought you during the coronavirus pandemic? What problems did you have when teaching remotely?

Several teachers said distance learning had moved them forward. “The distance form of teaching has moved me forward. Two years ago, I could not have imagined that even from a distance, I could carry out a good course of the hour and coolly meet the goal of every hour. I became acquainted with videoconferencing platforms (Zoom, Google meet, Microsoft Teams), and now I successfully use them in the pedagogical process and various

training", said JUDr. Petr Valný from the Business Academy in Rožňava. Furthermore, as stated by the teacher Mgr. Ľuboslava Hrešková from the gymnasium of Andrej Vrábel in Levice, distance teaching opened up new possibilities for her because she began to use other teaching methods, especially those that more activate pupils. In addition, she has improved in using information communication technologies in the teaching process; she has also learned to use the zoom, Discord, Edupage programs. On the other hand, some teachers have complained about technical problems such as internet signal failures and difficulties with microphones or cameras. "It has often been the case that pupils have misrepresented certain information or misinterpreted it, and I did not have enough opportunity to notice it on their faces. Social contact and group work were also lacking", added teacher Mgr. Erik Chalupský from the Gymnasium of Detva in the Banská Bystrica Region.

Question No. 8: What do you think are the needs of schools in the event of the re-closure of schools (including educational requirements)?

If the answer to this question, the teachers were not uniform. Some of them praise the technical equipment. "As a school, we are ready for online teaching; we even provide pupils with hybrid teaching. Quarantined pupils will join the classroom and be fully involved in the teaching process via a streaming camera. Of course, there is also screen sharing", said teacher Mgr. Darina Chobotová from the Business Academy on Nevädzová Street in Bratislava. The second part of the teachers complained about the lack of technical equipment; according to the teacher Mgr. Monika Pilková from the Piarist Gymnasium of Jozef Branecký in Trenčín, every teacher should have a computer that can handle online teaching at ease. "There are rarely minor technical problems, such as a malfunctioning camera and so on. I also consider the critical availability of various educational programs and applications. I'm not saying they're not today. But you know it's time-consuming to create new and self-contained educational aids constantly. Instead, I would personally welcome uniform aids for all teachers of the civics subject." Teacher Mgr. Martin Huba from the Business Academy in Topoľčany would welcome better and faster internet connection in schools, as well as support for teacher education in the use of digital technologies and, last but not least, the contribution to the internet connection and the necessary technical security for teachers in the case of home-office.

RQ2: What digital didactic aids would teachers of the subject civics in secondary schools in the Slovak Republic welcome for distance learning?

Question No. 9: What didactic aids did you use to teach the subject of civics during the COVID-19 pandemic?

Teachers used presentations, videos, and images to teach online civics. The teacher, Diana Ferencz from the Gymnasium of A. Einstein from Bratislava, taught through MS Teams, using the recommended pages of the Ministry of Education of Science, Research and Sport of the Slovak Republic such as edupage, Zmúdri, as well as methodological letters of the Methodological Pedagogical Centre or the website of the National Bank of Slovakia in teaching economics issues. Mgr. Monika Pilková from the Piarist Gymnasium of Jozef Branecký in Trenčín for students during COVID created various tests that can be filled out online because not every student has textbooks in them. At school, it is common for pairs of students to use one textbook. So if she wanted them to receive the same amount of information in some appropriate form, she had to process her notes and aids herself. She then sent them to students this way, which took up a lot of time to give the students the curriculum. Beáta Pjonteková from the Gymnasium in Špišská Nová Ves used several videos during her online teaching; for example, she let the comments of economists on the impact of inflation on the running of the economy in the state, which she and the students discussed afterward.

Part of the teachers produced their didactic aids. "When we are in classic attendance mode, I use an interactive whiteboard. The truth is, however, that there is not much to the subject of Civic Doctrine in those textbooks. That's why I teach more or less in my own right as before. During distance teaching, I was so based on what I had before. In addition to various presentations, didactic games, and all sorts of activities, I also used videos, and at

the same time, I gave students various practical tasks. In our school, the subject Civics is taught once a week. So you're not going to do any great miracles, but I'm trying to make that class as interesting as possible for the students. Therefore, we do not even write notes. Rather, I focus on the practicalities and personal creativity of students. As part of distance teaching, I mostly assigned them various tasks via email, and during the lessons, they are tasked with fulfilling and discussing them", said PaedDr. Emília Černeková from the Business Academy Dušan Methodius Janota in Čadca.

Question No. 10: Have you used classic didactic aids in online or offline teaching, or have you had the opportunity to use digital didactic aids?

The teacher Mgr. Dominik Ilaš from the Gymnasium of P. O. Hviezdoslav in Kežmarok used PowerPoint presentations, electronic documents, philosophical texts in electronic form, or worksheets from economics during online teaching. The teacher PaedDr. Emília Černeková from the Business academy of Dušan Methodius Janota in Čadca combined the interpretation from the classic textbook by the author Štefan Bojnák with materials, which she found on her own on the Internet and subsequently processed. The teacher Mgr. Lenka Krištofiková from the Gymnasium of Ladislav Novomeský in Senica also used the same didactic tools in online teaching as in offline teaching. She couldn't use physical interpretation dictionaries or dictionaries of foreign words, which they replaced with shared Youtube videos.

Question No. 11: Has the Ministry of Education, Science, Research, and Sport of the Slovak Republic or any other competent state institution helped you in any way with the provision of online teaching? Or have you searched for digital didactic aids for online learning in a self-help way?

Several teachers agree that the competent authorities' teaching initially did not help ensure online teaching. They appreciate that the Ministry of Education, Science, Research, and Sport of the Slovak Republic later made classic textbooks online. Teacher Mgr. Martin Huba from the Business Academy in Topoľčany sought to use all the resources available on the pages covered by the field of education and also desired to educate himself in the development of digital technologies. The teacher Mgr. Ľuboslava Hrešková from the gymnasium of Andrej Vrábel in Levice sought didactic aids on her own, complaining about the problem of accessing online textbooks, which was complex through various logins in the form of passwords and codes. The teacher Mgr. Monika Pilková from the Piarist Gymnasium of Jozef Branecký in Trenčín did all the materials according to herself because she did not find a single source or anything like that would personally help her in teaching the subject Civics in distance form.

Question No. 12: Would you like to see a more excellent selection of didactic aids in teaching the personal curriculum of the subject of civics in the future?

All teachers would welcome a more excellent selection of didactic aids. "It would make our lives easier. Over and over again, you have to invent something new and new individually for those students. A possible choice would bring new wind and direction to all this. How often do the students bring some good idea, a good article, or good information, and then we teachers deal with it? But I would certainly accept something like uniform didactic aids for all teachers of the subject Civics", said teacher Beáta Pjonteková from the Gymnasium in Spišská Nová Ves. According to the lecturer JUDr. Petr Valný from the Business Academy in Rožňava, the emphasis should be placed above all on visual aids, which have the most significant impact on students' attention, focus, and interest. As Stated by Mgr. Monika Pilková from the Piarist Gymnasium of Jozef Branecký in Trenčín, teachers, would undoubtedly be significantly helped by a uniform selection of up to three approved textbooks because today they have to search for everything on the Internet for themselves. Worse still, the information available today varies in everything. "In several textbooks for Civics, whether for an eight-year grammar school or the third year, there is a lack of methodology. As textbooks, they are excellently done. They're nice. But sometimes, there's a task or a discussion that I don't know exactly if I'm thinking right. And then I can't tell if they even exist for those textbooks. I am therefore of the opinion that this methodology should come along with those textbooks.", adds the instructor Mgr. Lenka Krištofiková from the Gymnasium of Ladislav Novomeský in Senica.

Question No. 13: What are adequate digital didactic aids that would be useful to the educator and of interest to the student? (e.g., electronic textbooks, video lectures, etc.)

Teacher PaedDr. Marianna Kamenská from the Business Academy in Sered' agrees with the electronic library and video lectures, but mainly with interactive didactic aids. "Specify digital textbooks where you can work seamlessly. I at least see that it is exciting for students to use different applications to which they can connect via their mobile phones. I, as a teacher, will give them, for example, various tasks or a test, which they then do on their mobile phone. I know from experience that this is a complete top for them. And as for other digital didactic aids, digital textbooks, videos, video lectures, etc., are also very adequate.", said lecturer Mgr. Monika Pilková from the Piaristic Gymnasium of Jozef Branecký in Trenčín. Teacher Mgr. Ľuboslava Hrešková from the Gymnasium Andrej Vrábel in Levice would welcome an interactive electronic textbook, online worksheets, practical tasks on given topics, educational videos, games, quizzes, and other activities produced in various applications (learning apps, word wall...). "I like videos on YouTube. Some, for example, are in English or German. Even though our students learn both foreign languages, not everyone is so adept at them that they understand the videos as they would like. That's why, in my opinion, those videos that are animated or interesting in some other way and are also contained in less formal language are much more interesting. In them, the whole curriculum could be summed up in seven or eight minutes. I think that is what they would be more interested in. Because, for example, when I play a five-minute video on their philosophy, it's animated, but it's in English. I'll honestly tell you they enjoy it. It's handy and fun for them. I would personally be heading in that direction. Those classic lectures are so stereotypical for them. An electronic textbook has also helped so that they do not have to take the classic textbook home, but they can get a better look at it is fine. But I would rather go into something so dynamic and interesting.", said teacher Mgr. Lenka Krištofiková from the Gymnasium of Ladislav Novomeský in Senica. The teacher JUDr. Petr Valný from the Business Academy in Rožňava thinks that not everything will solve digital aids because an electronic textbook, to a limited extent, like a video lecturer, can improve the teaching process but not replace it.

Question No. 14: Do you think that, for example, a digital didactic textbook and other digital didactic aids could also help in the framework of self-study attendance teaching?

Teachers differ in their views on whether a digital didactic textbook could help with full-time teaching within self-study—teacher Mgr. Ľuboslava Hrešková from the Gymnasium Andrej Vrábel in Levice is convinced that the electronic textbook should be used well, especially in these uncertain times during the pandemic, when the form of education changes from day to day. It is often the case that students keep the textbook at school and then do not have it available during distance learning. If an electronic textbook is available, you don't have to deal with whether you have a textbook at home or school. According to the teacher Mgr. Monika Pilková from the Piarist Gymnasium Jozef Branecký in Trenčín, such a digital didactic textbook could help because they have many students using self-study at the grammar school. Such students are present in the classroom, they will listen to it, but at the same time, they need to supplement themselves with additional information. The opposite view is the teacher Mgr. Lucia Szentesi from the Private Business academy in Prešov would welcome methodological material for the teacher to elaborate on the state educational program – i.e., according to particular standards/themes – before the electronic textbook. "I don't like textbooks; the world is changing, especially Civics is full of change; if we want to be up to date, the textbook would have to be very general, and it would again be up to the teacher to update that information. It would be great if there were a database of such methodologies for each lesson/topic and if it were still adapted to both attendance and distance form (e.g., as two versions of the work – similarly they do in Zmudri)." Teacher Mgr. Erik Chalupský from the Gymnasium in Detva thinks that no child who goes home by bus from school or lies at home on the couch will open a digital textbook. What might open up would be a didactic game or app.

Question No. 15: Where do you see space for distance form in teaching civic education, and where, on the contrary, do you think online teaching is not suitable?

Teachers differ on the future of distance learning in civic education teaching, according to JUDr. Petr Valný of the Business Academy in Rožňava, the distance form in teaching civics can be applied when passing on information, either in the form of enlightening videos or PowerPoint presentations or in the form of assignment of a task and finding a solution on the Internet or in literature. "Their graphic design, musical background, or method of administration play a major role in visual aids. (Let me draw attention to the video series History otherwise on the Youtube channel. They feature a young, beautiful, cultivated, and erudite history and civics teacher, photographically accurate with a pleasant voice and a perfect way of speaking – in short, a delight for everyone who watches this channel). However, the subsequent discussion of the video would require an attendance form in which it is essential not only to hear the opinions of students at the verbal level but also to perceive their emotions, face mimic, gestures, and that distance form, even with the camera on, can never be replaced." Teacher Mgr. Ľuboslava Hrešková from the Gymnasium Andrej Vrábel in Levice thinks that online teaching is suitable for the whole subject of civics. At the same time, she adds that online teaching is a good alternative, but it does not adequately replace the full-time form of teaching. The teacher Mgr. Dominik Ilaš from the Gymnasium of P. O. Hviezdoslav in Kežmarok was suited for distance teaching in thematic units such as psychology, sociology, and law. In the case of thematic units of political science, economics makes more use of the board to conceptual maps and needs immediate interaction with pupils and better feedback. The teacher Mgr. Darina Chobotová from the Business Academy in Bratislava on Nevädzová Street can imagine that a theory could be sent to pupils. Still, it has proved to present practical examples on every topic/phenomenon, with pupils showing their own opinions and attitudes, having to argue and have a discussion—teacher Mgr. Lucia Szentesi from the Private Business academy in Prešov found it challenging to learn civics because she lacked the contact and forum needed in this subject. "I see the great advantage of distance learning or this form is discussions with experts. We are based in the east; it is understandable that only at any time an expert who works in Bratislava comes to us. Through distance education, we succeeded, and we discussed with Mr. Šnidl about hoaxes, with UNICEF about child soldiers, and with Zmudri. I can also imagine applying this to attendance education and inviting guests to an online meeting while the class will be looking at the whiteboard and discussing with the guest remotely." Mgr. Diana Ferenczy from Gymnasium of Albert Einstein in Bratislava believes that distance teaching is unsuitable for group work of pupils when working in pairs and is less effective even if it wants to have dialogues with pupils. In addition to naturally active pupils, during online teaching, other pupils are heard only for direct calls by the teacher; there is no visual contact, and the current control of pupils' work in the classroom, according to Mgr. Erik Chalupský from the Gymnasium in Detva, a distance form of teaching is not suitable for any subject because the pupil does not go to school only to be educated. At school, he gets to know friends, communicates, lives socially, and argues with classmates, which helps shape his personality.

Conclusion

Qualitative research mapped the state of teaching civic education in secondary schools in the education system in the Slovak Republic during the COVID-19 pandemic in 2020-2021, resulting in the following most important results:

- From the interviews conducted with secondary school teachers, it appears that the distance teaching of teachers surprised them. The fact that Slovak education at the beginning of the coronavirus pandemic was not sufficiently prepared for online teaching is also evidenced by the fact that the vast majority of teachers at the beginning of distance teaching used the classic form of offline teaching before moving fully to online teaching, or using a combination of both.
- Most of the teachers surveyed complained not only about unsatisfactory technical equipment but also about insufficient digital skills. On the other hand, the rest of the teachers praised the technical equipment, which means that secondary schools are still differently technically equipped.

- Several teachers agree that the competent authorities of the instructors did not initially help with the provision of online teaching. Teachers at the beginning of distance learning used various digital didactic aids in teaching the subject of civic education. The Ministry of Education, Science, Research, and Research of the Slovak Republic made classical textbooks in the online form available to teachers later, resulting in several managerial failures.
- Teachers would welcome a more excellent selection of didactic aids in teaching individual curriculums on the subject of civic education.
- Teachers differ in their views on the future of the distance form of education in teaching civic education without being made clear either whether a digital didactic textbook and other digital didactic aids could also help in the framework of full-time teaching within self-study.

Based on the results presented above and clarified, the authors formulated several recommendations that could be a basis for managing authorities and inspiration for school facility managers in the Slovak Republic:

- Distance education and subsequent online teaching during the COVID-19 pandemic highlighted regional differences in digitization in Slovak education, implying the need to continue the concept of informatization and digitization of education in the Slovak Republic. Teachers and schools need to be equipped with digital technologies, whether software or hardware.
- It is necessary to streamline the management of regional education so that managing authorities can respond more promptly and effectively in crisis management.
- There is space for complementing teachers' digital skills in secondary schools in the Slovak Republic in the form of further education.
- Based on interviews with teachers, the authors see space for creating digital didactic aids for teaching distance learning in secondary schools in the Slovak Republic.

The authors are aware that this topic is still not researched but are convinced that the study's results have broadened the knowledge to date and will contribute to the improvement of online teaching in distance learning in the future. The main limitation of this study is the geographical area limited to the Slovak Republic, where the research was carried out. The authors, therefore, plan to extend the analysis to the other Member States of the European Union in the future for the possibility of further comparison. The authors believe that the impacts of the COVID-19 pandemic were so severe for education that this issue needs to be addressed more intensively.

References

- Bouchey, B., Gratz, E., Kurland, S. (2021). Remote Student Support during COVID-19: Perspectives of Chief Online Officers in Higher Education. *Online Learning Journal*, 25(1), 28-40. <https://doi.org/10.24059/olj.v25i1.2481>
- Bida, O., Prokhorchuk, O., Fedyaeva, V., Radul, O., Yakimenko, P., Shevchenko, O. (2021). Covid-19 and Distance Education: Analysis of the Problems and Consequences of the Pandemic. *IJCSNS International Journal of Computer Science and Network Security*, 21(12), 629-635. http://paper.ijcsns.org/07_book/202112/20211286.pdf
- Caliskan, S., Suzek, S., Ozcan, D. (2017). Determining student satisfaction in distance education courses. In: 9th International Conference on Theory and Application of Soft Computing, Computing with Words and Perception, ICSCCW 2017, 24-25 August 2017, Budapest, Hungary. vol. 120. pp. 529-538. ISSN: 1877-0509. <https://doi.org/10.1016/j.procs.2017.11.275>
- Canals-Botines, M., Crisan, M.M., Leproni, R., Medina-Casanovas, N., Tubau, M.P., Alonso, A.R. (2021). The Challenge of Distant Teaching for Primary School Teachers of English during the Covid-19: The Cases of Spain, Italy and Romania. *Lea-Lingue E Letterature D Oriente E D Occidente*, 10, 393-404. <https://doi.org/10.13128/LEA-1824-484x-12798>
- Cassel, C., Lo, C. (1997). Theories of Political Literacy. *Political Behavior*, 19(4), 317-335. ISSN: 0190-9320. <https://doi.org/10.1023/A:1024895721905>

Černeková, E. Personal interview, 8. decembra 2021, Obchodná akadémia Dušana Metoda Janotu Čadca, Ul. 17. novembra 2701, Čadca, Žilinský samosprávny kraj

Ead, H.A., Fadallah, S.M., Fahmy, H.M., Rezk, M.R., Piccinetti, L., Sakr, M.M. (2021). Awareness of foresight through education in Egypt: a case study from Egyptian university. *Insights into Regional Development*, 3(4), 10-20. [https://doi.org/10.9770/IRD.2021.3.4\(1\)](https://doi.org/10.9770/IRD.2021.3.4(1))

Ferenczy, D. Personal interview, 25. januára 2022, Gymnázium A.Einsteina, 852 03, Bratislava, Bratislavský samosprávny kraj

García-Sampedro, M., Peña-Suárez, E., Rodríguez-Olay, L. (2021). Online education during the COVID 19 lockdown and school closures in Spain. Teachers' perceptions. *Aloma*, 39(2), 43-51. <https://doi.org/10.51698/aloma.2021.39.2.43-51>

Gardoňová, K., Rybanská, V. (2021). Obmedzená škola, obmedzená budúcnosť: Vplyv obmedzenia školskej dochádzky ako opatrenia proti šíreniu Covid-19 na populáciu slovenských detí (Limited school, limited future: The impact of limiting school attendance as a measure against the spread of Covid-19 on the population of Slovak children). Bratislava: Inštitút pre stratégie a analýzy, Úrad vlády Slovenskej republiky. https://www.vlada.gov.sk/share/isa/obmedzena_skola_obmedzena_buducnost.pdf

Guri-Rosenblit, S. (2005). 'Distance education and 'e-learning': Not the same thing. *Higher Education*, 49(4), 467-493. ISSN: 0018-1560. <https://doi.org/10.1007/s10734-004-0040-0>

Helvoort, J. (2019). Four Spaces of Civic Literacy Education: A Literature Review. In: *Information Literacy in Everyday Life: 6th European Conference, ECIL 2018 Oulu, Finland, September 24-27, 2018 Revised Selected Papers*. vol. 989. pp. 94-102. ISBN: 978-3-030-13471-6. https://link.springer.com/chapter/10.1007/978-3-030-13472-3_9

Hollá, M. Personal interview, 8. decembra 2021, Gymnázium Michala Miloslava Hodžu v Liptovskom Mikuláši, Hodžova 860/9, Liptovský Mikuláš, Žilinský samosprávny kraj

Hrešková, E. Personal interview, 20. januára 2022, Gymnázium Andreja Vrábla Levice, Mierová 5, 934 03 Levice, Nitriansky samosprávny kraj

Huba, M. Personal interview, 4. februára 2022, Obchodná akadémia Topoľčany, Inovecká 2041/24 95 501, Topoľčany, Nitriansky samosprávny kraj

Chalupský, E. Personal interview, 8. decembra 2021, Gymnázium Detva, Štúrova 849, Detva, Banskobystrický samosprávny kraj

Chobotová, D. Personal interview, 7. februára 2022, Obchodná akadémia Bratislava, Nevädzová 3, 820 07, Bratislava 27, Bratislavský samosprávny kraj

Ilaš, D. Personal interview, 12. januára 2022, Gymnázium P. O. Hviezdoslava v Kežmarku, Hviezdoslavova 20, Kežmarok, Prešovský samosprávny kraj

Izakova, L., Breznoscakova, D., Jandova, K., Valkucakova, V., Bezakova, G., Suvada, J., What mental health experts in Slovakia are learning from COVID-19 pandemic? *Indian Journal of Psychiatry*, 62(9), 459-466. https://doi.org/10.4103/psychiatry.IndianJPsychiatry.758_20

Juszczyk, S. (2003). Metodológia empirických výskumov v spoločenských vedách (Methodology of empirical research in social sciences). Bratislava: Vydavateľstvo IRIS. ISBN 978-80-89018-13-0.

Kaya, H. (2020). Investigation of the effect of online education on eye health in Covid-19 pandemic. *International Journal of Assessment Tools in Education*, 7(3), 488-496. ISSN: 2148-7456. <https://doi.org/10.21449/ijate.788078>

Karakurum-Ozdemir, K., Kokkizil, M., Uysal, G. (2019). Financial Literacy in Developing Countries. *Social Indicators Research*, 143(1), 325-353. ISSN: 0303-8300. <https://doi.org/10.1007/s11205-018-1952-x>

Kaya, H. (2020). Investigation of the effect of online education on eye health in Covid-19 pandemic. *International Journal of Assessment Tools in Education*, 7(3), 488-496. ISSN: 2148-7456. <https://doi.org/10.21449/ijate.788078>

Krištofiková, L. Personal interview, 14. januára 2022, Gymnázium Ladislava Novomeského Senica, Trnavský samosprávny kraj

- Kamenská, M. Personal interview, 9. decembra 2021, Obchodná akadémia Sereď, Mládežnícka 158/5, Sereď, Trnavský samosprávny kraj
- Kurbakova, M. (2021). Mixed Distant Learning In Pandemic Waves. *Strategies for Policy in Science and Education-Strategii Na Obrazovatel'nata I Nauchnata Politika*, 29(1), 21-34.
- Lincényi, M., Mindár, M. (2021). Comparative analysis of the views and attitudes of elementary and secondary school pupils from the Czech Republic and Slovak Republic on the division of the Czech and Slovak Federative Republic (ČSFR). *Insights into Regional Development*, 3(1), 104-123. [https://doi.org/10.9770/IRD.2021.3.1\(6\)](https://doi.org/10.9770/IRD.2021.3.1(6))
- Marčeková, M. Personal interview, 10. decembra 2021, Obchodná akadémia Milana Hodžu Trenčín, Martina Rázusa 1, Trenčín, Trenčiansky samosprávny kraj
- Marković Krstić, S., Milošević Radulović, L. (2021). Evaluating Distance Education in Serbia during the Covid-19 Pandemic. *Problems of Education in The 21st. Century*, 79(3), 467-484. ISSN: 2538-7111. <https://doi.org/10.33225/pec/21.79.467>
- Marsone, S. (2016). Integration of Civic Education into Lower Secondary School Curriculum. In: Society. Integration. Education: Proceedings of the International Scientific Conference. Volume II, May 27th-28th, pp-173-180. ISSN: 1691-5887. <https://doi.org/10.17770/sie2016vol2.1388>
- Nodeh, H. (2021). Students' Lived Experience of Online Education Challenges in the Covid-19 Era. *Pakistan Journal of Medical & Health Sciences*, 15(8), 2401-2405. ISSN: 1996-7195. <https://doi.org/10.53350/pjmhs211582401>
- Ramón Fuentes Laiño, N. (2018). Educación cívica liberal e multiculturalismo. *AGORA -Papeles de Filosofía*, 37(2), 193-214. ISSN: 2174-3347. <https://doi.org/10.15304/ag.37.2.4389>
- Payne, K., Keys Adair, J. (2020). Reconceptualizing civic education for young children: Recognizing embodied civic action. *Education, Citizenship and Social Justice*, 15(1), 35-46. ISSN: 1746-1979. <https://doi.org/10.1177/1746197919858359>
- Pjonteková, B. Personal interview, 6. januára 2022, Gymnázium , Školská 7, Spišská Nová Ves, Košický samosprávny kraj
- Pilková, M. Personal interview, 6. januára 2022, Piaristické gymnázium Jozefa Braneckého v Trenčíne, Palackého 84/4, Trenčín, Trenčiansky samosprávny kraj
- Polc Varsová, D. Personal interview, 8. februára 2022, Súkromná obchodná akadémia DSA, Nám. Matice slovenskej 23, Žiar nad Hronom, Banskobystrický samosprávny kraj
- Szentesi, L. Personal interview, 14. februára 2022, Súkromná obchodná akadémia, Petrovianska 34, 080 05, Prešov, Prešovský samosprávny kraj
- Tomšík, R., Rajčániová, E., Ferenčíková, P., Kopányiová, A. (2020). Pohľad rodičov na vzdelávanie počas pandémie covid-19 na Slovensku - porovnanie rodičov detí so špeciálnymi potrebami a rodičov detí bez identifikovaných špeciálnych potrieb (Parents' view of education during the covid-19 pandemic in Slovakia - comparison of parents of children with special needs and parents of children without identified special needs). *Pedagogická orientace*, 2(30), 156-183. <https://doi.org/10.5817/PedOr2020-2-156>
- Tomášková, H., Mohelská, H., Němcová, Z. (2011). Issues of financial literacy education. In: Procedia - Social and Behavioral Sciences. vol. 28, pp. 365-369. ISSN: 1877-0428. <https://doi.org/10.1016/j.sbspro.2011.11.069>
- Tuncay, N., Özçinar, Z. (2009). Distance Education Students' "Metaphors". *World Conference on Educational Sciences*, 1(1), 2883-2888, ISSN: 1877-0428. <https://doi.org/10.1016/j.sbspro.2009.01.513>
- Tüzün, F., a Yörük-Toraman, N. (2021). Online Tertiary Education during the COVID-19 Pandemic in Turkey: A Country Profile Based on Survey With 13 Thousand Students. *Sosyoekonomi*, 29(50), 197-227. ISSN: 1305-5577. <https://dergipark.org.tr/en/pub/sosyoekonomi/issue/65592/892374>
- Valný, P. Personal interview, 20. decembra 2021, Obchodná akadémia Rožňava, Akademia Hronca 8, Rožňava, Košický samosprávny kraj
- Vitáloš, Matej. (2021). Zmiernenie dopadov pandémie na vzdelávanie žiakov musí byť (vyššou) prioritou. Najvyšší kontrolný úrad Slovenskej republiky (Mitigating the impact of the pandemic on student education must be a (higher) priority. The Supreme Audit Office of the Slovak Republic). Dostupné: www.nku.gov.sk/analzy

Witschge, J., Rozer, J., van de Werfhorst, H. (2019). Type of education and civic and political attitudes. *British Educational Research Journal*, 45(2), 298-319. ISSN: 0141-1926. <https://doi.org/10.1002/berj.3501>

Worthington, C. A. (2013). Financial literacy and financial literacy programmes in Australia. *Journal of Financial Services Marketing*, 18(3), 227-240. ISSN: 1363-0539. <https://doi.org/10.1057/fsm.2013.18>

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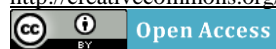
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INVESTIGATION OF STARTUPS' SUSTAINABILITY: EMPIRICAL EVIDENCE FROM SAUDI ARABIA

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Abstract. Despite many government attempts, it is still unclear how individual startups grow and promote their sustainability-oriented market innovations and alter markets toward sustainable growth in Saudi Arabia. This research aims to uncover the factors that contribute to a startup's long-term viability and establish interrelationships among them. A two-phased method was used in this study. Empirical research on startups' sustainability was undertaken in the first phase to identify the most critical enablers from a list of factors found after a thorough literature review. A hierarchy-based model is built among the most critical enablers in the second phase, utilizing interpretative structural modeling (ISM). The study discovers that: (1) there are ten factors influencing entrepreneurial startups' sustainability that play different hierarchical roles; (2) the startup product/service & market position, as a key influencing factor of entrepreneurial startups' sustainability, can be cultivated and improved by enriched startup partnerships & resources, industrial and market; and (3) regulatory & political may indirectly affect startups' sustainability by affecting the entrepreneurial environment. Policymakers in Saudi Arabia might utilize the methodology described in this paper to design appropriate policies for enhancing startup sustainability.

Keywords: entrepreneurship; sustainability; enablers; multi-criteria decision making; interpretative structural modeling (ISM); startups; Saudi Arabia

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1. Introduction

The Global Entrepreneurship Monitor (GEM) is a worldwide collaboration that performs research on 66 economies throughout the globe, accounting for 82 percent of global GDP and 71 percent of the world's population. Every year, GEM brings together approximately 400 researchers from around the world and more than 100 institutions. GEM is the world's most significant research on entrepreneurship and entrepreneurial activity due to the participation of all of these persons and institutions (Bosma et al., 2021).

GEM is the world's most prestigious entrepreneurship research institute. GEM started in 1999 as a collaboration between Babson College in the United States and London Business School in the United Kingdom, with the goal of better understanding why certain nations are more 'entrepreneurial' than others. For 20 years, GEM has given high-quality data on a wide range of entrepreneurship indicators in 114 economies via a massive, centrally organized multinational data gathering operation. GEM is a trusted resource for organizations all around the globe to help them make better decisions about how to increase the number and quality of entrepreneurship (Aloulou & Al-Othman 2021).

The GEM KSA National Report takes an in-depth look into entrepreneurship in Saudi Arabia. This covers surveys of public opinions, self-perceptions, entrepreneurial connections, and entrepreneur profiles. Despite the pandemics devastating effect on entrepreneurship, Saudi Arabia's overall entrepreneurial activity climbed by 24% from 2019 to 2020/21, according to the annual national report. Over the last three years, the Kingdom has seen a 65 percent growth in company ownership. According to the research, more than 90% of people think entrepreneurship is a good career option, and a third of Saudis want to start a firm in the next three years (Hill et al., 2022).

Indicators also demonstrate that progress in bridging the gender gap has been significant. Women were significantly less likely than males to see prospects (89 percent vs. 92 percent) and believe they had the skills to start a company (89 percent vs. 92 percent) (84 percent vs. 88 percent). On the other hand, fear of failure is virtually equal for both men and women (Alnemer 2021).

The goal of this study is to investigate the factors that contribute to a startup's long-term viability. This comprises looking at the factors that contribute to a startup's long-term viability and modeling their interplay using Interpretive Structural Modeling (ISM). This will reveal their strengths and weaknesses in terms of dependence and driving ability. The following section summarizes the entrepreneurial literature and the resources and processes used to reach the study's aim.

The remainder of the paper is laid out as follows: Section 2 of the literature review includes a list of every linked study. Section 3 discusses the materials and procedures used. The findings are presented in Section 4. Finally, Sections 5 and 6 provide the discussion and conclusions, respectively.

2. Literature Review

The present study examines various enabling factors for entrepreneurship implementation and maintenance. The relationships between startup sustainability enablers and performance measurements are studied using interpretive structural modeling, a well-established technique. A short literature review is offered in this area.

2.1 Entrepreneurship in Saudi Arabia

According to Almahdi (2020), entrepreneurship has a robust support system in Saudi Arabia. Regarding entrepreneurship, the Kingdom has been the Arab region's leader in regulatory changes. According to the current Doing Business (DB) survey, the nation rated 13th worldwide and first in the area in terms of business ease (World Bank 2016). Saudi Arabia climbed from 35th to first place in the DB's six metrics after utilizing French law as a model to revise its policies. It rose seven places from 28th to 21st position in the current World Economic Forum Global Competitive Index (GCI 2010-2011), indicating a robust and stable institutional framework, efficient markets, and sophisticated business environments (Schwab 2018). Saudi Arabia's real GDP was predicted to increase by 3.4 percent in 2010 and 4.5 percent in 2011. In recent years, the Kingdom has

benefited from the passage of new foreign investment legislation, the formation of the Saudi Arabian General Investment Authority (SAGIA), and the privatization of state-owned firms.

However, inside the country's regulatory structure, firms continue to confront challenges, such as contract enforcement and labor disputes. According to a survey conducted by the Global Entrepreneurship Monitor (GEM) from May to October 2009, Saudi Arabia had the lowest Total Entrepreneurial Activity (TEA) rate among the region's factor-driven economies, with only 4.7 percent of the adult population (18–64 years old) actively involved in the startup of a new business or owning a young business less than three and a half years old (Kelley et al., 2016). Saudi Arabia could build a competitive economy and diversify beyond natural resources, according to a 2008 study by Michael Porter, if it was willing to take a strategic approach, make multiple improvements in its business environment, truly open up competition and entrepreneurship in the private sector, and commit to a sustained effort to equip Saudi citizens with new skills, attitudes, and mindsets (Porter 2008).

The hurdles of starting a business today are more complicated and demanding than ever. Changes in technology, industrial innovation, product development, and severe rivalry and market laws have placed pressure on traditional management approaches, requiring them to alter. As a consequence, the number of startups and new firms that close, depart, or discontinue is relatively high (Westhead et al., 1993; Storey, 1994; Lussier, 1995; Wastson et al., 1998; Timmons, 1999; Bridge et al., 2012; Xiao et al., 2013; Daskalakis et al., 2013; Amankwah-Amoah, 2016; Hyder & Lussier, 2016; Cowling & Matthews, 2017; Vervoort, 2021). Small businesses, on the other hand, play a unique function in contemporary economies, boosting revenue, growth, and employment rates by responding to the market needs faster than large corporations (Acs, 1999; Thurik & Wennekers, 2004; Xiao, 2007; Savlovski & Robu, 2011; Repushevskaya, 2022). Despite the importance of small businesses in the economy, they confront distinct challenges that negatively impact their performance and survival rate. Regardless of their adaptability and flexibility, they face unique challenges compared to major corporations, necessitating a reaction on their side. In reality, pinpointing the exact reasons why small businesses fail is difficult at best. Failure is a nebulous concept, and specifying its causes is difficult (Storey, 1994; Wastson et al., 1998; Timmons, 1999; Hamilton, 2006; Storey and Greene, 2010; Walsh & Bartunek, 2011; Wennberg & DeTienne, 2014; Brusco, 2022).

Whether small firms can boost economic development seems straightforward: entrepreneurs start enterprises, which generate employment and promote competition, resulting in higher productivity (Acs et al., 2008; Cowling, 2000; Daskalakis et al., 2013; Morrish & Hamilton, 2022). In truth, entrepreneurship is about establishing and maintaining commercial activity to realize a goal. Entrepreneurs see market gaps and create businesses to fill them (Diaz-Foncia & Marcuello, 2013; Bastida et al., 2021). As a result, they are risk takers who fuel change, innovation, and advancement in a country's economy (Longenecker et al., 2012; Saydaliev & Kadyrov, 2022). A country's total economic development is proportional to its amount of entrepreneurship (Acs, 2006; Xiao, 2007; Acs et al., 2008; Anshika & Singla, 2022). This has previously been shown in nations such as the United States, where entrepreneurial efforts from the 1970s and 1980s altered the economy by producing new employment in a variety of industries, broadening the national economic base (Smith, 2010; Bampoky et al., 2013; Kritikos, 2014; Drucker, 2015; Poonguzhali, 2021). As a result, entrepreneurship has risen to prominence and has become a hot issue among practitioners and academics, especially in its ability to develop new enterprises (Acs et al., 2014; De Silva & Wright, 2019). Small startup enterprises have the potential to increase their product and service offerings for customers while also increasing job possibilities, contributing to economic development in a variety of ways (Acs, 2006; Dima, 2021).

However, beginning a company may be difficult for various reasons. Learning about the significant obstacles to survival experienced by small business startups will help entrepreneurs get off on the right foot. As a result, this research aims to empirically add to the study of the characteristics of entrepreneurial company startups' sustainability in Saudi Arabia in the context of Saudi Vision 2030.

Most small startups fail within three years, according to empirical evidence from developed economies (Argenti, 1976; Westhead et al., 1993; Storey, 1994; Lussier, 1995; Cowling, 2006; Ooghe & Prijcker, 2008; Amankwah-Amoah et al., 2021) and developing economies (Temtime & Pansiri, 2004; Al-Ghamri, 2016; Estrin et al., 2019). However, there is no data collected by the Saudi Arabian Authority of Small and Medium Enterprises to confirm the percentage of small startups that fail; however, given the evidence that small ventures face unique challenges in their early stages, it is reasonable to assume that failure in a complex developing country like Saudi Arabia is slightly higher or higher than failure in developed countries (Hameed & Irfan 2019).

2.2 Interpretive Structural Modeling (ISM)

ISM is a modeling tool for identifying and describing correlations between specific aspects that define a problem, ranking variables based on their effects' importance, and providing a managerial inference. Academics have used ISM to examine raw data and unclear situations across various disciplines. ISM transforms muddled and poorly articulated mental models of systems into observable, well-defined models that may be used for many problems (Sushil 2012).

Jabeen and Faisal (2018) classified enablers into four groups using a combination questionnaire and ISM approach. The study offers valuable insights into female entrepreneurs' perceptions of the UAE's entrepreneurial culture and a relationship model that can be used as a decision-making tool to improve female entrepreneurship.

Portuguese research (Banha et al., 2017) explored eleven obstacles and their linkages impacting the growth of the Portuguese entrepreneurial ecosystem using the ISM technique. The findings show a model represented by a flowchart consisting of ten barriers, three of which are located at the bottom of the model and have political-legislative features with a high level of range in all remaining barriers, implying that carefully measured political involvement could contribute to the improvement of the Portuguese entrepreneurship ecosystem.

Ebrahimi et al. (2022) employed ISM technique to compare variables gathered from the literature and validated by experts, using a qualitative approach. A questionnaire was constructed and disseminated to a small group of platform business and social network specialists to compare nine identified criteria. The research revealed that the strategic determinants in the growth of media entrepreneurship are eight aspects: opportunity, influencers, UX/UI, Strategic partners, resource control, platform governance, technological characteristics, and target audiences. The regulatory environment has been identified as a dependent variable affecting media entrepreneurship's success on platforms.

Parto Afkanan et al. (2021) created a pattern for restarting small and medium-sized unsuccessful entrepreneur's firms using interpretative structural modeling and multi-criteria decision-making methodologies. Lack of experience, lack of reform and developmental attitude, frustration and lack of reinvestment, lack of government financial support, turbulent economic situation, consumer value changes, instability of government laws, lack of motivation and willingness to re-enter the business and market, insufficient training and lack of irrational advice and targeting, lack of knowledge of the target market, lack of modern technology, and lack of value were among the findings.

Wei et al. conducted research utilizing ISM approach on variables impacting entrepreneurial learning from failure (2019). (1) There are 15 factors influencing entrepreneurial learning from failure that play different hierarchical roles, according to the study; (2) entrepreneurs' self-efficacy, as a key influencing factor of entrepreneurial learning from failure, can be cultivated and improved by enriched entrepreneurs' successful career experience. Furthermore, emotion regulation following an entrepreneurial failure is a key influencing factor of entrepreneurial learning from failure, and emotion management is regarded as an important part of entrepreneurship education;

(3) entrepreneurial education may indirectly affect entrepreneurship learning from failure by affecting entrepreneurs' self-efficacy; (4) economic conditions, policy support, industry characteristics, and cultural.

Raeesi et al. (2013) identified and supported eleven general impediments to entrepreneurship in the literature. Understanding the relationships among these obstacles may aid decision-makers in identifying effective overcoming methods since they are not separate and unrelated. This work uses interpretative structural modeling (ISM) to simulate these interactions, which has been proved to be a valuable tool for evaluating systematic interactions between obstacles. We divide barriers into two categories: inside and outside, and we demonstrate that interior barriers are reliant on outside barriers using the ISM-based model. As a result, a tainted and unsupportive corporate environment emerges as a primary impediment to entrepreneurship.

Despite the fact that the ISM technique has only been used in a few studies on startup sustainability, the current study proposes a systematic strategy for assessing and prioritizing interactions among enablers for the successful building of entrepreneurship, intending to fill the highlighted gap. Next, the resources and processes used to achieve the research study's purpose are described.

3. Materials and Methods

In order to identify the enablers of startup sustainability, a comprehensive literature review was conducted. This necessitated a rigorous approach to searching the literature for enablers in previously published studies in scientific databases. The recovered enablers to startup sustainability were then studied using the ISM approach, and relationships between them were modeled to determine their dependency and driving capacities classifications. This was done by engaging the support of 31 entrepreneurs to gather information on key enablers. The experts were tasked with evaluating the extracted enablers for startup sustainability, providing insightful and valuable analogies to feed into their models, and discovering the contextual links between them. Entrepreneurs having successful companies in Saudi Arabia have shared their own experiences. All of the entrepreneurs in this research regularly attended academic and/or social activities linked to entrepreneurship. Until all possible pair combinations of enablers were exhausted, each entrepreneur was asked to determine if each of the extracted enablers affected another enabler and the direction of influence.

According to some research, ISM's application may be summarized into seven phases (Kannan et al., 2008; Mandal & Deshmukh, 1994).

1. Make a list of the components you want to look into. In this paper, the components are the enablers of startups' sustainability.
2. Find the contextual ties between the enablers using four symbols:
 - V: if enabler i is present, enabler j is present.
 - A: if enabler j is present, enabler i is present.
 - X: if both enablers i and j result in the other's appearance.
 - O: if enablers i and j don't have any kind of connection.
3. Create a structural self-interaction matrix (SSIM) that represents the pair-wise contextual interactions between the enablers under consideration.
4. To generate the initial reachability matrix (IRM), apply the following replacement rules to the SSIM data values:
 - V: will become 1 for entry (i, j) and become 0 for entry (j, i).
 - A: will become 0 for entry (i, j) and become 1 for entry (j, i).
 - X: will become 1 for both entries (i, j) and (j, i).
 - O: will become 0 for both entries (i, j) and (j, i).
5. Use a transitivity test on the IRM to confirm that, for example, if the I enabler leads to the presence of the j enabler and the j enabler leads to the existence of the k enabler, then the i enabler leads to the existence of the k

enabler. As a result, 0–1 entries may be validated, and the resultant matrix is the FRM. Then, by constructing the partition matrix in each iteration, the levels of all enablers are determined repeatedly (PM).

6. Enablers are classified as links, dependents, drivers, or autonomous by the FRM.

7. Enablers are prioritized into the number of established and recognized levels in accordance with the FRM and PM, and the final ISM form may then be constructed.

The outcomes of the use of the ISM technique are then provided, along with a discussion of the findings.

4. Results

The study's goals were met using the seven steps of the ISM application listed above. First, as indicated in Table 1, a list of enablers was produced from the extensive literature study process. Second, a group of specialists aided in the identification of enabler-to-enabler contextual linkages. The SSIM in Table 2 must be developed as the third step toward modeling interactions among enablers using ISM to demonstrate pair-wise contextual links between the enablers. Fourth, using the SSIM supplied in Table 2 and the replacement criteria mentioned above, the IRM was generated as shown in Table 3. The transitivity criterion was used in the IRM in Table 3 as the fifth stage of ISM to verify all (0, 1) elements, resulting in the FRM displayed in Table 4. According to the transitivity rule, if IEn1 leads to IEn2, then IEn2 leads to IEn3, and so on, until all enablers have been exhausted. As a consequence, in the FRM presented in Table 4, some initial entries in the IRM are changed from a 0 to a 1 and denoted with a (*). Each enabler's driving and dependent powers (IEn1–XEn5) are represented by the sums of the entries in the FRM's rows and columns.

Table 1. Enablers to Startups Sustainability

Acronym	Enabler	Description	References
Internal Enabler			
IEn1	Processes	<i>Processes</i> may include: the distribution process (customer relationship and investments in the distribution process), internal governance mechanisms (formalization of the organization such as written rules, procedures, and instructions), internal processes, and knowledge management processes (access to external knowledge and information sources, and formalization of knowledge management processes).	<ul style="list-style-type: none"> • Groenewegen et al., (2012) • Giarratana (2004) • Kawakami et al., (2012) • Savarese et al., (2016) • Song et al., (2010)
IEn2	Product/Service & Market Position	<i>Product/ Service & Market Position</i> may include: competitiveness (competitor reactions to the startup's offering, and uniqueness of product/service), customers (past sales, and status of the customers a startup has reputation & signaling), innovativeness of the startup (R&D activities, uniqueness of innovation), market positioning of the startup (geographical location, geographical location, and growth of the startup, geographical location and social outcome orientation of the startup, and participation in competitions/awards), technology (role of technology in the business model), and maturity of startup (startup age).	<ul style="list-style-type: none"> • Koster & André (2014) • Pitkänen et al., (2014) • Khaire (2010) • Stam & Wennberg (2009) • Alon et al., (2018) • Dumont et al., (2016) • Mueller et al., (2008) • van Stel & Suddle (2008) • Kachlami (2017) • Mendoza-Abarca et al., (2015) • Khefacha & Belkacem (2016) • Arend (2003) • Song et al., (2008)
IEn3	Partnerships & Resources	<i>Partnerships & Resources</i> may include: advising bodies (board members), funding situation (funding approach & funding availability), incubators & accelerators (duration of the incubator or accelerator program a startup takes part in, network of an incubator or accelerator that	<ul style="list-style-type: none"> • Takahashi et al., (2018) • Florin et al., (2003) • Vanacker et al., (2011) • Qian Ye (2017) • Van Praag et al., (2005)

		supports a startup, and participation in an incubator or accelerator program, services an incubator or accelerator provides to a startup), and intellectual property (patents), investors (age, size and expertise of investors, attributes & capabilities of investors, geographical proximity between investors and startup, investment experience, investor behavior, IPO underwriters, and types of investors), network of startup (background of network partners, number and type of cooperation's along the value chain, number and type of formal networks, relationships with organizations beyond the own industry, and relationships with organizations in the own industry), and network of entrepreneurial management team (background of people in network, board roles in other ventures, and relationships to investors).	<ul style="list-style-type: none"> • Harada (2003) • Choonwoo Lee et al., (2001) • Lall et al., (2020) • Engel (2004) • Alexy et al., (2012) • Croce et al., (2018) • Niemann (2011) • Stubner et al., (2007) • Cumming et al. (2017) • Alemany (2006) • Shane & Stuart (2002) • Pangarkar & Wu (2013) • Dutta & Hora (2017) • Bellavitis et al., (2014) • Stam & Elfring (2008)
IEn4	Vision & Strategy	<i>Vision & strategy</i> may include: business model (ambidexterity of the business model (combination of novelty and efficiency), efficiency/productivity of the business model, fit between strategy and team experience, the role of innovation and technology in the business model, and targeted industry sector/segment), customers (geographic location of the customers' startup targets), planning (business plan), and strategy (degree of diversification in terms of customers/ markets and products).	<ul style="list-style-type: none"> • Balboni et al., (2019) • Shrader & Siegel (2007) • Dvir et al., (2010) • Kohn & Wewel (2018) • Aspelund et al., (2007) • Schueffel et al., (2011) • Sleuwaegen & Onkelinx (2014) • Blesa et al., (2008) • Almodóvar & Rugman (2014)
IEn5	Team	<i>A team</i> may include: capabilities in the startup (available capabilities, and investments in new capabilities), employees (existence and type of employee incentives, number and type of employee degrees, and a number of employees), entrepreneurial team (age, attitude, behavior, capabilities, characteristics, decision-making style, duration of having resided in the location/area of the startup, education, experiences, gender, motivation, personality, strategic variety, team composition, team demographics, and team wealth), and organizational design (similarity of organizational structure and roles compared to incumbents).	<ul style="list-style-type: none"> • Chen (2009) • Terjesen et al. (2011) • Westerman et al., (2008) • Larrañeta et al. (2014) • Garnsey et al., (2006) • Baum & Locke (2004) • Yitshaki (2012) • Hughes et al., (2007) • Wang et al. (2017) • LeBrasseur et al., (2003) • Wu (2007) • Martínez-Fierro et al., (2020) • Smolka et al. (2018) • Read et al., (2009) • Dahl & Sorenson (2012) • Streletzki & Schulte (2013) • Delmar & Shane (2006) • Dick et al., (2013) • Florin et al., (2003) • Barba-Sánchez & Martínez-Ruiz (2009) • Alsos et al., (2006) • de Mol et al., (2020) • Mai & Zheng (2013) • Yamakawa et al. (2015) • Mueller et al., (2017) • Frank et al., (2007) • Eesley et al., (2014) • Jin et al. (2017) • Chen & Thompson (2015) • Hvide & Møen (2010)

External Enabler			
XEn1	Entrepreneurial Ecosystem	<i>Entrepreneurial ecosystem</i> may include: local ecosystem, knowledge context of a startup, and proximity to urban business districts.	<ul style="list-style-type: none"> • Raspe & Oort (2011) • Honjo (2004)
XEn2	Industrial & Market	<i>Industrial & market</i> may include: differentiators in an industry (relevance of sustainability), the economic condition of a region (unemployment rate), the economic condition of an industry (level of collective optimism among industry peers), industry cluster (strength of a cluster of related industries), investors (venture capital availability), suppliers (supplier accessibility), and target markets (entry barriers, market dynamism, and market growth).	<ul style="list-style-type: none"> • Schick et al., (2002) • Anglin et al., (2018) • Wennberg & Lindqvist (2010) • Robinson, & McDougall (2001)
XEn3	Regulatory & Political	<i>Regulatory & Political</i> may include: institutional environment (strength and efficiency of institutions), regulation (bankruptcy regulation and costs of doing business due to the government regulation), and support policies/subsidies (continuity of support policies that could affect the startup, generosity of support policies that could affect the startup, and usage of support policies through the startup).	<ul style="list-style-type: none"> • Batjargal et al., (2013) • Eberhart et al., (2017) • Georgallis & Durand (2017) • Söderblom et al., (2015) • Alonso-Nuez & María J. (2012) • Norrman & Bager-Sjögren (2010)
XEn4	Socio-cultural	<i>Socio-cultural</i> may include: community entrepreneurial culture (entrepreneurial perception of community entrepreneurial culture), and social norms and culture (degree of social supportiveness in the cultural context and performance orientation of social norms and culture).	<ul style="list-style-type: none"> • Coleman & Kariv (2014) • Laskovaia et al. (2017) • Seo & Lee (2019)
XEn5	Technological	<i>Technological</i> may include: infrastructure and quality of the infrastructure.	<ul style="list-style-type: none"> • Sarma & Marszalek (2020)

Table 2. The structural self-interaction matrix

Enabler	IEn1	IEn2	IEn3	IEn4	IEn5	XEn1	XEn2	XEn3	XEn4	XEn5
IEn1		V	O	X	O	V	O	V	V	A
IEn2			A	A	A	V	A	O	A	A
IEn3				A	A	V	X	A	O	A
IEn4					V	V	V	V	O	A
IEn5						V	V	A	A	A
XEn1							A	O	O	A
XEn2								A	A	O
XEn3									A	A
XEn4										A
XEn5										

Table 3. The initial reachability matrix

Enabler	IEn1	IEn2	IEn3	IEn4	IEn5	XEn1	XEn2	XEn3	XEn4	XEn5
IEn1	1	1	0	1	0	1	0	1	1	0
IEn2	0	1	0	0	0	1	0	0	0	0
IEn3	0	1	1	0	0	1	1	0	0	0
IEn4	1	1	1	1	1	1	1	1	0	0
IEn5	0	1	1	0	1	1	1	0	0	0
XEn1	0	0	0	0	0	1	0	0	0	0
XEn2	0	1	1	0	0	1	1	0	0	0
XEn3	0	0	1	0	1	0	1	1	0	0
XEn4	0	1	0	0	1	0	1	1	1	0
XEn5	1	1	1	1	1	1	0	1	1	1

Table 4. The final reachability matrix

Enabler	IEn1	IEn2	IEn3	IEn4	IEn5	XEn1	XEn2	XEn3	XEn4	XEn5	Driving Power
IEn1	1	1	1*	1	1*	1	1*	1	1	0	9
IEn2	0	1	0	0	0	1	0	0	0	0	2
IEn3	0	1	1	0	0	1	1	0	0	0	4
IEn4	1	1	1	1	1	1	1	1	1*	0	9
IEn5	0	1	1	0	1	1	1	0	0	0	6
XEn1	0	0	0	0	0	1	0	0	0	0	1
XEn2	0	1	1	0	0	1	1	0	0	0	4
XEn3	0	1*	1	0	1	1*	1	1	0	0	6
XEn4	0	1	1*	0	1	1*	1	1	1	0	7
XEn5	1	1	1	1	1	1	1*	1	1	1	10
Dependence Power	3	9	8	3	6	10	8	5	4	1	

* changed from 0 to 1 due to transitivity rule

As a result, a partition matrix was created to specify the levels of all enablers (IEn1–XEn5) in the structural model. The "reachability set" is the initial set, and it displays all the enablers that an enabler can reach for each enabler. The "antecedent set," or collection of variables that have previously gone through that enabler, is the second set. The "interaction set," which represents the set of enablers that overlap between the reachability and antecedent sets, implying that they may be deleted, and a level may be attributed to the enabler based on this, is the third set. This elimination and level assignment procedure is used for each created partition matrix in iterations until all enablers are exhausted, and levels are determined. In iterations, this elimination and level assignment procedure is used for each created partition matrix until all enablers have been exhausted and levels have been determined. The adoption of the provided approach resulted in seven iterations classifying the enablers into eight levels (Level I–Level VIII), as shown in Table 5.

Table 5. Partition matrix and enabler levels—all iterations of ISM computations.

Iteration 1				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEn1, IEn2, IEn3, IEn4, IEn5, XEn1, XEn2, XEn3, XEn4	IEn1, IEn4, XEn5	IEn1, IEn4	
IEn2	IEn2, XEn1	IEn1, IEn2, IEn3, IEn4, IEn5, XEn2, XEn3, XEn4, XEn5	IEn2	
IEn3	IEn2, IEn3, XEn1, XEn2	IEn1, IEn3, IEn4, IEn5, XEn2, XEn3, XEn4, XEn5	IEn3, XEn2	
IEn4	IEn1, IEn2, IEn3, IEn4, IEn5, XEn1, XEn2, XEn3, XEn4	IEn1, IEn4, XEn5	IEn1, IEn4	
IEn5	IEn2, IEn3, IEn5, XEn1, XEn2	IEn1, IEn4, IEn5, XEn3, XEn4, XEn5	IEn5	
XEn1	XEn1	IEn1, IEn2, IEn3, IEn4, IEn5, XEn1, XEn2, XEn3, XEn4, XEn5	XEn1	I
XEn2	IEn2, IEn3, XEn1, XEn2	IEn1, IEn3, IEn4, IEn5, XEn2, XEn3, XEn4, XEn5	IEn3, XEn2	
XEn3	IEn2, IEn3, IEn5, XEn1, XEn2, XEn3	IEn1, IEn4, XEn3, XEn4, XEn5	XEn3	

XEn4	IEN2, IEN3, IEN5, XEN1, XEN2, XEN3, XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	
XEn5	IEN1, IEN2, IEN3, IEN4, IEN5, XEN1, XEN2, XEN3, XEN4, XEN5	XEN5	XEN5	
Iteration 2				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN2, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn2	IEN2, XEN1	IEN1, IEN2, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	IEN2	II
IEn3	IEN2, IEN3, XEN2	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	IEN3, XEN2	
IEn4	IEN1, IEN2, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn5	IEN2, IEN3, IEN5, XEN2	IEN1, IEN4, IEN5, XEN3, XEN4, XEN5	IEN5	
XEn2	IEN2, IEN3, XEN2	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	IEN3, XEN2	
XEn3	IEN2, IEN3, IEN5, XEN2, XEN3	IEN1, IEN4, XEN3, XEN4, XEN5	XEN3	
XEn4	IEN2, IEN3, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	
XEn5	IEN1, IEN2, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	XEN5	XEN5	
Iteration 3				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn3	IEN3, XEN2	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	IEN3, XEN2	III
IEn4	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn5	IEN3, IEN5, XEN2	IEN1, IEN4, IEN5, XEN3, XEN4, XEN5	IEN5	
XEn2	IEN3, XEN2	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	IEN3, XEN2	III
XEn3	IEN3, IEN5, XEN2, XEN3	IEN1, IEN4, XEN3, XEN4, XEN5	XEN3	
XEn4	IEN3, IEN5, XEN2, XEN3, XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	
XEn5	IEN1, IEN3, IEN4, IEN5, XEN2, XEN3, XEN4, XEN5	XEN5	XEN5	
Iteration 4				

Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN4, IEN5, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn4	IEN1, IEN4, IEN5, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn5	IEN5	IEN1, IEN4, IEN5, XEN3, XEN4, XEN5	IEN5	IV
XEn3	IEN5, XEN3	IEN1, IEN4, XEN3, XEN4, XEN5	XEN3	
XEn4	IEN5, XEN3, XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	
XEn5	IEN1, IEN4, IEN5, XEN3, XEN4, XEN5	XEN5	XEN5	
Iteration 5				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN4, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn4	IEN1, IEN4, XEN3, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
XEn3	XEN3	IEN1, IEN4, XEN3, XEN4, XEN5	XEN3	V
XEn4	XEN3, XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	
XEn5	IEN1, IEN4, XEN3, XEN4, XEN5	XEN5	XEN5	
Iteration 6				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN4, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
IEn4	IEN1, IEN4, XEN4	IEN1, IEN4, XEN5	IEN1, IEN4	
XEn4	XEN4	IEN1, IEN4, XEN4, XEN5	XEN4	VI
XEn5	IEN1, IEN4, XEN4, XEN5	XEN5	XEN5	
Iteration 7				
Enabler	Reachability Set	Antecedent Set	Intersection	Level
IEn1	IEN1, IEN4	IEN1, IEN4, XEN5	IEN1, IEN4	VII
IEn4	IEN1, IEN4	IEN1, IEN4, XEN5	IEN1, IEN4	VII
XEn5	IEN1, IEN4, XEN5	XEN5	XEN5	VIII

Using Cross-Impact Matrix Multiplication Applied to Classification (MICMAC) and the FRM's estimated dependence and driving powers determined in Table 4, all enablers (IEn1–XEn5) were classified or sorted into four groups in the sixth stage of ISM. Linking, dependent, driver and autonomous enablers are all types of enablers. The values associated with each enabler were used as (x, y) coordinates to build the dependency versus driving power curve. As a result, their categories were defined, and the chart's four quadrants were separated into four quadrants, as illustrated in Figure 1.

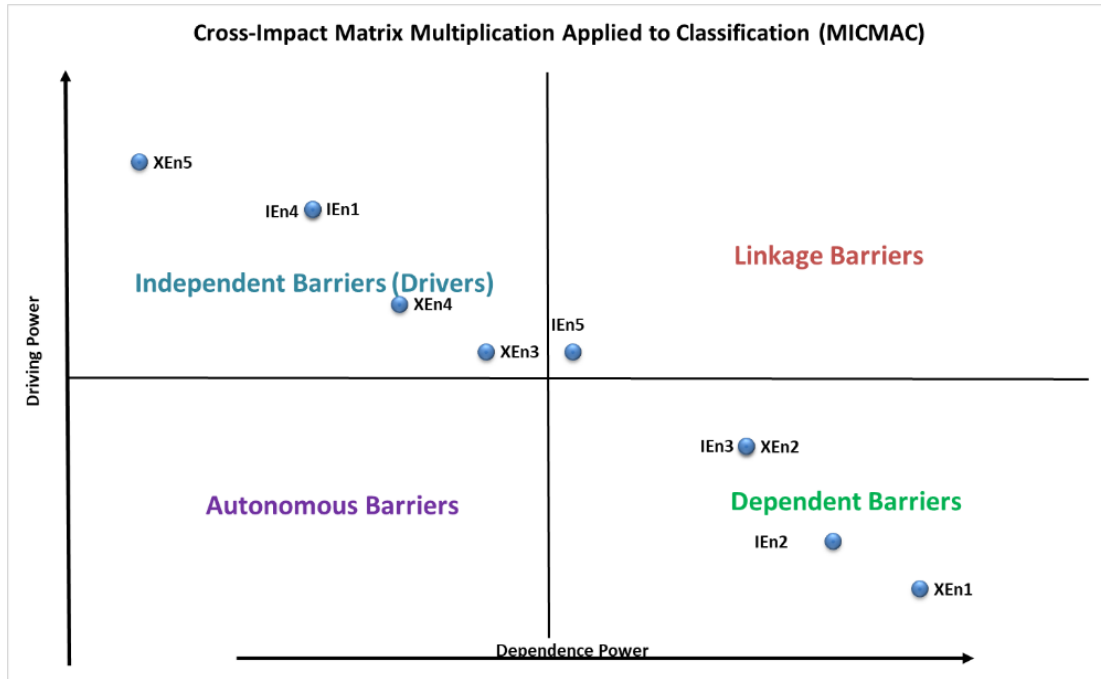


Figure 1. Startups sustainability clustering diagram

Results of this study's ISM, shown in Tables 1–5 and Figures 1 and 2, demonstrate that the targeted experts have categorized all enablers into three categories: independently derived, dependent, and linked. No independently derived enabling mechanisms have been found. Experts involved in this research have also categorized the ten discovered enablers of startups' long-term viability into eight distinct degrees of importance.

This suggests that XEn5, Technological, has the largest amount of dependency on other enablers and displays a lesser level of driving strength among other enablers to startups' sustainability. According to the findings, the second level of enablers (Processes "IEn1" and Vision & Strategy "IEn4") have a direct impact on the outcome. A lack of vision and strategy (e.g., business model, ambidexterity of a business model, efficiency/productivity of a business model, fit between strategy and the team experience, the role of innovation and technology in a business model, and business model) is to blame for the infrastructure's inadequacy. It is thus safe to say that this collection of enablers has had a direct impact on Socio-culture, which in turn has had an impact on Regulations and Politics, which in turn has had an impact on Startup Team Capabilities (XEn4) (IEn5). A product/service & market position (XEn2) is immediately impacted by team enabler (IEn3), which is directly influenced by the product/service & market position (XEn2) (IEn2). To sum it up, the entrepreneurial ecosystem (XEn1) has the most effect on all of the enablers, which comprise the third through eighth levels with the greatest driving force.

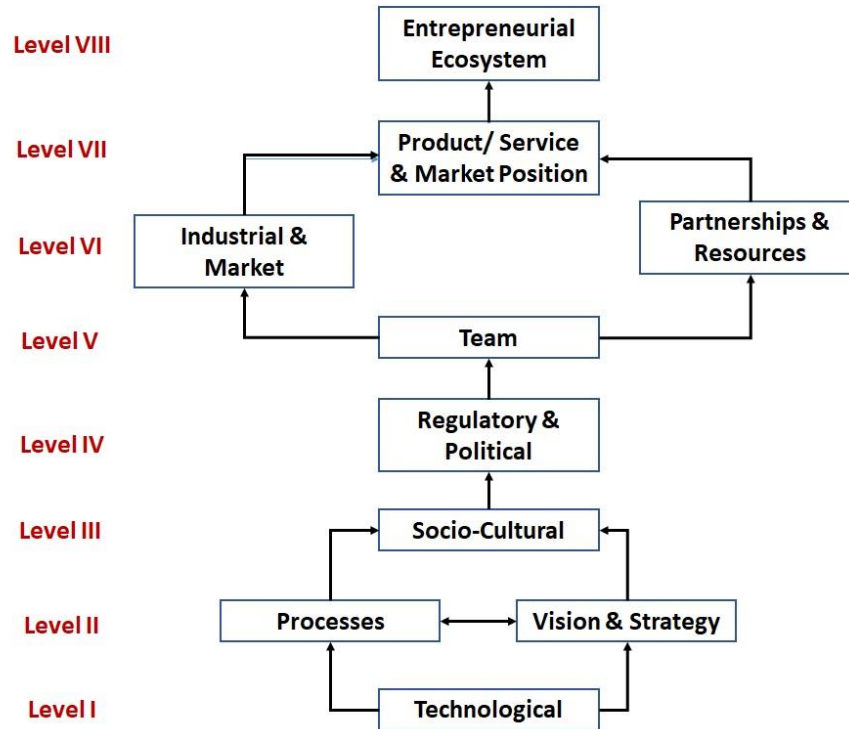


Figure 2. The final ISM digraph of enablers to startups sustainability

5. Discussion and Limitations

According to the report, the entrepreneurial environment is critical to the long-term viability of businesses. There are no barriers to new ideas in Saudi Arabia's entrepreneurial environment. FinTech ExPermit was created by the Saudi Capital Market Authority (CMA) to allow equity crowdfunding platforms to operate in the country. On the heels of this, the Saudi Arabian Monetary Agency (SAMA) has set up an experimentation zone to test different digital payment systems and has given many banks and enterprises experimental permits. There was also a group called Fintech Saudi that brought together essential players to encourage a culture of innovation inside the financial industry in Saudi Arabia.

Additionally, several support firms have popped out from the PIF subsidiary TAQNIA, which is dedicated to creating value from technology. BIAC, Riyadh TAQNIA Fund, and Research Products Development (RDP), a technological development and commercialization center, are just a few examples of organizations that fall under this category (Ashri, 2019). Another key enabler is the ability to use a company's operations, vision, and strategy in conjunction with various resources and partners. The entrepreneurial environment may be built by accepting these enablers one at a time.

The theoretical contribution of this paper is divided into three parts. First, we identified ten influencing elements of startups' sustainability based on literature research. We suggested a hierarchical model of influencing startup sustainability using the expert approach based on the ISM method of system dynamics. The majority of Saudi Arabian research has concentrated on female entrepreneurship (Islam et al., 2018), post-materialistic ideals (Alammari et al., 2019), female entrepreneur environmental problems (Alkhaled & Berglund, 2018), and characteristics that influence the entrepreneurial success (Al-Tit et al., 2019). Only one research (Abdulghaffar & Akkad, 2020) looked at various variables impacting startup sustainability on two levels, including internal and external factors, without looking at how they interrelate. This work conducts in-depth research and presents

researchers with a user-friendly ISM (as illustrated in Figure 2). Second, this paper shows that industrial & market factors (Differentiators in an industry, Economic condition of a region, Economic condition of an industry, Industry cluster, Investors, Suppliers, and Target markets), as well as partnerships & resources (Advising bodies, Funding situation, Incubators & accelerators, Intellectual property, Investors, Network of startups, and Network of entrepreneurial management team), can have direct effects on startup sustainability as a key factor. Industrial & market (Schick et al., (2002); Anglin et al., (2018); Wennberg & Lindqvist (2010)) and collaborations & resources (Takahashi et al., (2018); Lall et al., (2020); Croce et al., (2018)) have also been emphasized by certain academics. This adds to our understanding of how industrial and market conditions, as well as relationships and resources, impact startup sustainability. Furthermore, this research incorporates current research aspects and frameworks, allowing for a more in-depth examination of sustainability theory as well as an empirical investigation of startup sustainability.

Our study results have three implications for entrepreneurs and companies looking to develop entrepreneurial ecosystems. This article first lays out a route for entrepreneurs to follow to enhance their chances of becoming more sustainable. The industry and market, as well as relationships and resources, demand special consideration since they might directly impact the startup's long-term viability. Entrepreneurs should maintain a high level of competitiveness (competitor reactions to the startup's offering and uniqueness of product/service), customers (past sales, and status of customers a startup has reputation & signaling), innovativeness of the startup (R&D activities, uniqueness of innovation), market positioning of the startup (geographical location, geographical location and growth of the startup, geographical location and social outcome orientation of the startup), and market positioning of the startup (geographical location, geographical location, and growth). Second, regulatory and political factors may have an indirect impact on the startup's long-term viability by altering the entrepreneurial team. To provide entrepreneurs with appropriate support, the institutional environment (institutional strength and efficiency), regulation (bankruptcy regulation and costs of doing business due to government regulation), and support policies/subsidies (continuity of support policies that could affect the startup, generosity of support policies that could affect the startup, and usage of support policies through the startup) are all required. Third, technological, process, vision, strategy, and socio-cultural variables must be considered (Horne & Fichter, 2022). To create an excellent social atmosphere and environment for entrepreneurial activities, the socio-cultural (entrepreneurial perception of community entrepreneurial culture, degree of social supportiveness in the cultural context, and performance orientation of social norms and culture) must provide vigorous support and openness.

The research design that was used in this study includes several limitations. Due to the exploratory nature of this research, we cannot apply the perspectives of the business owners we interviewed here to any other set of institutional or political conditions. However, all this knowledge is valuable since every entrepreneur has an engaging story about their personal experience starting a business. We believe that the theoretical model can be used in various settings. Consequently, it is hard to determine whether or not the strategies discussed in this article are really effective or making an impact. Even though those who responded are highly experienced in their separate fields as entrepreneurs, it would still be necessary to use different methods to analyze this data.

Conclusions

Impact startups may help the sustainability transition by effectively scaling up their "sustainability-oriented market innovations" and "transforming markets towards sustainable development," as discussed in this article. Most elements influencing startups' success and establishing links between business ventures' social or environmental repercussions remain unknown. The interpretive structural modeling (ISM) method was used to study the linkages between distinct enabling components since they are not entirely stand-alone. The stages of the ISM process were designed based on the advice of industry professionals. This diagram of startup sustainability enablers helps us to understand how they interact together.

The three primary contributions we provide to science result from our work. If you want your business to have a better shot at long-term viability, this article offers a path to follow. The startup's long-term sustainability may be directly impacted by the industry and market, as well as the startup's ties and resources. A startup's competitiveness, customer base, R&D activities, uniqueness of its innovation, and market positioning should all be maintained at a high level by entrepreneurs. This may have a direct influence on the startup's long-term sustainability by changing the entrepreneurial team. It is necessary to have a strong and efficient institution and regulations (bankruptcy regulations and the costs of doing business due to government regulation) to support entrepreneurs. A third factor to examine is the influence of various socio-cultural and technical factors (Horne & Fichter, 2022). For entrepreneurial activities to thrive, the socio-cultural (entrepreneurial perceptions, degree of social support, and performance orientation of social norms and culture) must give active support and openness to the community's entrepreneurial culture.

According to this research, ten main factors contribute to a company's long-term survival. System dynamics (Sushil, 2012) from ISM was utilized to provide a comprehensive picture of the links and interrelationships among the many factors affecting startup long-term viability. This study classified internal and external facilitators. Processes, goods or services, and market position; partnerships; resources; vision; strategy; team; entrepreneurial ecosystem; regulatory; political; socio-cultural & technological; are all facilitators to success in a commercial context.

References

- Abdulghaffar, N. A., & Akkad, G. S. (2021). Internal and external barriers to entrepreneurship in Saudi Arabia. *Digest of Middle East Studies*, 30(2), 116-134. <https://doi.org/10.1111/dome.12231>
- Acs, Z. (2006). How is entrepreneurship good for economic growth? *Innovations: technology, Governance, Globalization*, 1(1), 97-107. <https://doi.org/10.1162/itgg.2006.1.1.97>
- Acs, Z. J. (1999). The new American evolution. Are small firms important? Their role and impact (pp. 1-20). Springer, Boston, MA. https://doi.org/10.1007/978-1-4615-5173-7_1
- Acs, Z. J., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43(3), 476-494. <https://doi.org/10.1016/j.respol.2013.08.016>
- Acs, Z. J., Desai, S., & Hessels, J. (2008). Entrepreneurship, economic development and institutions. *Small Business Economics*, 31(3), 219-234. <https://doi.org/10.1007/s11187-008-9135-9>
- Alammari, K., Newbery, R., Haddoud, M. Y., & Beaumont, E. (2019). Post-materialistic values and entrepreneurial intention-The case of Saudi Arabia. *Journal of Small Business and Enterprise Development*, 26, 158-179. <https://doi.org/10.1108/JSBED-12-2017-0386>
- Almahdi, H. K. (2020). Assessing government intervention towards the development of entrepreneurship in Saudi Arabia. *Journal of Entrepreneurship Education*, 23(3), 1-12
- Aleman, L. (2006). Venture Capital in Spain: Evolution, characterisation and economic impact analysis. *International Journal of Entrepreneurship and Innovation Management*, 6(4-5), 412-428. <https://doi.org/10.1504/IJEIM.2006.010374>
- Alexy, O. T., Block, J. H., Sandner, P., & Ter Wal, A. L. (2012). Social capital of venture capitalists and startup funding. *Small Business Economics*, 39(4), 835-851. <https://doi.org/10.1007/s11187-011-9337-4>
- Al-Ghamri, N. S. (2016). Challenges Facing Businesswomen and Their Negative Impact on the Performance of Small Businesses in the Province of Jeddah in Saudi Arabia. *International Journal of Business and Management*, 11(9), 96. <https://doi.org/10.5539/ijbm.v11n9p96>

Alkhaled, S., & Berglund, K. (2018). 'And now I'm free': Women's empowerment and emancipation through entrepreneurship in Saudi Arabia and Sweden. *Entrepreneurship & Regional Development*, 30, 877-900. <https://doi.org/10.1080/08985626.2018.1500645>

Almodóvar, P., & Rugman, A. M. (2014). The MC urve and the Performance of S panish International New Ventures. *British Journal of Management*, 25, S6-S23. <https://doi.org/10.1111/1467-8551.12022>

Alnemer, H. A. (2021). Predicting startup intention among the females of Saudi Arabia using social cognitive theory. *World Journal of Entrepreneurship, Management and Sustainable Development*.

Alon, T., Berger, D., Dent, R., & Pugsley, B. (2018). Older and slower: The startup deficit's lasting effects on aggregate productivity growth. *Journal of Monetary Economics*, 93, 68-85. <https://doi.org/10.1016/j.jmoneco.2017.10.004>

Alonso-Nuez, M. J., & Galve-Górriz, C. (2012). The Impact Of Public Programs On The Survival And Profits Of Startups: Evidence From A Region of Spain. *Journal of Developmental Entrepreneurship*, 17(02), 1250010. <https://doi.org/10.1142/S1084946712500100>

Aloulou, W. J., & Al-Othman, N. (2021). Entrepreneurship in Saudi Arabia. In *Entrepreneurship In The Gulf Cooperation Council Region: Evolution and Future Perspectives* (pp. 111-145). https://doi.org/10.1142/9781786348081_0006

Alsos, G. A., Isaksen, E. J., & Ljunggren, E. (2006). New venture financing and subsequent business growth in men-and women-led businesses. *Entrepreneurship theory and practice*, 30(5), 667-686. <https://doi.org/10.1111/j.1540-6520.2006.00141.x>

Al-Tit, A., Omri, A., & Euch, J. (2019). Critical success factors of small and medium-sized enterprises in Saudi Arabia: Insights from sustainability perspective. *Administrative Sciences*, 9, 32. <https://doi.org/10.3390/admsci9020032>

Amankwah-Amoah, J. (2016). An integrative process model of organisational failure. *Journal of Business Research*, 69(9), 3388-3397. <https://doi.org/10.1016/j.jbusres.2016.02.005>

Amankwah-Amoah, J., Khan, Z., Ifere, S. E., Nyuur, R. B., & Khan, H. (2021). Entrepreneurs' Learning from Business Failures: An Emerging Market Perspective. *British Journal of Management*. <https://doi.org/10.1111/1467-8551.12557>

Anglin, A. H., McKenny, A. F., & Short, J. C. (2018). The impact of collective optimism on new venture creation and growth: A social contagion perspective. *Entrepreneurship Theory and Practice*, 42(3), 390-425. <https://doi.org/10.1111/etap.12256>

Anshika, A., & Singla, A. (2022). Financial literacy of entrepreneurs: a systematic review. *Managerial Finance*. <https://doi.org/10.1108/MF-06-2021-0260>

Arend, R. J. (2003). Revisiting the logical and research considerations of competitive advantage. *Strategic Management Journal*, 24(3), 279-284. <https://doi.org/10.1002/smj.285>

Argenti, J. (1976), *Corporate Collapse: The Causes and Symptoms*, McGraw-Hill, London.

Ashri, M. Osama. (2019). On The Fast Track: Saudi Arabia's Entrepreneurship Ecosystem. *Entrepreneur Middle East*. <https://www.entrepreneur.com/article/336766>

Aspelund, A., Madsen, T. K., & Moen, Ø. (2007). A review of the foundation, international marketing strategies, and performance of international new ventures. *European Journal of Marketing*. <https://doi.org/10.1108/03090560710821242>

Balboni, B., Bortoluzzi, G., Pugliese, R., & Tracogna, A. (2019). Business model evolution, contextual ambidexterity and the growth performance of high-tech startups. *Journal of Business Research*, 99, 115-124. <https://doi.org/10.1016/j.jbusres.2019.02.029>

Bampoky, C., Blanco, L., Liu, A. and Prieger, J. (2013). Economic Growth and the Optimal Level of Entrepreneurship. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2295612>

Banha, F. M., Almeida, M. H., Rebelo, E. L., & Ramos, A. O. (2017). The main barriers of Portuguese entrepreneurship ecosystem: Interpretive Structural Modeling (ISM) approach. *Tourism & Management Studies*, 13(2), 60-70.

<https://doi.org/10.18089/tms.2017.13206>

Barba-Sánchez, V., & Martínez-Ruiz, M. D. P. (2009). A longitudinal study to assess the most influential entrepreneurial features on a new firm's growth. *Journal of Small Business & Entrepreneurship*, 22(3), 253-266. <https://doi.org/10.1080/08276331.2009.10593454>

Bastida, M., Vaquero García, A., & Vázquez Taín, M. Á. (2021). Social economy, sustainable entrepreneurship and regional policy drivers. *Territory, Politics, Governance*, 1-23. <https://doi.org/10.1080/21622671.2021.1967778>

Batjargal, B., Hitt, M. A., Tsui, A. S., Arregle, J. L., Webb, J. W., & Miller, T. L. (2013). Institutional polycentrism, entrepreneurs' social networks, and new venture growth. *Academy of Management Journal*, 56(4), 1024-1049. <https://doi.org/10.5465/amj.2010.0095>

Baum, J. R., & Locke, E. A. (2004). The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth. *Journal of applied Psychology*, 89(4), 587. <https://doi.org/10.1037/0021-9010.89.4.587>

Bellavitis, C., Filatotchev, I., & Kamuriwo, D. S. (2014). The effects of intra-industry and extra-industry networks on performance: A case of venture capital portfolio firms. *Managerial and Decision Economics*, 35(2), 129-144. <https://doi.org/10.1002/mde.2647>

Blesa, A., Monferrer, D., Nauwelaerts, Y., & Ripollés, M. (2008). The effect of early international commitment on international positional advantages in Spanish and Belgian international new ventures. *Journal of International Entrepreneurship*, 6(4), 168-187.

<https://doi.org/10.1007/s10843-008-0026-6>

Bosma, N., Hill, S., Ionescu-Somers, A., Kelley, D., Guerrero, M., & Schott, T. (2021). Global entrepreneurship monitor 2020/2021 global report. Global Entrepreneurship Research Association: London, UK.

Bridge, S. and O'Neill, K. (2012). Understanding enterprise: Entrepreneurship and small business. Palgrave Macmillan.

Brusco, S. (2022). Small firms and industrial districts. Department of Economics 0199, University of Modena and Reggio E., Faculty of Economics "Marco Biagi".

Chen, C. J. (2009). Technology commercialization, incubator and venture capital, and new venture performance. *Journal of Business Research*, 62(1), 93-103. <https://doi.org/10.1016/j.jbusres.2008.01.003>

Chen, J., & Thompson, P. (2015). New firm performance and the replacement of founder-CEOs. *Strategic Entrepreneurship Journal*, 9(3), 243-262. <https://doi.org/10.1002/sej.1203>

Coleman, S., & Kariv, D. (2014). 'Deconstructing' entrepreneurial self-efficacy: a gendered perspective on the impact of ESE and community entrepreneurial culture on the financial strategies and performance of new firms. *Venture Capital*, 16(2), 157-181.

<https://doi.org/10.1080/13691066.2013.863063>

Cowling, M. (2000). Are entrepreneurs different across countries?. *Applied Economics Letters*, 7(12), 785-789.

<https://doi.org/10.1080/135048500444804>

Cowling, M. (2006). Early stage survival and growth. In *The life cycle of entrepreneurial ventures*. Springer US, pp.479-506.

https://doi.org/10.1007/978-0-387-32313-8_16

Cowling, M. and Matthews, C. (2017). Internal Financial Management in Smaller, Entrepreneurial Businesses In: Blackburn, R., De Clercq, D., Heinonen, J. and Wang, Z., eds. *The SAGE Handbook of Small Business and Entrepreneurship*. Sage, California, United States. ISBN 9781473925236 <https://doi.org/10.4135/9781473984080.n18>

Croce, A., Guerini, M., & Ughetto, E. (2018). Angel financing and the performance of high-tech startups. *Journal of Small Business Management*, 56(2), 208-228. <https://doi.org/10.1111/jsbm.12250>

Cumming, D. J., Grilli, L., & Murtinu, S. (2017). Governmental and independent venture capital investments in Europe: A firm-level performance analysis. *Journal of Corporate Finance*, 42, 439-459. <https://doi.org/10.1016/j.jcorpfin.2014.10.016>

Dahl, M. S., & Sorenson, O. (2012). Home sweet home: Entrepreneurs' location choices and the performance of their ventures. *Management Science*, 58(6), 1059-1071. <https://doi.org/10.1287/mnsc.1110.1476>

Daskalakis, N., Jarvis, R. and Schizas, E. (2013). Financing practices and preferences for micro and small firms. *Journal of Small Business and Enterprise Development*, 20(1), 80-101. <https://doi.org/10.1108/14626001311298420>

De Mol, E., Cardon, M. S., de Jong, B., Khapova, S. N., & Elfring, T. (2020). Entrepreneurial passion diversity in new venture teams: An empirical examination of short-and long-term performance implications. *Journal of Business Venturing*, 35(4), 105965. <https://doi.org/10.1016/j.jbusvent.2019.105965>

Diaz-Foncea, M. and Marcuello, C. (2013). Entrepreneurs and the context of cooperative organizations: A definition of cooperative entrepreneur. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 30(4), 238-251. <https://doi.org/10.1002/cjas.1267>

Dick, J. M., Hussinger, K., Blumberg, B., & Hagedoorn, J. (2013). Is success hereditary? Evidence on the performance of spawned ventures. *Small Business Economics*, 40(4), 911-931. <https://doi.org/10.1007/s11187-011-9394-8>

Drucker, P. (2015). *Innovation and Entrepreneurship*. Oxon: Routledge Classics. <https://doi.org/10.4324/9781315747453>

Dumont, M., Rayp, G., Verschelde, M., & Merlevede, B. (2016). The contribution of startups and young firms to industry-level efficiency growth. *Applied Economics*, 48(59), 5786-5801. <https://doi.org/10.1080/00036846.2016.1184381>

Dutta, D. K., & Hora, M. (2017). From invention success to commercialization success: Technology ventures and the benefits of upstream and downstream supply-chain alliances. *Journal of Small Business Management*, 55(2), 216-235. <https://doi.org/10.1111/jsbm.12334>

Dvir, D., Sadeh, A., & Malach-Pines, A. (2010). The fit between entrepreneurs' personalities and the profile of the ventures they manage and business success: An exploratory study. *The Journal of High Technology Management Research*, 21(1), 43-51. <https://doi.org/10.1016/j.hitech.2010.02.006>

Eberhart, R. N., Eesley, C. E., & Eisenhardt, K. M. (2017). Failure is an option: Institutional change, entrepreneurial risk, and new firm growth. *Organization Science*, 28(1), 93-112. <https://doi.org/10.1287/orsc.2017.1110>

Eesley, C. E., Hsu, D. H., & Roberts, E. B. (2014). The contingent effects of top management teams on venture performance: Aligning founding team composition with innovation strategy and commercialization environment. *Strategic Management Journal*, 35(12), 1798-1817. <https://doi.org/10.1002/smj.2183>

Engel, D. (2004). The performance of venture-backed firms: the effect of venture capital company characteristics. *Industry and Innovation*, 11(3), 249-263. <https://doi.org/10.1080/1366271042000265401>

Florin, J., Lubatkin, M., & Schulze, W. (2003). A social capital model of high-growth ventures. *Academy of Management Journal*, 46(3), 374-384. <https://doi.org/10.2307/30040630>

Florin, J., Lubatkin, M., & Schulze, W. (2003). A social capital model of high-growth ventures. *Academy of Management Journal*, 46(3), 374-384. <https://doi.org/10.2307/30040630>

Frank, H., Lueger, M., & Korunka, C. (2007). The significance of personality in business startup intentions, startup realization and business success. *Entrepreneurship & Regional Development*, 19(3), 227-251. <https://doi.org/10.1080/08985620701218387>

Garnsey, E., Stam, E., & Heffernan, P. (2006). New firm growth: Exploring processes and paths. *Industry and Innovation*, 13(1), 1-20. <https://doi.org/10.1080/13662710500513367>

Georgallis, P. P., & Durand, R. (2017). Achieving high growth in policy-dependent industries: Differences between startups and corporate-backed ventures. *Long Range Planning*, 50(4), 487-500. <https://doi.org/10.1016/j.lrp.2016.06.005>

Giarratana, M. S. (2004). The birth of a new industry: entry by startups and the drivers of firm growth: the case of encryption software. *Research Policy*, 33(5), 787-806. <https://doi.org/10.1016/j.respol.2004.01.001>

Groenewegen, G., & de Langen, F. (2012). Critical success factors of the survival of startups with a radical innovation. *Journal of Applied Economics and Business Research*, 2(3), 155-171.

Hameed, I., & Irfan, Z. (2019). Entrepreneurship education: a review of challenges, characteristics and opportunities. *Entrepreneurship Education*, 2(3), 135-148. <https://doi.org/10.1007/s41959-019-00018-z>

Hamilton, E. A. (2006). An exploration of the relationship between loss of legitimacy and the sudden death of organizations. *Group & Organization Management*, 31, 327-358 <https://doi.org/10.1177/1059601106286885>

Harada, N. (2003). Who succeeds as an entrepreneur? An analysis of the post-entry performance of new firms in Japan. *Japan and the World Economy*, 15(2), 211-222. [https://doi.org/10.1016/S0922-1425\(02\)00002-6](https://doi.org/10.1016/S0922-1425(02)00002-6)

Hill, S., Ionescu-Somers, A., Coduras, A., Guerrero, M., Roomi, M. A., Bosma, N. & Shay, J. (2022, February). Global Entrepreneurship Monitor 2021/2022 Global Report: Opportunity Amid Disruption. In Expo 2020 Dubai.

Honjo, Y. (2004). Growth of new startup firms: evidence from the Japanese manufacturing industry. *Applied Economics*, 36(4), 343-355. <https://doi.org/10.1080/00036840410001674277>

Horne, J., & Fichter, K. (2022). Growing for sustainability: Enablers for the growth of impact startups-A conceptual framework, taxonomy, and systematic literature review. *Journal of Cleaner Production*, 131163. <https://doi.org/10.1016/j.jclepro.2022.131163>

Horne, J., & Fichter, K. (2022). Growing for sustainability: Enablers for the growth of impact startups-A conceptual framework, taxonomy, and systematic literature review. *Journal of Cleaner Production*, 131163. <https://doi.org/10.1016/j.jclepro.2022.131163>

Hughes, M., Hughes, P., & Morgan, R. E. (2007). Exploitative learning and entrepreneurial orientation alignment in emerging young firms: Implications for market and response performance. *British Journal of Management*, 18(4), 359-375. <https://doi.org/10.1111/j.1467-8551.2007.00519.x>

Hvide, H. K., & Møen, J. (2010). Lean and hungry or fat and content? Entrepreneurs' wealth and startup performance. *Management Science*, 56(8), 1242-1258. <https://doi.org/10.1287/mnsc.1100.1177>

Hyder, S. and Lussier, R. N. (2016): Why businesses succeed or fail: a study on small businesses in Pakistan. *Journal of Entrepreneurship in Emerging Economies*, 8 (1), 82-100. <https://doi.org/10.1108/JEEE-03-2015-0020>

Islam, M., Bokhari, A., & Abalala, T. (2018). Perceptions to start up business as a career choice among Saudi female higher education students. *Societies*, 8, 31. <https://doi.org/10.3390/soc8020031>

Jabeen, F., & Faisal, M. N. (2018). Imperatives for improving entrepreneurial behavior among females in the UAE: An empirical study and structural model. *Gender in Management: An International Journal*. <https://doi.org/10.1108/GM-03-2016-0042>

Jin, L., Madison, K., Kraiczy, N. D., Kellermanns, F. W., Crook, T. R., & Xi, J. (2017). Entrepreneurial team composition characteristics and new venture performance: a meta-analysis. *Entrepreneurship Theory and Practice*, 41(5), 743-771. <https://doi.org/10.1111/etap.12232>

Kachlami, H. M. (2017). Social Entrepreneurship and Influence on Regional Firm Demography (Doctoral dissertation, Mid Sweden University).

Kannan, G., Haq, A. N., Sasikumar, P., & Arunachalam, S. (2008). Analysis and selection of green suppliers using interpretative structural modelling and analytic hierarchy process. *International Journal of Management and Decision Making*, 9(2), 163-182. <https://doi.org/10.1504/IJMDM.2008.017198>

Kawakami, T., MacLachlan, D. L., & Stringfellow, A. (2012). New venture performance in China, Japan, and the United States: The impact of formalized market information processes. *Journal of Product Innovation Management*, 29(2), 275-287. <https://doi.org/10.1111/j.1540-5885.2011.00895.x>

Kelley, D., Singer, S., & Herrington, M. (2016). Global entrepreneurship monitor. Global Report, Global Entrepreneurship Research Association, London Business School, Regents Park, London NW1 4SA, UK.

Khaire, M. (2010). Young and no money? Never mind: The material impact of social resources on new venture growth. *Organization Science*, 21(1), 168-185. <https://doi.org/10.1287/orsc.1090.0438>

Khefacha, I., & Belkacem, L. (2016). Technology-based ventures and sustainable development: Cointegrating and causal relationships with a panel data approach. *The Journal of International Trade & Economic Development*, 25(2), 192-212. <https://doi.org/10.1080/09638199.2015.1048707>

Kohn, K., & Wewel, S. A. (2018). Skills, scope and success: An empirical look at the startup process in creative industries in Germany. *Creativity and Innovation Management*, 27(3), 295-318. <https://doi.org/10.1111/caim.12279>

Koster, S., & van Stel, A. (2014). The relationship between startups, market mobility and employment growth: An empirical analysis for Dutch regions. *Papers in Regional Science*, 93(1), 203-217. <https://doi.org/10.1111/pirs.12000>

Kritikos, A. (2014). Entrepreneurs and their impact on jobs and economic growth, IZA World of Labor, 8, pp.1-10. <https://doi.org/10.15185/izawol.8>

Lall, S. A., Chen, L. W., & Roberts, P. W. (2020). Are we accelerating equity investment into impact-oriented ventures?. *World Development*, 131, 104952. <https://doi.org/10.1016/j.worlddev.2020.104952>

Larrañeta, B., Zahra, S. A., & Galán González, J. L. (2014). Strategic repertoire variety and new venture growth: The moderating effects of origin and industry dynamism. *Strategic Management Journal*, 35(5), 761-772. <https://doi.org/10.1002/smj.2103>

Laskovaia, A., Shirokova, G., & Morris, M. H. (2017). National culture, effectuation, and new venture performance: global evidence from student entrepreneurs. *Small Business Economics*, 49(3), 687-709. <https://doi.org/10.1007/s11187-017-9852-z>

LeBrasseur, R., Zanibbi, L., & Zinger, T. J. (2003). Growth momentum in the early stages of small business startups. *International Small Business Journal*, 21(3), 315-330. <https://doi.org/10.1177/02662426030213004>

Lee, C., Lee, K., & Pennings, J. M. (2001). Internal capabilities, external networks, and performance: a study on technology-based ventures. *Strategic Management Journal*, 22(6-7), 615-640. <https://doi.org/10.1002/smj.181>

Longenecker, J., Pettie, J., Palich, L. and Hoy, F. (2012). Small Business Management: Launching & Growing Entrepreneurial Ventures. Available at: http://www.cengage.com/search/productOverview.do?N=4294966572+4294950520&Ntk=P_EPI&Ntt=39036951135286799918906405

Lussier, R. N. (1995). A nonfinancial business success versus failure prediction. *Journal of Small Business Management*, 33(1), 8. Retrieved from <https://search.proquest.com/docview/221008471?accountid=9727>

Mandal, A., & Deshmukh, S. G. (1994). Vendor selection using interpretive structural modelling (ISM). *International Journal of Operations & Production Management*. <https://doi.org/10.1108/01443579410062086>

Martínez-Fierro, S., Biedma-Ferrer, J. M., & Ruiz-Navarro, J. (2020). Impact of high-growth startups on entrepreneurial environment based on the level of national economic development. *Business Strategy and the Environment*, 29(3), 1007-1020.

<https://doi.org/10.1002/bse.2413>

Mendoza-Abarca, K. I., Anokhin, S., & Zamudio, C. (2015). Uncovering the influence of social venture creation on commercial venture creation: A population ecology perspective. *Journal of Business Venturing*, 30(6), 793-807.

<https://doi.org/10.1016/j.jbusvent.2015.04.003>

Mueller, B. A., Wolfe, M. T., & Syed, I. (2017). Passion and grit: An exploration of the pathways leading to venture success. *Journal of Business Venturing*, 32(3), 260-279. <https://doi.org/10.1016/j.jbusvent.2017.02.001>

Mueller, P., Van Stel, A., & Storey, D. J. (2008). The effects of new firm formation on regional development over time: The case of Great Britain. *Small Business Economics*, 30(1), 59-71. <https://doi.org/10.1007/s11187-007-9056-z>

Niemann, P. (2011). The impact of social interactions on venture performance: empirical evidence analyzing the relationship between syndicates and ventures. *The Journal of Private Equity*, 14(4), 41-55. <https://doi.org/10.3905/jpe.2011.14.4.041>

Norrman, C., & Bager-Sjögren, L. (2010). Entrepreneurship policy to support new innovative ventures: Is it effective?. *International Small Business Journal*, 28(6), 602-619. <https://doi.org/10.1177/0266242610369874>

Ooghe, H., & De Prijcker, S. (2008). Failure processes and causes of company bankruptcy: a typology. *Management Decision*, 46(2), 223-242. <https://doi.org/10.1108/00251740810854131>

Pangarkar, N., & Wu, J. (2013). Alliance formation, partner diversity, and performance of Singapore startups. *Asia Pacific Journal of Management*, 30(3), 791-807. <https://doi.org/10.1007/s10490-012-9305-9>

Parto Afkanan, M., Gelard, P., & Naami, A. (2021). Design a pattern for restarting small and medium-sized failed entrepreneur's businesses using interpretive structural modeling and multi-criteria decision making methods. *Journal of Decisions and Operations Research*, 5(4), 486-491.

Pitkänen, I., Parvinen, P., & Töytäri, P. (2014). The significance of the new venture's first sale: The impact of founders' capabilities and proactive sales orientation. *Journal of Product Innovation Management*, 31(4), 680-694. <https://doi.org/10.1111/jpim.12160>

Poonguzhali, R. L. (2021). Entrepreneurs and their impact on jobs and economic development.

<https://www.openaccessjournal.com/abstract/805>

Porter, M. E. (2008, January). Competitiveness as an engine for economic growth: implications for Saudi Arabia. In The Global Competitiveness Forum.

Raeesi, R., Dastranj, M., Mohammadi, S., & Rasouli, E. (2013). Understanding the interactions among the barriers to entrepreneurship using interpretive structural modeling. *International Journal of Business and Management*, 8(13), 56.

<https://doi.org/10.5539/ijbm.v8n13p56>

Raspe, O., & van Oort, F. (2011). Growth of new firms and spatially bounded knowledge externalities. *The Annals of Regional Science*, 46(3), 495-518. <https://doi.org/10.1007/s00168-009-0357-9>

Read, S., Song, M., & Smit, W. (2009). A meta-analytic review of effectuation and venture performance. *Journal of Business Venturing*, 24(6), 573-587. <https://doi.org/10.1016/j.jbusvent.2008.02.005>

Repushevskaya, O. A. (2022). Assessment of the Economic Potential of Entrepreneurship and Modern Consumer Cooperation in the Modern Economy. In Cooperation and Sustainable Development (pp. 237-248). Springer, Cham.

https://doi.org/10.1007/978-3-030-77000-6_28

- Robinson, K. C., & Phillips McDougall, P. (2001). Entry barriers and new venture performance: a comparison of universal and contingency approaches. *Strategic Management Journal*, 22(6-7), 659-685. <https://doi.org/10.1002/smj.186>
- Sarma, S., & Marszalek, J. M. (2020). New venture growth: role of ecosystem elements and prior experience. *Entrepreneurship Research Journal*, 10(1). <https://doi.org/10.1515/erj-2018-0215>
- Savarese, M. F., Orsi, L., & Belussi, F. (2016). New venture high growth in high-tech environments. *European Planning Studies*, 24(11), 1937-1958. <https://doi.org/10.1080/09654313.2016.1232700>
- Schick, H., Marxen, S., & Freimann, J. (2002). Sustainability issues for startup entrepreneurs. *Greener Management International*, (38), 59-70. <https://doi.org/10.9774/GLEAF.3062.2002.su.00007>
- Schueffel, P., Amann, W., & Herbolzheimer, E. (2011). Internationalization Of New Ventures: Tests Of Growth And Survival. *Multinational Business Review*. <https://doi.org/10.1108/15253831111190199>
- Schwab, K. (2018, November). The global competitiveness report 2018. In World Economic Forum (Vol. 671).
- Seo, Y. W., & Lee, Y. H. (2019). Effects of internal and external factors on business performance of startups in South Korea: The engine of new market dynamics. *International Journal of Engineering Business Management*, 11, 1847979018824231. <https://doi.org/10.1177/1847979018824231>
- Shane, S., & Stuart, T. (2002). Organizational endowments and the performance of university startups. *Management Science*, 48(1), 154-170. <https://doi.org/10.1287/mnsc.48.1.154.14280>
- Shrader, R., & Siegel, D. S. (2007). Assessing the relationship between human capital and firm performance: Evidence from technology-based new ventures. *Entrepreneurship theory and practice*, 31(6), 893-908. <https://doi.org/10.1111/j.1540-6520.2007.00206.x>
- Sleuwaegen, L., & Onkelinx, J. (2014). International commitment, post-entry growth and survival of international new ventures. *Journal of Business Venturing*, 29(1), 106-120. <https://doi.org/10.1016/j.jbusvent.2013.01.001>
- Smith, D. (2010). The role of entrepreneurship in economic growth. *Undergraduate Economic Review*, 6(2), pp.1-17.
- Smolka, K. M., Verheul, I., Burmeister-Lamp, K., & Heugens, P. P. (2018). Get it together! Synergistic effects of causal and effectual decision-making logics on venture performance. *Entrepreneurship Theory and Practice*, 42(4), 571-604. <https://doi.org/10.1177/1042258718783429>
- Söderblom, A., Samuelsson, M., Wiklund, J., & Sandberg, R. (2015). Inside the black box of outcome additionality: Effects of early-stage government subsidies on resource accumulation and new venture performance. *Research Policy*, 44(8), 1501-1512. <https://doi.org/10.1016/j.respol.2015.05.009>
- Song, M., Podoyntsyna, K., Van Der Bij, H., & Halman, J. I. (2008). Success factors in new ventures: A meta-analysis. *Journal of Product Innovation Management*, 25(1), 7-27. <https://doi.org/10.1111/j.1540-5885.2007.00280.x>
- Song, M., Wang, T., & Parry, M. E. (2010). Do market information processes improve new venture performance?. *Journal of Business Venturing*, 25(6), 556-568. <https://doi.org/10.1016/j.jbusvent.2009.03.003>
- Stam, E., & Wennberg, K. (2009). The roles of R&D in new firm growth. *Small Business Economics*, 33(1), 77-89. <https://doi.org/10.1007/s11187-009-9183-9>
- Stam, W., & Elfring, T. (2008). Entrepreneurial orientation and new venture performance: The moderating role of intra-and extraindustry social capital. *Academy of Management Journal*, 51(1), 97-111. <https://doi.org/10.5465/amj.2008.30744031>

Storey, D. J., & Greene, F. J. (2010). Small business and entrepreneurship. Financial Times Prentice Hall.

Storey, D.J. (1994). Understanding the small business sector. Routledge.

Streletzki, J. G., & Schulte, R. (2013). Which venture capital selection criteria distinguish high-flyer investments?. *Venture Capital*, 15(1), 29-52. <https://doi.org/10.1080/13691066.2012.724232>

Stubner, S., Wulf, T., & Hungenberg, H. (2007). Management support and the performance of entrepreneurial start-ups. *Schmalenbach Business Review*, 59(2), 138-159. <https://doi.org/10.1007/BF03396745>

Sushil, S. (2012). Interpreting the interpretive structural model. *Global Journal of Flexible Systems Management*, 13(2), 87-106. <https://doi.org/10.1007/s40171-012-0008-3>

Takahashi, H., Yamakawa, Y., & Mathew, P. G. (2018). Board members' influence on resource investments to startups and IPO outcomes: Does prior affiliation matter?. *Pacific-Basin Finance Journal*, 49, 30-42. <https://doi.org/10.1016/j.pacfin.2018.03.004>

Tas, M., Saydaliev, H. B., & Kadyrov, S. (2022). Impact of collaborative, entrepreneurship education on the financial risk taken by university students. *Industry and Higher Education*, 09504222211068294. <https://doi.org/10.1177/09504222211068294>

Tentime, Z. T., & Pansiri, J. (2004). Small business critical success/failure factors in developing countries: some evidences from Botswana. <https://doi.org/10.3844/ajassp.2004.18.25>

Terjesen, S., Patel, P. C., & Covin, J. G. (2011). Alliance diversity, environmental context and the value of manufacturing capabilities among new high technology ventures. *Journal of Operations Management*, 29(1-2), 105-115. <https://doi.org/10.1016/j.jom.2010.07.004>

Thurik, R. and Wennekers, S. (2004). Entrepreneurship, small business and economic growth. *Journal of Small Business And Enterprise Development*, 11(1), 140-149A <https://doi.org/10.1108/14626000410519173>

Timmons, J.A. (1999). New Venture Creation: Entrepreneurship for the 21st Century. Homewood, IL: Irwin.

Van Praag, M., De Wit, G., & Bosma, N. (2005). Initial capital constraints hinder entrepreneurial venture performance. *The Journal of Private Equity*, 9(1), 36-44. <https://doi.org/10.3905/jpe.2005.605369>

Van Stel, A., & Suddle, K. (2008). The impact of new firm formation on regional development in the Netherlands. *Small Business Economics*, 30(1), 31-47. <https://doi.org/10.1007/s11187-007-9054-1>

Vanacker, T., Manigart, S., Meuleman, M., & Sels, L. (2011). A longitudinal study on the relationship between financial bootstrapping and new venture growth. *Entrepreneurship & Regional Development*, 23(9-10), 681-705. <https://doi.org/10.1080/08985626.2010.502250>

Vervoort, A. (2021). Various phases in surface movements linked to deep coal longwall mining: from startup till the period after closure. *International Journal of Coal Science & Technology*, 8(3), 412-426. <https://doi.org/10.1007/s40789-020-00325-0>

Walsh, I. J., & Bartunek, J. M. (2011). Cheating the fates: Organizational foundings in the wake of demise. *Academy of Management Journal*, 54(5), 1017-1044. <https://doi.org/10.5465/amj.2008.0658>

Wang, T., Thornhill, S., & De Castro, J. O. (2017). Entrepreneurial orientation, legitimation, and new venture performance. *Strategic Entrepreneurship Journal*, 11(4), 373-392. <https://doi.org/10.1002/sej.1246>

Watson, K., Hogarth-Scott, S., & Wilson, N. (1998). Small business startups: success factors and support implications. *International Journal of Entrepreneurial Behavior & Research*, 4(3), 217-238. <https://doi.org/10.1108/13552559810235510>

Wei, J., Chen, Y., Zhang, J., & Gong, Y. (2019). Research on factors affecting the entrepreneurial learning from failure: an interpretive structure model. *Frontiers in Psychology*, 10, 1304. <https://doi.org/10.3389/fpsyg.2019.01304>

Wennberg, K., & DeTienne, D. R. (2014). What do we really mean when we talk about 'exit'? A critical review of research on entrepreneurial exit. *International Small Business Journal*, 32(1), 4-16. <https://doi.org/10.1177/0266242613517126>

Wennberg, K., & Lindqvist, G. (2010). The effect of clusters on the survival and performance of new firms. *Small Business Economics*, 34(3), 221-241. <https://doi.org/10.1007/s11187-008-9123-0>

Westerman, J. W., Geiger, S. W., & Cyr, L. A. (2008). Employee equity incentives and venture capitalist involvement: Examining the effects on IPO performance. *Journal of Developmental Entrepreneurship*, 13(04), 409-423. <https://doi.org/10.1142/S1084946708001058>

Westhead, P., Storey, D.J. and Cowling, M. (1993). An exploratory analysis of the factors associated with the survival of independent high-technology firms in Great Britain. Centre for Small and Medium Sized Enterprises, Warwick Business School.

World Bank. (2016). Doing business 2017: Equal opportunity for all. The World Bank.

Wu, L. Y. (2007). Entrepreneurial resources, dynamic capabilities and startup performance of Taiwan's high-tech firms. *Journal of Business Research*, 60(5), 549-555. <https://doi.org/10.1016/j.jbusres.2007.01.007>

Xiao, L. (2007). Financing high-tech SMEs in China (Doctoral dissertation, Middlesex University).

Xiao, L., Larson, M., & North, D. (2013). Influence of entrepreneurial teams on the growth orientation of early-stage high-tech SMEs in China: Multiple measures of performance. *The International Journal of Entrepreneurship and Innovation*, 14(1), 29-38. <https://doi.org/10.5367/ijei.2013.0106>

Yamakawa, Y., Peng, M. W., & Deeds, D. L. (2015). Rising from the ashes: Cognitive determinants of venture growth after entrepreneurial failure. *Entrepreneurship Theory and Practice*, 39(2), 209-236. <https://doi.org/10.1111/etap.12047>

Ye, Q. (2017). Entrepreneurs, strategy, venturing process and industry environment: a configurational approach to new venture emergence. *International Business Research*, 10(3), 148-163. <https://doi.org/10.5539/ibr.v10n3p148>

Yitshaki, R. (2012). How do entrepreneurs' emotional intelligence and transformational leadership orientation impact new ventures' growth?. *Journal of small Business & Entrepreneurship*, 25(3), 357-374. <https://doi.org/10.1080/08276331.2012.10593578>

Zheng, Y., & Mai, Y. (2013). A Contextualized Transactive Memory System View on How Founding Teams Respond to Surprises: Evidence from China. *Strategic Entrepreneurship Journal*, 7(3), 197-213. <https://doi.org/10.1002/sej.1157>

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DETERMINANTS OF THE TENNIS PLAYERS' SUCCESS AND THEIR EFFECT ON THE SPORTS ORGANIZATIONS' SUSTAINABILITY*

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Abstract. The article aims to reveal whether the number of tournaments in different categories, GDP, and the average wage impact athletes' success. GDP and average wage are viewed as the factors influencing the financial support of athletes. It allows the players to participate in the tournaments in their home country, increasing the chances of achieving better results. On the other hand, a high average wage can change athletes' decisions to pursue university studies. The main research question is: Which of the selected factors affect the success of juniors, men, and women playing tennis professionally? This was studied on the sample starting with fifty European countries (geographically assigned in this international research perspective). The relationship was corroborated between the number of tournaments organized in the country and the number of athletes from the country in the TOP 100 rankings. The article builds on the previous research works conducted worldwide, focusing on other relevant factors and their effect on the success of professional tennis players. The empirical research focuses on economic factors playing a pivotal role in tennis associations' operation and economic sustainability and other entities involved. Econometric regression modeling was applied to the panel data as a quantitative method to justify the relationships among the variables studied.

Keywords: sport; tennis; tournaments; average wage; GDP

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1. Introduction

Earning a living via sport is a dream for many children. However, this way is long and affected by numerous factors. Looking at the sports system in the USA, less than five percent of high school athletes become collegiate athletes, and only less than three percent of those become professional athletes. A high school athlete's chance of becoming a professional is around 0.001% (Bryan, 2009). Within individual sports, the best-paid athletes are boxers, golfers, and tennis players. Swiss tennis player Roger Federer was the best-paid athlete of 2020 (Gough, 2020). Following the path of a professional athlete is accompanied by decisions from an early age. These are influenced by the environment, traditions, upbringing, and other factors. The impact of the environment on sport and vice versa creates a plethora of possible variations leading to the decision of a young athlete to pick up or give up the sport.

One of the critical factors affecting a young athlete's path toward a professional career is the chance of success (Schmidt et al., 2016). Bringing up successful athletes is an aim of national governing bodies. Associations need successful athletes to gain direct funds bound to their results, attract children, and extend their membership bases to succeed in the future. Even though there are many factors the associations cannot influence, there are others they can control. The article aims to identify the factors affecting tennis players' career trajectories, adding to the previous research, determining factors that can be affected by the national association to support the upbringing of athletes.

The authors are aware that various factors influence athletes' success. The article focuses mainly on those states or tennis associations can control. A question emerged: *Why are fewer TOP 100 athletes in historically successful tennis countries now than in the past?*

This question, revealed during the initial analysis, formed the motivation to address the issue. Therefore, examples of historically most prosperous countries in tennis were selected (Figure 1, Figure 2). In these countries, the number of athletes in the TOP 100 and the stagnation of new faces in the ranking was examined. Based on the graph, the attention was focused on the financial situation, too. The purpose was to create recommendations for associations leading to an effective strategy to improve the case in the short term.

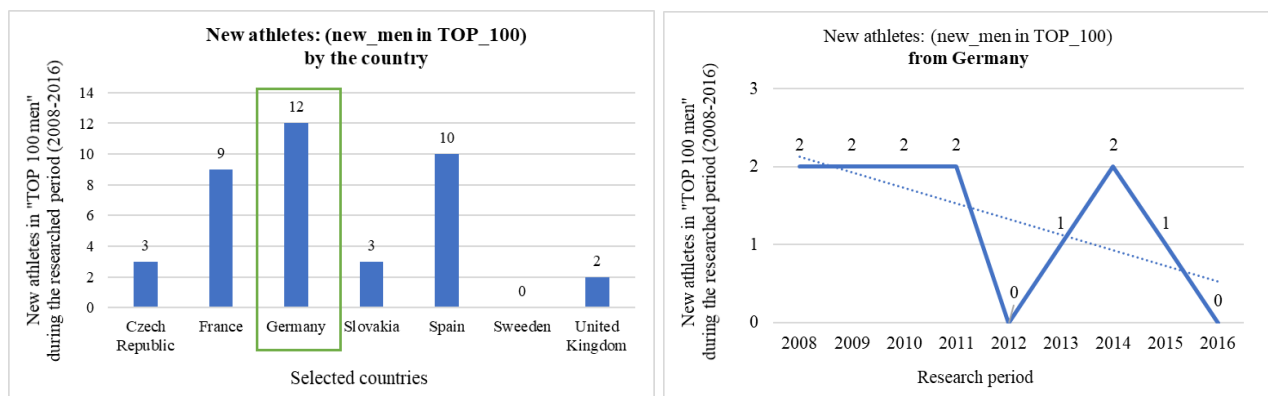


Figure 1. Number of athletes in the TOP 100 ranking (TOP 100 men) for the countries selected (left) and the number of new faces in the ranking for Germany (right) during the analyzed period

Source: own elaboration

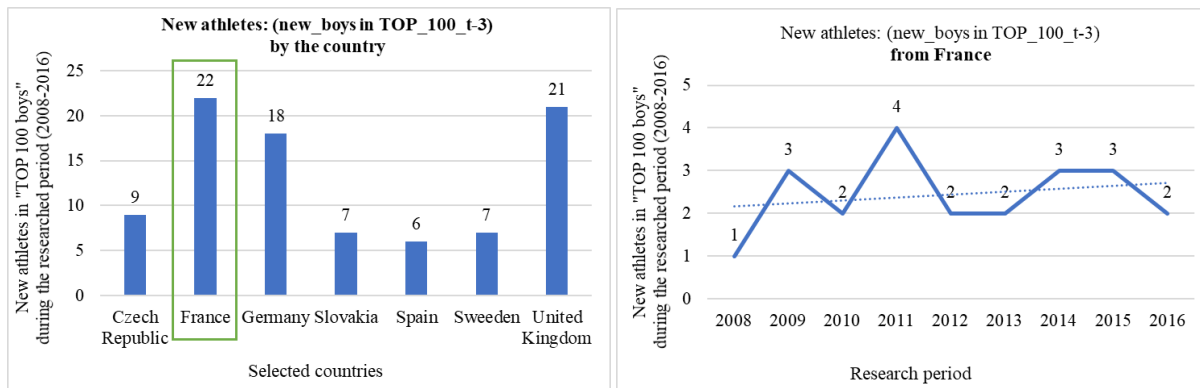


Figure 2. Number of athletes in the TOP 100 ranking (TOP 100 boys) for the countries selected (left) and the number of new faces in the ranking for France (right) during the analyzed period

Source: own elaboration

Specifically, the article focuses on examining the interconnection between the country's economic situation, its ability to organize tennis tournaments, and the final success of the country in this sport. The economic situation is represented by GDP, GDP per capita, and the average wage. The country's success in tennis was defined by the number of athletes placed in the junior and adult rankings and by the annual increase of these variables. This logic presented in the article is captured in Figure 3.

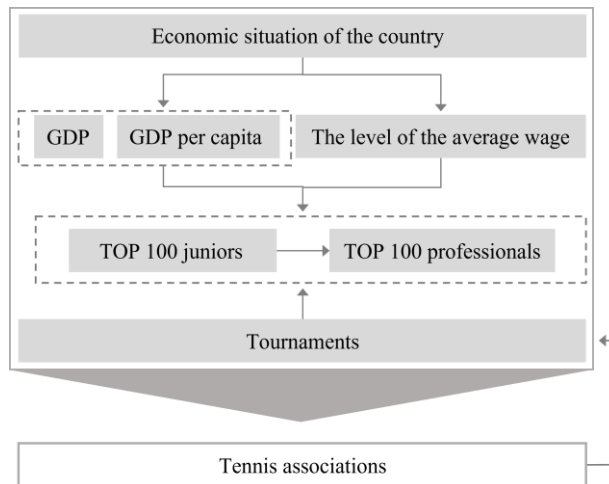


Figure 3. Logical structure underpinning the research

Source: own elaboration

2. Theoretical background

According to the previous research, the factors affecting a young tennis player's path towards being a professional athlete include two main categories. The first are socioeconomic factors, representing the impact of the environment, family, or school on individual athletes, and the state's attitude towards sport. The second group represents a chance for a successful career not only during the junior age.

2.1 The impact of socioeconomic environment on sport

Several authors focused on the relationship between sport and macroeconomic behavior in developed countries (Erben, 2003) or the economic impact of collegiate (Baade et al., 2011) and professional sport (Storm et al., 2017) on local economies. Leeds & Leeds (2009) studied the impact of the external environment on success in sport. They focused on the impact of a nation's political regime, institutions, and colonial heritage on soccer performance. The effect of a nation's standard of living and culture on success in soccer was examined in other studies. The impact of these factors on a national soccer team's success in international competitions was confirmed by Hoffman et al. (2002) and Foer (2006).

The athletes' motivation to decide on a professional career is also important, as it was concluded in several studies. According to Frey (1988), individuals perceive their chances of becoming top-level athletes as higher than they are. Their surroundings influence young athletes' decision-making. The link between the events of becoming top-level athletes, birthplace, and the size of the community was confirmed by other studies (Bruner et al., 2011; Turnnidge et al., 2014; Imtiaz et al., 2014; Rossing et al., 2016; Hancock et al., 2017; Rossing et al., 2018). Authors observed a trend when young athletes are supported to become elite via selective sports clubs beyond the standard interscholastic sports systems. This approach aims to enhance their skills and showcase their skills in front of scouts (Brenner and Council on Sports Medicine and Fitness, 2007, 2016; LaPrade et al., 2016).

The state's policy can also be aligned with the preparation of elite athletes. It usually sets the rules for allocating funds towards the best athletes, not spending a lot of money on athletes with weaker performance. This contrasts with national federations' approach to building large memberships (De Bosscher et al., 2003).

Schmidt et al. (2016) studied the selection between education and a professional soccer career. They dealt with the impact of socioeconomic factors from a macroeconomic perspective, observing that athletes from countries with lower economic status have a higher tendency to give up their studies in favor of professional sport. They assume that athletes from poorer countries perceive a sports career as significant progress in social status. This means that via playing soccer, they are striving for recognition. On the other hand, in a country with a high living standard, such as Hongkong, the youths are more focused on the academic environment (Shuttleworth & Wan-Ka, 1998; Bridges, 2012; Zheng, 2015). An even more significant effect than the one described above can be observed concerning the socioeconomic status and the impact on the athletes' families.

Families' social status in relation to the child's hockey career was studied by Moret & Ohl (2018). They did not compare sports on an international level but only in Switzerland. According to their findings, for athletes from the upper-middle class, the faith in becoming successful in sport is combined with the family's strategy, assessing the risks in a sports career as a type of entrepreneurship. These athletes have strong support from their families. The family perceives hockey as a good source of social status. Athletes from the lower-middle class aspire to improve their social position via hockey. However, their families are more supportive of education. These athletes have a backup plan applicable after the end of a sports career.

Sletten (2010) studied the athletes from the lower-middle class, stating that the ideology of sport without social barriers is not aligned with reality and Post et al. (2018) agreed. Studying the sports system in the USA, they concluded that year-round participation in the sports process could limit the engagement of children from families without sufficient resources. Regardless of social class, a young athlete is influenced by the family's sports tradition. According to Park et al. (2013), such an intense sports identity can negatively affect study results. This leads to perceiving a young person as an athlete, not a student. The family background also influences the sports children to want to do or the club they wish to join. Especially the USA has unique conditions with an elaborate collegiate system. Selecting a particular university is often the most critical decision in an athlete's life. This

inspired the authors to study the reasons for choosing a specific university (Goss et al., 2006; Feldman, 2007; Croft, 2008; Puline et al., 2008; Magnusen et al., 2014).

Concerning the past research focused on the athletes' background, family support, their motivation to play tennis professionally, and the wage young people can expect in a specific country, the first preconditions for the research presented emerged. The authors focused on the following perspectives:

- (1) With a high wage, parents have money to fund athletes during their career advancement.
- (2) With a lower wage, parents want their children to have better conditions and secure themselves via tennis.

This determined the first partial research question: **V₁ – Does the average wage affect the success of junior athletes in tournaments?** The following research question was based on the consideration that the higher the average salary in the country, the more athletes lose their motivation to make a living from sports. The paradox of prosperity applies when athletes from countries with good conditions for performance growth lose their interest in professional sports: **V₂ – Does the average wage in the country affect the motivation of professional athletes to get into the TOP 100?**

2.2 Factors affecting success in tennis

An athlete's career cycle, including transitioning to adult categories, is intertwined with success. This is most frequently deciding whether an athlete will continue competing or switch to another profession. Regarding individual sports such as tennis, one's deficiencies cannot be hidden behind the team's success. Everything depends on the individuals, even if they are surrounded by professional staff. De Bosscher et al. (2003) classify three levels of impact on the tennis player's success. These include *micro-level encompassing genetic predispositions and environment; macro level related to the social background; and meso level including the structure of tournaments, system, and rules*. Crespo et al. (2001) identify competitors as an important factor in athletes' development. According to the authors, all athletes need sufficient opportunities to compete. In tennis, the key position is held by the tournaments. The research on the tournaments' impact on the position of athletes from the countries organizing them was conducted by several authors.

According to Galenson (1993), the total number of tournaments in the countries correlates with the number of male tennis players in the international ranking. Filipcic et al. (2013), focusing on the TOP 300 ranking, found a steadily decreasing correlation over time between the number of tournaments and the position of male athletes in the ATP ranking. They assumed that the athletes from these countries use the tournaments in the neighboring countries. Reid et al. (2007) studied a similar topic in women's tennis. Their study examines the relationship between the number of professional tournaments and the results of professional female athletes from these countries. The authors divided the countries into five subgroups based on the type of tournaments. A positive correlation was detected between the subgroup and the number of female athletes in the ranking. The subgroups correlate with the best five female athletes in the ranking. This means that extensive tournament structures help the nations produce elite female athletes. However, the success of players from the countries such as Russia, the Slovak Republic, and Belgium serves as a reminder that competition opportunities are only one of the components of success.

Other research questions were built on the premise: that the more tournaments the country organizes, the more opportunities home players have for getting the necessary points and advancing in the rankings. In addition, organized tournaments allow athletes to get wild cards. This increases the athletes' confidence that they will participate in the main competition (without taking part in the qualification) or in the qualification (regardless of the points earned). Another advantage of home tournaments is the saving on travel costs. These assumptions led to the following research questions: **V₃ – Does the number of tournaments in the country affect the athletes' success in the TOP 100 ranking?** and **V₄ – If so, which tournaments have the most significant impact?**

Kovalchik et al. (2017) studied the career trajectory of female players in relation to their age and experience on the professional circuit. The authors detected a strong correlation between the shape of the trajectory and the best placement in the ranking. The athletes who achieved the highest placements during their careers got into the ranking while being juniors. This corroborated the research of Reid & Morris (2011), focusing on the benchmarks between the 16th and 17th years of age of professional players in the TOP 100 ranking. Comparing the interannual placement, the authors assessed the athletes' average progress. They concluded that the athletes aspiring towards the TOP 100 should get their first points in the ATP ranking at the age of 16 or 17, and they should be around 250th place at the age of 19. A more recent work by Reid et al. (2014) broadened this by assessing indicators based on the athletes' highest placement in their careers. The aim was to compare the career trajectories of male athletes who reached the highest professional placement in the ranking between TOP 250 and TOP 10. The study confirms that the placement of athletes who reached different peaks started to differ as early as in the first year on the professional circuit. Therefore, it is possible to predict athletes' placement between TOP 10 and TOP 100 to a certain extent based on their placement in the ranking during the initial phases of their career. Therefore, this article also focuses on examining the relationship between success in junior tennis and success in adult professional tennis. Specifically, the fifth research question was: **V₅ – Does the success of junior athletes affect the success of professional tennis players?**

This is connected to the research by Bane et al. (2014), who compared the career trajectories of athletes between 1985 and 2010. They detected differences between the points when the athletes achieved their first points on the circuit to the moment of getting into TOP 100. This period extended the time athletes spent at the peak of their careers. The athletes stay in the TOP 100 longer. Thus it takes longer for new players to get there. This connection stems from the development in the sports sciences, medicine, training process, and the increase in financial rewards for professional athletes.

Athletes' careers were also studied by Guillaume et al. (2011), focusing on athletes in the TOP 10 and the differences in the number of matches played and won depending on gender during their careers. The relationship between the age at which junior players shall start playing on the international scene and their later success in the adult ranking was studied by Brouwers et al. (2012). However, the age at which the athletes shall start playing to become successful on the professional level was not identified. It is also challenging to determine the age at which the performance could be used as a reliable indicator for the selection of talents. The transition from junior to adult competitions was studied by Reid et al. (2009). These authors studied the possibility of predicting the placement of the players from the TOP 20 of the International Tennis Federation's Junior Circuit in the adult ranking. 99% of female athletes from the junior TOP 20 got in the adult ranking. A high percentage of the junior female athletes from the TOP 20 got into the adult TOP 100 (61.4%). Reid et al. (2007) studied the same focus on boys. In this case, 91% of male athletes from the junior ITF TOP 20 ranking got to the adult professional ranking.

The current research is focused on the influence of the family, state, or environment on young athletes' decision to continue their careers. In tennis, emphasis was also put on the level athletes in junior age must achieve to become adult professionals. This article examines the factors that affect young tennis players, defining those that the national association can influence. *What can an association do? Can it manage the number of tournaments or financially support athletes?*

3. Research objective and methodology

Based on the research questions, the necessary data were collected. Details are provided in section 3.1. Since the created data set was complex and allowed to examine multiple connections, the authors decided to narrow it down. This was done by correlation analysis of all variables (Figure 4).

This was performed via a correlation matrix. It represented the initial assessment of the logic behind selecting variables needed to test the research hypotheses. Figure 4 illustrates the distinction between negative (blue) and positive relationships (red); saturation represents the relationships' strength. The analysis of the correlation matrix consisted not only of studying it visually but also of evaluating the values.

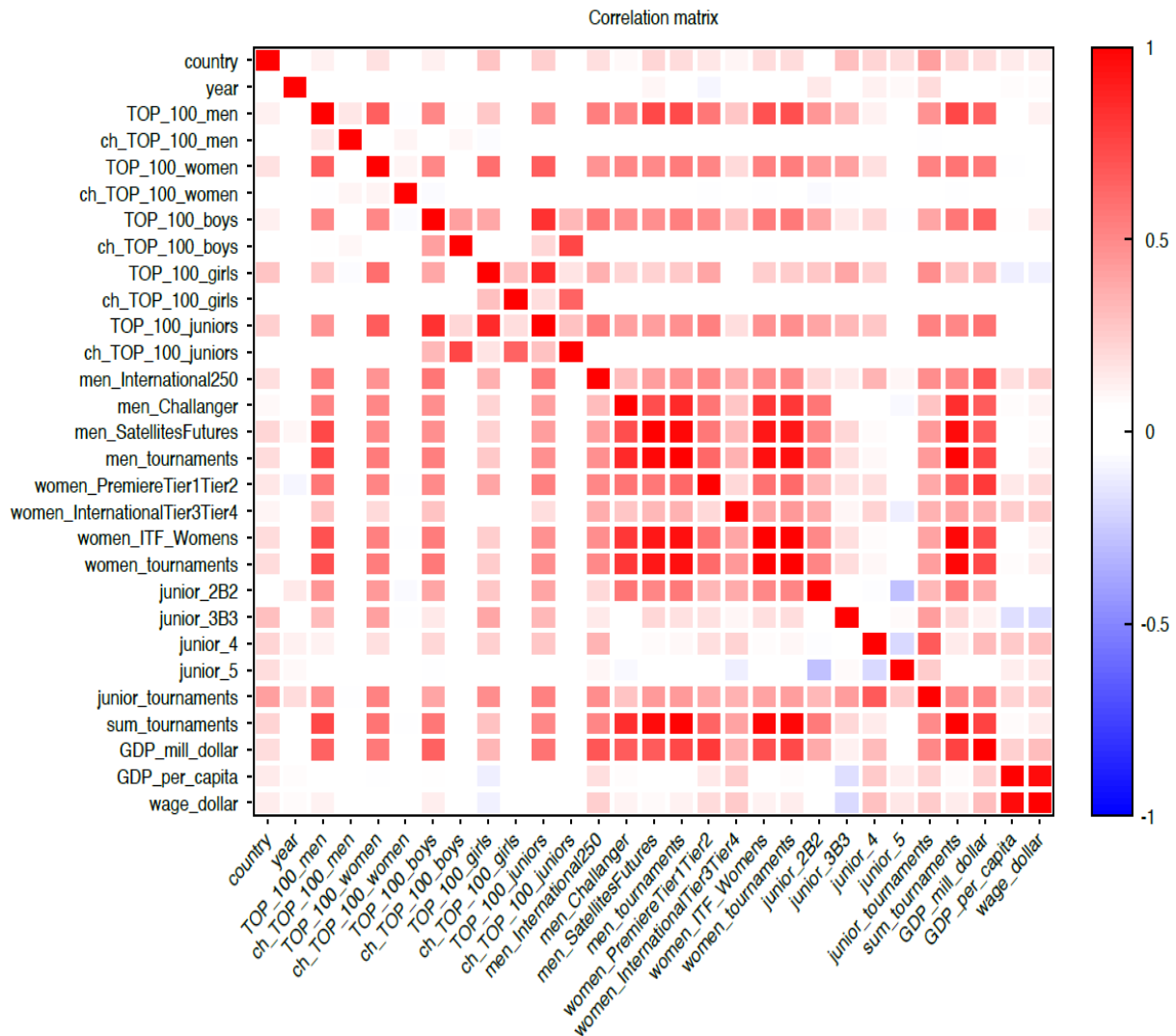


Figure 4. Correlation matrix of all variables obtained

**The variables of the correlation matrix are explained in Appendix A*

Source: own elaboration in Gretl

The main research area consists of the factors affecting the country's success in tennis which led to the hypotheses defined:

H₁: If a country organizes more tournaments, the number of athletes in the TOP 100 ranking is higher.

H₂: The better the economic situation (represented by GDP and average wage), the more athletes the country has in the TOP 100 ranking.

H₃: If a country has more successful junior athletes, it becomes more successful in adult professional tennis.

3.1 Data description

The research is based on the data collected for 13 years, between 2004 and 2016, including 50 European countries. Data was collected from a historical database of the ITF. The data entries represent the achievements of junior and adult tennis players. They also include the number of tennis tournaments organized by the studied countries. In addition, economic data on GDP, GDP per capita, and average wage per country were collected.

For Serbia and Montenegro, the tournaments before 2006 were added to the countries according to their current geographic division.

The groups of tournaments used in the analysis were created to deal with the changes in the names and classification of the tournaments over time. For example, a group of comparable male tennis tournaments was created by putting together Satellite and Future tournaments. A similar approach was applied to all other types. Certain types were deliberately excluded from the analysis (the Olympics, World Cup team). The canceled tournaments were also excluded. Within junior tournaments, type C and team tournaments were excluded. The numbers of athletes placed in the TOP 100 to 31 December of each year were extracted from the ITF website (2021) and Rank tennis (2021).

The data on the average wage was collected from the UNECE website (2021) in US dollars and calculated using current exchange rates. The GDP and GDP per capita data were also collected in current US dollars. This was retrieved for the selected countries from the World Bank open database (2021).

Based on the data accessibility, the main data set included the data representing 39 countries. After filtering the data using deliberate criteria, there were 21 countries left to be used for other operations. The complementary data set 1 described data points from 28 countries for nine years. The complementary data set the data from 27 countries created 2 during the same time. Details on the filtration and variables included in complementary data sets are listed below.

3.2 Description of the procedure

The methodological approach consisted of three phases – data pre-processing, data analysis, and econometric modeling. Each stage was divided into parts comprising several activities (Figure 5).

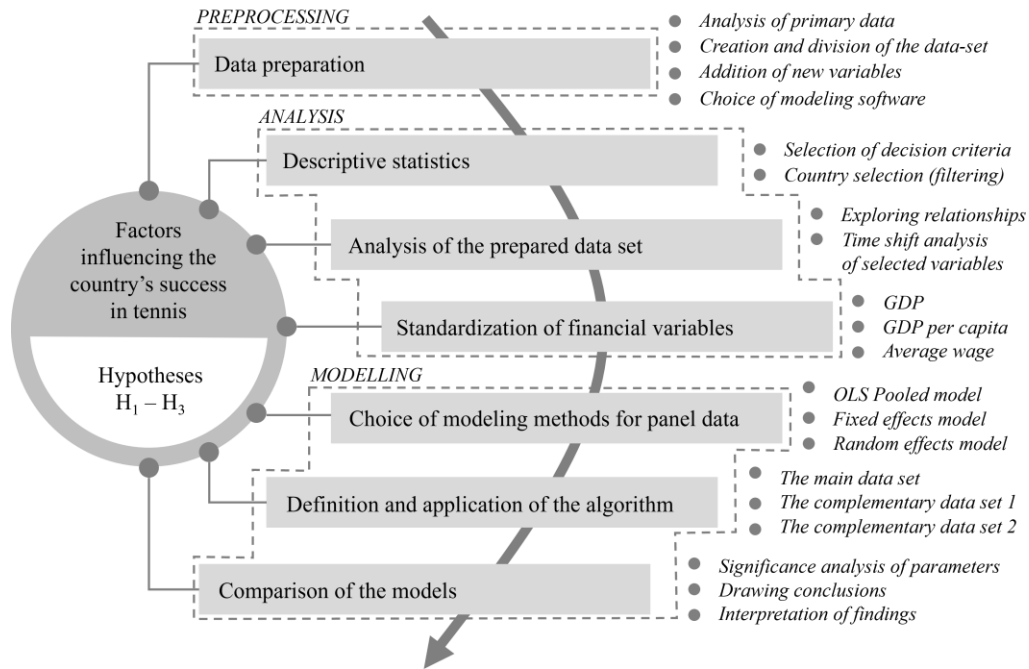


Figure 5. Modeling procedure

Source: own elaboration

The data were divided into three data sets before performing other operations on them: *the main data set*, *complementary data set 1*, and *complementary data set 2*. The main data set included all the essential variables to be applied in the modeling. However, other variables were added, created as a sum of the selected variables (e.g., all the men's tournaments), the annual change of the studied variables (e.g., change in TOP 100 men), or the time lag of variables (the lag up to three years: $t-1$ to $t-3$). The last activity performed on the main data set was filtering the countries according to the set criteria. These included the average value and the sum of variables entering the models as dependent variables (TOP 100 men, TOP women). The countries with the average value of 0 for at least one of the selected variables and those with the sum of $<0;3>$ for the whole studied period were filtered out for at least one of the selected variables.

The complementary data set 1 included the annual increase in men in the TOP 100 ranking, and the yearly growth in the boys in the TOP 100 ranking lagged by three years ($t-3$). This shift was deliberately selected in relation to the data collection to capture a period needed for effect to manifest itself (transition from the juniors into the adult category). The same logic was applied to create the complementary data set 2, which covered the situation of female athletes.

Gretl statistical software was selected for working with the panel data structures. One of such operations was data standardization. This was applied to the macroeconomic variables since they differed by magnitude. Standardization allowed to eliminate distortion of the modeling results. The relevant variables were standardized using a standard procedure: $(\text{original value} - \text{average value}) / \text{standard deviation}$.

The main part of modeling was the creation and application of the following algorithm:

- selection of the dependent variable and independent variables (conditioned by the logic and the results of correlation analysis),
- application of OLS (ordinary least squares) Pooled model,
- analysis of the parameters' significance and the model's significance accompanied by the study of relevant statistical tests,
- adjustment of the model/elimination of the variables with insignificant,
- selection of the most appropriate model,
- application of panel diagnostics tests,
- analysis of the tests' results,
- assessment of the appropriateness of individual models: OLS model/Fixed effects model/Random effects model,
- creation of the appropriate model using the selected variables,
- verification of the model focusing on three perspectives: (1) *logical*, (2) *statistical*, and (3) *econometric*:
 - if the parameters are insignificant, the modeling algorithm is rerun with different variables (statistical verification),
 - if the parameters are significant, the presence of other phenomena is tested (autocorrelation, heteroskedasticity, normality of residues – econometric verification),
 - if the phenomena are present, the model is modified based on the test's results (Between model was applied),
- the selected models with significant parameters were noted as the final models.

The application of the algorithm described led to **88 modeling experiments**. The selected results from the modeling are described below.

4. Results and discussion

The results section is divided according to the data sets used. The initial tool of the analysis was the correlation matrix. This was followed by experimenting with econometric models.

4.1 The results of the main data set analysis

The variables included in the main data set were analyzed to obtain the results presented. Other added variables supplemented the basic variables. The technique of filtering the data based on deliberate criteria was also applied in the modeling.

4.1.1 Results of the selected experiments of the econometric modeling

The application of the procedure described in the methodology led to numerous branches of modeling experiments. A considerable portion of them was not considered successful since they did not bring statistically, econometrically, or logically significant models. This section presents examples of how individual modeling branches ended.

Modeling with the basic data

Among the basic data, relevant variables were selected (number of TOP 100 men, men International 250 tournaments, men Challenger tournaments, men Satellites + Futures, standardized GDP, standardized GDP per capita, and standardized average wage). TOP 100 men represented the dependent variable in the modeling. Firstly, the Pooled OLS model was created, in which the variables with insignificant variables were gradually

eliminated. The panel diagnostics tests were run on this model. The results (joint significance of differing group means: $F(38,465) = 46.5891$, $p\text{-value} < 0.001$; Hausman test statistic: $H = 81.2744$, $p\text{-value} < 0.001$) indicated suitability of a Fixed effects model. After eliminating all the variables with insignificant parameters in this model, the resulting model included only one independent variable – standardized GDP (coefficient = -0.5931 ; $t = -2.284$; $p\text{-value} = 0.0228^{**}$). However, this model was not considered appropriate econometric-wise. Therefore, no further procedure was applied.

Subsequently, the following variables entered the modeling process: the number of TOP 100 women, women Premiere + Tier 1 + Tier 2 tournaments, women International + Tier 3 + Tier 4 tournaments, women ITF Women's tournaments, standardized GDP, standardized GDP per capita, the standardized average wage in the country. **TOP 100 women** were the dependent variable. The modeling procedure started with the Pooled OLS model. After achieving a model with only significant parameters, the panel diagnostics followed. The results (joint significance of differing group means: $F(38,464) = 37.9772$, $p\text{-value} < 0.001$; Hausman test statistic: $H = 61.2969$, $p\text{-value} < 0.001$) indicated the suitability of a Fixed effects model. After eliminating variables with insignificant parameters, two independent variables remained (women Premiere + Tier 1 + Tier 2 tournaments, standardized GDP). The tests for detecting autocorrelation (Wooldridge test: $F(1,38) = 27.8375$, $p\text{-value} < 0.001$), heteroskedasticity (Wald test: Chi-square (39) = $5.63529e+11$, $p\text{-value} = 0$), and the normality of residuals (Chi-square (2) = 230.905 , $p\text{-value} = 0$) were performed. Autocorrelation and heteroskedasticity were detected, and the residuals were not normally distributed. Therefore, a modification using the Between model followed. The best-resulting model contained one independent variable (women Premiere + Tier 1 + Tier 2 tournaments). The values for this variable were as follows: coefficient = 4.22485 ; $t = 5.544$; $p\text{-value} < 0.001^{***}$. The significance of the whole model was described by the adjusted $R^2 = 0.439$. These results support the premise of a positive impact of the tournaments within the studied categories organized in the country on the number of professional women athletes in the TOP 100 ranking.

Modeling with added variables

The men's tournaments variable was added, representing the sum of all men's tennis tournaments. This entered the modeling with the standardized macroeconomic variables as independent variables. The dependent variable **TOP 100 men**. The algorithm was applied, leading to the best result of this experiment, a Fixed effects model with one independent variable (standardized GDP; coefficient = -0.593147 ; $t = -2.284$; $p\text{-value} = 0.0228^{**}$).

For women, the added variable was represented by all women's tournaments. This independent variable entered the modeling process with the standardized macroeconomic variables. The dependent variable was the **TOP 100 women**. The algorithm led to a Fixed effects model, but after the adjustments, only one independent variable remained (standardized GDP; coefficient = -1.06279 ; $t = -3.288$; $p\text{-value} = 0.0011^{***}$). This was where the procedure ended for this experiment.

Similarly, a model with the dependent variable **TOP 100 juniors** was created, using the added variable representing all junior tennis tournaments studied. The algorithm led to a Fixed effects model as the best result achieved. Again, this model contained only one independent variable – standardized GDP (coefficient = -0.625486 ; $t = -1.690$; $p\text{-value} = 0.0917^{*}$).

Modeling with filtered data

One of the branches of experimenting with the filtered data was working with the sum variable for all men's tournaments. Since this branch was unsuccessful, the research followed the other direction, using variables for individual categories of tournaments separately.

The algorithm worked with the dependent variable **TOP 100 men** and independent variables (types of men tournaments and standardized GDP). The best result was a Pooled OLS model. It contained two independent variables with significant parameters (at the significance $\alpha = 0.01$). The panel diagnostics tests followed and indicated the suitability of a Fixed effects model. However, the parameters were insignificant. Thus, this experiment ended.

The dependent variable of another experiment using the filtered data was **TOP 100 women**. The independent variables included all studied categories of women's tournaments and standardized macroeconomic indicators. The best result was a Fixed effects model with one independent variable – standardized GDP (coefficient = -1.31483; $t = -2.472$; $p\text{-value} = 0.0141^{**}$).

Subsequently, a model with the dependent variable **TOP 100 juniors** was created. The independent variables included all studied types of junior tennis tournaments and standardized macroeconomic variables. The best result was a Between model. However, this model did not belong among the final models since it contained only one independent variable – standardized GDP (coefficient = 1.27540; $t = 3.200$; $p\text{-value} = 0.0047^{***}$). This model had the adjusted $R^2 = 0.316$, representing the extent to which it explained the variability of the data.

4.1.2 Selected final models

The first final model (Table 1) resulted from a successful run of the selected algorithm. The dependent variable in this model was **TOP 100 juniors**, and the independent variables included individual categories of junior tennis tournaments and standardized macroeconomic variables. The Between model was successful in eliminating the previously present autocorrelation Wooldridge: $F(1,38) = 20.4815$; $p\text{-value} < 0.001$) and heteroskedasticity (Chi-square (39) = $6.04376e+11$; $p\text{-value} = 0$).

Table 1. Between model with dependent variable Top_100_juniors

Between model, using observations 1-39					
Dependent variable: Top 100 juniors					
Adjusted $R^2 = 0.622$					
	coefficient	std. error	t-ratio	p-value	sign.
const.	0.945501	0.283796	3.332	0.0020	***
junior G2 + B2 tournaments	0.564562	0.285718	1.976	0.0561	*
junior G3 + B3 tournaments	1.57488	0.427353	3.685	0.0008	***
standardized GDP	1.12597	0.225567	4.992	1.64e-05	***

Source: own elaboration

However, the modification did not achieve residue normality, as evidenced by the test results shown in the graph (Figure 6). Failure to achieve normality limits the possibility of generalizing model results beyond the sample used.

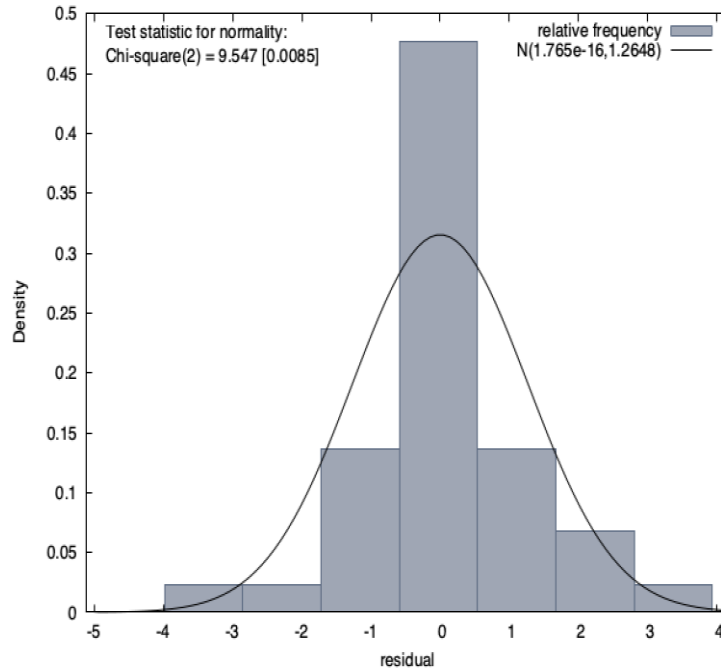


Figure 6. Test for normality of residuals (Between model with dependent variable Top_100_juniors)

Source: own elaboration in Gretl

The model achieved a degree of data variability explanation of more than 60%. The variables with significant parameters at the significance level of 0.01 in the model were: juniors G3 + B3 tournaments and standardized GDP. The results show that their effect on the investigated dependent variable is positive.

The second final model (Table 2.) also included the dependent variable **TOP 100 juniors**. This model was based on analyzing the variables' time shift effect. The previously present autocorrelation (Wooldridge: F (1.38) = 25.0041; p-value <0.001) and heteroskedasticity (Chi-square (39) = 5.24526e+11; p-value = 0) were removed using the Between model.

Table 2. Between model with dependent variable Top_100_juniors, examining a lagged effect of GDP

Between model, using observations 1-39					
Dependent variable: Top 100 juniors					
Adjusted R² = 0.608					
	coefficient	std. error	t-ratio	p-value	sign.
const.	1.11253	0.287005	3.876	0.0004	***
standardized GDP (t-3)	1.28337	0.238635	5.378	5.11e-06	***
junior G2 + B2 tournaments	0.478034	0.282850	1.690	0.0999	*
junior G3 + B3 tournaments	1.21708	0.429124	2.836	0.0075	***

Source: own elaboration

The modification did not achieve the normality of the residues, as evidenced by the test results in Figure 7. Failure to achieve normality limits the generalization of the model's results.

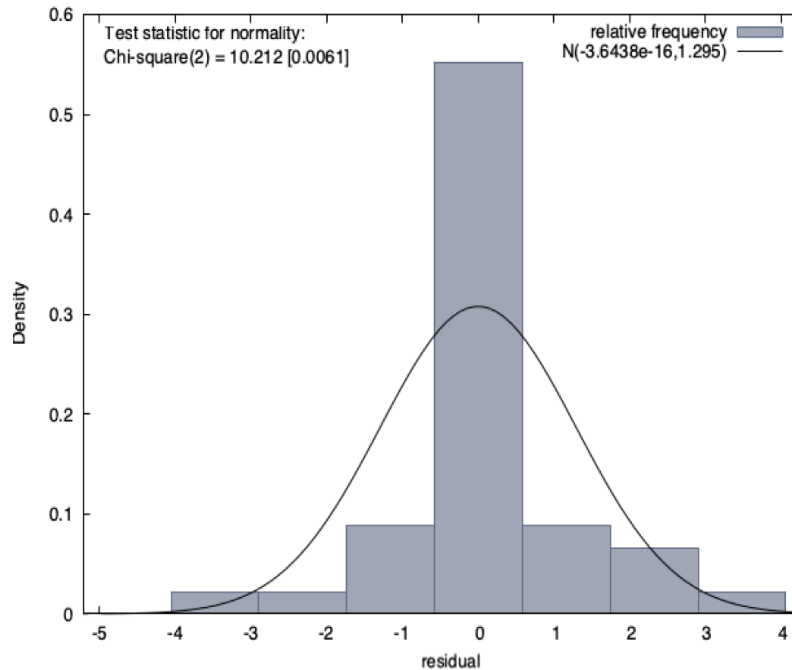


Figure 7. Test for normality of residuals (Between model with dependent variable Top_100_juniors, examining a lagged effect of GDP)

Source: own elaboration in Gretl

The model's explanation rate of data variability is very similar to the previous case (about 60%). The model also describes a similar effect of the explanatory variables on the dependent variable **TOP 100 juniors**. Based on the results, the conclusion is that the country's GDP for the examined variable is consistent over time.

4.2 Results of analyzing the complementary data set 1

A similar approach was applied to the complementary data set 1. The results are presented in a structured manner.

4.2.1 Correlation matrix for the complementary data set 1

The analysis of the correlation matrix represented the first layer of analysis. The logic captured in Figure 8. is identical to the case from the main data set.

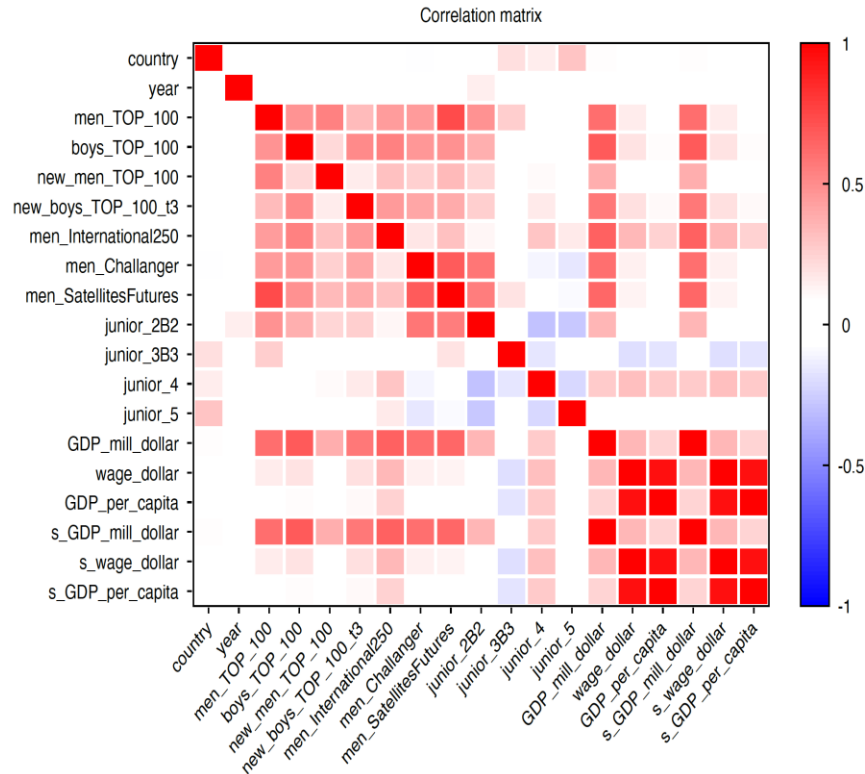


Figure 8. Correlation matrix of variables included in complementary data set 1

Source: own elaboration in Gretl

4.2.2 Results of selected econometric modeling experiments for the complementary data set 1

As described in the methodology, complementary data set 1 provided further insight into the analyzed relationships by examining new faces in the TOP 100 rankings. A Between model was the best result of several modeling experiments using this data set. The first assumption of this model was the Pooled OLS model, where the **new TOP 100 men** entered as the dependent variable. Based on previous experiments, the independent variables included: new boys TOP 100 t-3, men International 250 tournament, men Satellites + Futures tournament, standardized GDP t-3, and the standardized average wage t-3. Finally, in the Between model, the standardized GDP t-3 (coefficient = 0.236219; t = 5.127; p-value <0.001 ***) remained the only variable with a significant parameter. The explanation rate of data variability by the model is represented by adjusted R² = 0.484. The model was not chosen as final.

4.2.3 Selected final models for the complementary data set 1

The third final model was obtained by modification using the Between model estimator. It was based on the OLS Pooled model, where the dependent variable was **new TOP 100 men** (new faces in the ranking). Independent variables included: macroeconomic indicators, men's tennis tournaments and new faces among boys in the TOP 100 t-3.

In the final Between model (Table 3.), there were two explanatory variables: men Satellites + Futures tournaments and standardized GDP. The parameter for the variable standardized GDP had a higher degree of significance. The adjusted R² of the model was above the 50% level.

Table 3. Between model with dependent variable new Top_100_men

Between model, using observations 1-28					
Dependent variable: new Top 100 men					
Adjusted R² = 0.545					
	coefficient	std. error	t-ratio	p-value	sign.
const.	0.213793	0.0714761	2.991	0.0062	***
men Satellites + Futures tournaments	0.0121539	0.00624031	1.948	0.0628	*
standardized GDP	0.164344	0.0575864	2.854	0.0086	***

Source: own elaboration

This modification removed previously present heteroskedasticity (Wald test: Chi-square (28) = 6.63373e + 07; p-value = 0) and achieved normality of residues (test results shown in the Figure 9.). Autocorrelation was not present before the modification (Wooldridge test: t (27) = -0.533269; p-value = 0.59821). The model indicates a positive, albeit very weak, impact of the given categories of tournaments on the examined dependent variable.

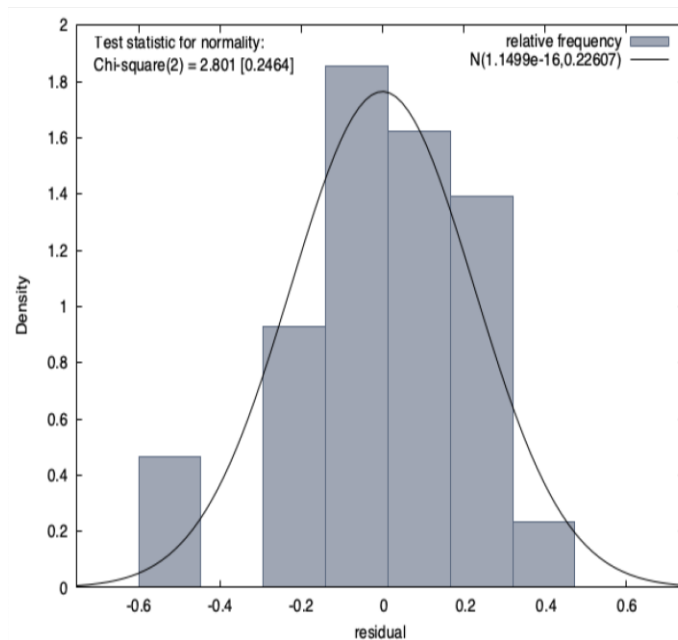


Figure 9. Test for normality of residuals (Between model with dependent variable Top_100_men)

Source: own elaboration in Gretl

4.3 Results of analysing the complementary data set 2

Finally, the last section of results shows the analysis of the second complementary data set, including new variables described in the methodology.

4.3.1 Correlation matrix for the complementary data set 2

Based on the correlation analysis, relationships were selected for closer examination via modelling (Figure 10.).

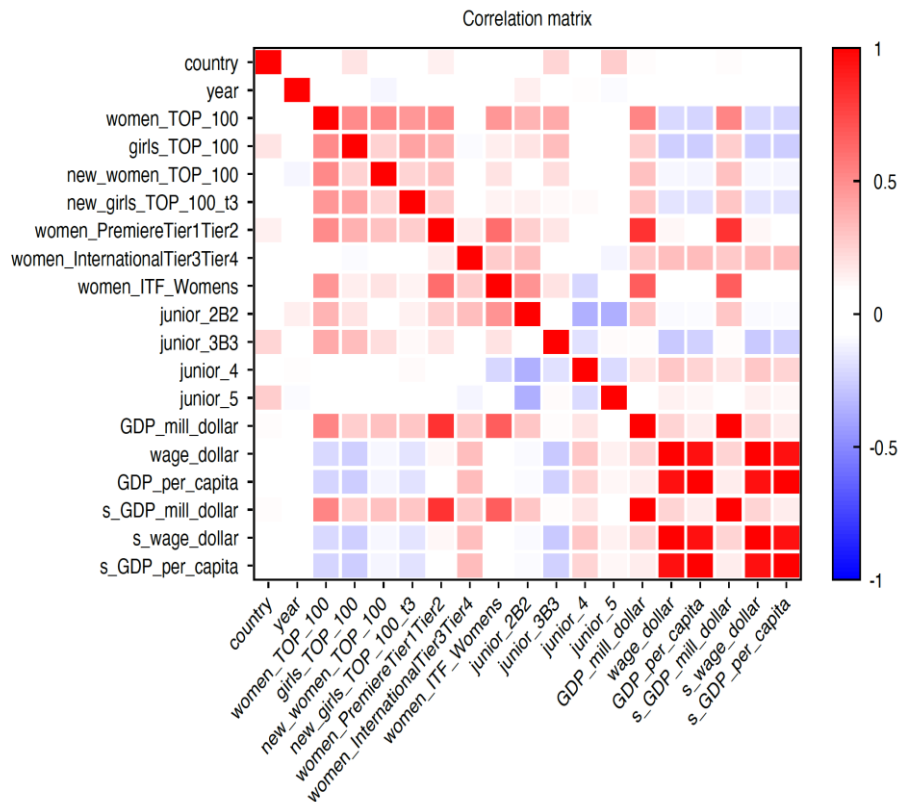


Figure 10. Correlation matrix of variables included in complementary data set 2

Source: own elaboration in Gretl

4.3.2 Results of selected econometric modelling experiments for the complementary data set 2

Within this branch of modelling experiments, the best result was the Fixed effects model, derived from the Pooled OLS model. The initial model contained the dependent variable **TOP 100 women** and the independent variables included: new girls TOP 100 t-3, standardized GDP, and all women's tournaments. However, the resulting Fixed effects model contained only one explanatory variable with a significant parameter – standardized GDP (coefficient = - 0.557090; t = -2.026; p-value = 0.044 **).

4.3.3 Selected final models for the complementary data set 2

The starting point for the last final model (a Between model – Table 4.) was the Pooled OLS model with the dependent variable **new TOP 100 women**. In this case, the independent variables were women's tournaments, new girls TOP 100 t-3, and standardized macroeconomic indicators t-3.

Table 4. Between model with dependent variable new Top_100_women

Between model, using observations 1-27					
Dependent variable: new Top 100 women					
Adjusted R ² = 0.489					
	coefficient	std. error	t-ratio	p-value	sign.
const.	0.328833	0.0412069	7.980	3.30e-08	***
standardized GDP (t-3)	0.214953	0.0443092	4.851	6.06e-05	***
standardized wage (t-3)	-0.122668	0.0425119	-2.886	0.0081	***

Source: own elaboration

Modification using the between model removed previously present heteroskedasticity (Wald test: Chi-square (27) = 978418; p value = 0) and led to achieving residue normality (Figure 11; Chi-square (2) = 1,426; p value = 0.49006). Autocorrelation was not present before the model modification (Wooldridge test: t (26) = 0.795036; p value = 0.433791).

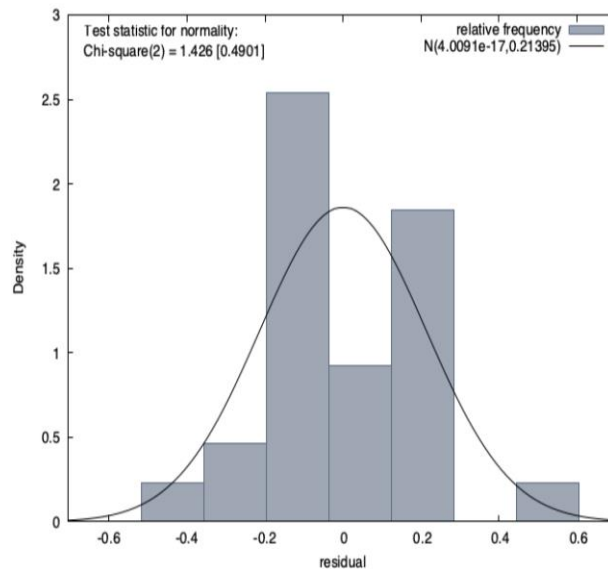


Figure 11. Test for normality of residuals (Between models with dependent variable Top_100_women)

Source: own elaboration in Gretl

Both variables in the model affect the dependent variable. The lagged impact of standardized GDP is positive, as in the previous case. The lagged effect of the average wage in the country on the dependent variable is negative.

Results of the hypotheses' testing

Synthesizing all the results in the form of final models, the testing of the research hypotheses came to these conclusions:

- hypothesis H₁ was confirmed,
- hypothesis H₂ was explicitly confirmed for men and junior athletes,
- hypothesis H₃ could not be confirmed by the research.

Discussion

Becoming a professional athlete is a childhood dream. Tennis is the most popular individual sport (Gough, 2020). However, the fulfillment of this dream is affected by numerous factors. The previous research on this topic focused on several aspects. The first was the relationship between the standard of living, political situation, and the country's culture toward sport (Erben, 2003; Foer, 2006; Leeds & Leeds, 2009; Baade et al., 2011; Storm et al., 2017). Another aspect was represented by various impacts on the athlete's decision-making in a professional career. An important role is played by motivation and life values (Frey, 1988; Goss et al., 2006; Feldman, 2007; Croft, 2008; Puline et al., 2008; Magnusen et al., 2014), the impact on the environment (Bruner et al., 2011; Turnnidge et al., 2014; Imtiaz et al., 2014; Rossing et al., 2016; Hancock et al., 2017; Rossing et al., 2018), the upbringing of elite athletes (De Bosscher et al., 2003; Brenner and Council on Sports Medicine and Fitness, 2007; Brenner and Council on Sports Medicine and Fitness, 2016; LaPrade et al., 2016), the macroeconomic situation (Shuttleworth & Wan-Ka, 1998; Bridges, 2012; Zheng, 2015; Sascha et al., 2016; Moret & Ohl, 2018), and the family's socioeconomic position (Sletten, 2010; Park et al., 2013; Moret & Ohl, 2018; Post et al., 2018).

The previous research studying the factors affecting success in tennis (De Bosscher et al., 2003) also focused on the competitive environment based on the number of tournaments (Galenson, 1993; Crespo et al., 2001; Reid et al., 2007; Filipcic et al., 2013). The second factor was the level of quality the junior players must achieve to continue in their adult professional careers (Reid et al., 2006; Reid et al., 2009; Brouwers et al., 2012), followed by its trajectory (Guillaume et al., 2011; Reid & Morris, 2011; Reid et al., 2014; Bane et al., 2014; Kovalchik et al., 2017;). Other research works focused on social and economic factors affecting the athlete's career. These included the impact of the macroeconomic and political situation. The latest research projects from around the world within the sports management field also studied the topic of sports organizations' sustainability. They examined its various aspects such as social responsibility (Barbu et al., 2022), impact on the environment (Moon, et al., 2022), economic issues (Lesch et al., 2022), sustainable tourism (Tsekouropoulos et al., 2022), but also the sustainable psychological well-being of athletes (Jovanovic et al., 2022). The last aspect listed is connected to human potential management and its application within the broader sports management field, being closely linked to the research presented in this article.

The problem is the high costs of a successful tennis player's development. It is justified to study the possibilities of the parents to financially support their children in this sport. The study of the impact of the average wage in the country on the success of junior tennis players was based on the presumption that its level positively affects athletes' success because of the funds the parents can use to pay for the training, tournaments, and traveling. The results showed that the success of junior athletes is not significantly affected by the average wage in the country. The research included the study of the number of male and female junior athletes in the TOP 100 ranking. This was followed by the study of the impact of the average wage in the country on the success of adult professional athletes on the men's and women's circuits. The presumption was that a higher average salary in the country lowers the motivation of tennis players to continue in their careers. This is aligned with the results achieved by Zheng (2015), Bridges (2012), and Shuttleworth & Wan-Ka (1998), who concluded that people living in countries

with a higher living standard focus on sport less. Sascha et al. (2016) focused on a different perspective, revealing that athletes from poorer countries see sport as an opportunity to improve their social status.

Another critical factor is the competitive environment. Athletes test their skills in sports duels. In tennis, there is a system of tournaments where athletes can play several matches during a few consecutive days. A higher number of tournaments in a country means a better chance to compare the skills, leading to faster progress. This is also related to the socioeconomic background of players since a higher number of tournaments in the home country means lower costs of traveling and accommodation. From this perspective, the relationship between the number of tournaments and the number of players in the TOP 100 was studied for junior and adult athletes. It can be stated that there is a statistically significant relationship between the number of tournaments organized in the country and the success of its tennis players. This finding further confirms the conclusions reached by Gleeson (1993) & Filipcic et al. (2013). Since the research indicates that the number of tournaments influences the quality of the athletes' base, it is also relevant to study the ability of the countries to organize these tournaments. This represents a financially demanding activity.

The research results add new knowledge to the previous works dealing with socioeconomic factors affecting individuals' professional sports activity. Novel aspects are represented by the focus on both genders in junior and adult professional sports and the relationship between the success of the athletes and their competitive environment. The length of the period analyzed led to enough data points for relevant statistical results. Even though the article focuses specifically on tennis, conclusions can be applied to other individual sports based on similar principles.

Conclusions

The research focuses on the success of junior and adult tennis players. The factors influencing it can be divided into two groups, economic and competitive. The main findings include the corroboration of the relationship between the number of tournaments organized in the country and the number of athletes from the country in the TOP 100 rankings. These results, focusing on the macro-level perspective, bring a more comprehensive view of the issue and help tennis federations to develop a concept for preparing successful athletes. It should be focused on the creation of a competitive environment with a high number of tournaments.

Model 1 – The success of the junior athletes is influenced by GDP and tournaments organized by the country in the G2 and G3 categories

Athletes get more points in G2 and G3 tournaments than in G4 and G5 categories, so they need to win fewer matches. A G2 winner has 200 points, and a G5 winner only 30 points (ITF, 2021). If the country organizes these tournaments, home athletes have a higher chance to get wild cards, thus play better matches and get more points when they win in the first round (at a G2 tournament, it is 18 points, and at a G5 tournament, it is 0). Athletes who achieve points this way have a better starting position to get into the tournaments abroad, or they do not have to participate in qualifiers. This gives athletes greater comfort and confidence. In addition, these tournaments are easier to plan and require fewer funds since tournaments from G3 or higher must provide hospitality for the participants. The impact of GDP on the number of G2 and G3 tournaments is related to this, as they are more costly. The level of GDP in the country has an impact on the willingness of sponsors to support young athletes, too.

Model 2 – The success of male adult athletes is influenced by GDP and tournaments in a country in the ITF M15 and M25 category

In these tournaments, athletes gain their first ATP points and move to professional tennis. Here, home players are more likely to get wild cards and become confident that they will participate in a tournament. This eliminates the frustration of not getting to tournaments and increases comfort by making it easier to plan a tournament calendar for individual athletes. GDP affects the willingness of sponsors to support athletes and the organization of tournaments. The costs of organizing a \$15,000 tournament are around \$25,000, so it is not easy to raise the money. The question is why the organization of higher-subsidized tournaments, such as the *ATP Challenger* or the *ATP Tour*, did not positively impact athlete success. The answer can be found in the quality of athletes on the ATP circuit, where it is much harder to prevail; therefore, athletes must come prepared from the circuit with a lower subsidy.

Model 3 – The success of female adult athletes is influenced by GDP and the average wage

This result can be considered intriguing but explainable. According to the ITF, WTA, and ATP calendars, there are fewer women's tournaments than men's tournaments. This played a role in the statistical evaluation – *low number of tournaments organized, incomparable samples*. On the other hand, the impact of GDP and average wage may signal the need to get sponsors, or the family members must support athletes to travel abroad to participate in the tournaments. Another question is whether lower wages in the country do not incentivize women athletes to make a living at tennis.

Focusing on a specific sport and the system of competitions is the main limitation of the research. It prevents further generalization of conclusions for the whole sport. Another limitation is the period studied. A longer period could provide a more complex picture. Future research can focus on verifying the findings achieved via the analysis of the impact of socioeconomic factors and the competitive environment on the athletes' success in other individual sports. Other opportunities include broadening the scope and studying other countries or going deeper and selecting fewer countries with similar attributes, adding other factors to be examined such as the size of the country of interest in tennis (size of the player base, number of registered tennis players in relation to the number of citizens). Subsequent model creation for these countries and selection of the best model will form the basis for deriving measures other countries could take based on the selected model.

References

- Baade, R. A., Baumann, R. W. & Matheson, V. A. (2011). Big men on campus: Estimating the economic impact of college sports on local economies. *Regional Studies*, 45 (3), 371–80. <http://doi.org/10.1080/00343400903241519>
- Bane, M.K., Reid, M. & Morgan, S. (2014). Has player development in men's tennis really changed? An historical rankings perspective. *Journal of Sports Sciences*, 32 (15), 1477–84. <http://doi.org/10.1080/02640414.2014.899706>
- Barbu, M.C.R., Popescu, M.C., Burcea, G.B., Costin, D.E., Popa, M.G., Pasarin, L.D. & Turcu, I. (2022). Sustainability and Social Responsibility of Romanian Sport Organizations. *Sustainability*, 14 (2), <http://doi.org/10.3390/su14020643>
- Brenner, J. S., Council on Sports Medicine and Fitness. (2007). Overuse injuries, overtraining, and burnout in child and adolescent athletes. *Pediatrics*, 119 (6), 1242–45. <http://doi.org/10.1542/peds.2007-0887>
- Brenner, J. S., Council on Sports Medicine and Fitness. (2016). Sports specialization and intensive training in young athletes. *Pediatrics*, 138 (3), 154–57. <http://doi.org/10.1542/peds.2016-2148>
- Bridges, B. (2012). A bid too far: Hong Kong and the 2023 Asian Games. *The International Journal of the History of Sport*, 29 (4), 652–65. <http://doi.org/10.1080/09523367.2012.658195>

- Brouwers, J., Sotiriadou, P. & De Bosscher, V. (2012). An examination of the importance of performances in youth and junior competition as an indicator of later success in tennis. *Sport Management Review*, 15 (4), 454–77. <http://doi.org/10.1016/j.smr.2012.05.002>
- Bruner, M. W., Macdonald, D. J., Pickett, W. & Côté, J. (2011). Examination of birthplace and birthdate in World Junior ice hockey players. *Journal of sports sciences*, 29 (12), 1337–44. <http://doi.org/10.1080/02640414.2011.597419>
- Chris, C. (2008). *Factors influencing big 12 conference college basketball male student-athletes selection of a university*. PhD Dissertation, The University of Texas, El Paso
- Crespo, M., Miley, D. & Couraud, F. (2001). An overall vision of player development. In *Tennis Player Development*. Edited by Miguel Crespo, Machar Reid, Dave Miley. London, United Kingdom: ITF Ltd., pp. 13–18
- De Bosscher, V., De Knop, P. & Heyndels, B. (2003). Comparing tennis success among countries. *International Sports Studies*, 25 (1), 49–68. Retrieved May 10, 2022 from URL https://www.researchgate.net/profile/Veerle-Bosscher/publication/239844205_Comparing_Tennis_Success_Among_Countries/links/59f18211a6fdcc1dc7b9072e/Comparing-Tennis-Success-Among-Countries.pdf
- Erben, N. (2003). Sports practice, health, and macroeconomic performances: An endogenous growth model. *Journal of Sports Economics*, 4 (2), 126–44. <http://doi.org/10.1177/1527002503004002003>
- Feldman, B. (2007). *Meat market: Inside the smash-mouth world of college football recruiting*. New York, New York: ESPN Books, 320 p. ISBN: 9781933060392
- Filipicic, A., Panjan, A., Reid, M., Crespo, M. & Sarabon, N. (2013). Tournament structure and success of players based on location in men's professional tennis. *Journal of Sports Science and Medicine*, 12 (2), 354–61. Retrieved May 20, 2022 from URL <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3761828/>
- Foer, F. (2006). *How governments nurture soccer*. The New Republic. Retrieved February 14, 2021, from <https://newrepublic.com/article/65485/how-governments-nurture-soccer>
- Frey, B. S. (1988). Ipsative and objective limits to human behavior. *Journal of Behavioral Economics*, 17 (4), 229–48. [http://doi.org/10.1016/0090-5720\(88\)90012-5](http://doi.org/10.1016/0090-5720(88)90012-5)
- Galenson, D. W. (1993). The impact of economic and technological change on the careers of American men tennis players, 1960-1991. *Journal of Sport History*, 20 (2), 127–50. Retrieved April 4, 2022 from URL <https://www.jstor.org/stable/43609929>
- Gayle, B. (2009). *Virtual apprentice: Professional athlete*. New York, New York: Ferguson Publishing Company. 64 p. ISBN: 9780816067596
- Goss, B. D., Jubenville, C. B. & Orejan, J. (2006). An examination of influences and factors on the institutional selection processes of freshman student-athletes at small colleges and universities. *Journal of Marketing for Higher Education*, 16 (2), 105–34. http://doi.org/10.1300/J050v16n02_05
- Gough, Ch. (2020). *Highest paid athletes by earnings from salary and endorsements worldwide in 2019/20*. Statista. Retrieved February 14, 2021, from <https://www.statista.com/statistics/250295/highest-paid-athletes-worldwide>
- Guillaume, M., Len, S., Tafflet, M., Quinquis, L., Bernard, M., Schaal, K., Nassif, H., Desgorces, F. D. & Toussaint, J. F. (2011). Success and decline: Top 10 tennis players follow a biphasic course. *Medicine & Science in Sports & Exercise*, 43 (11), 2148–54. <http://doi.org/10.1249/MSS.0b013e31821eb533>
- Hancock, D. J., Coutinho, P., Côté, J. & Mesquita, I. (2017). Influences of population size and density on birthplace effects. *Journal of Sports Sciences*, 36 (1), 33–8. <http://doi.org/10.1080/02640414.2016.1276614>
- Intiaz, F., Hancock, D. J., Vierimaa, M. & Côté, J. (2014). Place of development and dropout in youth ice hockey. *International Journal of Sport and Exercise Psychology*, 12 (3), 234–44. <http://doi.org/10.1080/1612197X.2014.880262>
- International Tennis Federation – ITF. (2021). *ITF Rules and Regulations*, pp. 1–105. Retrieved March 15, 2021, from <https://www.itftennis.com/media/4471/2021-itf-world-tennis-tour-juniors-regulations.pdf>

- ITF. (2021). *International tennis federation – World tennis tour junior rankings*. Retrieved September 5, 2021, from <https://www.itftennis.com/en/rankings/world-tennis-tour-junior-rankings/>
- Jovanovic, B.K., Smrdu, M., Holnthaner, R. & Kajtna, T. (2022). Elite Sport and Sustainable Psychological Well-Being. *Sustainability*, 14 (5), <http://doi.org/10.3390/su14052705>
- Kovalchik, S. A., Bane, M. K. & Reid, M. (2017). Getting to the top: An analysis of 25 years of career rankings trajectories for professional women's tennis. *Journal of Sports Sciences*, 35 (19), 1904–10. <http://doi.org/10.1080/02640414.2016.1241419>
- LaPrade, R. F., Agel, J., Baker, J., Brenner, J. S., Cordasco, F. A., Côté, J., Engebretsen, L., Feeley, B. T., Gould, D., Hainline, B., Hewett, T., Jayanthi, N., Kocher, M. S., Myer, G. D., Nissen, C. W., Philippon, M. J. & Provencher, M. T. (2016). AOSSM Early sport specialization consensus statement. *Journal of Orthopaedic & Sports Medicine*, 4 (4), 1–8. <http://doi.org/10.1177/2325967116644241>
- Leeds, M. A. & Leeds, E. M. (2009). International soccer success and national institutions. *Journal of Sports Economics*, 10 (4), 369–90. <http://doi.org/10.1177/1527002508329864>
- Lesch, L., Kerwin, S., Thormann, T.F. & Wicker, P. (2022). Critical Masses and Gender Diversity in Voluntary Sport Leadership: The Role of Economic and Social State-Level Factors. *Sustainability*, 14 (10). <http://doi.org/10.3390/su14106208>
- Magnusen, M. J., Kim, T., Perrewé, P. L. & Ferris, G. R. (2014). A critical review and synthesis of student-athlete college choice factors: Recruiting effectiveness in NCAA sports. *International Journal of Sports Science & Coaching*, 9 (6), 1265–86. <http://doi.org/10.1260/1747-9541.9.6.1265>
- Moon, P., Bayle, E. & Francois, A. (2022). Assessing International Sport Federations' Sustainability Practices: Toward Integrating Sustainability in Their Main Sports Events. *Frontiers in sports and active living*, 3. <http://doi.org/10.3389/fspor.2021.752085>
- Orlan, M. & Ohl, F. (2018). Social class, the elite hockey player career, and educational paths. *International Review for the Sociology of Sport*, 54 (8), 899–920. <http://doi.org/10.1177/1012690218765759>
- Park, S., Lavalley, D. & Tod, D. (2013). Athletes' career transition out of sport: A systematic review. *International Review of Sport and Exercise Psychology*, 6 (1), 22–53. <http://doi.org/10.1080/1750984X.2012.687053>
- Pauline, J., Pauline, G. & Allen, C. (2008). Factors influencing college selection by NCAA Division I, II, and III softball student-athletes. *Journal for the Study of Sports and Athletes in Education*, 2 (3), 363–78. <http://doi.org/10.1179/ssa.2008.2.3.363>
- Post, E., Green, N. E., Schaefer, D. A., Trigsted, S., Brooks, M. A., McGuined, T. M., Watson, A. M. & Bell, D. R. (2018). Socioeconomic status of parents with children participating on youth club sport teams. *Physical Therapy in Sport*, 32, 126–32. <http://doi.org/10.1016/j.ptsp.2018.05.014>
- Rank tennis. (2021). *Data from official websites of ATP/WT*A. Retrieved September 10, 2021, from <https://www.rank-tennis.com/en/home>
- Reid, M., Crespo, M., Atienza, F. & Dimmock, J. (2007). Tournament structure and nations' success in women's professional tennis. *Journal of Sports Sciences*, 25 (11), 1221–28. <http://doi.org/10.1080/02640410600982691>
- Reid, M., Crespo, M. & Santilli, L. (2009). Importance of the ITF junior girls' circuit in the development of women professional tennis players. *Journal of Sports Sciences*, 27 (13), 1443–48. <http://doi.org/10.1080/02640410903037714>
- Reid, M., Crespo, M., Santilli, L., Miley, D. & Dimmock, J. (2007). The ITF junior boys' circuit and its role in professional player development. *Coaching and Sport Science Review*, 25 (6), 667–72. <http://doi.org/10.1080/02640410600811932>
- Reid, M., Morgan, S., Churchill, T. & Bane, M. K. (2014). Rankings in professional men's tennis: A rich but underutilized source of information. *Journal of Sports Sciences*, 32 (10), 986–92. <http://doi.org/10.1080/02640414.2013.876086>
- Reid, M. & Morris, C. (2011). Ranking benchmarks of top 100 players in men's professional tennis. *European Journal of Sport Science*, 13 (4), 350–55. <http://doi.org/10.1080/17461391.2011.608812>
- Rossing, N. N., Nielsen, A. B., Elbe, A-M. & Karbing, D. S. (2016). The role of community in the development of elite handball and football players in Denmark. *European Journal of Sport Science*, 16 (2), 237–45. <http://doi.org/10.1080/17461391.2015.1009492>

Rossing, N. N., Stentoft, D., Flattum, A., Côté, J. & Karbing, D. S. (2018). Influence of population size, density, and proximity to talent clubs on the likelihood of becoming elite youth athlete. *Scandinavian Journal of Medicine & Science in Sports*, 28 (3), 1304–13. <http://doi.org/10.1111/sms.13009>

Schmidt, S. L., Torgler, B. & Jung, V. (2016). Perceived trade-off between education and sports career: Evidence from professional football. *Applied Economics*, 49 (29), 2829–50. <http://doi.org/10.1080/00036846.2016.1248357>

Shuttleworth, J. & Wan-Ka, Ch. (1998). Youth sport education and development in Hong Kong – A conflict model social impact assessment. *Sport, Education and Society*, 3 (1), 37–58. <http://doi.org/10.1080/1357332980030103>

Storm, R. K., Thomsen, F., Jakobsen, T. G. (2017). Do they make a difference? Professional team sports clubs' effects on migration and local growth: Evidence from Denmark. *Sport Management Review*, 20 (3), 285–95. <http://doi.org/10.1016/j.smr.2016.09.003>

Tsekouropoulos, G., Gkouna, O., Theocharis, D. & Gounas, A. (2022). Innovative Sustainable Tourism Development and Entrepreneurship through Sports Events. *Sustainability*, 14 (8), <http://doi.org/10.3390/su14084379>

Turnnidge, J., Hancock, D. J. & Côté, J. (2014). The influence of birth date and place of development on youth sport participation. *Scandinavian Journal of Medicine & Science in Sport*, 24 (2), 461–68. <http://doi.org/10.1111/sms.12002>

UNECE. (2021). *United Nations Economic Commission for Europe – Gross Average Monthly Wages by Country and Year*. Retrieved September 15, 2021, from http://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT_20-ME_3MELF/60_en_MECCWagesY_r.px/?rxid=a9fa5e81-549d-4198-845f-02d7eee8a67b

World Bank. (2021). *Open data*. Retrieved September 5, 2021, from <https://data.worldbank.org/>

Zheng, J. (2015). Hong Kong. *International Journal of Sport Policy and Politics*, 8 (2), 321–38. <http://doi.org/10.1080/19406940.2015.1031813>

Appendix A – List and description of the variables used in the research (Figure 4)

Country they represent)	... country of athletes' origin (country
Year period	... specific year within the studied
TOP_100_men (men_TOP_100) the country in the TOP 100 ranking	... number of male athletes from
ch_TOP_100_men ranking of male athletes	... annual change in the TOP 100
new_men_TOP_100 of male athletes	... new faces in the TOP 100 ranking
TOP_100_women (women_TOP_100)	... number of female athletes from the country in the TOP 100 ranking
ch_TOP_100_women	... annual change in the TOP 100 ranking of female athletes
new_women_TOP_100 of female athletes	... new faces in the TOP 100 ranking
TOP_100_boys (boys_TOP_100)	... number of junior male athletes from the country in the TOP 100 ranking
ch_TOP_100_boys	... annual change in the TOP 100 ranking of junior male athletes
new_boys_TOP_100	... new faces in the TOP 100 ranking of junior male athletes
TOP_100_girls (girls_TOP_100)	... number of junior female athletes from the country in the TOP 100 ranking
ch_TOP_100_girls	... annual change in the TOP 100 ranking of junior female athletes
new_girls_TOP_100	... new faces in the TOP 100 ranking of junior female athletes
TOP_100_juniors	... number of junior athletes from the country in the TOP 100 ranking
ch_TOP_100_juniors	... annual change in the TOP 100 ranking of junior athletes
men_International250	... number of International 250 tournaments organized in the country
men_Challenger	... number of Challenger tournaments organized in the country
men_SatellitesFutures	... number of Satellites and Futures tournaments organized in the country
men_tournaments	... number of tennis tournaments for men organized in the country (sum of all the categories analysed)

women_PremiereTier1Tier2	... number of Premiere, Tier1, and Tier2 tournaments organized in the country
women_InternationalTier3Tier4	... number of International, Tier3, and Tier4 tournaments organized in the country
women_ITF_Womens	... number of ITF tournaments organized in the country
women_tournaments	... number of tennis tournaments for women organized in the country (sum of all the categories analysed)
junior_2B2	... number of G ₂ and B ₂ tournaments organized in the country
junior_3B3	... number of G ₃ and B ₃ tournaments organized in the country
junior_4	... number of G ₄ tournaments organized in the country
junior_5	... number of G ₅ tournaments organized in the country
junior_tournaments	... number of tennis tournaments for junior players organized in the country (sum of all the categories analysed)
sum_tournaments	... number of all tennis tournaments organized in the country (sum of all the categories analysed)
GDP_mill_dollar of US dollars	... financial value of GDP in millions
GDP_per_capita	... financial value of GDP per capita in US dollars
wage_dollar	... financial value of average wage in US dollars
s_GDP_mill_dollar	... standardized financial value of GDP in millions of US dollars
s_GDP_per_capita	... standardized financial value of GDP per capita in US dollars
s_wage_dollar	... standardized financial value of average wage in US dollars

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**THE IMPACT OF SOCIAL MEDIA MARKETING ACTIVITIES ON GREEN CONSUMPTION
INTENTION: EVIDENCE FROM EMERGING COUNTRIES**

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Abstract. The study investigated the impact of social media marketing activities on green consumption intention. The study used the survey method to describe this impact in five countries (Brazil, Egypt, India, South Africa, and Turkey). The analysis was applied to the leading platforms of electric car pages on social media - Facebook, TikTok, Twitter, YouTube, and Instagram. Five control variables (Age, Gender, Education, Income, and Citizenship) were used. A total of 393 questionnaires were collected in the first quarter of 2022. The study verified the adequacy of the sample with Cronbach's alpha. Finally, based on Hierarchical Multiple Regression, the study found that social media marketing activities impact green consumption intention by (89.9%). In addition, control variables contributed to raising the impact to (94.9%). In this manner, the current study is new and offers valuable insight into the function of social media on green consumption intention under the demographic characteristics of consumers.

Keywords: social media; marketing activities; green marketing; consumption intention; emerging countries; environmental issues

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JEL Classifications: M31, M15, Q56

1. Introduction

Incremental growth in internet users led many enterprises to experiment with more ways of managing their cyberspace existence. They tested new business models that could provide them more opportunities than the Internet (Wielki, 2010). Many kinds of research on social media have been conducted in the last two decades that show their importance for enterprises (Kapoor et al., 2018), especially from direct marketing perspective (Unold, 2003). Nowadays, social media acts as a base for marketing strategy in enterprises. As consumers can communicate about products, enterprises, or brands, the influence of consumer engagement has increased (Liu et al., 2018). Therefore, managers rely on social media users and algorithms (using platforms) to plan their marketing content (Kanuri, Chen, and Sridhar, 2018).

Enterprises should understand users' needs and organise marketing activities according to this. They should organise events that have a lasting impression (Kim and Perdue, 2013). For example, Louis Vuitton (fashion brand) provides live fashion shows via Facebook (Kim and Ko, 2012). Ralph Lauren, Gucci, Chanel, and others have created iPhone applications (apps), while other brands created Facebook, TikTok, Twitter, YouTube, or Instagram accounts. This allows the communication between brand and customer to have no time, location, and media restrictions.

Facebook (FB) is considered one of the most popular platforms for promoting products, managing relationships, and communicating with customers (Chodak and Suchacka, 2017; Myers West, 2018). Any firm can use different posts or content on FB to notify customers about goods, services, and offers. FB enables a firm to get feedback from recent and prospective customers (Abeza, O'Reilly, and Reid, 2013). This helps enterprises understand customers' needs and opinions about products or services. In addition, FB fan pages are used to promote discount coupons, spread information about promotions, and manage competitions for customers (Radzi, Harun, Ramayah, Kassim, and Lily, 2018).

Through social media, consumers may create, develop, or distribute content which affects their behavioural intentions (Lee and Cranage, 2014). Social media allows consumers to communicate and search for information (Nezakati et al., 2015). Social media networks (i.e. Facebook, Instagram, TikTok, Twitter, and YouTube) allow consumers to be more integrated into the online environment. It also offers alternative chances for enterprises to market their products and services and to know consumer demand.

An increased concern has emerged in many countries about green consumption, as pollution destroys natural resources. It is related to unpredictable economic development (Lee, 2008). Because of this, it is essential to reshape enterprises' consumption strategies to have sustainable development and environmental protection (Martinsons et al., 1997). This study measures the impact of social media marketing activities on green consumption for electric car brands on Facebook, TikTok, Twitter, YouTube, and Instagram.

2. Literature Review

The deterioration of ecological systems and consumers' heightened expectations about the role of enterprises in society have dramatically raised enterprise awareness of the significance of environmental concerns. Although sustainability has become a prominent trend in modern society, the unsustainable purchasing habits of individual consumers remain a significant impediment to sustainable development. Simultaneously, a rising number of customers have grown increasingly receptive to the concept of sustainable consumption. People's knowledge of the lasting effects of their consumption on environment and society is related to sustainable consumption. Modern enterprises should educate and enlighten their customers since a high level of knowledge substantially influences consumer purchasing behaviour and the adoption of sustainable consumption habits. Using modern technology,

enterprises may determine what encourages customers to act more sustainably and promote sustainable consumption. Recently, social networking has emerged as a viable solution for managing consumer information (Radziszewska, 2021).

With the advent of the mobile internet economy and social networks, there is substantial evidence that consumers' eco-friendly purchase patterns have shifted. Social commerce, which blends social networking and e-commerce, is frequently used to encourage eco-friendly purchase patterns (Gao et al., 2022). Currently understudied is the function of social media in creating sustainable attitudes (Zafar et al., 2021). Therefore, the study reviews the intellectual framework through three main dimensions, including: "Social media marketing", "Purchasing intention", and "Green consumption intention".

2.1 Social Media Marketing

The term "social media" consists of "social" and "media". Social refers to the interactions between individuals or groups who have similar interests. Media refers to channels or platforms allowing individuals or groups to create, develop, and share content (Icha and Agwu, 2015). Social media reflected consumers' need for interpersonal interactions through virtual worlds. For example, real-time texting is used in information sharing and social contact between people. This motivates enterprises to include social media in their online marketing strategies. Social media marketing (SMM) could be defined as influencing.

Social media marketing (SMM) refers to commercial behaviour on social media (Zhang and Daugherty, 2009; Harvey, Stewart, and Ewing, 2011). SMM can be represented in two types: user-generated content (UGC) and social-based SMM (Mangold and Faulds, 2009; Chan and Guillet, 2011; Alves, Fernandes, and Raposo, 2016; Zeng and Wei, 2013). UGC-based SMM uses UGC platforms (e.g., Brand communities, Blogs, TikTok, Twitter, YouTube, and Forums). UGC platforms are designed as informative media; therefore, they are more easily adapted for commercial behaviours (Kaplan and Haenlein, 2010; Goh, Heng and Lin, 2013).

Social-based SMM uses direct communication between users (e.g., WeChat). It expanded recently as a shopping channel. For example, about 12.57 million users use WeChat (Internet Society of China (ISC), 2016). Social media became a part of everyday life. The interactions through virtual platforms, e.g., Pinterest, Facebook, Instagram, TikTok, Twitter, YouTube, LinkedIn, and others, reflect the behaviour towards all social media technologies (Alalwan et al., 2017). Social media has proved helpful in social, commercial, and educational life. It is becoming more popular in consumers' information searches and purchasing decisions (Kim et al., 2018). For customers, it became one of the most appropriate tools for gaining knowledge and developing relationships (Ladhari and Michaud, 2015).

These days, customers use blogs, social media, online communities, or consumer review systems to collect product information (Yoo et al., 2018; Nam et al., 2020). Social media and social networking are different, although both convey information. Social media permits individuals and enterprises to broadcast, influence others and share user-generated content (Alalwan et al., 2017). For that Internet, platforms are used, which allow the exchange of interests, experiences, goods, and services, for example, Forums, blogs, online communities, social networks, and YouTube (Ladhari and Michaud, 2015). Social networks are platforms, programs, or electronic sites, used by individuals with similar interests (Alalwan et al., 2017). Social networking uses social media is directly connecting people.

Social media marketing communicates customers and enterprises; service-driven dialogue promotes information, which enables the use of the experience of the parties involved (Alalwan et al., 2017). User content describes the opinions placed on social media. As it is easy to share comments and know the impressions of others, this has influenced users to seek information, and it has also affected their purchasing decisions (Ladhari and Michaud,

2015). Customers' use of social media to seek information about products is increasing, without the need for enterprises to promote or post information on their official accounts or websites (Erkan and Evans, 2016).

Social media has been integrated into marketing strategies and considered one way to deal with consumers' needs through the different available platforms. It's a powerful tool for increasing the global existence of the company, promoting products and services, and growing brand reputation (Dolega et al., 2021).

Social media allows customers to share their positive or negative experiences. They tell their opinions about enterprises, goods, and services they have tried. Much research has proved that word-of-mouth influences consumer interaction. (Alalwan et al., 2017). This has motivated much research to pay attention to its relation to behaviour (Septiani et al., 2017; Huynh et al., 2020). Or to purchasing intention (Erkan and Evans, 2016; Wu and Lin, 2017; Wang et al., 2018; Filieri et al., 2018; Zhao, et al., 2020; Shankar et al., 2020; Lee and Wong, 2021). In addition, many researchers examined its relation to loyalty (Yoo et al., 2013; Nguyen-Phuoc et al., 2020; Lee and Wong, 2021). Their findings proved the effect of word-of-mouth on trust and customer engagement.

Electronic word of mouth is a positive or a negative statement by potential, existing, or former customers. It represents his opinion about a product or a company. In social media, this is done through the Internet: social network websites, e-retail stores, blogs, forums (Shankar et al., 2020). The opinion of consumers represented in electronic word of mouth on social media is usually considered unbiased, reliable, and can be easily accessed. So, it means a source for information other than the company official website or any other traditional way of having the data (Ladhari and Michaud, 2015).

In addition to providing a way for communication between customers, enterprises can promote their products and services. They also can share comments via text, images, applications, links, or videos on social platforms or websites. Customers can also share their thoughts by posting or forwarding posts. This makes a consumer need to analyse critically and comprehend information before adopting it, which affects his purchasing intention (Erkan and Evans, 2016).

These days' social media is considered a primary source of information, as it influences consumers' purchasing decisions (Alalwan et al., 2017). Researchers used the information posted by consumers after purchasing on social platforms. The researchers tried to explore consumer behaviour, information adoption (Kim et al., 2021), customer review (Hussain et al., 2018), and intentions (Septiani et al., 2017). The information on social media websites affects consumer expectations; it influences consumers' preferences, attitudes, and purchase decisions. It also represents post-use evaluations (Ladhari and Michaud, 2015). Consumers post and share their opinion before and after purchasing on social media using technology services. This implies a relation between online communication channels and technology adoption behaviour (Shankar et al., 2020).

The increase in these virtual community websites encouraged many enterprises to think about relying on such sites to deepen their relationship with consumers (Kaplan and Haenlein, 2010; Chen et al., 2014). Alternative forms of media and programs has been developed through the Internet. This changed past traditional human interactions and created new ways of communication. Reliance on online social media, sharing of consumer experiences, and the sharing of brand information became new topics in brand marketing.

The traditional one-way information transmission has become interactive, two-way communication (Kaplan and Haenlein, 2010). As a result, this encouraged more enterprises to profit from social media.

Social media marketing (SMM) attracted the attention of scholars in past years. Many researchers have investigated the effect of social media on consumers' behaviour (Mangold and Faulds, 2009; Kaplan and Haenlein, 2010; Chan and Guillet, 2011; Wang, Yu, and Wei, 2012; Wang and Chang, 2013; Zeng and Wei,

2013; Goh et al., 2013; Vinerean et al., 2013; Alves et al., 2016). However, the investigation of social media on green consumption intention under demographic characteristics of consumers is lacking.

2.2 Purchasing Intention

Purchase intention can measure the possibility that a consumer will buy a product. The higher the purchasing intention is, the higher a consumer's willingness to buy a product (Dodds et al., 1991). Using intentions to forecast purchasing depends on the assumption that intentions are good indicators of purchasing behaviours (Armstrong et al., 2000). Buying intention indicates that customers will follow their experience, preference, and external environment to gather information, evaluate alternative options, and make a purchasing decision (Zeithaml, 1988; Dodds et al., 1991).

Purchasing intention can be classified as one of the factors of consumer cognitive behaviour, as how an individual intends to buy a specific brand or product. Laroche Kim and Zhou (1996) argue that certain variables as customers' consideration in purchasing a product and expectation to buy a product, can be used in measuring a consumer's purchasing intention. These factors may include customer's interest, attending, information, and assessment as parts of the overall process of determining intention. Many marketing researchers use continuance intention to measure whether consumers will continue to use a product or a service (Thong et al., 2006). Consumers' willingness to continue using a product or service is crucial for a firm success.

A customer's willingness to purchase a good or service is represented by his purchasing intention (Dodds et al., 1991). Morwitz and Schmittlein (1992) showed that willingness to buy is usually used as an indicator of customers' future purchasing behaviour. Blackwell et al. (2001) found that willingness to purchase can be seen as customers' preference for selecting a good or service. In addition, Boyd and Mason (1999) proved that willingness to purchase reflects customers' degree of appreciation for a particular product.

In practical investigations it is more difficult to track whether an action has been taken (a purchase or a recommendation). Usually, when customers purchase a product, they search for information on their experiences and external environment. After gathering enough information, customers evaluate, compare, and finally make a purchase. Purchasing intention can be seen as consumers' subjective preference for a specific good or service. Therefore, purchasing intention is usually used in measuring customers' behavioural intention (Fishbein and Ajzen, 1977).

Schiffman and Kanuk (2009) argue that willingness to purchase reflects a consumer's probability of buying a particular product; the higher the desire to acquire, the higher the chance. Previous studies have found that purchase intention might be a critical predictor of a consumer's behaviour and tendency to purchase (Verhagen and Van Dolen, 2009; Huang et al., 2010; Lu et al., 2010; Kim and Chung, 2011).

Finding the main reasons for users' participation in social networking sites and attracting users to the site is mainly essential for social networking site operators. Predicting human behaviour has been a central interest in social sciences (e.g. marketing: purchase behaviour; political science: voting behaviour). Thus, predicting behaviour from attitude and intention is considered one of the essential issues for researchers (Morris et al., 2002). This study measures the effects of social media marketing activities on purchasing intention.

2.3 Green Consumption Intention

Environmental pollution reflected in air, water, ozone layer problem, global warming, and waste disposal (Dagher and Itani, 2014) is growing due to the increase in consumption, which drives us to adopt sustainability alternatives (Uddin and Khan, 2016). Joshi and Rahman (2016) clarify that green consumption behaviour is an ethical decision-making behaviour for consumers. It's considered a socially responsible behaviour type. Examples of green consumption activities for consumers are: purchasing goods made of recycled materials and participating in recycling waste (Fakunle and Ajani, 2021). As for enterprises: adopting marketing practices that consider environmental dimensions such as packaging, green advertising, product design, and marketing strategies (Lu et al., 2015). Green consumption behaviour gives a chance for customers to participate in environmental protection (Sun et al., 2019).

Cleaner production can be defined as improving industrial processes to prevent polluting air, water, and land and decreasing the risk for humans and environment (Lee, 2001). The scope, methods, and application areas for cleaner production have been changing recently (Hens et al., 2018).

Consumers' communication has increased through social media platforms, which is affecting consumers' buying intentions (Jain et al., 2020). For example, customers' accessibility to information about goods, services, and traditional shopping ways has evolved rapidly (Devereux et al., 2020). A study by Carmela and Fiorillo (2017) proved that exposure to media increases environmental concerns and awareness among targeted consumers. Media exposure refers to the opportunity of a viewer, reader, or listener to hear or see an advertising message in a particular medium (e.g. Internet, TV, radio). In the green product context, media exposure means the appealing and persuasive messages published through certain mediums about consuming green goods (Jan et al., 2019). Joshi and Rahman (2016) claim that young educated consumers' green behaviour can be predicted by their exposure to environmental messages in India's media.

Rashid (2009) declares that consumers' willingness to buy eco-friendly products rather than traditional products reflects green consumption intention. Other research about green consumption (i.e., Paul et al., 2016; Sharma and Dayal, 2016; Biswas and Roy, 2015) proved a positive relationship between consumers' willingness to learn about eco-friendly products and their intention to use green products. The study can conclude that green consumption intention refers to an individual's desire to buy green products.

According to Nassar and Strielkowski (2022) there is a link between green consumption and green competitiveness of companies. Green consumption is crucial for building green strategies of companies.

According to Nguyen, Do, and Le (2022), exposure to environmental problems affects pro-environmental personal norms (PNs), influencing individual behaviour. More importantly, the effects of action-related and effectiveness-related information on PNs were moderated differently by egoistic values held by consumers.

Sarkar, Sarkar, and Sreejesh (2022) that systematic and heuristic analysis of message cues regarding sustainable enterprises practises transmitted by the brand via online social networks influence consumers' views of the brand's warmth and competence. These impressions guide customers' responsible consumption practices and promote brand relationships. The influence of these cues is mitigated by how customers perceive the brand's motivations for engaging in sustainable enterprise practices.

3. Study Design

The study used the survey method to describe the impact of social media marketing activities on green consumption in five countries (Brazil, Egypt, India, South Africa, and Turkey) for electric car brands (see Appendix A) on Facebook, TikTok, Twitter, YouTube, and Instagram under five control variables (Age, Gender, Education, Income, and Citizenship).

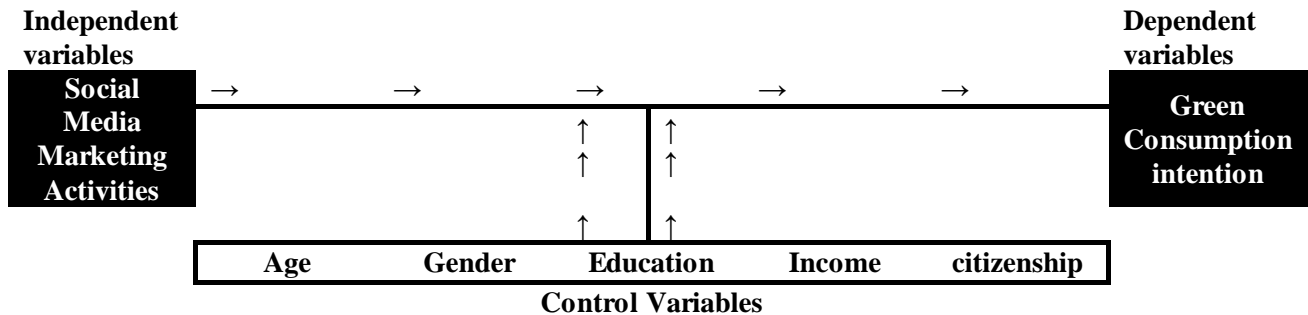


Figure 1. Study layout

Accordingly, Kim and Ko (2012), Bedard and Tolmie (2018) and Zollo et al. (2020) Measurement Social Media Marketing Strategies, on the one hand, Lao and Wu (2013), Li et al. (2016) and Gao et al. (2016) to Measurement Green consumption intention (see Appendix B). The study used Hierarchical Multiple Regression to determine this impact within five control variables (Age, Gender, Education, Income, and Citizenship) to determine the additional contribution of control variables in interpreting Green Consumption.

4. Sample and Hypotheses Testing

4.1 Data Collection

A questionnaire from the end-user based on Google forms with sponsored ads via social media (Instagram, TikTok, Twitter, YouTube, and Facebook as leading platforms) to attract the potential buyers of the electric cars were from Brazil, Egypt, India, South Africa, and Turkey. They were contacted by Google form between October 2021 and January 2022. A total of 393 questionnaires were received. Table 1 summarises the number of participants in the survey.

Table 1. Survey participants

No.	Region	Male	Female	Total	Weight
1	Brazil	21	29	50	12.72%
2	Egypt	43	28	71	18.06%
3	India	44	39	83	21.11%
4	South Africa	48	49	97	24.68%
5	Turkey	39	53	92	23.41%
Total		195	198	393	
Weight		49.62%	50.38%	100%	100%

Source: Authors, according to data collection

The study's limitation was the lack of diversity of participants from only five countries. The study justified this by relying on an English-language survey. This matter caused a bias when reaching the individuals participating in the investigation. Only conducted a study with 50 participants on Brazilian consumers' perceptions towards green

consumption intentions. Individuals from Burkina, Faso, Burundi, Cameroon, Congo, East Timor, Guinea Bissau, Macau, and Mozambique did not participate for the same reason.

4.2 Examining the impact of Social Media Marketing Activities on Green Consumption intention

Reliability statistics .Cronbach's alpha was used to validate the adequacy of the sample. The study verified hypotheses through confirmatory factor analysis and structural equation modelling. The Cronbach's alpha coefficient of the received questionnaires was 0.8645. Thus, the study found stability indicators of the statistical tests' results.

After processing the data, the following outputs appear within Statistical Package for the Social Sciences (SPSS). That is based on Hierarchical Multiple Regression from two blocks; first for Social Media Marketing Activities only; second within five control variables (Age, Gender, Education, Income, and Citizenship).

Table 2. ANOVA test outputs

ANOVA ^c						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1392.232	1	1392.232	3504.551	.000 ^a
	Residual	155.330	391	.397		
	Total	1547.562	392			
2	Regression	1470.123	6	245.020	1221.310	.000 ^b
	Residual	77.440	386	.201		
	Total	1547.562	392			

a. Predictors: (Constant), SMMA

b. Predictors: (Constant), SMMA, AGE, CIT, GEN, INC, EDU

c. Dependent Variable: GCI

Source: Statistical Package for Social Sciences outputs

Through Table 2, the study found the importance of a model at the level of (1%), where it recorded (F) was 3504.551 in the first block, compared to 1221.3 in the second block. Table 3 shows the interpretation.

Table 3. Study Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.948 ^a	.900	.899	.6303
2	.975 ^b	.950	.949	.4479

a. Predictors: (Constant), SMMA

b. Predictors: (Constant), SMMA, AGE, CIT, GEN, INC, EDU

Source: Statistical Package for Social Sciences outputs

Through the statistical outputs, there is the interpretation of social media marketing activities on green consumption intention by (89.9%) based on adjusted R Square, and the control variables contributed to raising the performance to (94.9%) of the change in green consumption intention; based on adjusted R Square. As for the significance of the model variables, whether in the first or second block, the study found the significance of all variables at the level of (1%) for "social media marketing activities ", "Citizenship", "Education", and "Gender" vs "Age" and "Income" at the level of (5%), as shown in Table 4.

Table 4. Significance of the model variables

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	-9.53E-02	.058		.099
	SMMA	1.200	.020	.948	.000
2	(Constant)	-1.822	.167		.000
	SMMA	.655	.038	.518	.000
	AGE	.121	.048	.047	.013
	CIT	-.300	.050	-.180	.000
	EDU	.880	.060	.498	.000
	GEN	.554	.115	.136	.000
	INC	7.559E-02	.038	.055	.050

a. Dependent Variable: GCI

Source: Statistical Package for Social Sciences outputs

According to Table 4, there is a positive impact of social media marketing activities on green consumption intention; under the demographic characteristics of consumers, the demographic variable that is more important for green consumption intention was the level of education. There is a strong positive effect of the level of education. Gender ranked second, with females being more emotional than males for green consumption intentions. But age and income level were the weak impact factors on green consumption intentions for the individuals in the sample under investigation. In this manner, the current study is new and offers valuable insight into the function of social media on green consumption intention under the demographic characteristics of consumers.

5. Conclusions and Recommendations

The human lifestyle has witnessed many stages of development since it appeared on this planet (Earth). Products in information and communication technology have had significant repercussions on the human lifestyle, which was called the Fourth Industrial Revolution (Tohanean and Toma, 2018).

Despite the emergence of the Internet in the last quarter of the previous loan, many marketing practices have differed from the emergence of social media such as Facebook, TikTok, Twitter, YouTube, and Instagram. Now enterprises have a marketing strategy on social media derived from the company's marketing strategy, as many components of the marketing mix have become associated with social media. Social media mirrored the need of consumers for human relationships in the virtual realm. This motivates enterprises to incorporate social media into their internet marketing efforts.

The study investigated five countries (Brazil, Egypt, India, South Africa, and Turkey) for electric car brands on Facebook, TikTok, Twitter, YouTube, and Instagram under five control variables (Age, Gender, Education, Income, and Citizenship). The population of the study is individual consumers. Accordingly, the received questionnaire was 393 in the first quarter of 2022. Finally, based on Hierarchical Multiple Regression, the study found the impact of social media marketing activities on green consumption intention. The interpretation of social media marketing activities on green consumption intention by (89.9%) based on adjusted R Square, and the control variables contributed to raising the performance to (94.9.1%) of the change in green consumption intention; based on adjusted R Square. As for the significance of the model variables, whether in the first or second block, the study found the importance of all variables at the level of (1%) for "social media marketing activities ", "Citizenship", "Education", and "Gender" but "Age" and "Income" was at the level of (5%), in this

manner, the current study is new and offers valuable insight into the function of social media on green consumption intention under demographic characteristics of consumers.

Thus, the study finds more extensive results from Chi (2021), where the study does not believe that motivation influenced the association between social media – as an independent variable - and green consumption intention – as a dependent variable, which was mediated by motivation. Therefore, the study recommends that professionals consider the control variables, which include Age, Gender, Education, Income and Citizenship, while designing marketing strategies on social media. The study believes that taking these variables as a basis for planning and developing marketing campaigns improves the efficiency and effectiveness of marketing activities on social media.

The study's limitation was that a qualitative approach was adopted due to the lack of quantitative data and the lack of diversity of participants from just five countries. The study justified this by relying on an English-language survey. This matter caused a bias when reaching the individuals participating in the investigation. Finally, the type of social media platform used influenced the study results. Therefore, the study recommends expanding the future studies of other platforms such as WhatsApp, WeChat, Sina Weibo, QQ, Telegram, Snapchat, Kuaishou, and Qzone, not being limited to Facebook, TikTok, Twitter, YouTube, and Instagram.

It is essential to point out the role of the ethical factor in supporting brands that belong to green products, of which electric cars are one example. In addition, adopting environmental issues helps enterprises achieve leadership if this represents direct and indirect benefits to consumers (Wagdi and Hasaneen, 2019) according to green marketing or green entrepreneurial orientation (GEO). Emerging economies create "green" economies based on factors and patterns that are fundamentally distinct from most established nations. Emerging economies have vast, mostly untapped potential for "green" development.

On the other hand, the study recommended more ground-breaking research on green consumption and social media, which is very important for developing marketing theories and models related to attracting customers to the green brand through comparative testing between emerging and international markets.

References

- Abeza, G., O'Reilly, N., & Reid, I. (2013). Relationship marketing and social media in sport. *International Journal of Sport Communication*, 6, 120-142. <https://doi.org/10.1123/ijsc.6.2.120>
- Alalwan, A. A., Rana, N. P., Dwivedi, Y. K., & Algharabat, R. (2017). Social media in marketing: A review and analysis of the existing literature. *Telematics and Informatics*, 34(7), 1177-1190. <https://doi.org/10.1016/j.tele.2017.05.008>
- Alves, H., Fernandes, C., & Raposo, M. (2016). Social media marketing: A literature review and implications. *Psychology and Marketing*, 33(12), 1029-1038. <https://doi.org/10.1002/mar.20936>
- Armstrong, J. S., Morwitz, V.G., & Kumar, V. (2000). Sales forecasts for existing consumer products and services: Do purchase intentions contribute to accuracy? *International Journal of Forecasting*, 16, 383-397. [https://doi.org/10.1016/S0169-2070\(00\)00058-3](https://doi.org/10.1016/S0169-2070(00)00058-3)
- Bedard, S.A.N., & Tolmie, C.R. (2018). Millennials' green consumption behaviour: exploring the role of social media. *Corporate Social Responsibility and Environmental Management*, 25 (6), 1388-1396. <https://doi.org/10.1002/csr.1654>
- Bhattacharjee, A. (2001). Understanding information systems continuance: an expectation confirmation model. *Management Information Systems Quarterly*, 25 (3), 351-370. <https://doi.org/10.2307/3250921>

- Biswas, A., & Roy, M. (2015). Leveraging factors for sustained green consumption behavior based on consumption value perceptions: testing the structural model. *Journal of Cleaner Production*, 95, 332-340. <https://doi.org/10.1016/j.jclepro.2015.02.042>
- Blackwell, R.D., Miniard, P.W., & Engel, J.F. (2001). *Consumer Behavior*, 9th ed. Harcourt College Publishers, Orlando, FL.
- Bollen, K.A. (1989). A new incremental fit index for general structural equation models. *Sociological Methods and Research*, 17 (3), 303-316. <https://doi.org/10.1177/0049124189017003004>
- Boyd, T.C., & Mason, C.H. (1999). The link between attractiveness of "extrabrand" attributes and the adoption of innovations. *Journal of the Academy of Marketing Science*, 27 (3), 306-319. <https://doi.org/10.1177/0092070399273002>
- Carmela, M., & Fiorillo, D. (2017). Water conservation behavior and environmental concerns: Evidence from a representative sample of Italian individuals. *Journal of Cleaner Production*, 159, 119-129. <https://doi.org/10.1016/j.jclepro.2017.05.036>
- Chan, N. L., & Guillet, B. D. (2011). Investigation of social media marketing: How does the hotel industry in Hong Kong perform in marketing on social media websites? *Journal of Travel and Tourism Marketing*, 28(4), 345-368. <https://doi.org/10.1080/10548408.2011.571571>
- Chen, S.C., Chiu, Y.B., Lai, M.T., Wu, C.H., Chen, H.H., & Zhang, S.Y. (2014). An empirical study of users' loyalty on virtual communities: the prospective of fundamental interpersonal relations orientation. *Journal of e-Business*, 16 (3), 309-338.
- Cheung, C.M., & Lee, M.K. (2009). Understanding the sustainability of a virtual community: model development and empirical test. *Journal of Information Science*, 35 (3), 279-298. <https://doi.org/10.1177/0165551508099088>
- Chi, N. T. K. (2021). Understanding the effects of eco-label, eco-brand, and social media on green consumption intention in ecotourism destinations. *Journal of Cleaner Production*, 321, 128995. <https://doi.org/10.1016/j.jclepro.2021.128995>
- Chodak, G., & Suchacka, G. (2017). An experiment with Facebook as an advertising channel for books and audiobooks. In: Information systems architecture and technology: Proceedings of 37th international conference on information systems architecture and technology ISAT 2016 Part I (pp. 221-233). Springer. https://doi.org/10.1007/978-3-319-46583-8_18
- Dagher, G. K., & Itani, O. (2014). Factors influencing green purchasing behavior: Empirical evidence from the Lebanese consumers. *Journal of Consumer Behavior*, 13, 188-195. <https://doi.org/10.1002/cb.1482>
- Dann, S. (2010). Redefining social marketing with contemporary commercial marketing definitions. *Journal of Business Research*, 63 (2), 147-153. <https://doi.org/10.1016/j.jbusres.2009.02.013>
- Devereux, E., Grimmer, L., & Grimmer, M. (2020). Consumer engagement on social media: Evidence from small retailers. *Journal of Consumer Behavior*, 19(2), 151-159. <https://doi.org/10.1002/cb.1800>
- Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effect of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research*, 28(3), 307-319. <https://doi.org/10.1177/002224379102800305>
- Dolega, L., Rowe, F., & Branagan, E. (2021). Going digital? The impact of social media marketing on retail website traffic, orders and sales. *Journal of Retailing and Consumer Services*, 60, 102501. <https://doi.org/10.1016/j.jretconser.2021.102501>
- Erkan, I., & Evans, C. (2016). The influence of eWOM in social media on consumers' purchase intentions: An extended approach to information adoption. *Computers in Human Behavior*, 61, 47-55. <https://doi.org/10.1016/j.chb.2016.03.003>
- Filieri, R., McLeay, F., Tsui, B., & Lin, Z. (2018). Consumer perceptions of information helpfulness and determinants of purchase intention in online consumer reviews of services. *Information and Management*, 55(8), 956-970. <https://doi.org/10.1016/j.im.2018.04.010>
- Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention, and behavior: an introduction to theory and research. *Philosophy and Rhetoric*, 10(2), 177-188.
- Fakunle, S. O., & Ajani, A. O. (2021). An empirical study of community involvement in household solid waste management: a case study. *Insights into Regional Development*, 3(3), 114-127. [https://doi.org/10.9770/IRD.2021.3.3\(7\)](https://doi.org/10.9770/IRD.2021.3.3(7))
- Gao, J., Sheng, G., & Zhou, L. (2016). The influence mechanism of green product purchase intention: an analysis based on consumer innovativeness. *Journal of Guangdong University of Finance and Economics*, 31 (2), 33-42.

- Goh, K.-Y., Heng, C.-S., & Lin, Z. (2013). Social media brand community and consumer behavior: Quantifying the relative impact of user- and marketer-generated content. *Information Systems Research*, 24(1), 88-107. <https://doi.org/10.1287/isre.1120.0469>
- Harvey, C. G., Stewart, D. B., & Ewing, M. T. (2011). Forward or delete: What drives peer-to-peer message propagation across social networks? *Journal of Consumer Behaviour*, 10(6), 365-372. <https://doi.org/10.1002/cb.383>
- Hens, L., Block, C., Cabello-Eras, J.J., Sagastume-Gutierrez, A., Garcia-Lorenzo, D., Chamorro, C., et al. (2018). On the evolution of "Cleaner Production" as a concept and a practice. *Journal of Cleaner Production*, 172, 3323-3333. <https://doi.org/10.1016/j.jclepro.2017.11.082>
- Huang, C.Y., Chou, C.J., & Lin, P.C. (2010). Involvement theory in constructing bloggers' intention to purchase travel products. *Tourism Management*, 31 (4), 513-526. <https://doi.org/10.1016/j.tourman.2009.06.003>
- Hussain, S., Guangju, W., Jafar, R. M. S., Ilyas, Z., Mustafa, G., & Jianzhou, Y. (2018). Consumers' online information adoption behavior: Motives and antecedents of electronic word of mouth communications. *Computers in Human Behavior*, 80, 22-32. <https://doi.org/10.1016/j.chb.2017.09.019>
- Huynh, T. L. D., Vo, A. K. H., Nguyen, T. H. H., Le Nguyen, V. B., Ho, N. N. H., & Do, N. B. (2020). What makes us use the shared mobility model? Evidence from Vietnam. *Economic Analysis and Policy*, 66, 1-13. <https://doi.org/10.1016/j.eap.2020.02.007>
- Icha, O., & Agwu, P. E. (2015). Effectiveness of social media networks as a strategic tool for organisational marketing management. *Journal of Internet Banking and Commerce*, S2(006), 1-9.
- Internet Society of China (ISC). (2016). Development research report on China's we-business industry. Accessed [15/11/2021] <https://www.isc.org.cn/en>
- Jain, V. K., Gupta, A., Tyagi, V., & Verma, H. (2020). Social media and green consumption behavior of millennials. *Journal of Content, Community and Communication*, 10(6), 221-230. <https://doi.org/10.31620/JCCC.06.20/16>
- Jan, I. U., Ji, S., & Yeo, C. (2019). Values and green product purchase behavior: The moderating effects of the role of government and media exposure. *Sustainability*, 11(23), 6642 <https://doi.org/10.3390/su11236642>
- Joshi, Y., & Rahman, Z. (2016). Predictors of young consumer's green purchase behavior. *Management of Environmental Quality: An International Journal*, 27(4), 452-472. <https://doi.org/10.1108/MEQ-05-2015-0091>
- Kanuri, V. K., Chen, Y., & Sridhar, S. (2018). Scheduling content on social media: Theory, evidence, and application. *Journal of Marketing*, 82, 89-108. <https://doi.org/10.1177/0022242918805411>
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, 53(1), 59-68. <https://doi.org/10.1016/j.bushor.2009.09.003>
- Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2018). Advances in social media research: Past, present and future. *Information Systems Frontiers*, 20, 531-558. <https://doi.org/10.1007/s10796-017-9810-y>
- Kim, A.J., & Ko, E. (2012). Do social media marketing activities enhance customer equity? An empirical study of luxury fashion brand. *Journal of Business Research*, 65 (10), 1480-1486. <https://doi.org/10.1016/j.jbusres.2011.10.014>
- Kim, D., & Perdue, R.R. (2013). The effects of cognitive, affective, and sensory attributes on hotel choice. *International Journal of Hospitality Management*, 35, 246-257. <https://doi.org/10.1016/j.ijhm.2013.05.012>
- Kim, H.Y., & Chung, J.E. (2011). Consumer purchase intention for organic personal care products. *Journal of Consumer Marketing*, 28 (1), 40-47. <https://doi.org/10.1108/07363761111101930>
- Kim, M., Lee, S. M., Choi, S., & Kim, S. Y. (2021). Impact of visual information on online consumer review behavior: Evidence from a hotel booking website. *Journal of Retailing and Consumer Services*, 60, 102494. <https://doi.org/10.1016/j.jretconser.2021.102494>
- Kim, S., Kandampully, J., & Bilgihan, A. (2018). The influence of eWOM communications: An application of online social network framework. *Computers in Human Behavior*, 80, 243-254. <https://doi.org/10.1016/j.chb.2017.11.01>

- Ladhari, R., & Michaud, M. (2015). eWOM effects on hotel booking intentions, attitudes, trust, and website perceptions. *International Journal of Hospitality Management*, 46, 36-45. <https://doi.org/10.1016/j.ijhm.2015.01.010>
- Lao, K., & Wu, J. (2013). Research on influencing mechanism of consumer green consumption behavior referring to TPB. *Finance and Economics*, (2), 91-100.
- Laroche, M., Kim, C., & Zhou, L. (1996). Brand familiarity and confidence as determinants of purchase intention: an empirical test in a multiple brand context. *Journal of Business Research*, 37(2), 115-120. [https://doi.org/10.1016/0148-2963\(96\)00056-2](https://doi.org/10.1016/0148-2963(96)00056-2)
- Lee, C. H., & Cranage, D. A. (2014). Toward understanding consumer processing of negative online word-of-mouth communication: The roles of opinion consensus and organisational response strategies. *Journal of Hospitality and Tourism Research*, 38, 330-360. <https://doi.org/10.1177/1096348012451455>
- Lee, C. K. H., and Wong, A. O. M. (2021). Antecedents of consumer loyalty in ride-hailing. *Transportation Research Part F: Traffic Psychology and Behavior*, 80, 14-33. <https://doi.org/10.1016/j.trf.2021.03.016>
- Lee, K. (2008). Opportunities for green marketing: young consumers. *Marketing Intelligence and Planning*, 26 (6), 573-586. <https://doi.org/10.1108/02634500810902839>
- Lee, K.F. (2001). Sustainable tourism destinations: the importance of cleaner production. *Journal of Cleaner Production*, 9 (4), 313-323. [https://doi.org/10.1016/S0959-6526\(00\)00071-8](https://doi.org/10.1016/S0959-6526(00)00071-8)
- Li, Y., Lu, Y., Zhang, X., Liu, L., Wang, M., & Jiang, X. (2016). Propensity of green consumption behaviors in representative cities in China. *Journal of Cleaner Production*, 133, 1328-1336. <https://doi.org/10.1016/j.jclepro.2016.06.012>
- Liu, L., Lee, M. K., Liu, R., & Chen, J. (2018). Trust transfer in social media brand communities: The role of consumer engagement. *International Journal of Information Management*, 41, 1-13. <https://doi.org/10.1016/j.ijinfomgt.2018.02.006>
- Lu, L. C., Chang, H. H., & Chang, A. (2015). Consumer Personality and Green Buying Intention: The Mediate Role of Consumer Ethical Beliefs. *Journal of Business Ethics*, 127(1), 205-219. <https://doi.org/10.1007/s10551-013-2024-4>
- Lu, Y., Zhao, L., & Wang, B. (2010). From virtual community members to C2C e-commerce buyers: Trust in virtual communities and its effect on consumers' purchase intention. *Electronic Commerce Research and Applications*, 9(4), 346-360. <https://doi.org/10.1016/j.elerap.2009.07.003>
- Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons*, 52(4), 357-365. <https://doi.org/10.1016/j.bushor.2009.03.002>
- Martinsons, M.G., So, S.K., Tin, C., & Wong, D. (1997). Hong Kong and China: emerging markets for environmental products and technologies. *Long Range Planning*, 30 (2), 277-156. [https://doi.org/10.1016/S0024-6301\(96\)00119-7](https://doi.org/10.1016/S0024-6301(96)00119-7)
- Morris, J. D., Woo, W., Geason, J., & Kim, J. (2002). The power of affect: Predicting intention. *Journal of Advertising Research*, 42(3), 7-17. <https://doi.org/10.2501/JAR-42-3-7-17>
- Morwitz, V.G., & Schmittlein, D. (1992). Using segmentation to improve sales forecasts based on purchase intent: Which "intenders" actually buy? *Journal of Marketing Research*, 391-405. <https://doi.org/10.1177/002224379202900401>
- Myers West, S. (2018). Censored, suspended, shadow banned: User interpretations of content moderation on social media platforms. *New Media and Society*, 20, 4366-4383. <https://doi.org/10.1177/1461444818773059>
- Nam, K., Baker, J., Ahmad, N., & Goo, J. (2020). Determinants of writing positive and negative electronic word-of-mouth: Empirical evidence for two types of expectation confirmation. *Decision Support Systems*, 129, 113168. <https://doi.org/10.1016/j.dss.2019.113168>
- Nezakati, H., Amidi, A., Jusoh, Y.Y., Moghadas, S., Aziz, Y.A., & Sohrabinezhadtalemi, R. (2015). Review of social media potential on knowledge sharing and collaboration in tourism industry. *Procedia-social and behavioral sciences*, 172 (27), 120-125. <https://doi.org/10.1016/j.sbspro.2015.01.344>
- Nguyen, HV, Do, LT, & Le, MTT. (2022). Encouraging pro-environmental consumption behaviour amongst Gen-Y consumers: right messages to different consumers? *Asia-Pacific Journal of Business Administration* <https://doi.org/10.1108/APJBA-08-2021-0391>

- Nguyen-Phuoc, D. Q., Su, D. N., Tran, P. T. K., Le, D. T. T., & Johnson, L. W. (2020). Factors influencing customer's loyalty towards ride-hailing taxi services-A case study of Vietnam. *Transportation Research Part A: Policy and Practice*, 134, 96-112. <https://doi.org/10.1016/j.tra.2020.02.008>
- Nassar, N., & Strielkowski, W. (2022). Transition towards green financial sector for gaining newly perceived competitiveness by adopting a green management model. *Insights into Regional Development*, 4(1), 71-88. [https://doi.org/10.9770/IRD.2022.4.1\(5\)](https://doi.org/10.9770/IRD.2022.4.1(5))
- Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. *Journal of Retailing and Consumer Services*, 29, 123-134. <https://doi.org/10.1016/j.jretconser.2015.11.006>
- Radzi, N. A. A., Harun, A., Ramayah, T., Kassim, A. W. M., & Lily, J. (2018). Benefits of Facebook fan/brand page marketing and its influence on relationship commitment among generation Y: Empirical evidence from Malaysia. *Telematics and Informatics*, 35, 1980-1993. <https://doi.org/10.1016/j.tele.2018.07.002>
- Radziszewska, A. (2021). Managing Customer Knowledge of Sustainable Consumption using Social Media. In European Conference on Knowledge Management (pp. 623-XXIII). Academic Conferences International Limited, September, 623-630. <https://doi.org/10.34190/EKM.21.100>
- Sarkar, J.G., Sarkar, A., & Sreejesh, S. (2022). Developing responsible consumption behaviours through social media platforms: sustainable brand practices as message queues. *Information Technology & People* <https://doi.org/10.1108/ITP-01-2021-0044>
- Schiffman, L.G., & Kanuk, L. L. (2009). Customer Behavior, 10th ed. Prentice Hall.
- Septiani, R., Handayani, P. W., & Azzahro, F. (2017). Factors that affecting behavioral intention in online transportation service: Case study of GO-JEK. *Procedia Computer Science*, 124, 504-512. <https://doi.org/10.1016/j.procs.2017.12.183>
- Shankar, A., Jebarajakirthy, C., & Ashaduzzaman, M. (2020). How do electronic word of mouth practices contribute to mobile banking adoption? *Journal of Retailing and Consumer Services*, 52, 101920. <https://doi.org/10.1016/j.jretconser.2019.101920>
- Sharma, N., & Dayal, R. (2016). Drivers of green purchase intentions: green self-efficacy and perceived consumer effectiveness. *Global Journal of Enterprise Information System*, 8(3), 27-32. <https://doi.org/10.18311/gjeis/2016/15740>
- Sun, Y., Liu, N., & Zhao, M. (2019). Factors and mechanisms affecting green consumption in China: A multilevel analysis. *Journal of Cleaner Production*, 209, 481-493. <https://doi.org/10.1016/j.jclepro.2018.10.241>
- Thong, J. Y., Hong, S. J., & Tam, K. Y. (2006). The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human-Computer Studies*, 64(9), 799-810. <https://doi.org/10.1016/j.ijhcs.2006.05.001>
- Tohanean, D., & Toma, S. G. (2018). Innovation, a key element of business models in the Fourth Industrial Revolution. *Network Intelligence Studies*, 6(12), 121-130.
- Uddin, S. M. F., & Khan, M. N. (2016). Green Purchasing Behavior of Young Indian Consumers: An Exploratory Study. *Global Business Review*, 17(6), 1469-1479. <https://doi.org/10.1177/0972150916660440>
- Unold, J. (2003). Basic aspects of the digital economy. *Acta Universitatis Lodzensis Folia Oeconomica*, 167, 41-49 [Accessed May 21, 2022] <https://dSPACE.uni.lodz.pl/xmlui/handle/11089/7061>
- Verhagen, T., & Van Dolen, W. (2009). Online purchase intentions: A multi-channel store image perspective. *Information and Management*, 46(2), 77-82. <https://doi.org/10.1016/j.im.2008.12.001>
- Vinerean, S., Cetina, I., Dumitrescu, L., & Tichindelean, M. (2013). The effects of social media marketing on online consumer behaviour. *International Journal of Business and Management*, 8(14), 66-79. <https://doi.org/10.5539/ijbm.v8n14p66>
- Wagdi, O., & Hasaneen, A. (2019). Obstacles and success factors for entrepreneurship: a comparative analysis between Egypt and Nigeria. *Entrepreneurship and Sustainability Issues*, 7 (2), 962-976. [https://doi.org/10.9770/jesi.2019.7.2\(12\)](https://doi.org/10.9770/jesi.2019.7.2(12))
- Wang, J. C., & Chang, C. H. (2013). How online social ties and product-related risks influence purchase intentions: A facebook experiment. *Electronic Commerce Research and Applications*, 12(5), 337-346. <https://doi.org/10.1016/j.elelrap.2013.03.003>

- Wang, J. J., Wang, L. Y., & Wang, M. M. (2018), Understanding the effects of eWOM social ties on purchase intentions: A moderated mediation investigation. *Electronic Commerce Research and Applications*, 28, 54-62. <https://doi.org/10.1016/j.eierap.2018.01.011>
- Wang, X., Yu, C., & Wei, Y. (2012), Social media peer communication and impacts on purchase intentions: A consumer socialisation framework. *Journal of Interactive Marketing*, 26(4), 198-208. <https://doi.org/10.1016/j.intmar.2011.11.004>
- Wielki, J. (2010). The impact of the Internet on the development of web-based business models. *Journal of Internet Banking and Commerce*, 15(3), 1-9.
- Wu, T. Y., & Lin, C. A. (2017). Predicting the effects of eWOM and online brand messaging: Source trust, bandwagon effect and innovation adoption factors. *Telematics and Informatics*, 34(2), 470-480. <https://doi.org/10.1016/j.tele.2016.08.001>
- Yoo, C. W., Sanders, G. L., & Moon, J. (2013). Exploring the effect of e-WOM participation on e-Loyalty in e-commerce. *Decision Support Systems*, 55(3), 669-678. <https://doi.org/10.1016/j.dss.2013.02.001>
- Zafar, A. U., Shen, J., Ashfaq, M., & Shahzad, M. (2021). Social media and sustainable purchasing attitude: Role of trust in social media and environmental effectiveness. *Journal of Retailing and Consumer Services*, 63, 102751. <https://doi.org/10.1016/j.jretconser.2021.102751>
- Zeng, X., & Wei, L. (2013), Social ties and user content generation: Evidence from Flickr. *Information Systems Research*, 24(1), 71-87. <https://doi.org/10.1287/isre.1120.0464>
- Zhang, J., & Daugherty, T. (2009). Third-person effect and social networking: Implications for online marketing and word-of-mouth communication. *American Journal of Business*, 24(2), 53-63. <https://doi.org/10.1108/19355181200900011>
- Zhao, Y., Wang, L., Tang, H., & Zhang, Y. (2020). Electronic word-of-mouth and consumer purchase intentions in social e-commerce. *Electronic Commerce Research and Applications*, 41, 100980. <https://doi.org/10.1016/j.eierap.2020.100980>
- Zollo, L., Filieri, R., Rialti, R., & Yoon, S. (2020). Unpacking the relationship between social media marketing and brand equity: the mediating role of consumers' benefits and experience. *Journal of Business Research*, 117, 256-267. <https://doi.org/10.1016/j.jbusres.2020.05.001>

Appendix A. Brands

Audi: e-Tron

BMW: i3

Hyundai : Kona Electric - Ioniq Electric

Jaguar: I-Pace

Mahindra : e2oPlus - e-Verito - e-KUV100 - XUV300 EV

MG : ZS EV

Nissan: Leaf

TATA : Nexon EV; Tigor EV - Tiago EV

Tesla: Model S- Model X - Model 3

Volkswagen: e-golf

Appendix B. Questions with a five-point Likert scale

Social media -- (Bedard and Tolmie, 2018)

I use social media to find and spread information about electric car brands

I talk with my peers about electric car brands on social media

I seek information from other consumers online about electric car brands

I seek information from other customers online because my friends seek out information electronically

Social media marketing activities -- (Kim and Ko, 2012; Zollo et al., 2020)

- "Using electric car page on social media are fun"
- "Content of electric car page on social media seems interesting"
- "Electric car page on social media enable information-sharing with others"
- "Conversation or opinion exchange with others is possible through electric car page on social media"
- "It is easy to provide my opinion through electric car page on social media"
- "Content of electric car page on social media has the newest information"
- "Using electric car page on social media is very trendy"
- "Electric car page on social media offers a customised information search"
- "Electric car page on social media provides customised service"
- "I would like to share content from electric car page on social media on my blog or micro-blog"
- "I would like to pass information on brand, product, or services from electric car page on social media to my friends"

Green consumption intention – (Lao and Wu's, 2013; Li et al., 2016; Gao et al., 2016)

I plan to buy green products (electric car) soon.

I am willing to consider switching to electric cars for ecological reasons

I am willing to pay more for a product (electric car) that helps and protect the environment

I will consider buying green products (electric car) at eco-sites

I will prefer to buy environmentally friendly electric cars.

Regardless of price, I select environmentally friendly electric cars.

Before buying an electric car, I will pay attention to the degree of the product's impact on the environment.

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SUSTAINABLE TRANSPORT WITHIN THE CONTEXT OF SMART CITIES IN THE SLOVAK REPUBLIC*

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Abstract. The presented article focuses on the area of sustainable transport within the Smart City concept. Mobility, created in connection with the Smart City concept, is a service integrating several other types of transport services into one complex platform. The article examined the current situation in this area and its future development in the Slovak Republic. The main motivation of the authors for focusing on the Smart City concept was the topicality of this issue and its usability for process optimization, cost savings, and the achievement of sustainability. Methods such as orientation analysis, content analysis of documents, or sociological questioning using the questionnaire survey technique were used in the analysis. Several research questions and a research hypothesis were defined. It focused on the operation of local governments in the implementation of the Smart City concept and their orientation on the aspect of transport. The main findings include the fact that 22 Slovak cities out of the total number of 39 analysed cities are interested in the application of modern technologies. Another finding concerns the availability of a strategy focused directly on the Smart City concept on the city's website. It can be argued that only five websites had such a strategy available. The output of the research presented in this article was the creation of recommendations aimed at the implementation of the Smart City concept regarding the support of sustainable transport in the Slovak Republic. Using these recommendations, local governments will be able to formulate their digital strategies more effectively, leading to the practical implementation of the Smart City concept.

Keywords: Smart City; sustainable transport; sustainable mobility; digital strategy

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JEL Classifications: O22, O35, H72

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MINISTRY
OF TRANSPORT
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1. Introduction

The rapid development of information and communication technologies (ICT) has a positive effect on the processes of everyday life of people. ICT support processes that improve the standards of how cities operate. The main problem areas of a city, which can be solved via ICT, include: *improving the environment, improving the quality of public and individual transport, supporting and developing tourist activities, improving the quality and sustainability of electronic services for residents*, and others.

The term Smart City originated during the 1990s in the USA. In Europe, the Smart City concept has become important since 2008 in connection with the economic crisis. The main reasons for the development of this concept in Europe include the following: *the need to optimize processes, save costs, support processes and their sustainability, share information with citizens using electronic forms of communication*, etc.

The Smart City topic is currently also described by the ISO (International Organization for Standardization) standard no. 37120/2014 entitled Sustainable Development of Communities. The standard defines key indicators for evaluating the performance of cities with a focus on the services provided by the city and the quality of life of its residents. These indicators include: *economy, education, energy, environment, finance, rescue services, local government, health, recreation, security, waste management, telecommunications and innovation, transport, local planning, and water management* (ISO 37122, 2019).

The key indicators in the standard create a reference model to enable the city's stakeholders (management, politicians, researchers, businesses, experts, etc.) to influence and ensure the sustainable development of the city regarding the people's quality of life, environmental issues, and economic situation (Eremia et al., 2017; ISO 37122, 2019; Dameri et al., 2019; Fakunle, & Ajani, 2021; Fidlerová et al., 2022; Chehabeddine, Grabowska, & Adekola, 2022).

The transition of the city and the very mindset of its officials and residents is a complex process. It must be sufficiently organized to ensure acceptance by all the stakeholders. It starts with the initial phase. At this phase, the idea comes from the city officials. Such an idea and the effort to change the city comes mostly after the elections when the citizens elect their representative directly. The elected representative (mayor), in cooperation with the city council, can start building an intelligent city – a smart city. Since mayors are elected for four years, it is necessary that the whole society is set to understand the benefits of building a smart city. This is mainly because the strategy and vision are not planned for a four-year horizon, but for longer (ten years and more). In the initial phase, it is necessary to resolve the staffing that will be responsible for performing analyses and preparing the vision and strategy to be implemented (Mičiak, 2019; Siokas et al., 2021).

The increase in traffic at present also represents an increase in the number of means of transport on the roads. However, the infrastructure built is no longer sufficient for this trend. Therefore, traffic jams are being created, slowing down the transport of people and goods. In 2015, there were 1.1 billion cars and almost 400 million trucks in the world. In 2040, it is estimated that 2 billion cars and 800 million trucks will drive on the roads around the world. Transport is an organized activity the purpose of which is to move tangible objects or persons from the initial point to their destination using means of transport, considering the spatial and temporal aspects. In general, it can be argued that it is a service meeting the transport needs both in terms of freight and passenger transport. (Enviroportál.sk, 2021b; Zráková et al., 2019)

In mobility, Smart City brings a completely new business model. Mobility as a service integrates several other types of transport services into one complex platform. The operator mediates the offer of transport options to satisfy the transport requirements. These are primarily public transport, services of shared bicycles, scooters, the

availability of taxis, motor vehicle sharing, etc. A major added value is the availability of the city mobility application for customers. Via one platform, the customer can satisfy the need for transport in several ways by paying in one application. The advantage for the customer is the simplification of city travel planning and the payment itself. On the other hand, for a mobility operator, it brings the availability of information useful for improving the service. The basic goal is to provide passengers arriving in the cities with a suitable alternative to the individual transport. An important part of this functionality is a sufficient infrastructure – 3G/4G/5G networks and their security, daily updated information on the availability of individual services, timely information on updating timetables, and the availability of payment systems. To meet the demanding requirements for the infrastructure, the cooperation of individual representatives of the service is necessary (including city management, telephone operators, payment service providers, public transport providers, and shared services). The city's data service providers are also important here. They are responsible for the website and the mobile application of the service. This component is generating a large amount of data, which is used for further analysis and management. Carriers and shared service providers are major players in the service. Third parties such as Uber get still more and more attention (Slavík, 2017; Zrakova et al., 2019; Siokas et al., 2021).

The main concepts examined in this article were captured in the following scheme (Figure 1). These elements relate to sustainable transport in the Smart City concept *promote sustainable mobility* via joint interconnection. The main building block is the city's strategy the content of which is influenced by the degree of digitization. This strategy determines the extent to which the city focuses on the implementation of the Smart City concept. The specific element examined within this concept was transport, which also influences the overall focus of the city's strategy.

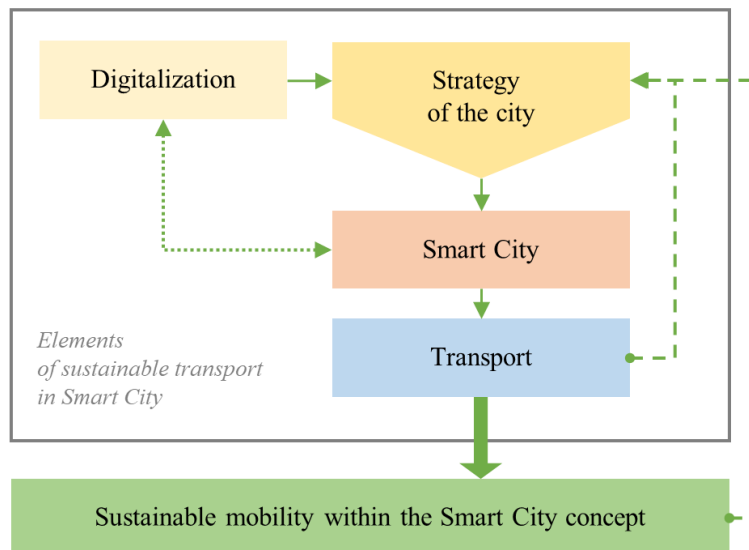


Figure 1. The main elements studied and their interconnections

Source: own elaboration

An appropriate setting of *sustainable mobility within the Smart City concept* has a retroactive effect on the updating of the city's strategy. It can be assumed that the strategy can be more ambitious every year and the city can thus become "Smart" in all areas of the presented Smart City concept.

2. Theoretical background

The analysis of the theoretical basis focused on two main areas, specifically on the Smart City concept and the digital strategies of local governments. The latter specifically focused on transport as part of sustainable mobility in a smart city.

2.1. Smart City

Currently, the term Smart City is described by several definitions the authors of which try to identify its essence from different perspectives (Table 1).

Table 1. Smart City features

Author	Smart City feature
Ministry of Economy of the Slovak Republic, 2017	<ul style="list-style-type: none"> - a modern approach to the processes associated with the management and planning of entire regions - the use of technological innovations including ICT to ensure information processes at the city level and their sustainability - improving the quality of life and the access to services (safety, cleanliness, energy efficiency, ecology, flexibility to the needs of society, etc.) - ensuring sustainability in the business environment in the city and the whole region
Khudyakova et al., 2020	<ul style="list-style-type: none"> - a new approach to the city administration - the use of digital technologies in the management processes of urban areas - a rational approach to the efficient use of resources to improve the quality of life and the environmental situation in the region
European Commission, 2020	<ul style="list-style-type: none"> - a city with modern ICT infrastructure - more efficient services via process digitization - a positive impact on the quality of life of the population and the entrepreneurial activity of businesses
Slavík, 2017	<ul style="list-style-type: none"> - use of modern technologies for the needs of strategic management of the city - achieving economic, social, and quality goals in the city with the support of modern ICT
Kalašová et al., 2018	<ul style="list-style-type: none"> - accelerating progress with ICT support in transport, energy, and other sectors - improving the use of energy resources, interconnection of transport systems, improving mobility
Pauhofová et al., 2019	<ul style="list-style-type: none"> - raising the standard of living of the population with the use of digital ICT

Source: own elaboration

Based on the definitions listed above, the concept of Smart City can be summarized as a *concept of city management solution, which uses numerous modern pieces of ICT to improve the lives of the city residents*.

The development of the Smart City concept was positively influenced by Industry 4.0 in combination with the Internet of Things (IoT). These modern approaches focused on the use of modern ICT for efficient data transmission and communication can be identified as key elements for the development of the Smart City. These are mainly sensor networks aimed at supporting various areas such as production, mobility, healthcare, building solutions, energy, waste management, intelligent city management, etc. (ISO 37122, 2019). The definition of smart cities includes both their *characteristics* and *the tools* that can be used to implement the concept in practice. Their categorization is graphically captured in Figure 2.

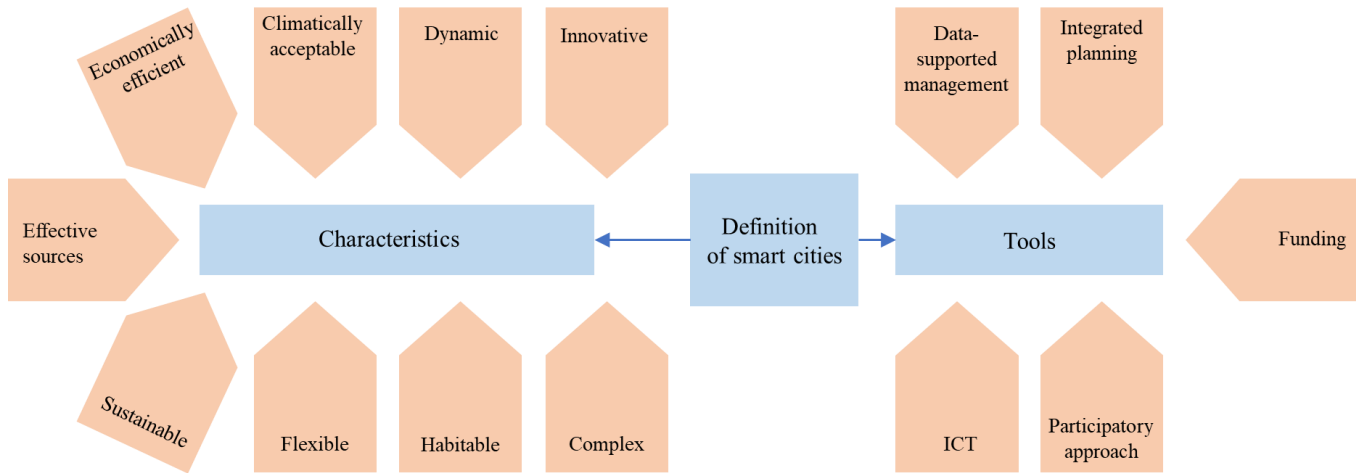


Figure 2. Characterization of the Smart City concept

Source: ISO 37122, 2019

The rapid development of ICT also influenced the development of the Smart City concept. The individual phases of Smart City development are listed in the following table.

Table 2. Phases of the Smart City development

Phase	Characteristics
Smart City 1.0	<ul style="list-style-type: none"> - providers offering IT services to municipalities - lack of understanding of the benefits for the self-governing regions - misunderstanding of the benefits of ICT by the city management - the absence of a clear strategy to support the lives of citizens within the Smart City concept
Smart City 2.0	<ul style="list-style-type: none"> - proactive and progressive leadership, which defines the importance of ICT and innovation in the city - focus on ICT to support the city residents' quality of life - implementation of projects focusing on public Wi-Fi networks, intelligent lighting, electromobility, etc.
Smart City 3.0	<ul style="list-style-type: none"> - currently the latest concept - primary orientation on the city's residents and their needs - direct involvement of the city residents in the projects - self-government body as a mediator between the people's needs and ICT implementation projects - a significant focus on the sustainability of the management for the Smart City concept, the citizens' quality of life, the protection of the environment, etc.

Source: Mayor of London, 2016

The city management based on the Smart City approach is very closely connected with the onset of the fourth industrial revolution, which is referred to as Industry 4.0. The main characteristic of Industry 4.0 is the implementation of ICT directly into the production and provision of related services.

Internet of Things (IoT) is a basic technology without which the concept of a smart city would not be possible. The essence of this technology consists of the IoT devices, sensors, and applications. These devices can be interconnected, and thus can communicate with each other (Kubina, Lendel, 2015; Gill et al., 2019).

The basic capabilities of these devices include monitoring, control, optimization, autonomy, and an effective decision-making process. Within the Smart City concept, this technology represents, e.g., intelligent lighting

based on sensors, automatic switching of signals at the intersections for the public transport vehicles, information on the fullness of containers, etc. IoT devices can generate large volumes of data, which then serve as a basis for managerial decisions. The main advantage of introducing such devices is the fact that the data are available in real-time. One of the disadvantages is the need for their correct evaluation and analysis (Gill et al., 2019).

In the paragraphs below, basic elements of the Smart City concept are briefly described. These include: *Big Data*; *artificial intelligence*; *cloud services*; *the city and its management*; *government and local governments*; *smart buildings*; *mobility*; *energy and the environment*; *education*; *health*.

Big Data – generation of large volumes of data is the result of the Internet of Things technology, which is essential for building the Smart City concept. Especially regarding the sensors deployed. Nowadays, the processing and interpretation of data is a necessary step in the expansion of urban structures. Data can be obtained from different urban areas, which ultimately leads to a holistic understanding of urban structures. It is the generation of large volumes of data that brings additional opportunities for managers in terms of monitoring the development of cities and their adaptation to real conditions. However, large volumes of data are also characterized by their complexity (Gill et al., 2019).

Artificial Intelligence (AI) – is closely linked to the generation of large amounts of data as well. AI can be applied to the analysis of data collected by sensors located on various physical devices within the city. AI can be characterized as machine learning seeking to mimic thought patterns. With the help of AI, human behaviour can be simulated. The accuracy of the results is increased by increasing the input data and subsequent processing by machine learning. Due to this, the data needs to be sufficient and available in real-time. Within individual cities and their management, AI and the results of analyses performed by it create a solid basis for their management and further strategic planning (Malichová, Mičiak, 2018; Gill et al., 2019).

Cloud services – are services using cloud computing technology. This is a type of service where servers, storage, and applications are available remotely via networks. The main advantage of such services is that they do not burden the software or hardware of the user devices with which they enter the cloud services. Thus, it can be argued that cloud computing reduces the overall costs that would be required to procure additional software and hardware. On the other hand, the availability of services is increasing. Reliability, security, and energy efficiency can be identified among the basic parameters of a high-quality cloud service (Gill et al., 2019).

The city and its management – a self-government body have responsibility for several different areas and institutions that are directly on their territory in the daily agenda. Institutions provide services to other stakeholders. All these areas can be included in the Smart City concept (Bělohávek, et al., 2001; Ansoff, 2007; Hitka, Balážová, 2014; Cities in Motion Blog Network, 2020).

Government and local governments – currently the most often used English term for the digitization of public administration is the eGovernment. The digitization of public administration is linked to the Smart City concept. The electronic message itself was introduced to improve the quality of services provided with a focus on the use of information and communication means. The Smart City concept is based on collecting, processing, integrating, and using data to a greater extent than ever before. All of this directly leads to better decision-making and higher-quality services. Finally, it supports the creation of more comprehensive partnerships among individual stakeholders (Ferenc et al., 2017; Mechant, Walravens, 2018).

Smart buildings – this type of building, or rather the term smart buildings, has begun to be used to describe the various technologies that are integrated into buildings. There is currently no clear definition of what makes a building smart. It is possible to talk about buildings that are automated and have systems based on sensors. Such a building adapts to the needs of users in real-time. Smart buildings can collect data on how and when a building is

used, providing a real-time picture. The basic generated data can include the most exposed times of use of the building, the number of people in the building, etc. Subsequently, the data can be further analysed so that the forecasts are made (Hoy, 2016).

Mobility – urban mobility is currently playing an increasingly important role in the development of the city. It is necessary to consider the fact that in the last century, the cities were designed for much lower traffic intensity. Today there is a situation where the construction of additional transport infrastructure is limited, and it is necessary to approach other alternatives that can improve the problem of city transport. The implementation of an efficient public transport system can solve some of the problems caused by high traffic intensity. However, smart mobility itself offers other solutions that are based on sustainable ways of providing mobility to the citizens. It is primarily the development of fuels for public transport with high respect for the environment (e.g., electricity, liquefied, compressed natural gas, etc.). Ultimately, smart mobility should be supported by smart technologies which also require progressive behaviour of the citizens (Klamár, 2010; Baucells, 2016).

Energy and the environment – waste production is becoming a rapidly growing problem in urban agglomerations. It is not only the fact that it is necessary to ensure the export of waste to dumps but also the dumps themselves represent an environmental issue. This is where the possibility of intelligent waste management emerges as an advantageous solution. Elements of the IoT, including sensors, will support solutions for waste handling, collection, and recovery. The application of the Smart City concept can also include energy management, which currently faces several challenges, such as efforts to reduce the negative impact on the environment and the use of fossil fuels. The energy efficiency of traditional systems is no longer sufficient for today's cities and their citizens (Esmailian et al., 2018; Golpîra, Bahramara, 2020).

Education – is a key component of smart cities' development. The areas of primary, secondary, higher education, lifelong learning, infrastructure, and e-learning should become a part of applying the Smart City concept. The aim of such education is primarily to educate graduates with modern knowledge, practical skills, and attitudes that are based on cooperation. Smart education itself can be defined as a learning model adapted to new generations of citizens and students. It is not just distance learning where digital technologies can play an important role. It is also about focusing on digital literacy, effective communication, teamwork, and the ability to create and participate in high-quality projects (Glasco, 2019).

Health – this component of a smart city is mainly focused on public health. Public health can be defined as the science of support, disease prevention, and prolongation of life via organized efforts in society. Telemedicine, care for disadvantaged groups with the help of innovative technologies, and integrated health systems interconnected at all levels can be included among the components of the smart city (Salvo et al., 2017).

The creation and development of a Smart City application are directly influenced by stakeholders since the very first phase of applying this concept (Pouš, 2013). The individual stakeholders that influence the creation of a smart city in practice are listed in Table 3.

Table 3. Stakeholders within the Smart City concept

Stakeholder	Characteristics	Importance within the creation of a Smart City application
City	<ul style="list-style-type: none"> - city mayor - members of the city council - employees of the municipal office 	<ul style="list-style-type: none"> - correct understanding of the concept in terms of the possibilities and needs of the city and its citizens
Citizens	<ul style="list-style-type: none"> - residents of the city 	<ul style="list-style-type: none"> - initialization and acceleration of changes in the city
Businesses	<ul style="list-style-type: none"> - supporters of the smart city conducting business in the area - a specific role for IT and energy companies 	<ul style="list-style-type: none"> - support for the development of the Smart City concept with its solutions, investments, and know-how
State	<ul style="list-style-type: none"> - individual ministries 	<ul style="list-style-type: none"> - creating appropriate economic and legislative standards - allocating funds including the European funds to support the Smart City concept application
Universities	<ul style="list-style-type: none"> - education sector - research institutions 	<ul style="list-style-type: none"> - research focused on ICT - knowledge sharing - developing strategic partnerships between cities and stakeholders
Non-governmental organizations	<ul style="list-style-type: none"> - various associations of towns and municipalities - clusters and other entities 	<ul style="list-style-type: none"> - sharing good practice - establishing partnerships to increase the chances of obtaining funding for the application of the Smart City concept

Source: Pouš, 2013

It is necessary to emphasize that a city cannot become smart without the involvement of several stakeholders. Cooperation of entities should start with the creation of a strategy, which subsequently leads to the creation of individual-specific measures.

2.2. Local governments' digital strategies

The approach to the strategy itself in the implementation of the Smart City concept can be different. It depends on various factors such as the setting of political representatives, the characteristics of the city's population, or the centralization of projects. Table 4 shows a basic overview of the factors influencing the creation of the entire Smart City strategy (Holubcik, Soviar, 2021; Siokas et al., 2022).

Table 4. An overview of the factors influencing the strategy creation

Area	Citizen aspect	Description
Participation	emphasis on technology	efforts to use online tools to involve citizens in the process of creating a smart city, the application of analytical tools
	emphasis on participation	focus on participation and measurability of the impacts of citizens' participation in the decision-making
Involvement in the strategy	top-down	the draft is based on the collective knowledge of all stakeholders
	bottom-up	the city is in the role of coordinator; citizens participate in the public life
Degree of centralization	centralized	implementation of a pilot project to establish communication with stakeholders
	decentralized	coordination position via working groups
Creation of plans	high priority	the plans are accepted by the city officials while assessing the influence of citizens on decisions being made in the city
	low priority	plans are accepted by the city officials
Maturity of citizens	high maturity	the citizens participate online in project creation
	low maturity	online activities must be complemented by off-line activities; the need to encourage citizens to use online technology

Source: Siokas et al., 2021

The next step after the initial phase is planning. As part of the planning, the current strategy of the city is evaluated, and a new strategic framework is created. This is focused on building the Smart City application. It is essential to select the areas that will be addressed in the concept. These areas can include everything covered by the city (transport, environment, public administration, health, etc.). It also needs to be emphasized that the city should implement activities in areas that it can finance, from public or private funds (Varmus et al., 2015). City officials should select areas that are perceived by several stakeholders as problematic (e.g., traffic jams, increased noise, etc.). During the planning phase, work teams responsible for individual areas are beginning to form. Teams can consist of newly hired employees who will be responsible for the implementation of the Smart City concept, as well as other experts, e.g., from businesses, citizens, Smart City experts, and others. The teams can also be built via the project organizational structure where the city employee is a member of several teams. Furthermore, the creation of the projects themselves in predefined areas is implemented and the methodology of monitoring and evaluating the solutions is set. This is followed by the stage of projects' implementation. In addition to creating the project, it is important to address the issue of funding the proposed solutions. Project funding can come from city resources, foreign funds, EU funds, and public-private partnerships. The last phase is the monitoring of projects. This takes place continuously after their implementation, including the evaluation of the results that the projects brought. It is mainly an impact assessment focused on measurable indicators such as reduction of air emissions, reduction of noise, reduction of traffic intensity, increase in public transport utilization, etc. During all the phases, communication between individual stakeholders and the presentation of solutions to the citizens in a suitable form is of vital importance (Holubeik et al., 2018; Mora et al., 2019; Simonofski et al., 2021).

Mora and Bolici (2017) defined strategic principles for building a smart city. In this research, four European cities were analysed – Amsterdam, Barcelona, Helsinki, and Vienna. The research was carried out qualitatively using content analysis of unstructured data with Atlas.ti software support. As a result, the authors defined new strategic principles for building a Smart City application:

- monitoring current technologies,
- creating a functional model involving all institutions,
- combining approaches (top-down, bottom-up),
- integrating new ICT services into cities,
- public-private cooperation.

The strategy can be implemented with several (or only one) selected areas of the city. Ideally, the implemented technologies can cover several areas at once with the right strategy. For example, transport, safety, administration, etc.

2.3. Transport as part of sustainable mobility within the Smart City concept

Standard STN 018500 defines transport as *“the intentional movement of means of transport on transport routes or the operation of transport equipment by which transport is being performed”*. At present, the concept of mobility is at the forefront. This is a broader concept than transport, including the movement of goods and services via transport. Mobility as such is an approach to getting people to selected places safely, at the right time, and at a reasonable price level (schools, work, hospitals, etc.), (Figure 3). It does not consider which means of transport are used (Sedlák, 1997; Smith, 2016; Mora, Bolici, 2017; Ližbetinová et al., 2017; Varmus et al., 2022).

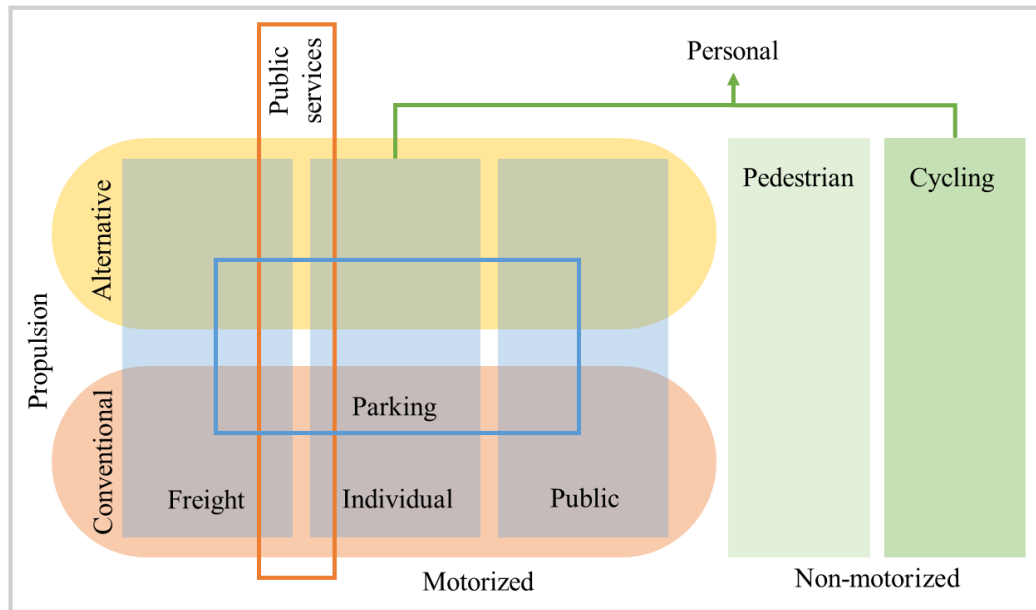


Figure 3. The structure of the city mobility

Source: own elaboration

Within smart cities, mobility is one of the basic components. Mobility in a smart city can be described as smart mobility. Šurdonja described this type of mobility as “a set of coordinated measures aimed at improving the efficiency and environmental sustainability of cities. Smart mobility could consist of a hypothetically infinite number of initiatives that are characterized by information and communication means” (Tej, 2021). The basis is to facilitate the mobility of individuals and goods within the city, which can bring the following benefits:

- reduction of the intensity of individual urban traffic,
- reduction of travel times,
- reduction of travel costs,
- reduction of environmental impacts (air pollution, noise).

The basic characteristic distinguishing smart mobility is connectivity. It is connectivity combined with a large amount of data that allows all users to obtain and transmit data in real-time. For mobility passengers, information on traffic conditions, available parking spaces, accidents, and delays in public transport are being provided. With mobile applications, such pieces of information can reach users instantly. Based on them, users can plan their routes to avoid problem areas and get to their destinations on time. For road managers and coordinating staff in cities, such pieces of information represent the possibility of dynamic, real-time traffic management. Numerous different solutions are implemented worldwide. The most often used include navigation, e-parking, e-travel and parking tickets, e-motorway signs, information panels, autonomous vehicles, shared mobility services (bicycles, scooters, cars, etc.), online vehicle tracking, and demand-responsive vehicles (Benevolo, 2016; Soviar et al., 2018).

From the perspective of the implementation of mobility solutions, individual types of services can be divided into two basic types: public transport services within the city, where it is possible to include the use of alternative fuels, autonomous transport, uniform prices for several types of transport, integrated equipment systems for the customers; services in the field of individual transport such as car sharing, using the system of shared rides,

navigation systems, shared non-motorized transport (bicycles, scooters, etc.). Furthermore, the infrastructure for public or individual transport services must be sufficiently built. The infrastructure can include car parks, dedicated bike paths, charging stations for electric vehicles, information boards on traffic in important places, intelligent traffic lights, zones without vehicles, zones with restricted vehicle entry, reserved lanes for buses, speed control by radars, and the navigation to free parking spaces. From the city's perspective, it is necessary to support the building of infrastructure as such directly via other managerial activities and policies influencing the citizens' behaviour within the mobility framework. These are the following activities (Benevolo, 2016):

- distribution and identification of various types of mobility entering the city,
- introduction of a single information system regarding both public and individual transport,
- setting up emissions controls in cities,
- pricing of individual services within the city mobility,
- defining the “green zones” where motor vehicles are prohibited from entering,
- setting timetables in line with stakeholders,
- division of the city into zones – residential, industrial, satellite, etc.

All the solutions listed above need to be supported by ICT elements. The basic ICT components of a smart city include (Benevolo, 2016):

- programmable, variable traffic signs showing up-to-date information for road users,
- 24/7 urban mobility monitoring,
- a single system of integrated urban mobility,
- a system for driving public transport vehicles in cities, including information on the current location of vehicles in the city,
- real-time traffic management systems (creation of rescue lanes, variable speed limit depending on the current traffic situation).

The ICT components can be described as components of intelligent transport systems (ITS), (Table 5). These systems can be defined as: “*advanced applications for the collection, storage, and processing of data, information, and knowledge for the planning, implementation, evaluation of integrated initiatives, and smart mobility policies*” (Benevolo, 2016).

Table 5. Possibilities of applying ICT in transport

Activity	Technical equipment for communication	Devices in vehicles
data collection	traffic detectors	vehicle identification
	weather monitoring	dynamic weighing
data processing	data in controllers	position system
	emergency detection	GPS
data transmission	fixed communication	mobile communication
	optical transmission of information	single-purpose communication
redistribution of information	variable message signs	radio channel, navigation
	Internet	traffic information service
utilization of information	tariffing	vehicle guidance
	traffic management	accident prevention

Source: Benevolo, 2016

Some components are part of the fixed infrastructure (e.g., IoT sensors, traffic signs) and another part of the equipment is located directly in the vehicles. Working with information at the level of transport infrastructure and in-vehicle equipment can be useful as it can suggest a route for drivers to avoid congestion, or it can warn them about imminent dangers on the road.

3. Research objective and methodology

The main research objective was *to propose recommendations for the implementation of the Smart City concept focused on sustainable transport in Slovakia* based on an orientation analysis and analysis of the state of sustainable transport (as one of the main areas of the Smart City concept) in Slovak cities.

The research was divided into several parts to obtain relevant pieces of information leading to the fulfilment of the defined objective. Three main components are presented in the article, namely: (1) *orientation analysis*, (2) *content analysis of documents related to the Smart City concept*, and (3) *application of a questionnaire survey focused on the city officials' perception of the Smart City concept*. The content analysis of the documents was focused on feasibility studies and an analysis of the municipalities' social and economic development programs.

The questionnaire survey focused on 39 largest Slovak cities. The invitation to fill in the questionnaires was distributed via e-mail to the offices of mayors or deputy mayors. The questionnaire survey aimed to obtain city officials' opinions on the Smart City concept, the problems of cities, and their other possible solutions within this concept from a long-term, sustainable perspective.

The respondents were competent persons with sufficient awareness of the management processes in the cities regarding their development and possible future involvement in the concept described. Cities were divided into three categories:

- 20,000 – 30,000 citizens – marked as small cities,
- 30,001 – 50,000 citizens – marked as medium cities,
- more than 50,001 citizens – marked as large cities.

Within the research, 37 questionnaires were collected, thus it can be stated that the condition of a 95% significance level was met. The collection of at least 36 responses was required to confirm the representativeness of the research sample. Therefore, the sample can be considered representative.

To specify the research focus, the following **research questions** were defined:

- Q₁: Are Slovak cities interested in implementing the Smart City concept?
- Q₂: What areas do cities focus on while implementing the Smart City concept?
- Q₃: Are cities in Slovakia willing to participate in calls financed by the EU funds?
- Q₄: Is the Smart City concept included in the strategic documents of Slovak cities?
- Q₅: Do the cities' strategies focus on sustainable aspects of the Smart City concept?

Based on the questions listed above, a **research hypothesis** was formulated. It was designed to be tested using the data obtained via the selected methods described in this chapter. The hypothesis was stated as follows:

- H₁: If local governments implement the Smart City concept, it is primarily within the area of sustainable transport.

4. Results and discussion

The results were obtained from the application of various analyses, methods, and techniques. The first area that this article focuses on is an orientation analysis in the Slovak environment, followed by a content analysis of selected documents and the conduction of a questionnaire survey.

4.1. Orientation analysis

The purpose of the orientation analysis was to delve into the issues of the Smart City concept within the conditions of the Slovak Republic and its future development. The following paragraphs present selected findings from this analysis, which were also used in other parts of the article.

The development of the Smart City market is happening continuously. Recently, a significant increase in its total value can be observed. Various digital solutions are being offered on the market, in demand mainly by local governments. Sales on some continents are expected to double by 2025 (Angelidou, 2016). The reason for the growing revenues of companies is mainly the state of constant global urbanization. According to the United Nations, up to 67% of the population is expected to live in cities and conurbations by 2030. That is why the world's big cities are expected to become the most attractive markets for Smart City solution providers. Due to this, it is expected that the demand for the implementation of intelligent solutions will increase in the Slovak Republic as well.

To implement the Smart City concept, it is necessary to monitor the use of the Internet in Slovakia, which determines the ability of residents to use various pieces of information technology. Looking at the population and digital literacy, it is possible to assess the indicator of the Internet use in Slovakia for the population aged 16 to 74, regardless of gender. This piece of information is summarized by the Statistical Office of the Slovak Republic in the survey. Based on this, it can be argued that more than 80% of the population within this age group have used the Internet in the last three months (Statistical Office of the Slovak Republic, 2020a, b, c). This creates a precondition for the adoption of the Smart City concept in Slovakia to the required extent.

An important part remaining is the availability of strategic documents of individual municipalities on their websites. Published strategic documents of individual municipalities and whole regions create a basic prerequisite for the participation of the population in the development of the entire city. The program of social and economic development of the municipality is a strategic document presenting the vision and strategic goals. Via the Open Strategies portal, it was found that most Slovak municipalities have this document published on their webs. Out of 2,954 municipalities inspected, up to 2,061 had strategic documents published on their websites, including the document *Program and social development of the municipality*. Most municipalities that did not have such document published had a population below 20,000 people. In the category of municipalities with more than 20,000 inhabitants, only 35 municipalities did not have strategic documents published (Open Strategies, 2022). The reason why small municipalities do not publish documents may be the fact that they do not have a website at all.

From the perspective of building intelligent cities in the conditions of the Slovak Republic, based on the survey of the Ministry of Economy of the Slovak Republic (2017), it can be stated that the representatives of Slovak cities are interested in this concept. The survey also showed that transport is perceived by city officials as an area that can be solved precisely via the application of the Smart City concept.

4.2. Content analysis of the documents connected with the Smart City concept

To perform the content analysis, freely available documents directly connected with the Smart City concept were selected. The first group of documents followed the response of cities to the call of the Ministry of Investments, Regional Development, and Informatization of the Slovak Republic. The second group focused on the strategic document of the social and economic development program.

4.2.1. Analysis of the cities' feasibility studies

The Ministry of Investments, Regional Development and Informatization of the Slovak Republic has published the call no. OPII-2021/7/17 – DOP for the submission of Applications for a non-repayable financial contribution to “*Modern Technologies II*”. This call is aimed at all cities in the Slovak Republic except for the capital city – Bratislava. The non-refundable contribution is directly focused on IT technologies in cities *to improve security in the city, the quality of public transport, building management, the environment, and communication with the citizens*. The call is also focused on Higher Territorial Units. The total support from this fund is 35 million euros.

In connection with the published application form, the cities can participate in this call. The first step in the implementation was the **elaboration of a feasibility study**. The participating cities have published their feasibility studies in the *Central Public Administration Metainformation System*. Due to this, it was possible to identify which cities plan to invest in Smart City solutions as well as the amount of the non-refundable financial contribution required.

Table 6 summarizes the results of the content analysis of the individual cities' documents with a focus on the projects studied. The analysis examined 39 largest Slovak cities. Of these, 22 cities submitted their projects, which are listed in the table. The following areas have been identified in each of the submitted projects (World Population Review, 2020):

- **transport** – the creation of systems to obtain information on the traffic situation in the city for further traffic management, creation of mobile applications for payment and guidance to the parking spots,
- **environment** – the creation of systems focused on the sensory acquisition of data on the meteorological situation in the city and the current quality of the environment,
- **waste management** – the creation of systems based on sensor networks to provide information on the fullness of garbage cans,
- **data** – the creation of a platform for data visualization on the city panel, streamlining of local governments based on open data,
- **security** – acquisition of security data (monitoring via camera systems),
- **lighting** – generation of luminance information, possibility to report a non-functional public light.

Table 6. Results of content analysis of planned city projects

City	Name	Orientation*	Start	End	Total amount [€]	Annual costs [€]
Snina	Modern technologies for the city of Snina	TRN, ENV	01.03.2021	28.02.2022	463 000	33 000
Senica	Smart plan of the city of Senica	TRN, SEC	04.05.2020	31.12.2021	999 882	40 000
Brezno	Electronic services of the city of Brezno	DATA, TRN, ENV	25.08.2021	31.12.2021	996 213	8 320
Šaľa	Modern technologies – Šaľa on the smart road	TRN, ENV	01.01.2021	30.06.2022	999 282	168 996
Vranov nad Topľou	Modern technologies for the city of Vranov nad Topľou	TRN, ENV	01.03.2021	28.02.2022	441 000	32 000
Dunajská Streda	Smart plan of the city Dunajská Streda	TRN, SEC, LIGHT, ENV	30.04.2021	31.12.2021	987 54	47 419
Dubnica nad Váhom	Modern technologies for the city of Dubnica nad Váhom	TRN, ENV	01.03.2021	31.12.2021	592 000	41 000
Rimavská Sobota	Intelligent Rimavská Sobota	ENV, SEC, LIGHT	01.02.2021	31.05.2023	617 600	38 320
Topoľčany	Smart solutions for the city of Topoľčany	TRN, SEC, WST	10.06.2021	31.12.2021	999 938	199 987
Ružomberok	Smart technologies of the city	ENV, TRN,	01.03.2021	28.02.2023	885 000	44 250

	of Ružomberok	LIGHT				
Bardejov	SMART Bardejov – a city within reach	TRN, ENV	01.07.2020	31.12.2020	650 000	50 000
Levice	Establishment of SMART technologies in the city of Levice	LIGHT	01.03.2021	28.02.2023	500 000	25 000
Spišská Nová Ves	Smart City Solution – SCS Spišská Nová Ves	SEC, DATA	04.08.2020	31.03.2023	750 000	20 000
Michalovce	Modern technologies – Smart City – City of Michalovce	ENV, WST	01.07.2020	30.04.2022	469 172	49 920
Považská Bystrica	Modern technologies SC Považská Bystrica	TRN, ENV	15.06.2020	30.11.2021	718 402,83	38 119
Zvolen	Data management of the city of Zvolen	DATA	01.01.2022	30.09.2023	200 000	20 000
Trenčín	Smart City plan of Trenčín	TRN, SEC	18.05.2021	31.05.2021	991 498	198 299
Trnava	Modern technologies for the city of Trnava	TRN, ENV	01.09.2020	31.12.2023	999 000	50 000
Banská Bystrica (BB)	Implementation of Smart City solutions in BB	TRN, ENV	01.01.2021	31.08.2022	999 992,72	51 280
Žilina	Modern technologies in the city of Žilina	ENV, LIGHT	01.03.2021	28.02.2023	1 000 000	50 000
Prešov	Introduction of modern technologies into traffic regulation	TRN	01.10.2020	31.05.022	999 781	51 5000
Košice	SC Košice	DATA, ENV, SEC, LIGHT	01.10.2020	30.09.2021	997 007	49 900

*TRN – Transport, SEC – Security, DATA – Open data system, ENV – Environment and meteorological monitoring, WST – Waste management, LIGHT – modern lightning and infrastructure

Source: European Committee of the Regions, 2021

Some of the analysed cities did not join the call and were therefore not included in Table 6. These cities include: Nové mesto nad Váhom, Hlohovec, Partizánske, Pezinok, Čadca, Trebišov, Piešťany, Lučenec, Liptovský Mikuláš, Humenné, Komárno, Nové Zámky, Prievidza, Poprad, Martin, Nitra, Bratislava (the city of Bratislava could not apply for a non-refundable financial contribution).

It should be emphasized that all participating cities have the status of the project marked as approved and ready for implementation. Some cities are already in the implementation phase. Finally, it can be stated that 22 cities submitted 381 projects showing that the cities are interested in the application of modern technologies.

4.2.2. Analysis of the program of social and economic development of the municipality

The analysis further focused on the program of social and economic development of the municipality. This document should be established by local governments according to Act 539/2008 Coll. *Act on the Support of Regional Development*. The document was analysed to identify the occurrence of the word “smart” or “intelligent”, given its closer meaning in the Smart City concept. These were, for example, the terms smart mobility, smart services, etc. The individual word counts with a specific focus are displayed in Table 7.

Table 7. Identified occurrence of words related to the Smart City concept in the strategic document

City	Category	Horizon	Word count	Sustainable aspect
Brezno	Small	2022	4	management, transport
Hlohovec	Small	2023	3	infrastructure, public administration
Šaľa	Small	2022	1	infrastructure
Dunajská Streda	Small	2020	1	energy
Lučenec	Small	2025	4	vision, concept
Liptovský Mikuláš	Medium	2030	3	transport
Bardejov	Medium	2024	5	energy
Humenné	Medium	2025	5	energy
Nové Zámky	Medium	2025	3	strategy
Michalovce	Medium	2022	6	strategy, transport
Považská Bystrica	Medium	2022	2	strategy, energy
Zvolen	Medium	2027	1	public administration
Poprad	Large	2040	24	all aspects of the city
Martin	Large	2023	18	all aspects of the city
Trenčín	Large	2040	21	all aspects of the city
Trnava	Large	2030	12	all aspects of the city
Nitra	Large	2023	8	transport, lighting
Banská Bystrica	Large	2023	4	transport, city zones
Žilina	Large	2023	7	transport, energy
Prešov	Large	2025	3	transport
Košice	Large	2025	1	energy
Bratislava	Large	2020	1	transport

Source: elaborated using: Ostertagová, 2022

Some of the cities studied did not focus on the Smart City concept in the selected document; the occurrence of the analysed words was equal to 0, so they were not included in Table 7. These were cities: *Nové Mesto nad Váhom, Snina, Senica, Vranov nad Topľou, Partizánske, Pezinok, Dubnica nad Váhom, Rimavská Sobota, Trebišov, Topoľčany, Ružomberok, Piešťany, Levice, Komárno, Spišská Nová Ves, Prievidza.*

During the research of individual city websites, it was also monitored whether the cities offer access to the whole Smart City strategy itself. It was revealed that only five cities had the entire Smart City strategy available. All of them also showed an occurrence of the words analysed in the document Program of Economic and Social Development. Based on the examination of the occurrence of smart technologies in individual program strategies, the occurrence of the phrases studied was recorded in 23 surveyed cities. It is necessary to emphasize that the validity of the examined strategic documents for all cities started in 2015. Thus, it is possible that the cities did not have enough information to implement modern technologies at the time of preparing these strategic documents.

4.3. Results from the questionnaire survey

To obtain information about the actual opinions of city officials on the Smart City concept, a questionnaire survey was performed. This was sent directly to the mayors or their deputies.

4.3.1. Data description

The responses were mainly provided by the *heads of individual city departments* within the municipal self-governments. These were employees focusing on strategic urban development and the transport department. The deputy mayors were also well represented as the questionnaire was addressed directly to them. The questionnaire

was also filled in by *transport officers* or *heads*. Based on this categorization, the persons who participated in the survey can be considered responsible for the questions asked. Figure 4 shows the individual distribution of respondents by their **profession**.

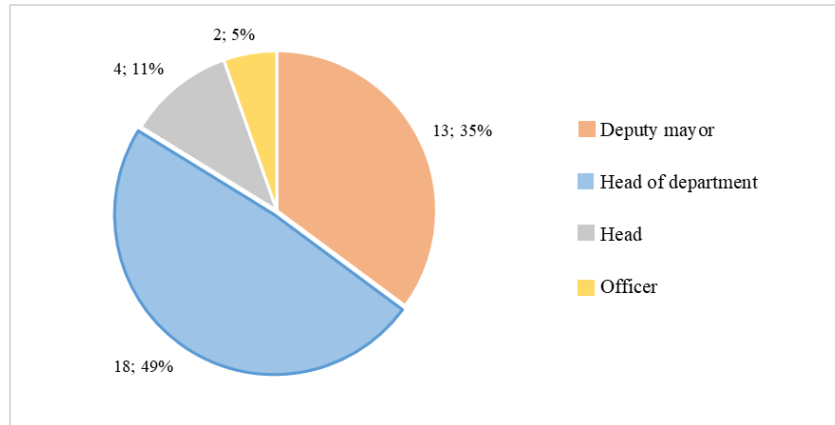


Figure 4. Distribution of respondents by profession

Source: own elaboration

From the perspective of the involvement of cities in the questionnaire survey, it can be confirmed that 37 cities from all size categories were involved – *small, medium, and large cities*. The representation of individual cities is divided proportionally; the overview is shown in Figure 5.

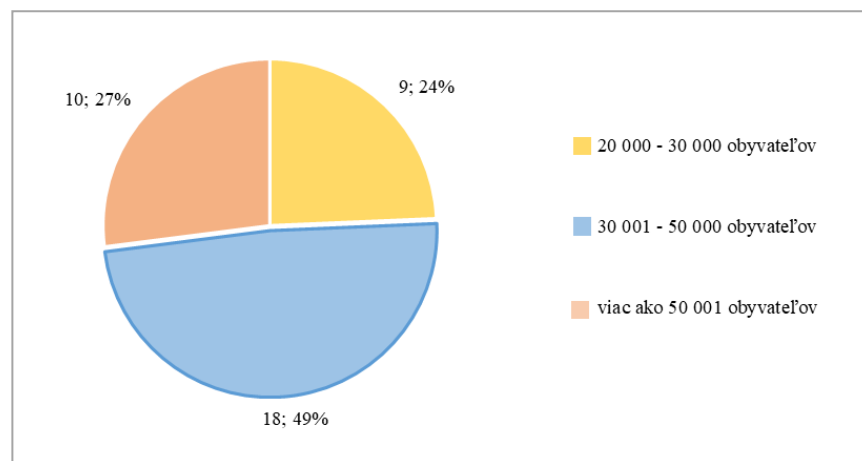


Figure 5. Distribution of the cities by their size

Source: own elaboration

4.3.2. Evaluation of the questionnaire survey results in connection with H_1

How city officials perceive problems in the city they are managing is an important basis for motivation to use modern technologies to eliminate these problems. The results from the questionnaire survey were examined concerning the defined hypothesis H_1 : *If local governments implement the Smart City concept, it is primarily within the area of sustainable transport.*

Attention can also be paid to the planned use of the funds within the projects regarding the implementation of Smart City solutions. A significant number of cities (15 of 22) plan to implement solutions in transport. Before performing the Chi-square test, the Shapiro-Wilk test was also performed to verify the normality of the data, i.e., to assess the suitability of the data for further statistical analysis (Table 8). The described relationship can then be examined by statistical evaluation using the Chi-square test (Table 9).

Table 8. Shapiro-Wilk test on the data for H_1

Area	W	p – value	Significance
Investments	0.631	<0.01	Yes
Environment	0.545	<0.01	Yes
Security	0.395	<0.01	Yes
Open data	0.233	<0.01	Yes
Intelligent lighting	0.350	<0.01	Yes
Waste management	0.233	<0.01	Yes
Transport	0.631	<0.01	Yes

Source: own elaboration

The results shown in Table 8 indicate the suitability of the selected data for further statistical analysis. To assess the relationship between the investments and the area that cities are focusing on when implementing the Smart City concept, the data were analysed using the Chi-square test. The results in Table 9 support the relationship between investing in smart technologies and specific three areas.

Table 9. Chi-square test on the data for H_1

Area	χ^2 values	p – value	Significance
Environment	10.392	0.001	Yes
Security	4.432	0.035	Yes
Open data	1.629	0.202	No
Intelligent lighting	3.444	0.063	No
Waste management	1.629	0.202	No
Transport	23.287	<0.01	Yes

Source: own elaboration

The statistical significance of the examined relationships in Table 9 points to the key importance of transport ($\chi^2 = 23.287$; p-value <0.01) as the main area in which municipalities are trying to obtain funds or are directly investing in. Other justified areas (with statistically significant relationships) include *environmental and safety solutions*. Both categories can be linked to transport since transport is a major air pollutant, and safety is an important element in road transport.

4.4. Evaluation of research questions and research hypothesis

Based on the analysed data and the presented results, the set research questions were answered. The orientation analysis, specifically the results presented in Table 6, led to the confirmation that *Slovak cities are interested in implementing the Smart City concept*. The same analysis also provides the answer to the second research question where it can be argued that cities focus mainly on the following areas: *transport, environment, waste management, data, security, and lighting* within the implementation of the Smart City concept.

Furthermore, it was confirmed that cities in Slovakia *are willing to participate in calls funded by the EU* (Table 6) and the Smart City concept is included in their strategic documents (Table 7). The last question concerned the sustainable aspects where it can be stated that the *cities' strategies focus on sustainable aspects of the Smart City concept* (Table 7).

Subsequently, the research hypothesis H_1 was tested: *If local governments implement the Smart City concept, it is primarily within the area of sustainable transport*. Based on the results displayed in Table 9, a statistically significant relationship between investment in smart technologies and the area of transport was confirmed ($\chi^2 = 23.287$; $p\text{-value} = <0.01$).

Conclusions

Based on the results of the performed analyses, recommendations for the implementation of the Smart City concept and sustainable transport in Slovakia were designed and described in this part of the article. They are divided into separate partial areas.

Unification of the city's strategic goals – the goals of individual self-government are defined in the document “Program of the municipality's economic and social development”. This document contains goals from all areas of the city (environment, energy, education, healthcare, mobility, etc.). Given that mobility as an area of the city is a cross-cutting area, the individual goals from other areas should be logically connected. The primary strategic goal should be to manage the city via the implementation of the Smart City concept in all areas.

Involvement of the citizens in the strategy creation – the Smart City concept has a fundamental need to create a strategic combination of approaches (top-down, bottom-up). The citizens can identify common problems in the city. More proactive citizens can also come up with specific solutions that can be implemented after discussion with other stakeholders. The result of the citizens' involvement is focusing on the real problems of the city and positioning the citizens into the area of interest. Within the individual involvement of the population, four types of citizens can be defined according to the level of their participation and the time required for public affairs. Specifically:

- **passive citizen** – this is a group of citizens who are not interested in participating in the activities of the municipal self-government, do not want to spend any time supporting the development of the city, they are only willing to perceive the information communicated by the self-government,
- **comments giver** – this is a group of citizens who can spend some time to express their opinions, and thus help cities in their direction. However, they are not interested in solving factual arguments – they only present their opinions on the issue,
- **discussant** – this part of the population is interested in the development of the city, can present their opinions, perceive arguments. They devote their time to organized public debates,

- **participant** – this is a group that is highly interested in the city's development, present their opinions, perceive arguments, and actively communicate with individual city representatives. They are involved in the city councils.

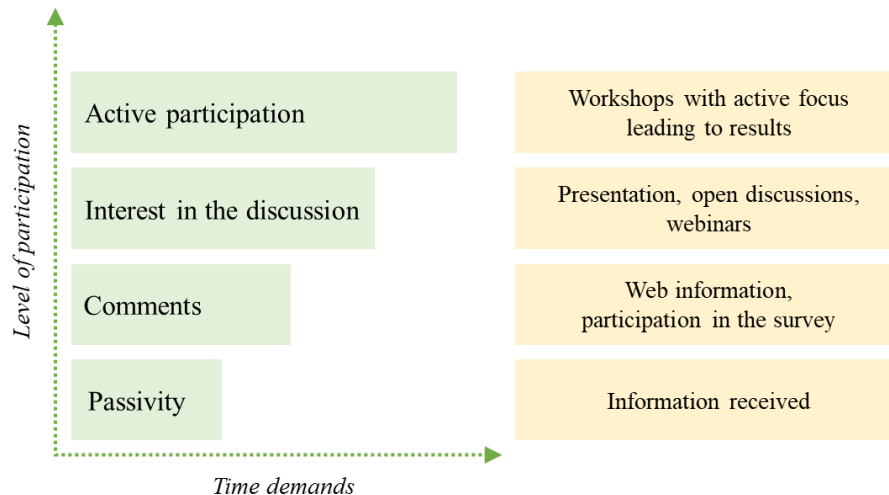


Figure 5. Levels of citizens' participation

Source: own elaboration

Implementation of mobility as a service – mobility as a service is one of the basic platforms for building Smart Cities. It is about connecting individual types of transport and their providers into one comprehensive platform managed by a central service provider. The advantage is the involvement of ICT in the whole process and the construction of a unified digital platform where the subsequent carrier can be a website or a mobile application. Users can use the following options via one platform:

- obtaining information on public transport options in the city, including micro-mobility services,
- the possibility of purchasing tickets for individual modes of transport,
- the possibility of guiding to a free parking area in the case of individual transport,
- the possibility of paying the parking fee,
- the possibility of obtaining information on shared journeys within (and outside) the city,
- obtaining information on weather and air quality within selected localities.

The introduction of mobility as a service brings many benefits to residents and tourists of the city. A significant disadvantage is the managerial complexity of the solution as it is a matter of the unification of several transport operators with the subsequent need for distribution of finance (e.g., profit).

Regulation of individual transport – car parks – following the mobility as a service comes the subsequent need to regulate individual transport. Municipalities approach regulation in Slovakia mostly by motivating motorists to change the means of transport (preference for public transport, lower rates for public transport, availability of connections, introduction of smart solutions). It is also possible to implement rigid measures based on the exclusion of motorists from the city centre and the introduction of car parks at the city borders, with the consequent rapid availability of public transport. This way, residents using individual transport are also forced to use public transport. However, such a decision of the self-government requires financial resources for the completion of the car park, or the possible reorganization of the public transport network. At the same time, it should be emphasized that the representative of the local government is elected for a certain period. For this

reason, political motives also enter decision-making. An unpopular decision may jeopardize the possible further candidacy of a local government representative.

Promotion of alternative (sustainable) sources of transport and the development of electromobility and hydrogen propulsion – transport is closely linked to the environment. The congestion of traffic in the city thus reduces the overall air quality and the quality of the citizens' lives. Cities should gradually use alternative sources of propulsion within the area of public transport. It is primarily about electromobility. The opportunity for hydrogen propulsion is also opening currently. By connecting alternative drives, the air quality can be increased.

By combining individual recommendations that have been defined, cities can create significantly better-living conditions for their citizens. Cities must have well-defined, interlinked strategic goals. It is also necessary that while creating a strategy, the citizens are involved because they can significantly influence the development of the city in the coming years. The essential fact remains that the defined objectives should be divided into concrete steps with subsequent implementation. A significant disadvantage remaining is that the cities often define goals, but the implementation does not occur for various reasons (lack of financial resources, weak motivation of the city representatives, political motives, etc.).

The **novelty** of this article consists mainly of *the analysis of the current state* of the Smart City concept application in Slovakia and *the indicators* that will influence future developments in this area. Another original aspect of the article is represented by the recommendations structured into several parts. The intention was to provide specific points that local governments could focus on when implementing the Smart City concept, particularly within the sustainable transport and mobility. These points include: (1) *Unification of the city's strategic goals*; (2) *Involvement of the citizens in the strategy creation*; (3) *Implementation of the mobility as a service*; (4) *Regulation of individual transport*; (5) *Promotion of alternative (sustainable) sources of transport and the development of electromobility and hydrogen propulsion*.

Geographical delimitation was identified as one of **the limitations** of the research. The research focused on the Smart City concept and its application only in Slovakia. Other limiting elements include, for example, the primary focus on transport issues within the broader Smart City concept. The last limitation is the utilization of the questionnaire survey distributed only to city mayors and their deputies.

In the **future**, the authors would like to focus their research on other aspects of the Smart City concept besides transport. When transforming a city into a smart city, it is important to proceed *gradually and systemically*. Gradual steps enable the creation of a digital city, where the first change within the implementation of this concept positively affects the introduction of another, creating suitable conditions for further development. In this article, the first change focused on the area of transport, which was identified as a key element within the current conditions of the Slovak Republic.

References

- Angelidou, M. (2016). Four European Smart City Strategies. *International Journal of Social Science Studies*, 4(4). <https://doi.org/10.11114/ijss.v4i4.1364>
- Ansoff, H. I. (2007). *Strategic Management*. Palgrave Macmillan UK. <https://doi.org/10.1057/9780230590601>
- Baucells Aletà, N. (2016, June 7). Smart Mobility in Smart Cities. Libro de Actas CIT2016. XII Congreso de Ingeniería Del Transporte. <https://doi.org/10.4995/CIT2016.2016.3485>
- Bělohlávek, F., Košťan, P., & Šuleř, O. (2001). *Management*. Rubico.

- Benevolo, C., Dameri, R. P., & D'Auria, B. (2016). Smart Mobility in Smart City (pp. 13–28). https://doi.org/10.1007/978-3-319-23784-8_2
- Chehabeddine, M. R., Grabowska, S., & Adekola, A. F. (2022). Building a model for securing regional development from ecological threats. *Insights into Regional Development*, 4(2), 22–40. [https://doi.org/10.9770/IRD.2022.4.2\(2\)](https://doi.org/10.9770/IRD.2022.4.2(2))
- Cities in Motion Blog Network. (2020). IESE Cities in Motion Index 2020. Retrieved October 30, 2020, from <https://blog.iese.edu/cities-challenges-and-management/2020/10/27/iese-cities-in-motion-index-2020/>
- Dameri, R. P., Benevolo, C., Veglianti, E., & Li, Y. (2019). Understanding smart cities as a glocal strategy: A comparison between Italy and China. *Technological Forecasting and Social Change*, 142, 26–41. <https://doi.org/10.1016/j.techfore.2018.07.025>
- Enviroportál.sk. (2021b). Preprava v osobnej depreve (Transport in passenger transportation). Retrieved January 31, 2021, from <https://www.enviroportal.sk/indicator/detail?id=3941&print=yes>
- Eremia, M., Toma, L., & Sanduleac, M. (2017). The Smart City Concept in the 21st Century. *Procedia Engineering*, 181, 12–19. <https://doi.org/10.1016/j.proeng.2017.02.357>
- Esmailian, B., Wang, B., Lewis, K., Duarte, F., Ratti, C., & Behdad, S. (2018). The future of waste management in smart and sustainable cities: A review and concept paper. *Waste Management*, 81, 177–195. <https://doi.org/10.1016/j.wasman.2018.09.047>
- European Commission. (2020). Smart cities: Cities using technological solutions to improve the management and efficiency of the urban environment. Retrieved September 06, 2021, from https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en
- European Committee of the Regions. (2021). Miestne samosprávy sa podelili o skúsenosti s riešením krízovej situácie v dôsledku koronavírusu (Local governments shared their experiences in dealing with the crisis situation due to the coronavirus). Retrieved February 02, 2022, from <https://cor.europa.eu/sk/news/Pages/local-governments-share-experiences-of-the-coronavirus-crisis-.aspx>
- Fakunle, S. O., & Ajani, A. O. (2021). An empirical study of community involvement in household solid waste management: a case study. *Insights into Regional Development*, 3(3), 114–127. [https://doi.org/10.9770/IRD.2021.3.3\(7\)](https://doi.org/10.9770/IRD.2021.3.3(7))
- Ferenc, P., Varmus, M., & Vodák, J. (2017). Stakeholders in the Various Field and Relations between Them. *Procedia Engineering*, 192, 166–170. <https://doi.org/10.1016/j.proeng.2017.06.029>
- Fidlerová, H., Stareček, A., Vraňáková, N., Bulut, C., & Keaney, M. (2022). Sustainable Entrepreneurship for Business Opportunity Recognition: Analysis of an Awareness Questionnaire among Organisations. *Energies*, 15 (3), 1–15. <https://doi.org/10.3390/en15030849>
- Gill, S. S., Tuli, S., Xu, M., Singh, I., Singh, K. V., Lindsay, D., Tuli, S., Smirnova, D., Singh, M., Jain, U., Pervaiz, H., Sehgal, B., Kaila, S. S., Misra, S., Aslanpour, M. S., Mehta, H., Stankovski, V., & Garraghan, P. (2019). Transformative effects of IoT, Blockchain and Artificial Intelligence on cloud computing: Evolution, vision, trends and open challenges. *Internet of Things*, 8, 100118. <https://doi.org/10.1016/j.iot.2019.100118>
- Glasco, J. (2019). Smart Education for Smart Cities: Visual, Collaborative & Interactive. Retrieved January 01, 2020, from <https://hub.beesmart.city/en/solutions/smart-people/smart-education/viewsonic-smart-education-for-smart-cities>
- Golpîra, H., & Bahramara, S. (2020). Internet-of-things-based optimal smart city energy management considering shiftable loads and energy storage. *Journal of Cleaner Production*, 264, 121620. <https://doi.org/10.1016/j.jclepro.2020.121620>
- Hitka, M., & Balážová, Z. (2014, October 29–31). *Comparison of Motivation Level of Service Sector Employees in the Regions of Slovakia and Austria*. BEMTUR – Global conference on business, economics, management and tourism (23), 348–355, Prague, Czech Republic
- Holubčík, M., & Soviar, J. (2021). Main Problems of Cooperation Management: Insights from Slovak Companies. *Sustainability*, 13(12), 6736. <https://doi.org/10.3390/su13126736>
- Holubčík, M., Vodák, J., & Soviar, J. (2018). How to Manage Business in Collaborative Environment – A Case Study of Multinational Companies (pp. 299–311). https://doi.org/10.1007/978-3-319-95204-8_26
- Hoy, M. B. (2016). Smart Buildings: An Introduction to the Library of the Future. *Medical Reference Services Quarterly*, 35(3), 326–331. <https://doi.org/10.1080/02763869.2016.1189787>

ISO 37122:2019. (2019). Sustainable cities and communities — Indicators for smart cities.

Kalašová, A., Ondruš, J., & Kubíková, S. (2018). Inteligentné dopravné systémy (Intelligent transport systems). EDIS.

Khudyakova, T., Shmidt, A., & Shmidt, S. (2020). Sustainable development of smart cities in the context of the implementation of the tire recycling program. *Entrepreneurship and Sustainability Issues*, 8(2), 698–715. [https://doi.org/10.9770/jesi.2020.8.2\(42\)](https://doi.org/10.9770/jesi.2020.8.2(42))

Klamár, R. (2010). Plánovanie rozvoja regiónov na lokálnej úrovni v nových podmienkach demokracie: na príklade vidieckeho mikroregiónu (Regional development planning at the local level in the new conditions of democracy: on the example of a rural microregion). Retrieved February 02, 2022, from <https://www.unipo.sk/public/media/13200/Pl%C3%A1novanie%20rozvoja%20regi%C3%B3nov%20na%20lokálnej%20%C3%BArovni%20v%20nov%C3%BDch%20podmienkach%20demokracie.pdf>

Kubina, M., & Lendel, V. (2015). Successful Application of Social CRM in the Company. *Procedia Economics and Finance*, 23, 1190–1194. [https://doi.org/10.1016/S2212-5671\(15\)00487-6](https://doi.org/10.1016/S2212-5671(15)00487-6)

Ližbetinová, L., Hitka, M., Li, C.G., & Čaha, Z. (2017, October 19). *Motivation of Employees of Transport and Logistics Companies in the Czech Republic and in a Selected Region of the PRC*. International scientific conference-logistics 2017 (134), Ceske Budejovice, Czech Republic

Malichová, E., & Mičiak, M. (2018). The Comparison of Managers' Decision-Making on Investment Processes in IT and Industrial Enterprises. *Innovation Management and Education Excellence through Vision 2020*, SI -XI, 4999–5009.

Mayor of London. (2016). The future of smart London: Harnessing digital innovation to make London the best city in the world. Retrieved September 01, 2020, from https://smartnet.niua.org/sites/default/files/resources/gla_smartlondon_report_web_4.pdf

Mechant, P., & Walravens, N. (2018). E-Government and Smart Cities: Theoretical Reflections and Case Studies. *Media and Communication*, 6(4), 119–122. <https://doi.org/10.17645/mac.v6i4.1848>

Mičiak, M. (2019). The efficiency of investment in human capital in IT enterprises. *Transportation Research Procedia*, 40, 1134–1140. <https://doi.org/10.1016/j.trpro.2019.07.158>

Ministry of Economy of the Slovak Republic. (2017). Podpora inovatívnych riešení v Slovenských mestách (Support of innovative solutions in Slovak cities). Retrieved January 14, 2020, from <https://www.mhsr.sk/uploads/files/n5m7duxS.pdf>

Mora, L., & Bolici, R. (2017). How to Become a Smart City: Learning from Amsterdam (pp. 251–266). https://doi.org/10.1007/978-3-319-44899-2_15

Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change*, 142, 70–97. <https://doi.org/10.1016/j.techfore.2018.07.035>

Ostertagová, E. (2012). Aplikácia štatistických testov dobrej zhody. Retrieved February 03, 2022, from <https://www.sjft.uke.sk/transerinovacii/pages/archiv/transer/23-2012/pdf/072-074.pdf>

Otvorené stratégie. (2022). Retrieved February 03, 2022, from <https://www.otvorenestrategie.sk/priebežny-report/>

Pouš, R. (2013). *Základy geografie mesta* (Basics of city geography). Belinaum.

Salvo, G., Caruso, L., Scordo, A., Guido, G., & Vitale, A. (2017). Traffic data acquirement by unmanned aerial vehicle. *European Journal of Remote Sensing*, 50(1), 343–351. <https://doi.org/10.1080/22797254.2017.1328978>

Sedlák Mikuláš. (1997). *Manažment*. ELITA.

Simonofski, A., Vallé, T., Serral, E., & Wautelet, Y. (2021). Investigating context factors in citizen participation strategies: A comparative analysis of Swedish and Belgian smart cities. *International Journal of Information Management*, 56, 102011. <https://doi.org/10.1016/j.ijinfomgt.2019.09.007>

Siokas, G., Kelaidi, V., & Tsakanikas, A. (2022). The smart city as a hub for nourishing public-private partnerships. *Sustainable Cities and Society*, 76, 103466. <https://doi.org/10.1016/j.scs.2021.103466>

Siokas, G., Tsakanikas, A., & Siokas, E. (2021). Implementing smart city strategies in Greece: Appetite for success. *Cities*, 108, 102938. <https://doi.org/10.1016/j.cities.2020.102938>

Slavík, J. (2017). Smart city v praxi (Smart city in practice). Profi Press.

Smith, M. N. (2016). The number of cars worldwide is set to double by 2040. Retrieved September 01, 2020, from <https://www.weforum.org/agenda/2016/04/the-number-of-cars-worldwide-is-set-to-double-by-2040>

Soviar, J., Holubčík, M., & Vodák, J. (2018). Regional Cooperation Ecosystem: Case of the Žilina Self-Government Region (Slovak Republic). *Sustainability*, 10(7), 2219. <https://doi.org/10.3390/su10072219>

Statistical Office of the SR. (2020a). Odvetvové štatistiky (Industry statistics). Retrieved September 06, 2020, from http://datacube.statistics.sk/#!/view/sk/VBD_DEM/om7102rr/v_om7102rr_00_00_00_sk

Statistical Office of the SR. (2020b). Zisťovanie o využívaní informačných a komunikačných technológií v domácnostiach (Finding out about the use of information and communication technologies in households). Retrieved September 01, 2020, from https://slovak.statistics.sk/wps/wcm/connect/3fa87945-8bf1-47e0-a9d21451aee938f0/Zistovanie_o_vyuzivani_i_nformacnych_a_komunikcnych_techologii_v_domacnostiach_2018.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-3fa87945-8bf1-47e0-a9d2-1451aee938f0-my4tPeD

Statistical Office of the SR. (2020c). Environmentálne ukazovatele (Environmental indicators). Retrieved September 01, 2020, from http://statdat.statistics.sk/cognosext/cgi-bin/cognos.cgi?b_action=cognosViewer&ui.action=run&ui.object=storeID%28%22i030B1D7EE8BB4E6AA68A2C7DE7AC4E82%22%29&ui.name=%c3%9a%c4%8det%20emisi%c3%ad%20do%20ovzdu%c5%a1ia%20%5b%20%5d&run.outputFormat=&run.prompt=true&cv.header=false&ui.backURL=%2fcognosext%2fcps4%2fportlets%2fcommon%2fclose.html&run.outputLocale=sk

Tej, J. (2001). Zvláštnosti manažmentu vo verejnom sektore (Peculiarities of management in the public sector). Dubnica n/V. Mf STU Trnava.

Varmus, M., Kubina, M., & Soviar, J. (2015). Cooperation on Sport Market – Reasons and Ways How to Improve It. *Procedia Economics and Finance*, 23, 391–395. [https://doi.org/10.1016/S2212-5671\(15\)00453-0](https://doi.org/10.1016/S2212-5671(15)00453-0)

Varmus, M., Kubina, M., Boško, P., & Mičiak, M. (2022). Application of the Perceived Popularity of Sports to Support the Sustainable Management of Sports Organizations. *Sustainability*, 14(3), 1927. <https://doi.org/10.3390/su14031927>

World Population Review. (2020). World Population by Country. Retrieved September 01, 2020, from <https://worldpopulationreview.com/>

Zráková, D., Demjanovičová, M., & Kubina, M. (2019). Online reputation in the transport and logistics field. *Transportation Research Procedia*, 40, 1231–1237. <https://doi.org/10.1016/j.trpro.2019.07.171>

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STUDENT ENTREPRENEURSHIP MINDSET AND SOCIAL ENTREPRENEURSHIP PEDAGOGY IN A GLOBAL HEALTH PANDEMIC IN LAGOS STATE UNIVERSITY, NIGERIA

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Abstract. The study interrogates the contention that social entrepreneurship pedagogy plays an essential role in developing students' entrepreneurial mindset in a Covid-19 era from the perspective of the Lagos State University, Nigeria. The exploratory design was employed to harness new knowledge from existing literature. A total of 18 final-year students were purposively and conveniently for an interview, and data were analyzed with the NVivo (v.12) qualitative software. Results reveal a lack of pedagogy initiatives in delivering teachings and learning such as seminars/workshops, networking, internships and case studies, the absence of a conventional department of entrepreneurship education and a lack of appropriate entrepreneurship education curriculum for the development of students' entrepreneurship mindsets. Notably, the fallout from the Covid-19 pandemic has shown that students can revive the Nigerian economy with a positive outlook due to their entrepreneurial mindset. The study echoes the need for the constitution of appropriate pedagogy initiatives and relevant course contents and curriculum that could steer a robust students' entrepreneurial mindset for venture creation and economic development amidst the prevailing loss of jobs in this epoch of Covid-19.

Keywords: social pedagogy; entrepreneurial mindset; Covid-19; higher education; students

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1. Introduction

The universal tradition of economic growth for human development cannot be unconnected with advancing and promoting viable work patterns. With the continued disruptions of the performance of economies across the globe engendered by the debilitating consequences of the Covid-19 pandemic, the aim of attaining social needs and sustainable development goals (SDG) are now more severely impacted. In other words, there has been an increasing swing from dependent on paid employment to a need for the provocation of entrepreneurship as the new pathway to human and economic survival (Wang, Hong, Li & Gao, 2020). With the increasing rate of job loss and poor economic performance indices, the call for university students to integrate the culture of entrepreneurial mindset into their learning processes through suitable and practicable social entrepreneurship

pedagogy techniques cannot be over-stretched (Wang, Hong, Li & Gao, 2020). This contention has continuously formed a public debate in the management literature as a cornerstone to stimulating economic prosperity and human growth, among other economic conditions (Rauf, Wijaya & Tari, 2021).

Social entrepreneurship pedagogy offers students the capability to comprehend and instil vital business principles needed to strive in a competitive business world (Malebana, 2017). The lasting global economic changes have persistently caused universities of higher learning agenda of theoretical teachings to the more practical ideology of instructions for students' acquisition of traditional and requisite skills that are required for success in this epoch of stiff and competitive labour markets (Ojode, Wolde & Claiborne, 2021). The essential knowledge and skills requisite for survival in this changing business world constantly undergo unceasing changes and modifications in tandem with global economic changes (Davis, Hall & Mayer, 2016). For instance, industries now prioritize what seems to be their most essential needs for continuous business operations. The wish and demand for these needs will no doubt continue to incite significant interference in the activities, functions and operations of global labour markets with modifications in the structure and pattern of available jobs (Malebana, 2017).

In essence, the innovative trend of jobs that will be formed will demand graduates with explicit entrepreneurial drive and mindset (Hussain & Norashidah, 2015). Fayolle and Gailly (2015) contend that the comprehension and use of social entrepreneurship pedagogy techniques explain a clear-cut pathway through which students can develop their entrepreneurial mindset and prosper in entrepreneurship undertakings. The business environment, interrupted and destabilized by the advent of the Covid-19 pandemic, calls for graduates with a robust entrepreneurial mindset who are willing to learn and unlearn the ropes of business principles through social entrepreneurship teachings, techniques and appropriate educational curriculum and course contents. The formation and arrangement of Nigeria's higher education course curriculum have continued to attract public criticism as a deficit in global relevance in terms of engendering qualitative entrepreneurship teachings required for sustainable venture creation (Adekunle & David, 2014). For example, data is scarce to substantiate government investment in entrepreneurship education to develop students' entrepreneurial mindset (Chinonye & Akinlabi, 2014). The consequence emanating from youth over-dependence on graduates' jobs, the conundrum of youth unemployment and the outdated and ambiguous course content and curriculum are clear evidence of Nigeria's government's inattention to the prominence of entrepreneurship education as an effective investment tool for employment creation and the growth of the Nigerian economy at large (Alabi, Famakinwa & Ogunjimi 2017).

The literature on entrepreneurship is awash in Nigeria with different subjects. A critical assessment and analysis of the literature reveal a range of studies such as entrepreneurship venture and development of small and medium enterprises (Adelekan, Arogundade & Dansu, 2016), entrepreneurship education and self-employment initiatives (Afolabi, 2016) and rationale for students' preparation and entrepreneurship education in the face of the global economic crisis in Nigeria (Onuwa, 2016). Similar work comprised the analysis of entrepreneurship education as a mechanism for national development and jobs creation hub, among others (Adekunle & David, 2014). Other similar studies conducted outside the context of Nigeria include Covid-19 and entrepreneurship education (Ratten & Jones, 2021) and the relationship between entrepreneurship education and entrepreneurial goal intentions (Ndofirepi, 2020). With this collection of research works, particularly in the discourse of entrepreneurship, there is a scarcity of research focusing on developing students' entrepreneurial mindset through social entrepreneurship pedagogy in a Covid-19 era in Nigeria. Therefore, this identifies the gap this present study will be addressing. The objectives of the paper include the interrogation of the significance of entrepreneurship pedagogy techniques and content employed in the teaching of entrepreneurship education; highlighting and understanding the nexus between entrepreneurship pedagogy and the development of students' entrepreneurial mindset, and assessing the impact of the covid-19 global pandemic on the development of students' entrepreneurship mindset among selected final year students.

The significance of this paper is anchored on the quest to address the existing research chasm on the role of social entrepreneurship pedagogy in developing students' entrepreneurial mindset. In other words, it is explicit that similar studies have failed to assess the role of social entrepreneurship pedagogy in transforming and developing students' entrepreneurship mindset in the Covid-19 era. Therefore, by interrogating this argument, the study hopes to convey a new perspective on the significance of social entrepreneurship pedagogy in transforming and developing students' entrepreneurial mindset in the new era. This proposition becomes crucial and relevant towards becoming self-sustained and independent through enterprising activities, even as the impact of the Covid-19 pandemic continues to interrupt the economy and the constant disappearance of graduate jobs.

2. Literature review

2.1 Entrepreneurship explained

The concept of entrepreneurship can be explained as an individual ability to produce value through the integration and use of human and material resources to create markets and consumption (Chinonye & Akinlabi, 2014). The term expressly denotes an individual who possesses skills that can be likened to a go-getter, inventor or someone who enjoys the art of taking a risk to uncover opportunities (Audretsch, Kuratko & Link, 2016). These narrations position an entrepreneur as a willing and string-willed personality who is geared towards integrating and converting available resources for monetary and societal gains (Imafidon, 2014). An entrepreneur is assumed to be an inventor of economic development. With the fluctuating economic order engendered by the disruptions of the Covid-19 pandemic, an entrepreneur can be likened to mean an individual with the ability to creatively adjust to the economic realities with the mindset of managing an effective enterprise for venture creation. This analogy seemingly confirms the significance and need for consciously stimulating entrepreneurial mindset and initiative among students as an alternative to overreliance on decreasing paid employment globally.

Kirkwood, Dwyer and Gray's (2014) thesis argued that the initial comprehension of entrepreneurship as a driver of transformation is consistently altering in recent times with a more concise focus on economic development. In short, the conceptual explanation of entrepreneurship is now widely accepted as an individual who initiates the beginning of a new business undertaking. Thus, the familiar axiom of the invention usually used in the description of an entrepreneur is now more conceptualized as an individual's capability to produce a new business venture. For instance, Boohene and Agyapong (2017) argued entrepreneurship is a self-driven practice and procedure of consistent wealth creation by an individual/s who undertakes risky entrepreneurial venture through the commitment of time and process for the production of value and result-oriented business outcomes.

Beech and Anseel (2020) describe entrepreneurship as the identification of opportunity that translates into job creation and economic development. This description is in tandem with the comprehension of entrepreneurship as an undertaking for personal growth, initiative taking, self-sustaining and applying innovative skills for personal growth and economic development. Conversely, with the university of higher learning in mind in ensuring students' entrepreneurship development, the literature has unswervingly argued that entrepreneurship is teachable and can be taught and instilled in students like all other courses of study (Imafidon, 2014). The argument of this study is to lengthen this position by defending the significance of social entrepreneurship pedagogy as an avenue through which students' entrepreneurship mindset can be advanced.

Audretsch, Kuratko and Link (2016, p. 610) conceived entrepreneurship as a dependent, regular business procedure set up by people ready to take risks to create values and wealth. Gundlach and Zivnuska's (2010) thesis broadly conceptualized entrepreneurship as the capability and competency to trail a business endeavour, create opportunities with it and transmute the same for economic gains. In the broad canon of management studies, entrepreneurship is related to an individual's possession of some exceptional human skills such as mental, social

and economic necessary for the progress of any entrepreneurial undertaking (Ojode, Wolde & Claiborne, 2021). To place correctly, the understanding of entrepreneurship in the perspective of pedagogy will enable student entrepreneurs to acquire the right mix of opportunities towards recognizing and understanding the significance of entrepreneurship pedagogy in the success of an enterprise, especially in this era of economic raging steered by Covid-19 pandemic.

2.2 Social entrepreneurship pedagogy explained

Social entrepreneurship pedagogy can be described as the training of students on social projects using pedagogy techniques for economic development and societal growth (Osunde, 2016). According to Audretsch, Kuratko and Link (2016, p. 612), social entrepreneurship pedagogy needs to be included as a compulsory syllabus for tertiary institutions to undertake to be conversant with the practical business stimulation and venture creation. This is to contend that Nigeria's university systems urgently require a unique social entrepreneurship pedagogy for students' entrepreneurial drive and mindset development. Okeke and Eme (2014) write that universities must teach a more conventional and real world for a creative and self-sustained turnout of university graduates with fitting social and employment creation skills and social entrepreneurship pedagogy instructions in replacement of the traditional methods of learning transmission.

Social entrepreneurship pedagogy must realize the behavioural change in students' entrepreneurial learning experience. For instance, if relevant results are desired, evaluation should be given to what is conveyed to the students concerning the social entrepreneurship course content and, more so, the means of its transmission (Lopes et al., 2021). A recent study by Guerrero, Urbano and Gajón (2020) has connected social entrepreneurship pedagogy among students to the efficacy of course contents. In other words, social entrepreneurship pedagogy should focus on exercises that provoke ordinary social entrepreneurial skills in students (Beech & Anseel, 2020). With a specific goal in mind for developing such skills, Ojode, Wolde and Claiborne (2021) argued that entrepreneurs should be consulted in the planning and outlining of social entrepreneurship pedagogy course content to ensure its direct relevance to all fields of study. Therefore, the course content should offer a large appliance for introducing students to everyday management opportunities and problems of small-scale business ventures, evaluating their growth, mindset, and readiness for entrepreneurial experience (Onuwa, 2016). Entrepreneurship courses must relish the entire course content in a real-world context relevant to developing students' entrepreneurship mindset (Yusoff, Ahmad & Halim, 2016). Instructors can employ appropriate content, including reading, cases and lectures that are desirable to assist students in transforming into social entrepreneurs. This can be realized by ensuring their course guidelines are in tandem with appropriate self-efficacy techniques for developing students' entrepreneurial mindset.

2.3 Social entrepreneurship pedagogy and students' entrepreneurship mindset

The use of social pedagogy techniques and approaches remains central to any entrepreneurship development. For instance, lectures and case studies have been reported reliable in stimulating and developing students' entrepreneurial mindsets (Onuwa, 2016). Kolawole and Ajila (2015) argued for using different methods as there are no precise techniques to provoke students' entrepreneurship mindset development. Other techniques, including media, seminars and lectures, were argued as the most effective pedagogical methods of entrepreneurship education development (Ahmed et al., 2020). Advocates of this postulation assert that the techniques promote ease of transiting students from job seekers to job owners if effectively applied (Guerrero, Urbano & Gajón, 2020; Wang, Hong, Li & Gao, 2020).

The social pedagogical teachings instil and allow for the alliance of knowledge and development of entrepreneurship skills. The importance of social entrepreneurship pedagogy remains an essential pathway through which students can build and develop their mindset (Yusoff, Ahmad & Halim, 2016). Supporting this

contention in tandem with the Covid-19 health pandemic call for a severe response from the managers of the Nigerian universities to develop a more sophisticated and time framework that can sustain the reformation of the present course contents and curriculum being employed by higher institutions of learning in Nigeria for a stout and enterprising students' entrepreneurial mindset. Mitigating the Covid-19 health crisis's economic challenge speaks to the identification of young and vibrant young talents but exerting more responsibilities toward developing a functional social education system that can spur economic transformation through students' entrepreneurial activities and business value (Zou, Huo & Li, 2020).

Using social entrepreneurship pedagogy enables students to develop appropriate business start-up skills. The Nigeria situation indicates a weak testament as an effort to develop students' entrepreneurship mindset continues to encounter several hindrances due to the poor application and use of social entrepreneurship pedagogy techniques and contents (Okeke & Eme, 2014). Many Nigerian higher learning institutions' teaching guidelines, course contents and curriculum are not in tandem with global best practices for building and developing a sustainable student entrepreneur with a creative business mindset (Chinonye & Akinlabi, 2014).

The discourse of social entrepreneurship pedagogy has continuously shown relevance in students' entrepreneurial efficacy and mindset development with the integration of an effective support system, hands-on-learning undertakings and the supervision of small start-up enterprises among the student population (Saeed et al. 2015). In addition, for students, entrepreneurial mindset development, appropriate programmes and teaching techniques that reflect growth in the area of human capital, business formation and market-oriented skills and other support roles must be clarified in the entrepreneurship teaching curriculum of universities (Lopes et al., 2021). However, contrary evidence in the entrepreneurship literature explains that the acquisition of entrepreneurship education should devote not so much attention to the application of technical teachings but emphasis more on the hands-on desk and practical instructions to rouse students' mindset for venture creation (Hussain & Norashidah, 2015; Wang, Hong, Li & Gao, 2020). To be sure, reinforcing students' confidence and experience in learning prospects are measures to spur an entrepreneurship mindset (Chinonye & Akinlabi, 2014). The effort chased in this study is the hope of launching a new pattern of social entrepreneurship pedagogy practice that will overturn the general outdated curriculum and course content for the advancement of students' entrepreneurship mindset and business creation skills in this era of Covid-19 pandemic with poor economic performance and ascending graduate unemployment rate.

3. Methodology and materials

3.1 Research philosophy and design

The philosophical viewpoint of this study supports the interpretive philosophical assumptions in understanding the significance of the social entrepreneurship mindset in the development of students' entrepreneurship mindset. (Sekaran & Bougie, 2016). It offers the assimilation of human features into a study by concentrating on the implication that human elements convey into a study and the range of interpretations given to them (Creswell, 2014). Students were asked to stimulate meanings that unpack how students' entrepreneurship mindset can be developed with social entrepreneurship pedagogy in the Covid-19 pandemic era. The experimental design was employed to increase the knowledge scarcity on the research problem (Shields & Rangarajan, 2013). For instance, when little is known about a research problem, the assumptions of the exploratory design represent a more justified design to address such a problem qualitatively (Sekaran & Bougie, 2016). This study employs these assumptions to engender qualitative answers to the social and economic issues of developing students' entrepreneurship mindset through social entrepreneurship pedagogy.

3.2 Population, sample size and recruitment

The study population consists of 18 final-year students selected based on deliberate and suitability from two departments of the faculty of management sciences of the Lagos State University, Nigeria. The selection mirrors two primary considerations; students understanding of the study's problem and their readiness to partake in the study. For example, recruiting students complies with intending to ensure only those with the essential information on the subject matter from the sample respondents. This was achieved through referrals by the class representatives and other stakeholders in the faculty. Consequently, after the intentional recruitment of these respondents, it was ensured that only students who were comfortable with the composition and timeliness of the study became respondents that partake in the study.

3.3 Research instrument, data collection procedure and quality

The study employs the semi-structured interview type to elicit qualitative data. This approach is justified as it allows for uncovering supplementary questions and provokes lucidity when the questions or responses are vague (Yin, 2016). The interview process follows with the use of an interview to monitor the drift of questions and answers (Sekaran & Bougie, 2016). The interview data approach cannot be unconnected from some challenges not limited to clarity in responses and the risk of misconstruing the questions and answers (Kumar, 2012). This study addressed these challenges by phrasing the interview questions in English and ensuring the questions were designed to minimize any likely misconstructions (Saunders, Lewis & Thornhill, 2009). The entire data collection process conforms to the non-pharmaceutical intervention for controlling the spread of the Covid-19 pandemic. The interview lasted between November 2021 and January 2022, just before Nigeria's public universities' present national academic union strike.

The interview sessions were recorded and complemented with note-taking if some questions and responses are ambiguous to transcribe. The interview procedure commences with a brief overview of the aim of the study for selected students. The general questions queried are anchored on the role of social entrepreneurship pedagogy in the development of students' entrepreneurship mindset on the one hand. On the other hand, the range of the specific questions probed includes the different pedagogical techniques used in the transmission of entrepreneurship education are? How can entrepreneurship pedagogy be used in developing students' entrepreneurship mindset? What is the effect of the Covid-19 pandemic challenges on students' entrepreneurship mindset? The paper adopts Trochim and Donnelly's (2007) four strategic approaches. i.e., credibility, transferability, dependability and confirmability of the data. The credibility of the data was achieved by ensuring that the views of the students were reported in the results of the study. For transferability, efforts were made to ensure that results become transferable to another research context. All ethical considerations were complied with in the study's data collection, analysis and reports. Finally, it was ensured that there exists a nexus between the data set and the results for confirmability.

3.4 Data analysis and ethics

The NVivo (v.12) qualitative software was used to identify themes and sub-themes from the transcribed data (see Table 1 below). After that, the themes were analyzed with the content qualitative analytical tool to make good sense of judgement of the themes and sub-themes and informed critical analysis of the role of social entrepreneurship pedagogy in developing students' entrepreneurship mindset. A critical analysis of the results supported the exact responses of respondents. The ethical concerns were judiciously considered, ensuring the names of all respondents were erased from the analysis and results of the study. The permission of all respondents was pursued before the commencement of the study to avoid any breach of privacy.

Table 1. Matrix of themes and sub-themes

	Themes	Sub-themes
1	Pedagogy Techniques	Internship, discussions, oral presentations, case studies and seminars
2	Entrepreneurship mindset through entrepreneurship pedagogy	Decrease level of the quality of education, sparsity of entrepreneurship faculty members, absence of entrepreneurship department and lack of entrepreneurship education curriculum and course content
3	Covid-19 role in students' entrepreneurship development	Impact on graduate jobs, limitation on students' entrepreneurial mindset and poor business environment for students entrepreneurs

Source: Nvivo qualitative results

4. Results and interpretation

4.1 Pedagogical techniques and transmission of social entrepreneurship education

The need for conventional and qualitative pedagogy techniques in the delivery of entrepreneurship education in higher educational institutions cannot be over-stretched. For instance, the range of views shared by most students reflects a state of emergency across the length and breadth of Nigerian universities. It was reported that the most commonly employed pedagogy techniques in the transmission of entrepreneurship education, including internship, discussions and oral presentations, are not effectively engaged in teaching entrepreneurship education. Similar techniques explained by respondents include case studies and seminars. Although the utility of lecture was collectively sighted as often employed, internships, case studies, and discussions were entirely not in use. This position explains the state of many Nigerian public universities, where the importance of entrepreneurship education has been largely ignored. One of the students interviewed explained the consequence of the absence of qualitative pedagogy techniques.

The situation we are having here is a severe one. We have seen how other universities embrace cutting-edge pedagogy techniques and technology in transmitting entrepreneurship education in other countries. The state and condition of our universities, especially the public universities, are not encouraging as we lack vital tools that are considered necessary in teaching entrepreneurship education, affecting the development of students' entrepreneurship mindset. We cannot build something on anything.

Another student narrates the university's inability to utilize appropriate media tools and technology in delivering lectures and transmitting entrepreneurship education knowledge to develop students' entrepreneurship mindset. Again, this position validates the non-readiness of the university in building students with a robust attitude capable of transforming the outlook of the Nigerian economy. This viewpoint is explained below:

While academic teachings continue in other climes with the application of the media tools, many Nigerian universities have had to pause academic activities during the Covid-19 pandemic. It is clear what we prioritize in our country and educational space. What is not clear is how students will develop an entrepreneurship mindset if the techniques employed in teaching are not conventional. For me, the inability of many Nigerian universities to compete with their counterparts in other African countries is a testament that we are not doing enough to employ the appropriate teaching techniques and tools the drive entrepreneurship education in Nigeria.

The importance of case studies has repeatedly been proven as the most efficient and effective pedagogy technique employed in transmitting entrepreneurship education and knowledge. The practical importance can be revealed through the hands-on-desk learning experiences students acquire. Many of the students interviewed attest that the significance of case studies is likely to improve their entrepreneurship knowledge and mindset than other pedagogy techniques. One of the students' reports below:

I am very sure we are falling so much behind due to the lack of case studies in our teaching curriculum in this university and most universities in Nigeria. I mean, the significance of practical business situations can be learned and

unlearned through case studies as it is used in other climes. I will tell you our entrepreneurship mindset and intention are being affected as a result of the non-use of case studies, as it were.

The Nigerian educational system has undergone severe setbacks in developing and delivering qualitative education. One of the significant issues stakeholders have widely accepted is the configuration and nature of the curriculum and course content employed in teaching and learning. Most students explained the lack of qualitative entrepreneurship education due to the ambiguous curriculum and teaching instructions. As illustrated, the global trend of theory-based approach is gradually being eroded, and international institutions are now embracing a hands-on-desk practical approach through restructuring course curriculum and content in alignment with the global requirement for sustainable entrepreneurship education. One of the students reported as follows:

I am confident that the content of the curriculum and range of courses taught in most Nigerian universities are not in tandem with the principle of entrepreneurship education. In other words, the curriculum is not just outdated but one that does not have practical relevance to today's developmental timeline. One wonders how such an ambiguous and outdated curriculum can be employed to develop students' entrepreneurship mindset and used as a channel of development in the long run.

Another student recounts an ugly trend in the teaching methods employed in the transmission of entrepreneurship education. Precisely, the explanation captures the lack of many universities' understanding of the importance of an appropriate entrepreneurship course curriculum and contents for the transmission of entrepreneurship education.

We are only being taught in theory and not practical. This method cannot birth the desired outlook regarding having a student population with an appropriate mindset ready and willing to enter the business world. We have come of age and need to think to introspect to do away with this moribund approach and start employing the conventional system. It is not pleasing that we are still far behind, and the current course we are adopting cannot give us the desired results in developing students' skills, capacity and mindset for the business world.

4.2 Entrepreneurship pedagogy and students' entrepreneurship mindset

The lack of social entrepreneurship education in many Nigerian universities has dramatically affected many students' entrepreneurship drive and mindset. This assertion validates the unceasing unemployment rate and poor utility of social venture skills on the part of many Nigerian youths. Many students attest to the decreasing quality and standard of entrepreneurship education in Nigeria's higher learning institutions. Other students decried the scarcity of entrepreneurship faculty members who can effectively teach entrepreneurship education. The absence of committed and dedicated entrepreneurship departments in many of Nigeria's higher learning institutions is the significant bottleneck to developing youths with a robust and viable entrepreneurship mindset. This problem no doubt confirms the position and ineptitude role of the Nigeria University Commission- NUC towards revitalizing Nigerian universities for sustainable development.

The condition of the Nigerian education system is in shamble. In Nigeria, it will be hard to see universities where the subject of entrepreneurship is being taught as a single course of study. Where this course is being taught, it will be short of the best international standards. There is no way this kind of arrangement can ensure students' entrepreneurship mindsets are appropriately developed. We are in a tight situation in Nigeria regarding the appropriate entrepreneurship education for developing students' entrepreneurship mindset. These challenges have to be urgently addressed for student entrepreneurs to thrive.

Other perspectives shared include the absence of a substantial entrepreneurship department in the university. Most students report this as one of the significant bottlenecks hindering the realization of students' entrepreneurship intention with an effective entrepreneurship mindset. Again, this position exposes the standing

and role of NUC in ensuring that Nigerian universities are effectively managed. One of the students reports in affirmation as follows:

I think the Nigerian universities should start prioritizing what is essential for recovering the economy by carefully looking at the importance of entrepreneurship education. How do we talk about developing students' entrepreneurship mindset when we hardly have a department of entrepreneurship in several Nigerian universities? For instance, taking a clue from my school, there is no stand-alone department of entrepreneurship, which is a tremendous setback regarding student development in entrepreneurship.

The Nigerian educational space is being confronted with many challenges. These problems' fallout effect on Nigeria's entrepreneurship education has continued unceasingly. For example, with the increasing global attention on entrepreneurship as an essential tool for job creation, it is clear that the Nigerian government is yet to understand and harness the importance of entrepreneurship education to curb the impact of the global economic disruptions on the Nigerian economy. As explained earlier, most students explain the absence of entrepreneurship education in their course outline and curriculum. In addition, the debate on the importance of entrepreneurship education as a driver of a strong entrepreneurship mindset, particularly in reviving students' attitude towards becoming independent, belief system, abilities and the development of entrepreneurship self-worth cannot be over-emphasis.

The conventional means of building resilient entrepreneurs with a solution-driven mindset is no doubt through the inculcation of effective entrepreneurship education. Thus, the argument pursued in this paper is the responsibility of the Nigerian government to establish a culture of entrepreneurship education to identify and develop students' entrepreneurship mindset for business venture creation. One of the respondents reported below:

One essential thing that needs to be done if we are serious about developing the entrepreneurship mindset of students in Nigeria is the need to start prioritizing the importance of entrepreneurship education through the various institutions of learning in the country. The changes can begin by ensuring these universities incorporate entrepreneurship in the curriculum as a mandatory course for all students, irrespective of their discipline. I firmly believe this will assist in several ways by building students' minds and mental capacity to withstand business pressure for entrepreneurial success.

Other opinions shared by the majority of the respondents explain the importance of entrepreneurship education as an instrument capable of building students' entrepreneurial skills and self-confidence. It was argued that one of the pathways to developing students' entrepreneurship mindset is through the inculcation of entrepreneurship skills and self-efficacy learnt through entrepreneurship education. However, it was explained that entrepreneurship education had not provoked the suitable capacity and mindset for students' entrepreneurs, as reported by one of the respondents:

I think I need to explain how our educational institutions and the entire system is being managed in Nigeria. There must be a deliberate effort to examine these institutions if the government is genuinely willing to invest in developing students' entrepreneurship mindset. It is high time for the government to start looking toward entrepreneurship education in these universities of higher learning. So we need to start looking at the effectiveness of entrepreneurship education to build students' mindset, capacity and skills in preparation for learning the ropes and challenges of the business world.

4.3 Covid-19 pandemic and students' entrepreneurial mindset

The poor global economic performance is becoming more glaring with the disruptions caused by the emergence of the COVID-19 global pandemic with subsequent job loss and other disturbances to human and business entities alike. The effect of these events calls for the revitalization of social entrepreneurship pedagogy as an instrument to revive the Nigerian economy through building and developing students' entrepreneurship mindset.

The argument is the position of the Nigerian government's responsibility to provide a conducive business environment where entrepreneurship can flourish. With the negative effect of Covid-19, the development of students' entrepreneurship mindset has remained feeble. One of the students highlights how Covid-19 has affected their mindset towards embracing entrepreneurship as a venture below:

I can confirm to you that the emergence of the Covid-19 pandemic has affected graduate jobs. The increasing unemployment rate has been the order of the day since the emergence of the Covid-19 pandemic. As an individual, I think that students need to look beyond the consequence of Covid-19 and see how to help and develop themselves. For instance, before Covid-19, there were hardly any jobs, and now that we have Covid-19, it is clear that the few available jobs have gone extinct. It is high time we embrace and develop our mindset towards entrepreneurship for self-sustenance and the development of our country in general.

In addition, most of the respondents explain the inability of students to transform the disadvantage of Covid-19 into an advantage by developing their entrepreneurship mind through entrepreneurship education. One of the participants explained below:

I believe that students need to take up and embrace the opportunity that Covid-19 has thrown us to build our minds since there are non-existing jobs. The fact is that the Nigerian economy cannot revive itself soon from the pressure of Covid-19. Hence jobs will remain scarce as it is. We need to shift our focus from depending on jobs to creating jobs. We need to develop our entrepreneurship mind for this to be realistic.

The Nigerian government's role in managing the impact of the Covid-19 pandemic on the development of students' entrepreneurship mindset cannot be over-emphasized. For instance, the Nigerian government must come to terms with the identification of the threats of the Covid-19 pandemic on students learning process, especially entrepreneurship education, for a positive outlook. One of the respondents calls for the intervention of the Nigerian government through appropriate policies to ensure students' mindsets are developed towards entrepreneurship and, in turn, create social value through employment creation.

In my opinion, the government also has a role to play. The government must also know that the Covid-19 pandemic should be addressed in such a way that it will inspire a lot of benefits to the Nigerian youths. This should be done by putting appropriate measures in place to ensure students are given the right opportunity to flourish in their enterprise in this era of Covid-19 global pandemic.

5. Discussion of results

The prevalence of the Covid-19 pandemic has triggered a new research frontier for developing social entrepreneurship pedagogy through appropriate students' entrepreneurship mindset. This swing is followed by the necessity to highlight the importance of social entrepreneurship pedagogy as a tool for development. The narrative of students' entrepreneurship mindset development has been recurrently argued as a significant pathway for employment creation prospects (Okeke & Eme, 2014). The need for students to possess a strong understanding of entrepreneurship education with suitable pedagogy initiatives cannot be over-stretched. In other words, social entrepreneurship pedagogy is employed as a symbolic model to appreciate how students' mindsets can be developed in creating social values for economic growth and expansion.

From the results, the pedagogy of discussions, case studies, internships and seminars were identified as measures for students' entrepreneurship mindset; however, with little proof to sustain the claim as the primary pedagogical techniques employed in the transmission of social entrepreneurship education. These results explain the shortfall and declining state of the Nigerian universities where conventional pedagogy is not used in entrepreneurship education. Similarly, this description encapsulates the immense corruption being propagated in most Nigerian

universities and, by extension, the Nigerian ministry of education in their management of students' development (Alabi, Famakinwa & Ogunjimi, 2017). Regarding the effectiveness and suitability of course content and curriculum, results revealed that the university practice and usage of the vague and obsolete curriculum are issues promising poor students' entrepreneurship mindset. Accordingly, this finding mirrors the deplorable state of many Nigerian public universities, where outdated curricula and course guidelines are being used to transmit entrepreneurship education, portraying a departure from global standards. These findings corroborate existing studies (Kolawole & Ajila, 2015; Onuwa, 2016).

The findings also explain the poor administration and management of entrepreneurship education with a consequential impact on students' entrepreneurship mindset development. For instance, unpacked concerns include scarce material accessibility and resources for disseminating entrepreneurship education and little or non-existing entrepreneurship education department burdened with entrepreneurship education teachings. These conundrums constrict students' venture creation talents, among other enterprising skills (Wang, Hong & Gao, 2020; Zou, Huo & Li, 2020). With this in mind, it is crucial to emphasize that the Nigeria account is a perfect demonstration of a society whose developmental duties do not include the development of the students' populace through fitting social entrepreneurship pedagogy initiatives. This is enough to argue that the roles and responsibilities of the Nigerian government remain doubtful concerning the development of students' entrepreneurship mindset for economic growth in Nigeria. Priority in accessibility and effective use of pedagogy techniques are predicted to be low. Many discussions in the entrepreneurship literature have reported similar results (Osunde, 2016; Audretsch, Kuratko & Link, 2016). The impact of the Covid-19 pandemic on graduate jobs and downsizing across the sectors requires the development of students' entrepreneurship mindset for enterprise creation (Zou, Huo & Li, 2020). This is imperative to raise students with a self-employment mindset and aptitudes who can help put the Nigerian economy on the track to revitalization through involvement in various enterprising businesses and undertakings.

6. Conclusion and recommendations

The emphasis of this paper has been to understand the symbolic significance of social entrepreneurship pedagogy as a tool for students' entrepreneurial mindset development in a Covid-19 pandemic epoch. The Nigerian model offers a rich laboratory for analyzing entrepreneurship education's implication in addressing the country's ascending graduate unemployment. The conversation of social entrepreneurship pedagogy has long remained an omitted treatise in the history of Nigeria's higher institution of learning curriculum and course content. It is crucial to argue that any committed government should realize the importance of social entrepreneurship pedagogy for developing students' entrepreneurship mindset. In line with this, the study concludes the significance of social entrepreneurship pedagogy as a development index employed by Nigerian universities. This agreement is essential to curb the increasing incidence of graduate unemployment by inspiring students' entrepreneurship mindset and intentions. The novelty of the findings can be mirrored by the argument that students' entrepreneurial mindset cannot be developed except an urgent intervention is employed to transform the social entrepreneurship pedagogy and techniques for refined and robust students' entrepreneurial mindset experiences. The implication of this novelty is the need to have students with an entrepreneurial mindset and intention that can be employed to salvage the consequence of the Covid-19 pandemic on graduate jobs by creating employment through the application of social entrepreneurship pedagogy.

The curriculum and contents of entrepreneurship education in Nigeria must be revised to integrate practicability that dovetails with conventional pedagogy techniques. The study also deduces that with the ongoing wrecking impact of the COVID-19 pandemic on graduate jobs, the vital significance of developing students' entrepreneurship cannot be over-emphasized. Overall, the study recommends a more positive measure from the Nigeria Ministry of Education domain to introduce conventional social entrepreneurship

education as clout for developing students' entrepreneurial mindset, competence and entrepreneurial skills. The policy insinuation can be uncovered from the considerable motivation of students into social venture creation for economic development to salvage the increasing rate of graduate jobs. The study's limitations include the challenge of access stemming from the university administrators. However, after several convictions, access was granted to conduct the study. In addition another limitation is the challenge of recruiting students for the study, as there was a national strike at the time this study was conducted. Similarly, a number of students were accessed to participate in the research.

References

- Adekunle, S.O. & David, J.K. (2014). Entrepreneurship education in Nigerian universities: a tool for National transformation. *Asia and Pacific Journal of Education and Education*, 29, 155-175.
- Adelekan, S.A. Arogundade, S.T. & Dansu, O.O. (2016). Entrepreneurship and economic growth in Nigeria: evidence from small and medium scale enterprises (SMEs) financing using asymmetric auto-regressive distributed lag. *Global Journal of Commerce & Management Perspective*, 5(3), 43-50.
- Afolabi, A. (2015). The effect of entrepreneurship on economic growth and development in Nigeria. *International Journal of Development and Economic Sustainability*, 3(2), 49-65.
- Ahmed, T. Chandran, V. G. R. Klobas, J. E. Li'n'an, F. & Kokkalis, P. (2020). Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy. *International Journal of Management in Education*, 18(1), 10–32. <https://doi.org/10.1016/j.ijme.2019.100327>
- Alabi, D. L. Famakinwa, M. & Ogunjimi, S. I. (2017). Household-based enterprises in Osun State, Nigeria. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 17(1), 31-38.
- Audretsch, D. B. Kuratko, D. F. & Link, A. N. (2016). Dynamic entrepreneurship and technology-based innovation. *Journal of Evolutionary Economics*, 26(3), 603-620. <https://doi.org/10.1007/s00191-016-0458-4>
- Beech, N. & Anseel, F. (2020). COVID-19 and its impact on management research and education: threats, opportunities and a manifesto. *British Journal of Management*, 31(3), 447–449. <https://doi.org/10.1111/1467-8551.12421>.
- Boohene, R. & Agyapong, D. (2017). Rural entrepreneurship in African countries: a synthesis of related literature. *Journal of Small Business and Entrepreneurship Development*, 5(1), 43-54. <https://doi.org/10.15640/jsbed.v5n1a5>
- Chinonye, I. M. & Akinlabi, M. (2014). Entrepreneurship curriculum and pedagogical challenges in captivating students interest towards entrepreneurship education. *Research Journal of Economics and Business Studies*, 4(1), 1-111.
- Creswell, J. W. (2014). *Research design: qualitative, quantitative and mixed methods approach*. [E-book] California: Sage Publications. Available at: <http://www.researchgate.net/file.PostFileLoader.html?assetkey> [Accessed 16 October 2021].
- Davis, H. Hall, A. & Mayer, I. S. (2016). Developing a new measure of entrepreneurial mindset: reliability, validity, and implications for practitioners. *Consulting Psychology Journal: Practice and Research*, 68(1), 21-48. <https://psycnet.apa.org/doi/10.1037/cpb0000045>.
- Fayolle, A. & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: hysteresis and persistence. *Journal of Small Business Management*, 53(1), 75-93. <https://doi.org/10.1111/jsbm.12065>
- Guerrero, M. Urbano, D. & Gajón, E. (2020). Entrepreneurial university ecosystems and graduates' career patterns: Do entrepreneurship education programmes and university business incubators matter? *Journal of Management Development*, 39(5), 753–775. <https://doi.org/10.1108/JMD-10-2019-0439>.

- Gundlach, M.J. & Zivnuska, S. (2010). An experiential learning approach to teaching social entrepreneurship, triple bottom line, and sustainability: modifying and extending practical organizational behaviour education (PROBE). *American Journal of Business Education*, 3(1), 19-28. <https://doi.org/10.19030/ajbe.v3i1.364>
- Hussain, A. & Norashidah, D. (2015). Impact of entrepreneurial education on entrepreneurial intentions of Pakistani students. *Journal of Entrepreneurship Business Innovation*, 2(1), 43-52. <https://doi.org/10.5296/jebi.v2i1.7534>.
- Imafidon, K. (2014). Entrepreneurship development for sustaining economic growth in third world nations. *Journal of Emerging Trends in Economics and Management Sciences*, 5(7), 101-108.
- Kirkwood, J. Dwyer, K. & Gray, B. (2014). Students' reflections on the value of an entrepreneurship education. *International Journal of Management Education*, 12(3), 307-316. <https://doi.org/10.1016/j.ijme.2014.07.005>
- Kolawole, O. D. & Ajila, K. (2015). Driving local community transformation through participatory rural entrepreneurship development. *World Journal of Entrepreneurship, Management and Sustainable Development*, 11(2), 131-139. <http://dx.doi.org/10.1108/WJEMSD-06-2014-0016>
- Kumar, R. (2012). *Research methodology: a step-by-step guide for beginners*. 3rd edition. California: Sage Publications.
- Lopes, J.M. Gomes, S. Santos, T. Oliveira, M. & Oliveira, J. (2021). Entrepreneurial intention before and during COVID-19—a case study on Portuguese university students. *Education Science*, 11, 1-17. <https://doi.org/10.3390/educsci11060273>
- Malebana, M.J. (2017). Knowledge of entrepreneurial support and entrepreneurial intention in the rural provinces of South Africa. *Development Southern Africa*, 34(1), 74-89. <https://doi.org/10.1080/0376835X.2016.1259990>.
- Ndofirepi, T.M. (2020). Relationship between entrepreneurship education and entrepreneurial goal intentions: psychological traits as mediators. *Journal of Innovation and Entrepreneurship*, 9(2), 1-20. <https://doi.org/10.1186/s13731-020-0115-x>
- Ojode, L. Wolde, M. & Claiborne, J. (2021). Impacts of the Covid-19 pandemic on business education: case for the AACSB's agility standard. *South-Western Business Administration Journal*, 19(1), 1-25
- Okeke, M. I. & Eme, O. I. (2014). Challenges facing entrepreneurship in Nigeria. *Singaporean Journal of Business Economics and Management Studies*, 3(5), 23-34. <https://doi.org/10.12816/0010956>
- Onuwa, N. (2016). Rationale for students' preparation and entrepreneurship education in the face of global economic crisis in Nigeria. *Journal of Education and Practice*, 7(12), 200-204.
- Osunde, C. (2016). Strategies for economic growth: micro, small and medium enterprises in rural areas of Nigeria. *Business and Economics Journal*, 7(4), 1-4. <https://doi.org/10.4172/2151-6219.1000259>
- Ratten, V. & Jones, P. (2021). Covid-19 and entrepreneurship education: implication for advancing research and practice. *The International Journal of Management Education*, 19, 1-10. <http://dx.doi.org/10.1016/j.ijme.2020.100432>
- Rauf, R. Wijaya, H. & Tari, E. (2021). Entrepreneurship education based on environmental insight: Opportunities and challenges in the new normal era. *Cogent Arts & Humanities*, 8(1), 1-15. <https://doi.org/10.1080/23311983.2021.1945756>
- Saeed, S. Yousafzai, S. Y. Yani-De-Soriano, M. & Muffatto, M. (2015). The role of perceived university support in the formation of students' entrepreneurial intention. *Journal of Small Business Management*, 53(4), 1127-1145. <https://doi.org/10.1111/jsbm.12090>
- Saunders, M. Lewis, P. & Thornhill, A. (2009). *Research methods for the business student*. England: Pearson Education Limited
- Sekaran, U. & Bougie, R. (2016). *Research methods for business: a skill-building approach*. 6th Ed. United Kingdom: John Wiley and Sons Limited.
- Shields, P. M. & Rangarajan, N. (2013). *A playbook for research methods: integrating conceptual frameworks and project management*. Oklahoma: New Forums Press.

Trochim, W. M. K. & Donnelly, J. (2007). *The research methods knowledge base*. 3rd ed. Mason, OH: Thomson Custom Publishing.

Wang, Y. Hong, H. Li, X. & Gao, J. (2020). Marketing innovations during a global crisis: a study of China firms' response to covid-19. *Journal of Business Research*, 116, 214-220. <https://doi.org/10.1016/j.jbusres.2020.05.029>

Yin, R. K. (2016). *Qualitative research from start to finish*. 2nd Ed. New York: The Guilford Press.

Yusoff, A. Ahmad, N.H. & Abdul-Halim, H.A. (2016). Entrepreneurial orientation and agropreneurial intention among Malaysian agricultural students: the impact of agropreneurship education. *Advances in Business-Related Scientific Research Journal*, 7(1), 77-92. <http://dx.doi.org/10.1108/IJEER-07-2017-0213>

Zou, P., Huo, D. & Li, M. (2020). The impact of the COVID-19 pandemic on firms: a survey in Guangdong Province, China. *Global Health Research Policy*, 5(41), 1-10 <https://doi.org/10.1186/s41256-020-00166-z>

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DETECTION OF TAX EVASION USING TAX AUDITS IN THE SLOVAK REPUBLIC^{*}

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Abstract. Tax evasion causes a significant shortfall in revenues from the state budget in the Slovak Republic and the European Union. Therefore, the European Union states are looking for ways to detect tax evasion. The most common tax evasion occurs from value-added tax. It is not possible to eliminate tax evasion, but it is possible to effectively see tax evasion and fight against tax evasion through legislation as well as effective tax control. The article aims to point out illegal tax evasion in the area of value-added tax and to point out the fight against tax evasion. Methods of analysis and comparison were used in the research. The study was carried out based on data from the Financial Administration of the Slovak Republic, where the results of control activities were analyzed with a focus on value-added tax as well as the effectiveness of the control activities of individual tax authorities within the Slovak Republic. I drew attention to the most frequently occurring tax evasions of value-added tax. The continuation of the research will be the analysis of tax evasion in corporate income tax. These research results will be published in the following article.

Keywords: tax evasion; tax control; Financial Administration of the Slovak Republic, analysis of the detection of VAT; effectiveness of tax controls

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JEL Classifications: H83

1. Introduction

In theory and practice, we know the concept of creative accounting. Some elements of the creative accounting of business entities are reflected in tax evasion. Tax evasion is a negative phenomenon in Slovakia and throughout the world (Terzic & Berger, 2020; Li et al., 2021; Ermasova, Haumann & Burke, 2021; Alstadsaeter et al., 2022). It is not entirely possible to eliminate tax evasion, but it is possible to reduce the incidence of tax evasion (Ngah, Ismail & Abd Hamid, 2021; Hungerman, 2022; Rashid et al., 2022; Hola, Zidkova, & Arltova, 2022; Mu, Fentaw, & Zhang, 2022; Slemrod & Velayudhan 2022).

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To eliminate tax evasion, the control mechanism of the Financial Administration of the Slovak Republic through the tax and customs authorities is built.

2. Literature review

In the Slovak Republic, the primary indirect tax is value added tax. The abovementioned tax is regulated by Act No. 222/2004 Coll. on VAT as amended. In addition to domestic transactions, the mentioned tax applies to foreign commerce, which we call intra-Community supply and intra-Community acquisition of goods and services. In the case of these foreign transactions, there is scope for tax evasion. The Financial Administration of the Slovak Republic ensures the detection of VAT evasion through the control system. These and other findings are presented by the authors in their publications: Balko & Babčák et al. (2009); Beličková et al. (2010); Babčák (2012); Burák (2016); Babčák (2018), Schultzová (2018); Babčák (2019).

Tax evasion exists in every country. Individual states individually create control systems that are aimed at detecting tax evasion. In practice, individual countries define control systems in tax and legal legislation. It is impossible to eliminate tax evasion; it is possible to maximize the fight against tax evasion. The following authors provide information about these facts: Natalizi (2020); Sacer & Zyznarska-Dworczak, (2020); Silva, Jorge & Rodrigues (2021); Tawiah & Gyapong (2021); Stewart & Connolly (2021); Wijekoon, Samkin & Sharma (2021);

Creating an effective control system brings individual countries an increase in the revenue part of the state budget, which is the goal of individual Financial Administrations in the world. The following authors wrote about this idea in their publications: Cachia (2017); Frintrup, Schmidhuber & Hilgers (2020); Lombardi et al. (2020); Pavic (2020); Hellmann & Patel (2021); Roca (2021); Henrique et al. (2020); Miah et al. (2021).

3. Legislative control of business entities in the Slovak Republic and its content

Tax evasions are unwanted phenomena in the economy of the state. Therefore every state is looking for ways to eliminate them (Lincényi & Čársky, 2020; Wijekoon, Samkin & Sharma, 2021). One of the options for reducing tax evasion is tax control (Cachia, 2017). A tax audit is an essential act of tax proceedings. For tax purposes, it means a detailed examination of accounting cases and all documents necessary to determine tax liability in terms of plausibility, completeness and correctness (Balko & Babčák, 2009). Tax administrators have the right to carry out tax control (Beličková et al., 2010; Schultzová, et al. 2018). The fundamental rights and obligations of tax subjects and tax administrators, the course of tax control, appeal proceedings, and enforcement proceedings - are defined in Act no. 563/2009 Coll. tax code as amended (Burák, 2016). Tax authorities' employees carry out institutional assurance of tax control within the Slovak Republic's Financial Administration. Financial administration in the Slovak Republic consists of the following institutions:

- a) The Financial Directorate of the SR;
- b) Tax offices (8 tax offices, one tax office for large tax entities, 39 tax office branches and 29 tax office contact points);
- c) Customs offices (9 customs offices, 62 customs office branches and 18 customs office stations);
- d) Criminal Office of the Financial Administration.

The Financial Directorate of the Slovak Republic is a budgetary organization connected to the state budget through the fiscal chapter of the Ministry. The mentioned institution is the employer of employees who work in the public interest at the Financial Directorate of the Slovak Republic, tax authorities, customs authorities and the Criminal Office of the Financial Administration. The employees of these institutions have the status of state employees, whose service office is the Financial Directorate of the Slovak Republic.

The Financial Directorate of the Slovak Republic fulfils the following tasks:

- manages and controls tax offices, customs offices and the Criminal Financial Administration Office;
- develops a concept for the development of financial management following the strategy for the development of financial management;
- ensures the uniform application of special regulations and international agreements by which the Slovak Republic is bound by financial administration in the area of taxes, fees and customs and proposes their changes;
- informs persons about their rights and obligations in matters of taxes and fees and their rights and obligations according to a special regulation;
- advises municipalities in matters of taxes and local fees that they administer, in cases of tax administration and of a particular rule, and higher territorial units on tax issues that they can impose according to a special regulation;
- decides on appeals against the decisions of the tax authorities, customs authorities and the Criminal Financial Administration Office and examines their findings outside the appeal procedure;
- ensures and implements mutual international assistance and cooperation in tax administration and in the recovery of specific financial claims following the international agreement to which the Slovak Republic is bound and a special regulation based on the authorization of the Ministry of Finance of the Slovak Republic;
- ensures and implements mutual international assistance and cooperation in the performance of customs supervision and tax supervision under the international treaty to which the Slovak Republic is bound and special regulations.

The tax office section of the financial administration is a progressive organization connected to the budget of the financial directorate. Among other functions, tax authorities perform the following:

- perform tax administration;
- make decisions in administrative proceedings;
- control the collection and payment of administrative fees, which are revenue of the state budget, return administrative fees paid with stamps, impose fines and recover administrative expenses, which are revenue of the state budget, and transfer the total amount of administrative fees remitted by other administrative bodies to the state budget;
- return court fees based on the decision of the court or the state court administration body, cover the total amount of court fees paid by the courts to the state budget;
- inform tax subjects about their rights and obligations in matters of taxes and special regulations - notify law enforcement authorities of criminal offences in connection with violations of special rules; informs the financial directorate about these suspicions.

A schematic view of the main functions of the Slovak tax authorities is presented in Figure 1 below.

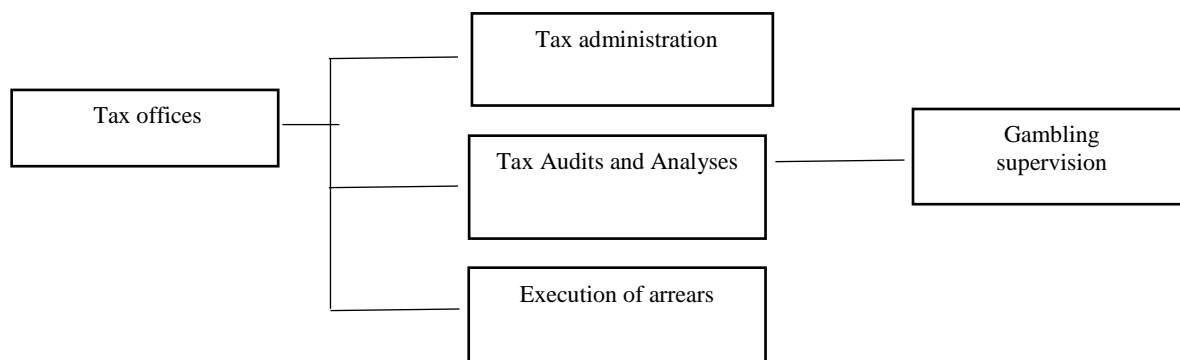


Figure 1. A schematic view of the main functions of the Slovak tax authorities

Source: Ministry of Finance of the Slovak Republic www.finance.gov.sk/lfp

The customs office section of the financial administration supervises compliance with laws, special regulations, other generally binding legal regulations and international agreements, which ensure the implementation of trade policy, financial policy and agricultural policy in the circulation of goods in contact with third countries and on the internal market if they so stipulate special regulations and takes measures to prevent illegal actions during the

import, export and transit of goods. The customs section of the Financial Administration also supervises compliance with particular regulations (e.g. laws on individual excise taxes). In addition to these activities, customs authorities perform the following tasks:

- ensure cooperation in a defined area with state administration bodies in the performance of tasks according to special regulations,
- Search for persons who have violated tax regulations or customs regulations, detect and prevent violations of tax regulations or customs regulations, perform tasks in the prevention, official detection and suppression of violations of customs regulations,
- they ensure the safety of the transportation of seized goods; they escort charged or paraded persons suspected of committing a crime,
- they provide cooperation to the Žilina Customs Office in verifying the fulfilment of the conditions for granting the status of an approved economic entity according to a special regulation,
- they inform the European Commission to the extent and under the requirements established by a particular statute in matters falling within its competence.

Figure 2 summarizes the main functions of customs offices.

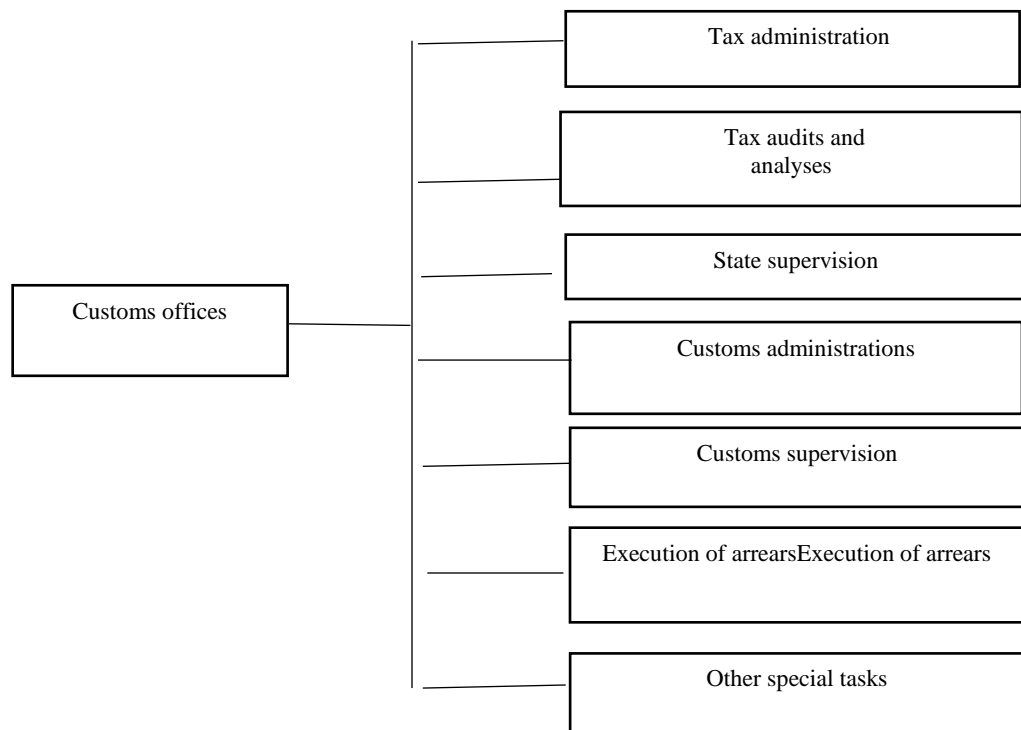


Figure 2. Schematic view of the main functions of the customs offices of the Slovak Republic

Source: Ministry of Finance of the Slovak Republic www.finance.gov.sk/lfp

The Criminal Office of Financial Administration is an advance payment organization connected to the budget of the Financial Directorate with its seat in Bratislava. The Criminal Office of Financial Administration exercises its jurisdiction over the entire territory of the Slovak Republic. This institution fulfils the following tasks:

- searches for persons who have violated tax regulations or customs regulations, detects and prevents violations of tax regulations or customs regulations, performs duties in the prevention, official investigation and suppression of violations of customs regulations,
- ensures the safety of transportation of seized goods, escorts seized or paraded persons suspected of committing a crime,
- provides cooperation to the Žilina Customs Office in verifying the fulfilment of the conditions for granting the status of an approved economic entity according to a special regulation,
- informs the European Commission to the extent and under the requirements established by a particular rule in matters falling within its competence.

The primary mission of the Financial Administration of the Slovak Republic is to ensure the uniform collection of taxes and duties in the total amount of the claim of the Slovak Republic and the EU, to ensure the protection of fiscal interests, trade policy measures and security interests of the state and the EU. The Financial Administration of the Slovak Republic fulfils the tasks that arise from the relevant legislation, especially in ensuring compliance with tax and customs regulations and preventing their violations, in the area of direct taxes and fees according to special regulations, in the supervision of compliance with generally binding legal rules, EU regulations and international contracts that ensure the implementation of tax policy, customs policy. The most important task of the Financial Administration of the Slovak Republic is to provide the performance of tax audits. With this function, it fights against illegal tax evasion. Tax evasion represents an undesirable situation for the state and the state budget. According to information from the Financial Policy Institute of the Slovak Ministry of Finance in the Slovak Republic, the estimated loss of VAT revenue reached 2.3 billion. Eur. This information shows that the most extensive tax evasions are in the Slovak Republic on value-added tax. Value added tax belongs to indirect taxes (consumption tax). The taxpayer pays indirect taxes, that is, the burden primarily on the final consumer because they form part of the realization price of taxable services.

4. Value added tax - a key tax in the Slovak tax system.

In the Slovak Republic, the VAT area is governed by Act No. 222/2004 Coll. on VAT, as amended.

- a) The mentioned legal norm in § 4 defines when the accounting units must be the payers of this tax. Mandatory registration as a VAT payer is referred to when the taxable person has reached the statutory turnover. The statutory amount of turnover for compulsory registration is 49,790 Euros for a maximum of 12 previous consecutive calendar months. In the case of reaching this turnover, the taxable person is obliged to apply for registration as a VAT payer to the relevant tax office no later than the 20th day of the month following the month in which he exceeded the statutory turnover. As a payer, he becomes a taxpayer on the day specified in the registration certificate.
- b) Legal registration occurs when a natural or legal person acquires a business or a part of it from a taxpayer, for example, based on bankruptcy, and is not yet a value-added taxpayer. In this case, the acquirer of the property or its part becomes a taxpayer by law from the business's acquisition date or its organizational component. Of course, the property's new acquirer must inform the tax office about this fact within ten days.
- c) Voluntary registration - a natural or legal person can apply for registration even if he has not reached the statutory turnover. In this case, it is a voluntary registration.

Regardless of whether it is mandatory, statutory or voluntary registration, the proof of registration of a taxable person is a registration certificate issued by the tax authority, in which the tax administrator assigns the taxpayer an identification number for value-added tax.

The identification number for value added tax is not only a certain administrative requirement, i.e. the registered entity is obliged to indicate it on all documents issued by it, but it also serves as "information" for the customer - the payer, that the goods are taken from the taxpayer and can deduct the input tax applied to him. The VAT identification number also plays an essential role in acquiring goods from another member state when the acquirer of the goods in the country is obliged to prove himself with the assigned identification number. Only in that case can a supplier from another member state supply him with tax-free goods. The acquirer then taxes these goods with a domestic value-added tax.

The member state assigns the business entity an identification number for value-added tax, which contains a specified number of numbers and characters. This number begins with a prefix indicating the relevant member state in which the entity's VAT identification number was assigned (see T).

Table 1. National codes of tax identification numbers of EU states

EU state	Code	EU state	Code	EU state	Code
Belgium	BE	Netherlands	NL	Austria	AT
Bulgaria	BG	Ireland	IE	Romania	RO
Cyprus	CY	Lithuania	LT	Slovakia	SK
Czech Republic	CZ	Latvia	LV	Slovenia	SI
Denmark	DK	Luxembourg	LU	Spain	SE
Estonia	EE	Hungary	HU	Sweden	SE
Finland	FI	Malta	MT	Italy	IT
France	FR	Germany	DE	Northern Ireland	XI
Greece	EL	Poland	PL		
Croatia	HR	Portugal	PT		

Source: European Commission https://ec.europa.eu/taxation_customs/vies/

As part of international cooperation with EU countries, the Financial Administration of the Slovak Republic operates the VIES system, which is an electronic tool for checking the validity of the VAT number of economic entities registered in the European Union for cross-border transactions related to goods or services. It is possible to verify the VAT number of a VAT payer in another member state (Northern Ireland) via the VIES web service; this request is sent via a secure connection to the relevant national database, where it is checked whether the given number is entered in the database as a value-added tax identification number. If so, "Valid" will be displayed. If so, "Invalid" will be displayed.

Depending on national data protection laws, some Member States (Northern Ireland) may also publish the name and address associated with the relevant VAT identification number in the format they are recorded in national databases.

A registered VAT payer maintains:

- records of taxable transactions made and received,
- submits a tax return on his behalf,
- in the control report, he provides data for his performed and received taxable services
- in the summary report provides data on cross-border deliveries of goods and services
- issues an invoice upon delivery of goods or services.

Table 2 contains the development of the number of VAT payers in Slovakia.

Table 2. Development of the number of VAT payers

Year	Number of registered VAT payers
2021	249 967
2020	243 762
2019	232 703

Source: Annual report of the Financial Administration of the Slovak Republic

Because business entities carry out business activities not only within Slovakia but also outside the territory of the Slovak Republic, there is room for illegal tax evasion. Tax evasion is defined as an unlawful measure in which the tax liability is concealed or ignored, i.e. the taxpayer pays less tax than he is required to pay by law by hiding income or information from the tax authorities (Babčák, 2018). Law no. 222/2004 Coll., on VAT valid in the Slovak Republic was amended several times; the current events of foreign business activities were addressed in the amendments to the laws; despite this, there is still room for the emergence of illegal transactions. That's why the Financial Administration of the Slovak Republic also focused on the detection of tax evasion in the area of VAT as part of its control activities.

5. Analysis of the detection of VAT tax evasion through the control activities of the Financial Administration of the Slovak Republic

The Financial Administration of the Slovak Republic secures the income part of the state budget through the control activity of direct and indirect taxes. The control activity of the financial administration is carried out with the focus of detecting tax evasion from tax controls of the value-added tax. Table 3 contains a numerical expression of VAT evasion detection and a comparison of the period 03/2022 with the period 03/2021.

Table 3. The numerical expression of detection of tax evasion from VAT tax audits

Tax Office	The volume of findings from Tax Audits as of 03/2022	The volume of findings from Tax Audits as of 03/2021	Index 2022/2021	Difference between 2022-2021
Bratislava	7 799 732 €	7 453 276 €	1,05	346 456 €
Trnava	16 887 849 €	8 243 885 €	2,05	8 643 964 €
Trenčín	6 958 748 €	5 015 043 €	1,39	1 943 705 €
Nitra	9 434 160 €	13 380 496 €	0,71	-3 946 336 €
Žilina	9 607 698 €	10 032 437 €	0,96	-424 739 €
Banská Bystrica	6 729 832 €	14 753 859 €	0,46	-8 024 027 €
Prešov	8 802 318 €	3 153 377 €	2,79	5 648 941 €
Košice	5 757 521 €	8 690 751 €	0,66	-2 933 230 €
Office for large economic entities	5 098 309 €	7 115 374 €	0,72	-2 017 065 €
Together	77 076 168 €	77 838 498 €	0,99	-762 330 €

Source:

Source: Financial Directorate of the Slovak Republic

https://www.financnasprava.sk/_img/pfsedit/Dokumenty_PFS/Zverejnovanie_dok/Vyrocné_spravy/FS/2022.05.13_VSFS_2021.pdf

Table 3 shows a decrease in the detection of tax evasion for 762,330 euros. An incorrect selection of subjects causes the mentioned decrease. This conclusion is also proved by Table 4, which contains the number of inspections carried out and the effectiveness of VAT inspection activities.

Table 4. Overview of performed VAT controls by tax authorities and the effectiveness of controls

Tax Office	Number of Tax Audits	of which the number of controls where VAT tax evasion was detected	Effectiveness of VAT controls in %
Bratislava	322	218	67,7%
Trnava	172	131	76,2%
Trenčín	120	83	69,2%
Nitra	158	120	75,9%
Žilina	150	95	63,3%
Banská Bystrica	136	99	72,8%
Prešov	140	99	70,7%
Košice	156	123	78,8%
Office for large economic entities	25	13	52,0%
Together	1 379	981	71,1%

Source: Financial Directorate of the Slovak Republic

https://www.financnasprava.sk/_img/pfsedit/Dokumenty_PFS/Zverejnovanie_dok/Vyrocné_spravy/FS/2022.05.13_VSFS_2021.pdf

Table 4 shows a 71.1% overall effectiveness of tax controls in detecting VAT evasion.

VAT evasion from the point of view of keeping the accounting agenda:

- Delivery of goods and services according to Sections 8 and 9 of Act No. 222/2004 Coll. o VAT (output tax)
 1. Failure to issue tax documents (invoices and documents from the electronic cash register) means that the accounting unit provided services or delivered goods, and the income is not registered in the accounting records. The stated tax evasion is the non-declaration of VAT and income tax reduction
 2. We are amending data on the number of taxable payments in the tax period on accounting documents.
 3. Deliberate non-payment of tax resulting from the submitted tax return (the reason may be secondary insolvency).
 4. Chain fraud occurs when the tax liability is shifted to more and more entities through targeted re-invoicing. At the same time, different tax periods are used, or a missing trader is also involved in the chain.
- Tax deduction (input tax)
 1. Registration of documents for fictitious taxable transactions enabling tax deduction. In some cases, business entities buy or sell such records among themselves.
 2. Duplicate tax deduction from the same document (in practice, mainly from ERP documents, as these documents enter the summary statement in one amount if the VAT for one business partner does not exceed EUR 3,000).
 3. Multiple deductions of tax on the same goods by different taxable persons.
 4. It is deducting tax from goods and services that are the subject of personal consumption by a business entity.

VAT evasion in Intra-Community trade

With the entry of the Slovak Republic into the European Union, the supply of goods and services between the Slovak Republic and the other EU member states is no longer referred to by the terms import and export but by the terms intra-community supply and intra-community acquisition of goods and services. Intra-Community delivery is exempt from VAT, but the right to deduction arises when VAT is paid. The basic premise of intra-Community trade for VAT purposes is that both the supplier and the customer are persons registered for VAT in different states of the European Union, and the goods are transported from one EU member state to another. As part of the financial administration internet portal, there is a VIES system through which it is possible to check online whether a business partner is or has been a VAT payer in individual EU member states.

The following tax evasions arise in connection with intra-Community trade:

1. Non-declaration of VAT on received services from providers from another EU member state in cases where tax liability arises from the received service.
2. Stores with used goods imported from another EU member state.
3. Business of foreign business entities on the territory of the Slovak Republic without VAT registration and its subsequent failure to remit VAT to the budget of the Slovak Republic.
4. Fictitious delivery of goods by a domestic taxable person to another EU member state and the related exemption from VAT. The sale is made domestically, and the tax is not remitted to the state budget.
5. Carousel frauds, which make up the largest share of the volume of VAT evasion. The main idea of these frauds is that a business company registered as a VAT payer concludes an actual or fictitious business

with a payer in another EU country and, according to individual rules, does not have to pay tax when delivering goods from another member state.

5.

The main signs of carousel scams are:

- a large number of mutually trading companies connected by property or personnel;
- a large number of companies united by property or personnel with their headquarters at the same address;
- unusual business operations;
- unreasonable manipulation of the price of goods, free shipping, accessible storage of goods, etc.;
- multiple business transactions with the same goods or in similar amounts;
- long-term low tax liability or frequent excessive VAT deductions;
- trading focused on a particular type of commodity with a high value;
- although the company declares large turnovers, it has only minimal or no assets or employees recorded in the accounts;
- sale, or company transfers to foreign owners or suspicious persons;
- missing accounting documents on business items.

Leaks from relations with third countries (import/export)

Third countries are not in the territory of the European Union, while the relevant regulations regulate the import and export conditions concerning them. When doing business with third countries, the following tax evasions may arise:

- illegal import of goods and their subsequent sale in the country without declaration and payment of VAT;
- legal importation of goods should subsequently be delivered to another EU member state under the VAT exemption regime while the delivery does not occur. Later, the sale is carried out in the country unofficially, and the tax is ultimately not remitted to the state budget. In practice, these are often excise goods;
- fictitious export of goods and the related application of excessive VAT deduction.

Final evaluation and recommendations

As part of the research project, based on the performed analysis, we found the following facts:

- The effectiveness of tax controls in the area of VAT is 71.1% - the stated percentage is low,
- Law no. 222/2004 Coll. About VAT is legislative, which is amended very often (4-5 times a year)
- A low number of inspectors and high turnover of employees performing VAT inspection.

These facts resulted in the following recommendations:

- Better selection of tax subjects for inspection. I propose increasing the efficiency of selecting topics for tax inspection. For example, to draw attention to the field of construction, where the many VAT evasion occurs. - Ensure the stability of the legislation governing VAT
- Increase the number of inspectors and strengthen control activities in value-added tax. In the case of VAT, the most significant tax evasions occur in Slovakia and within the European Union.
- I recommend making the information from the audit reports available to all auditors, not just those belonging to the top management of the financial administration. This decision would improve and simplify the selection of tax entities for inspection.
- Re-introduction of the payment of security for newly registered value-added taxpayers.
- Introduction of liability for value-added tax - the payer to whom goods or services are or are to be delivered in the country is liable for value-added tax.

In conclusion, it can be said that the stability of VAT legislation and established control mechanisms ensure adequate detection of tax evasion, which provides the revenue part of the state budget. The legislative process that governs VAT is changing, as it is a tax that will affect international transactions of business entities.

References

- Alstadsaeter, A., Johannesen, N., Herry, S.L., & Zucman, G. (2022). Tax evasion and tax avoidance. *Journal of Public Economics*, 206 Article Number 104587 <http://doi.org/10.1016/j.jpubeco.2021.104587>
- Babčák, V. (2012). Slovak Tax Law. Bratislava: EPOS, ISBN: 978-80-8057-971-5
- Babčák, V. (2018). Tax evasion and tax evasion and legal options for their prevention (by institutes of tax, commercial and criminal law). Košice: UPJŠ in Košice, ISBN: 978-80-8152-661-9
- Babčák, V. (2019). Tax Law in Slovakia. Bratislava: EPOS, ISBN: 978-80-5620-247-0
- Balko, L., Babčák, V., et al. (2009). Financial Law. Bratislava: Eurokódex. ISBN: 978-80-8944-702-2
- Beličková, K. et al. (2010). Budgetary Theory, Policy and Practice, Bratislava: IURA EDITION, ISBN 978-80-8078-335-8
- Burák, E. (2016). Tax inspection though the eyes of practice. Ján Šindlery, TESFO, Ružomberok, ISBN: 978-80-8925-373-9
- Cachia, F. (2017). Aggressive Tax Planning: An Analysis from an EU Perspective. *EC Tax Review*, ISSN 0928-2750
- European Commission https://ec.europa.eu/taxation_customs/vies/
- Ermasova, N., Haumann, C., & Burke, L. (2021). The Relationship between Culture and Tax Evasion across Countries: Cases of the USA and Germany. *International Journal of Public Administration*, 44(2), 115-131. <http://doi.org/10.1080/01900692.2019.1672181>
- Financial Directorate of the Slovak Republic
https://www.financnasprava.sk/img/pfsedit/Dokumenty_PFS/Zverejnovanie_dok/Vyrocne_spravy/FS/2022.05.13_VSFS_2021.pdf
- Frintrup, M., Schmidhuber, L., & Hilgers, D. (2020). Towards accounting harmonization in Europe: a multinational survey among budget experts. *International Review of Administrative Sciences*, Article Number 0020852320915640
<http://doi.org/10.1177/0020852320915640>
- Hellmann, A., & Patel, C. (2021). Translation of International Financial Reporting Standards and implications for judgments and decision-making. *Journal Of Behavioral And Experimental Finance*, 30, Article Number100479 <http://doi.org/10.1016/j.jbef.2021.100479>
- Henrique, Marcelo Rabelo; da Silva, Jessica Medeiros; Saporito, Antonio; et al. (2020). Tax accounting: bibliometric study of the accounting area between the period 2010 to 2020. *Revista Contabilidade E Controladoria-Rc C*, 12(3), 148-164.
- Hola, A., Zidkova, H., & Arltova, M. (2022). VAT Listings within the EU Member States and Their Impact On Tax Evasion. *CESifo Economic Studies* <http://doi.org/10.1093/cesifo/ifac002> Early Access MAY 2022
- Hungerman, D. (2022). Tax evasion, efficiency, and bunching in the presence of enforcement notches. *International Tax and Public Finance* <http://doi.org/10.1007/s10797-021-09710-0> Early Access JAN 2022
- Li, L.X., & Liu, K.Z., Nie, Z., & Xi, T.Y. (2021). Evading by any means? VAT enforcement and payroll tax evasion in China. *Journal of Economic Behavior & Organization*, 185, 770-784. <http://doi.org/10.1016/j.jebo.2020.10.012>
- Lincényi, M., & Čársky, J. (2020). Policy trusts in public policy in the Slovak Republic. *Insights into Regional Development*, 2(1), 456-468. [https://doi.org/10.9770/IRD.2020.2.1\(5\)](https://doi.org/10.9770/IRD.2020.2.1(5))

Lombardi, R., Schimperia, F., Smarra, M., Sorrentino, M. (2020). Accounting for infrastructure assets in the public sector: The state of the art in academic research and international standards setting. *Public Money & Management*, 41(3), 203-212. <http://doi.org/10.1080/09540962.2020.1840761>

Miah, MS., Jiang, HY., Rahman, A., Stent, W. (2021). The impact of IFRS complexity on analyst forecast properties: The moderating role of high quality audit. *International Journal of Finance & Economics* <http://doi.org/10.1002/ijfe.2456> JAN 2021 Early Access

Ministry of Finance of the Slovak Republic www.finance.gov.sk/lfp

Mu, R.Y., Fentaw, N.M., & Zhang, L. (2022). The Impacts of Value-Added Tax Audit on Tax Revenue Performance: The Mediating Role of Electronics Tax System, Evidence from the Amhara Region, Ethiopia. *Sustainability*, 14(10) Article Number 6105 <http://doi.org/10.3390/su14106105>

Natalizi, D. (2020). Public sector accounting contexts in the EPSAS change: a comparative study of Italy and Sweden. *International Review of Administrative Sciences* 0020852319894680 <http://doi.org/10.1177/0020852319894680>

Ngah, Z.A., Ismail, N., & Abd Hamid, N. (2021). A cohesive model of predicting tax evasion from the perspective of fraudulent financial reporting amongst small and medium sized enterprises. *Accounting Research Journal*, 35(3), 349-363. <http://doi.org/10.1108/ARJ-09-2020-0315>

Pavic, I. (2020). Analysis of Changes in International Financial Reporting Standards and Its Effects on Comparability and Consistency of Financial Statements. *Ekonomski Pregled*, 71(4), 331-357 <http://doi.org/10.32910/ep.71.4.2>

Rashid, M.H.U., Uddin, N., Haque, M.S., & Hossain, S.Z. (2022). Good governance and tax evasion: mediating effect of socioeconomic conditions. *Asia-Pacific Journal of Regional Science*, 6(2), 759-776. <http://doi.org/10.1007/s41685-022-00242-x>

Roca, F. (2021). The influence of mandatory adoption of IFRS in Argentina on value relevance of accounting information. *Journal of Applied Economics*, 24(1), 154-172. <http://doi.org/10.1080/15140326.2021.1900695>

Silva, A., Jorge, S., Rodrigues, LL. (2021). Enforcement and accounting quality in the context of IFRS: is there a gap in the literature? *International Journal of Accounting and Information Management* <http://doi.org/10.1108/IJAIM-08-2020-0126> JAN 2021 Early Access

Sacer, IM., Zyznarska-Dworczak, B. (2020). Assets Measurement Principles According to Croatian and Polish Accounting Standards. *Croatian Economic Survey*, 22(1), 41-64. <http://doi.org/10.15179/ces.22.1.2>

Slemrod, J., & Velayudhan, T. (2022). The VAT at 100: A Retrospective Survey and Agenda for Future Research. *Public Finance Review*, 50(1), 4-32. <http://doi.org/10.1177/10911421221094595>

Stewart, E., Connolly, C. (2021). Recent UK Central Government Accounting Reforms: Claimed Benefits and Experienced Outcomes. *Abacus-A Journal of Accounting Finance And Business Studies* <http://doi.org/10.1111/abac.12222> MAY 2021 Early Access

Schultzová, A. et al. (2018). Taxation, Tax Theory and Policy I., Bratislava: Wolter Kluwer, ISBN: 978-80-7598-108-0

Tawiah, V., Gyapong, E. (2021). International financial reporting standards, domestic debt finance and institutional quality: Evidence from developing countries. *International Journal of Finance & Economics* <http://doi.org/10.1002/ijfe.2575> MAY 2021 Early Access

Terzic, S., & Berger, W. (2020). Organization Tax Administration in the Function Reduction Tax Evasion. *Casopis Za Ekonomiju I Trzisne Komunikacije*, 10(1), 118-135. <http://doi.org/10.7251/EMC2001118T>

Wijekoon, N., Samkin, G, Sharma, U. (2021). International financial reporting standards for small and medium-sized entities: a new institutional sociology perspective. *Meditari Accountancy Research* <http://doi.org/10.1108/MEDAR-06-2020-0929> JUN 2102 Early Access

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DIGITAL PLATFORMS IN HEALTH CARE: EVALUATING WORKERS' EXPECTATIONS AND PROFILES DURING PANDEMIC TIME*

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Abstract. After the COVID-19, the search for innovative organizational and occupational change are essential to the achievement of sustainable health and economic targets. Instead, to fight the pandemic, one of the remedies is precisely to isolate one's own. The treatment for the most serious infections is treated in hospital, with working hours and emotional loads, not previously known by doctors and nurses. The study's aim is to examine the various expectations and profiles of doctors and nurses during a pandemic. The study's aim is to identify, using a regression analysis, the elements that both concerned health workers and those who assisted in supporting and overcoming this extended crisis. The data analysis highlights the strategic significance of the organization in the sector, specifically in respect to structures and services. In the context of the complex health organization, the conclusions suggest possible activities to be performed in order to execute an organizational change.

Keywords: digital platforms; health workers; management; quantitative data; pandemic time; regression analysis; COVID-19 Pandemic

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1. Introduction

More than half of the world's population has been in isolation and 90 countries that are preparing for re-start phase but, social distancing is a rule to which it is not possible to transgress, if we do not observe this rule the contagion can restart quickly and cause damage above phase 2, 3 and 4. Italy, after China, was the first country in Europe to be under pressure for COVID-19. Communities has been isolated and slowly need to recover, avoiding a new

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epidemiological health contagion. At macro level, all countries are very vulnerable to the COVID-19 pandemic, in part because of the lack of international support to achieve health and economic sustainability targets (Strielkowski et al., 2021). Yet the mounting financial burden, not only in developing countries, but also in Europe, in South Europe, several European Member States is facing the COVID-19 health crisis with high government debt and high interest payments. The legacy of the past has a negative impact on the management of the current crisis and affects the future prospects of the Countries. The search for innovative organizational and occupational change are essential to the achievement of sustainable health and economic targets (Lorincová et al., 2020; Mashhady et al., 2021). This involves developing affordable policies that make immediate progress on a number of issues and harmonizing economic incentives for long-term action. At micro level, within work groups, i.e. doctors and nurses, there have been, large changes in terms of job type, accumulated stress, expectation placed on doctors and nurses by all citizens. In the doctors and nurses jobs, there have been changes and within the hospital are initiating new relation and changing at work, between these two professional figures. Numerous studies and research have been conducted on COVID-19, with a focus on health and managerial issues (Taburchak, et al., 2021; Mikołajczak, 2021; Kopencova et al., 2021). During the pandemic, these two issues have a strong relationship as the theme of monitoring and social distancing has changed both social and job rules. Isolation is a mode that, until COVID-19, was envisioned, for example, as punishment for those who broke the law or a choice to understand because it is far from a common lifestyle. Instead, to fight the pandemic, one of the remedies is precisely to isolate one's own, to deprive one of the social and economic connections. At the same time, the treatment for the most serious infections is treated in hospital, intensive care, with working hours and emotional loads, not previously known by doctors and nurses. The reliance on information technology only fully solves this problem because in areas afflicted by the digital divide (Iqbal & Ahmad, 2022; Khan et al., 2022) as opposed to digital age, this solution also presents its difficulties and weaknesses. The presence of the digital divide also determines difficulties to implement geographic information system pandemic time. It is evident that in this case, smart hospital (SH) and digital platforms (Marino & Pariso, 2021c; Burinskas & Tvaronavičienė, 2021), as an information system implementation represents an important but unrealized domain. During this coronavirus period, the communication (Sanders et al., 2020) with support of information technologies is a strategic resource. These weaknesses are also present from a health care assistance point of view, with tensions that are developing global risk in times of coronavirus (Marino & Pariso, 2021; Nevskaya, N.A., 2021). Here too, the World Health Organization (2020) and the pandemic policy highlight at macro level, the weakness of different national governments and at micro level the changes emerging as profiles in health professionalism (Di Martino et al., 2020; Keakde & Muddana, 2022; Bhamare et al., 2019). Linked to this debate, but, a different World Health Organization point of view, highlight the political approach in coronavirus, time. This debate, take into account not only both, social and economic approach, but highlight a long term question related to health as a universal value. Furthermore, the Coronavirus, in terms of relations between people, propose a different model of development (Jašková, 2019; Okunola & Fakunle, 2021, Marino & Pariso, 2022; Chakhvadze, 2022, Grenčíková et al, 2020), in which the structured inequalities are emerging more than in the past. At this stage of the debate, it may be worth considering the possibility of rethinking health in terms of social, economic and institutional rules and objectives. These multipurpose is summarized in strengthen public health. At the micro level it is important, in order to carry out this action, to understand the following research question (RQ): what are the elaborations, of both doctors and nurses during the period of the pandemic, in relation to their work? The absence of this assessment risks not achieving the declared objective: to strengthen the public health and public choice system. The research we present in the paper develops in this logic. COVID has certainly modified the medical and nursing staff, how has the vision of their profession changed? This is the research question that the paper intend to answer at a stage in which dialogue with staff is possible, thanks to the success of vaccines and the decrease in ICU admissions and people who have died from the pandemic in Europe. The exit strategy is complicated; without involve the hospital staffs, including the Italian one. The sustainability of declaration that we must live with the virus is possible only understanding how medical work has changed. The relevant information is still insufficient to define active monitoring programs by medical personnel. There are cognitive limits to the phenomenon. Therefore, it is necessary to implement statistical tools for evaluating and predicting the

effectiveness of the monitoring activities of the changes taking place. These elements, job changes of both doctors and nurses, and assessments of it, are of primary importance for directing decision-making and making the best use of available resources (Marino & Pariso, 2021b). It is essential to develop sampling methods applied to monitoring these elements. The evaluation of the Italian Government is to start with active surveillance, not only of the virus but also the changes in public health professionalism. This concept may be summarized, as "surveillance is the systematic collection, storage, analysis and interpretation of data, followed by a dissemination of information to all the people who provided it and to those who must decide to undertake any interventions" (WHO, 2019). Active surveillance is identified as information for action. The information for action support organizational changes. In this context the National Health System, (NHS), play a strategic role in terms of information, active surveillance and healthcare. Italian health workers are the focal point of these three strategic targets. These targets, in pandemic time, may be realized with adequate skills, competencies and technologies. Italian health workers displays possible experimentation but also, bottlenecks and opportunity. The doctors and nurses is one of it and is considered by Italian Government as a strategic organizational asset related to exit of the pandemic time. The topic at international level, is focused from the same point of view, in relation to the technological potentiality and its adoption. From economic point of view, underline the strategic importance linked to doctors and nurses rules. These analyses should be integrated with doctors and nurses point of views. The Italian health workers offers an ample chance for experimentation. The research focuses on doctors and nurses of Italian hospitals. Its strength is linked to the richness of cultural assets of the country in medical fields, but also to the organizational bottlenecks and the high incidence of political decision, makers constitute the sector's negative features. After the introduction, section 2 displays literature review, section 3 results, discussion are in section 4, before conclusion in section 5. The paper is suitable for both the researcher and the operator interested in the study of the doctor and nurses profiles in and out the pandemic time.

2. Literature review

In the last European report linked to health sector (EU 2020) there are interesting evaluations and projections relating to the public sector, both on the technological and organizational side, with quantitative and qualitative elaborations but, the evaluation of what are the possible paths of public health workers in hospital in the post Covid phase in Europe is completely absent. This reflection opens the review of the literature because it highlights the need to deepen the issues related to health personnel working in hospitals. On the one hand, technological issues are summarized in a definition of the term "smart hospitals" may thus be: "A smart hospital is a hospital that relies on optimized and automated processes built on an ICT environment of interconnected assets, particularly based on Internet of things (IoT), to improve existing patient care procedures and introduce new capabilities" (Enisa, 2016, p. 9). On the other, efficient healthcare as well as an organized flow of patients, is able to reduce waiting times and the duration of hospital stays, thus also increasing revenues and the degree of patient satisfaction (Jankelová & Joniaková, 2021). The digital platforms in pandemic time (Marino & Pariso, 2021a; Marino et al., 2022a) can, also be implemented to identify, analyze and resolve the bottlenecks that could arise, thus contributing to the achievement of an efficient healthcare and patient flow in pandemic time. This stream of research is certainly important but not sufficient to understand how changing health workers are in pandemic time. It is strategic to investigate doctor and nurse roles and behaviors. It is interesting to note that there are numerous study linked to the topic but to the single Country. It is difficult to find comparative studies on the subject. It is probable that given the phenomenon still underway, albeit mitigated, it is difficult to propose comparative studies and perhaps it is more useful to deepen the study in individual countries to understand which are the common variables in individual countries and then evaluate the comparison between countries. The availability of information at all stages from the date of entry to the exit and future checks is, in the hospital, managed by ICT. The optimization of acceptance, planning and other processes will result in a significant reduction, if not total elimination, of interruptions in the flow of patient management. This approach has been widely implemented in pandemic time. In this approach, beyond technologies, doctors and nurses are also two other strategic pillars for the functioning of a smart hospital. It is useful to remember that doctors and nurses have

been stressed for over 18 months to ensure the necessary care. Some hospitals, such as intensive care, are the trenches in which health personnel work (Capone et al., 2020). It is interesting to note, however, that the changes related to how health professionals understand their work, expectations, are not within the technology or the technologies they use. How they understand the work, and the expectations? Starting from these assumptions, or, if the care and assistance in the long-term work stresses the health workers. How are the expectations of these figures changing? In the following paragraphs, we focus our attention on Italy. The Italy is one of first European countries (Gavurová et al., 2021, Leonov et al., 2021) to entry in pandemic phase with numerous deaths, hospitals and health personnel involved with numerous deaths even among hospital staff. Some geographical areas of Italy were particularly affected but at the same time Italy was one of the first European countries to have emerged from the pandemic phase.

2.1 Italian health policy

A competitiveness-enhancing reform should be based on professional skills, management capabilities and technological needs to be implemented but the process is still ongoing. Italian health workers, can be a driving force for to manage of the Italian hospital. As expanding sector, health, is a traditional economic activity and enhances cultural specificities, offering people new opportunities for employment. Moreover, numerous studies have shown that a timely analysis may be supportive to overcoming obstacles. Motivational factors and fitting in a group, working organization are essential as congruence between the functionality of services and organizational outcomes. Furthermore, following this research stream, knowing how and why to motivate employees is an important managerial skill. Furthermore, policy is strategic in order to formulate an integrated care and regulatory framework for the sustainable development of national health and health workers. Health system performance, is also an important element. Moreover, investment in information technology linked to health technology assessment. The organizational level, is not expressly addressed by the constitutional law, but is indirectly effected though the constitutional specification of the State's exclusive competence over civil law and social welfare, the State and the regions' concurrent jurisdiction over workplace safety and the professions. The regions regulate the organization and staff. All these organizational leverage may represent strategic tools for managing change. The limits upon regional power are not very clear, and the Constitutional Court has not provided uniform guidelines. Some decisions hold that the legal and economic status of health workers is the residual competence of the regions. Thus, in the exercise of this competence, the regions may even enact norms that are different from the national ones.

2.2 Italian health workers

The Italian National Health Service, was established in 1978 to grant universal access to a uniform level of care throughout Italy, free at the point of use, financed by general taxation. Beyond this, Italy's 20 regions are responsible for the actual planning and delivery of services. In recent years, 2018 - 2020, however, many regional health budgets ran into substantial deficit, leading to central authorities to imposing Recovery Plans on ten of them, of which eight are ongoing. These plans signaled the introduction of a dominant new player in national health care policy – the Ministry of Finance. Although the Ministry of Health maintained its role in ensuring that essential levels of care were provided at regional level, the Ministry of Finance became actively involved in designing and approving health care delivery. A large extent, then, the focus of this abrupt resumption of central control was financial and quality of care, risked becoming secondary. Many Italian health workers have had experienced a long stress related to performance but also to staff shortages due to lack of staff turnover. This absence of turnover has favored the aging of the staff with the possibility of withstanding short-term peaks of care and concentrated over time, the opposite of what happened in the pandemic period: long-term and continuous peaks of care over time. The Italian health workers are not the result of the simple addition of the performance, of single units. On the contrary, it depends on the relationship, which exists among all units, and the decisions linked to it, among the different targets and between these and the organizational and managerial actions. Starting from this assumption means to consider the expectations of doctors and nurses in the 20 Italian regions. In this context, (Italian health policy and Italian health workers) Italian health workers will be investigated. Although we are in

disjointed interests between administrative, organizational and managerial aspects health workers have responded to the pandemic with competence and quality ensuring the provision of emergency services related to the pandemic. This is an Italian peculiarity, the lack of clarity of the employment relationship even if public and the guarantee of the quality of the service, which can influence the choices of health personnel. Understanding what the implications are in this context for healthcare workers can initiate a broader path of accumulation knowledge also for the literature review related to the topic. Following this literature review the research question (RQ) highlight that, (H1): COVID has certainly modified the medical and nursing staff, but, how has the vision of their profession changed?

3. Methodology

A quantitative approach will be developed in order to answer the research question: Covid has certainly modified the medical and nursing staff, how has the vision of their profession changed?

3.1 *Dependent variable*

Starting from characteristics of doctors and nurses work' the performance has been measured. The performance has been divided in three categories: quality, time and cost performances. Each category involves indicators expressed by observable variables. The quality performance and the time performance are composed by observables variables that take into account the health workers expectation during pandemic time. Instead the cost performance is composed by internal organizational variables. Quality performance analyzes how the health services are provided and the perception of health workers. The variables "Age of each doctors and nurses", "Percentage of free time", "quality of relationships with other colleague's", "Workers friendliness" and "Info possibilities" are basic variables and assess the quality performance in terms of service and perception. "Time performance" expresses the quality of expectations in relation to its timing. The four variables, involved in this category, evaluating the averages of "length of service", "frequency of deaths treated", "shared information" and "system speed to support workers" are able to explain the degree of stress experienced by health workers. The category of "Cost Performance" involves internal variables of the organization aimed to the efficiency and effectiveness of the costs. The costs of cost of health personnel, cost of adopting technologies and cost of maintaining technologies are variables attributable to the efficiency in sense that measure the provider's ability to deliver service outputs within the limits of service inputs. A normalization (Singh & Singh, 2020) was performed for each index using the min-max method, which consists of a linear projection of each index on a scale from 0 to 10:

$$z = \frac{x - \min(x)}{\max(x) - \min(x)}$$

The beginning of the hypothesis test leads us to verify the existence of a linear relationship between all single indicators are standardized on a 0 to 10 scale (10 denoting the best performance). The three indices quality, cost and time, creating a general performance index, are created by equally weighting the components of each dimension with a linear regression model: (Figure 1)

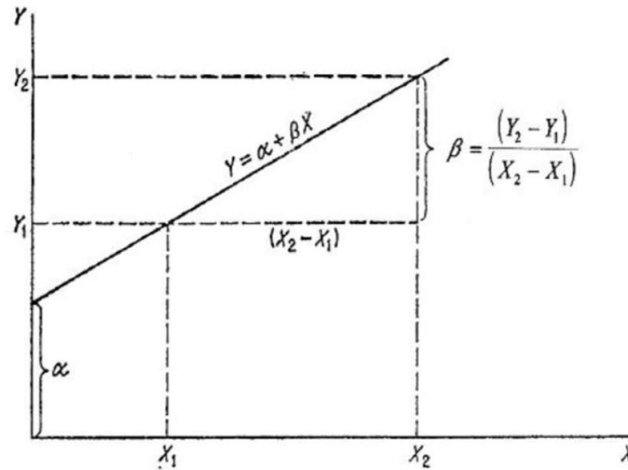


Figure 1. Relationship between all single indicators

Source: own making

Where Y is dependent variable and X_1, X_2, \dots, X_p are independent variables. The statistical link implied by the model is not symmetrical. It is the independent variables that fix the dependent variable and not vice versa. The model is statistically validated using the Pearson coefficient (r) to assess the existence of the linear correlation between the variable.

$$r = \frac{Cov_{xy}}{S_x S_y}$$

The collected data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 24.0. The data were collected at the end of June.

3.2 Independent variable

Starting from 20 privileged witnesses, the regional health councilors of the 20 Italian regions that make up the sector at legal, administrative and organizational level. On the basis of these 20 interviews, February - June 2022, has been elaborated a questionnaire, the same for doctors and nurses even if they were administered individually and separately for the 1600 interviewed, utilizing the follow topics:

Table 1. Questionnaire variables

Social variables and personal data	Surname
	First Name
	Age
	Sex
	Degree
	Years in the sector
	Years in the organization
	Marital status; (Married? How many children?)
	Previous work experience
	If Yes (Wich sector? How many years? Which role?)
Tangible Resource Assessment	Check of resources
	Health method applying during pandemic time
	The utility of diagnosis to prevent the Covid-19

Intangible Resource Assessment	The importance of analysis carried out, of your internal competences
	Method applying.
	Widespread skills in your organization.
	Evaluate the organizational process during pandemic time.
	Implemented processes to reengineer the organizational process in the last five months.
	(If yes) new balance between the organizational units.
	New levels of coordination implemented during pandemic time.
	New levels of integration implemented during pandemic time.
	New levels of control implemented during pandemic time.
	New behavior patterns acquired and consolidated during pandemic time.
	New decision patterns acquired and consolidated during pandemic time.
	New forms of learning in the organization during pandemic time
Change management process	At single level;
	As group;
	Between singles health workers;
	Between health workers groups;
Changes shared in the organization	Between single and group
	Between doctors;
	Between nurses;
	Between doctors and nurses
The elements that have been developed	In the group and its structure
	Leader and leadership
	Communication network
	Work group
	Social Identity
	Relation and discrimination between the groups
	Relation and discrimination between the single workers
	Processes of categorization and relational dynamics
	Motivational approach
	Actions related to aggression
	Situational approach
Cultural collective practices been created as a result of the changes	
Well managed and valued as a result of the changes	
The organization, implementing the changes, is able to give people a greater sense of belonging	
The degree of trust that workers manifest to those who govern the organization	
How many doctors - nurses, after implementing these changes, are still in the department?	
How many have changed department?	
How many have passed within the sector in department with different characteristics from the one of origin?	

Source: own making

Starting from these topics, a questionnaire has been elaborated (Hair et al, 1995) and a number of 1600 doctors and nurses employed in intensive care, were interviewed, based on 5000 contacts representing 10% of the total population, 800 from each category (doctors and nurses) divided by the 20 Italian regions, therefore, the total of the regions. A number of 40 doctors and 40 nurses were interviewed for each region (80 interviewees). The interviewees belong to the four geographical areas into which each region was divided (north, south, east, west) and within each area we chose the hospitals with the highest number of COVID-19 cases treated in the last six months before of the interview period. The questionnaire comprised 30 pre - developed, 15 for each part, Likert statements, designed to measure the five different areas of the questionnaire. Specifically, respondents were asked to indicate the level of criticism on a seven point scale, ranging from “strongly criticizes” (7) to “low criticizes” (1) on different items. The 30 Likert statements were explored by principal components factor analysis and varimax rotation, elaborated by Statistical Package for Social Science, version 28.0, which resulted in a linear regression. The interview have been carried out in basket. Each interview lasted about 65 minutes. It was not possible to obtain a list of all the doctors and nurses present in the hospitals of the Italian regions. The choice of the sample was non-probabilistic. The sample is drawn from the target population. Also with this type of sampling, it is possible to obtain estimates of the fundamental characteristics of the phenomenon being studied. The most used methods to carry out non-probabilistic sampling are: reasoned choice sampling, the statistical units to be included in the sample are chosen in a reasoned way (for example, based on the opinion of experts with specialist knowledge of the problem or on the literature) to select only those that best meet the research objectives. Sampling by shares, the statistical units to be included in the sample are selected so that the sample respects the proportions present in the population under study based on some variables (for example, gender, age group, geographical area). In this way we arrive at the definition of the quotas, which is the number of statistical units that must be included in the sample for each region.

4. Results

4.1 Sample profile doctors

The sample had 69% male and 31% female. The respondents were mainly married, between the ages of 56 and 65 (65%) over 65. The Education, Degree and Master have been declared of all doctors. Annually income is over 30.000. Therefore, our sample is representative of the Italian doctors in a pandemic time (Table 2).

Table 2. Demographic profile of respondents (Doctors N=800)

Variable		Frequency	Percentage
Gender	Male	550	69 %
	Female	250	31 %
Marital Status	Married	738	92 %
	Single	62	8 %
	Divorced	0	0 %
Age	18 – 25	0	0 %
	26 – 35	18	2 %
	36 – 45	26	3 %
	46 – 55	241	30 %
	56 – 65	490	62 %
	Over 65	25	3 %
Education	Degree	800	100 %
	Master	800	100 %
Annually Income	Over 30.000 Euro	800	100 %

Source: own making

4.2 Sample profile nurses

The sample had 59% male and 41% female. The respondents were mainly single, between the ages of 26 and 35 (628%) with a consistent percentage, 24% between 56 - 65 and 34 – 45 with 22%, moreover, over 65 are 4%. The Education Degree have been declared of all nurses. Annually income is under 30.000. Therefore, our sample is representative of the Italian nurses in a pandemic time (Table 3).

Table 3. Demographic profile of respondents (Nurses N=800)

Variable		Frequency	Percentage
Gender	Male	450	59 %
	Female	350	41 %
Marital Status	Married	238	29 %
	Single	562	71 %
	Divorced	0	0 %
Age	18 – 25	40	5 %
	26 – 35	218	28 %
	36 – 45	176	22 %
	46 – 55	141	17 %
	56 – 65	190	24 %
	Over 65	35	4 %
Education	Degree	800	100 %
Annually Income	under 30.000 Euro	800	100 %

Source: own making

4.3 Post COVID Phase and paths of public health workers: doctors

Table 4 contains essential information about doctors as public health workers. The ideal types of work, specifically tangible resource assessment, intangible resource assessment, change management process, changes shared in the organization, elements developed, and cultural collective practices created as a result of the changes, do not occur in pure form; however, differences along the defined criteria are observable, albeit in slightly more nuanced form. These changes were noted by doctors between the ages of 55 and 65, who make up the majority of Italian doctors as well as our sample. The layering of public health reforms, reforms that were not completed and were replaced by others, did not create a climate of trust in the change processes, distancing most doctors from the ideal type of work, substitute, from personal motivational incentives that would have weighed heavily on a positive response in the pandemic phase. This mental attitude manifests itself in actual actions such as the quality of the service offered, the amount of time worked, and the costs incurred. The remaining 30%, who are between the ages of 46 and 55, have attitudes and behaviors that are very similar to their older counterparts. It's worth noting that the two age groups, 46-55 and 56-65, account for 92 percent of the sample. Consistent with this type of response, the assessments regarding: well managed and valued as a result of the changes, the organization, implementing the changes, is able to give people a greater sense of belonging, the degree of trust that workers manifest to those who govern the organization; and how many doctors remain in the department after implementing these changes. How many people have changed departments? How many people have moved through the sector in departments with distinct characteristics from the one of origin? They are strongly related to past doctoral evaluations.

Table 4. Regression analysis: doctors

Questionnaire Doctors	Gener Performance Index	Quality Performance Index	Time Performance Index	Cost Performance Index
Social variables and personal data	-0,611*(0.239)	-1552(0.417)	-1177(0.264)	1.835**(0.583)
Tangible Resource Assessment	-0.372(0.234)	-0.244(0.377)	-0.005(0.272)	-0.664(0.127)
Intangible Resource Assessment	-0.217(0.210)	-0.218(0.234)	-0.319(0.341)	-320(0.237)
Change management process	-0.208(0.202)	-0.212(0.226)	-0.315(0.339)	-313(0.227)
Changes shared in the organization	-0.213(0.206)	-0.215(0.229)	-0.311(0.335)	-315(0.230)
The elements that have been developed	-0.112(0.318)	-0.215(0.132)	-0.312(0.241)	-0.113(0.175)
Cultural collective practices been created as a result of the changes	-0,521*(0.189)	-1432(0.365)	-1268(0.295)	1.854**(0.635)
Well managed and valued as a result of the changes	-0.452(0.355)	-0.352(0.487)	-0.012(0.298)	-0.534(0.99)
The organization, implementing the changes, is able to give people a greater sense of belonging	-0,534*(0.205)	-1336(0.334)	-1156(0.212)	1.672**(0.510)
The degree of trust that workers manifest to those who govern the organization	-0.434(0.327)	-0.365(0.498)	-0.032(0.385)	-0.521(0.127)
How many doctors -nurses, after implementing these changes, are still in the department?	-0,311*(0.339)	-1552(0.417)	-1177(0.264)	1.644**(0.456)
How many have changed department?	-0.372(0.234)	-0.254(0.326)	-0.034(0.152)	-0.434(0.112)
How many have passed within the sector in department with different characteristics from the one of origin?	-0.123(0.115)	-0.232(0.234)	-0.344(0.364)	-419(0.185)
Intercept	5.624**(0.546)	5.534**(0.571)	5.354**(0.567)	5.657**(0.301)
R ²	0.3751	0.354	0.530	0.327
Adj. R ²	0.213	0.184	0.204	0.162
N	800	800	800	800

* Significant at the 5% error level. ** Significant at the 1% error level Standard errors in brackets

Source: own making

4.4 Post COVID Phase and paths of public health workers: nurses

Table 5 contains pertinent information about nurses as public health workers. Despite the fact that the sample has a majority of singles, in accordance with national data, in the age groups 26 - 35 and 36 - 45 (50 percent), the most crucial factors also indicated by nurses are very comparable to medical workers. When we add the percentage of those aged 56 to 65, which differs significantly from the views made by fellow nurses included in the 50 percent, we find that 74 percent of nurses express a homogeneous internal evaluation that is not dissimilar to that of the doctors. In this case, the ideal types of work, specifically tangible resource assessment, intangible resource assessment, change management process, changes shared in the organization, elements that have been developed, and cultural collective practices that have been created as a result of the changes, do not occur in their pure form. Consistent with this type of response, the assessments regarding: well managed and valued as a result of the changes, the organization, implementing the changes, is able to give people a greater sense of belonging, the degree of trust that workers manifest to those who govern the organization; and how many nurses remain in the department after implementing these changes. How many people have switched departments? How many

people have moved through the sector in departments with characteristics that differ from the one of origin? They are significantly related to the prior ratings stated by nurses

Table 5. Regression analysis: nurses

Questionnaire Nurses	Gener Performance Index	Quality Performance Index	Time Performance Index	Cost Performance Index
Social variables and personal data	-0.601*(0.229)	-1452(0.407)	-1167(0.254)	1.735**(0.573)
Tangible Resource Assessment	-0.362(0.224)	-0.234(0.367)	-0.318(0.242)	-0.564(0.117)
Intangible Resource Assessment	-0.207(0.210)	-0.208(0.224)	-0.309(0.331)	-310(0.227)
Change management process	-0.202(0.201)	-0.202(0.216)	-0.305(0.319)	-303(0.217)
Changes shared in the organization	-0.203(0.203)	-0.205(0.219)	-0.301(0.315)	-305(0.220)
The elements that have been developed	-0.102(0.308)	-0.205(0.122)	-0.302(0.231)	-0.103(0.165)
Cultural collective practices been created as a result of the changes	-0.511*(0.179)	-1422(0.355)	-1258(0.285)	1.754**(0.535)
Well managed and valued as a result of the changes	-0.442(0.345)	-0.342(0.477)	-0.011(0.278)	-0.434(0.79)
The organization, implementing the changes, is able to give people a greater sense of belonging	-0.524*(0.201)	-1326(0.324)	-1146(0.202)	1.572**(0.410)
The degree of trust that workers manifest to those who govern the organization	-0.424(0.317)	-0.355(0.488)	-0.022(0.365)	-0.421(0.117)
How many doctors -nurses, after implementing these changes, are still in the department?	-0.301*(0.329)	-1542(0.407)	-1167(0.254)	1.544**(0.356)
How many have changed department?	-0.362(0.224)	-0.244(0.316)	-0.024(0.142)	-0.334(0.102)
How many have passed within the sector in department with different characteristics from the one of origin?	-0.113(0.105)	-0.222(0.224)	-0.334(0.354)	-319(0.175)
Intercept	5.614**(0.536)	5.524**(0.561)	5.344**(0.557)	5.557**(0.271)
R ²	0.3651	0.344	0.520	0.317
Adj. R ²	0.203	0.174	0.194	0.152
N	800	800	800	800
* Significant at the 5% error level. ** Significant at the 1% error level Standard errors in brackets				

Source: own making

The regression model suggests that there are a number of issues associated to the pandemic phase that, while observed and experienced by healthcare staff, have yet to be handled, and a change management process has not been launched.

5. Discussion

According to the literature, no change management procedure for health personnel has been established. At a specific level, health workers, while representing a resource for each country, have played a strategic role in terms of quality of service, working hours, and expenses during the epidemic. Concerning the medical personnel, it was determined that 490 of them, or 62 percent, are between the ages of 56 and 65 age group. The high age and thus the stay in the dated structure, on the one hand, does not show an immediate response to the new coordination, integration, and control levels of health work in the pandemic phase, on the other hand, these doctors have a

strong experience in diagnosis but this is insufficient to begin a process of change management in one phase as Covid 19. It is worth noting that there are no significant differences between the geographic locations studied. Despite the pandemic's dynamic phase, it should be recognized that these changes have affected individual workers rather than the organizational dimension as a whole as a response to the new phase. In this sense, we might highlight a static structure that does not support or anticipate medical personnel's anxiety. In terms of the nursing staff, 218 of them, or 28 percent, are between the ages of 26 and 35. Adding the age of the next range, we find that 50% of nurses are under the age of 45, making them younger than doctors. Regardless of this distinction, the essential topics indicated by this professional figure are comparable to those of doctors. In fact, despite the fact that the nurses' differing roles and responsibilities, on the one hand, do not demonstrate an immediate response to the new coordination, integration, and control levels of health work in the pandemic phase, on the other hand, these nurses do not have extensive experience in support work. In the case of nurses, their younger age, when compared to medical staff, was not used as a change agent. Indeed, during the epidemic, it was difficult to handle support activities in diagnosis and treatment. In these hospitals, personnel emphasize a number of obstacles related to quality, time, and cost of care during a pandemic. Doctors with a large presence in the structure, 490, and nurses (190) of the same age group, highlight these bottlenecks regardless of geographical location or type of role they perform in the department, as medical or nursing staff. These 680 health professionals have also contributed to the value of the epidemic, but they feel detached, as if they do not belong to the system, despite the fact that much has been accomplished in terms of personal skills and motivation. When evaluating Italian health care through the eyes of these workers, it is possible to notice that some common elements, typical of a culture with high permanence in the role, attention to the rules and procedures and only to the formality of its implementation, with bottlenecks highlighted in terms of quality, time, and costs. It is worth noting that these characteristics are identified by health workers as hospital bottlenecks that impede the process of change management. These health-care workers could be viewed as organizational leverage in order to contaminate other staff and establish a long-term change management process. In reality, the identified essential areas concern components that Italian hospitals should recognize and enhance. In the case of Italian hospital organizations, organizational leverage might mean the difference between success and failure of any reform attempt. Healthcare personnel were frequently left alone during the pandemic phase, and it is unclear whether they will be supported not only financially, but also psychologically and professionally in the coming phase. Based on the data analyzed, hospital ownership based on individual will may show to be a significant problem for the development of Italian hospitals. One of the key reasons that emerges is the lack of a change management process under pressure, as well as the low importance of workers in this change management. As others have noted the health organization must be examined in the context of the specific service conditions that they manage. Through this pandemic environment, quality change management may be addressed in consumer emotions and customer–employee relationships. There are no degrees of connection and communication between how medical professionals lived and how patients experienced the pandemic in Italian hospital organizations. We are still caught in the realm of medical care, with little attention paid to the phenomenon's organizational, psychological, and social dimensions. Furthermore, citizen associations are not only heard during the planning phase; in this situation, there is a gap between services supplied and services expected. Following the epidemic, hospitals are failing to meet a strategic condition: the congruence between service functionality and organizational outcomes. These similarities are not the result of an evolutionary framework; rather, the profile of health workers emphasizes competencies that might improve both services and costs. In this manner, the functional scope of structure is greatly expanded. Our results show that this profile does not consider service as general performance, and the single benefit beats the advantages of structure and service, which include the ability to manage and improve service quality, time, and cost. This is due to two factors. First, within pandemic time, the characteristics of interest articulation and the discussions between diverse interests are less complicated and autonomous, allowing more custom for service. The second reason is that the hospital might be regarded as a zone of flow for services rather than a space of conflict. The slowing evolution of pandemic time may affect the hospital in the conflict arena, taking into account the organization's lack of support action during epidemic time. The service and flow space are linked to pandemic skills and competences. These experiences can be used to modify the structural

composition and organizational setting based on the health of the personnel. The involvement of health staff, with special attention to attitudes and expectations, is a strategic distinction between hospitals before, during, and after a pandemic. This means that not only should the hospital's planning and provision not be divided among multiple actors, but also a quality of service must be implemented on a continual basis, increasing the possibilities of a more efficient and effective service. The decision-making process in hospital structures should constantly be closer to the needs of the client. From a more specific standpoint, our findings can be interpreted along two lines of thought. The health personnel appear to be appropriate in terms of not only the qualities of the service in pandemic times, but also the service delivery expectations. From this vantage point, health personnel have frozen their expectations and worked to battle the pandemic, but both motivation and expectation elements may shift after this fight. The service was returned to be delivered in a static manner. In contrast, in epidemic time, the service and its user demand are dynamic, and different components of the service must be considered at different stages of the process. As a result, the structure demonstrates intriguing and relevant competencies related to service planning, as well as obstacles related to quality, service time, and cost solutions. During a pandemic, the hospital's quality and planning operations are organized around the needs of the patients. This experience was stressful for the staff, but there was also an exciting learning process associated with working in the hospital. This might be an intriguing beginning point for Italian and European healthcare, as it should collect the experiences of healthcare personnel in various Member States. Unfortunately, as seen by the study of literature, Europe lags behind in expanding on these concerns. The European Union's investments are important for all member countries, but they relate to the dimension of development and growth of the health service, also with a logic of reorganization, but nothing has been addressed in terms of psychological support to the new expectations that arise, are determined in the time of the pandemic. This design flaw could provide significant challenges in the material restructuring of the one national health care. It is feasible to imagine a stronger healthcare system in terms of technology but a weaker workforce motivation. This type of gap does not result in care-oriented healthcare, which was essential during the epidemic and was based on the motives and expectations of healthcare personnel. Europe is made up of 27 member states, each of which has its own national health system as well as a set of regulations and objectives that are shared at the European Union level. Building the European Health Union is not easy, but the epidemic has proved that it is important.

Conclusions

Rescheduling the idea of hospital in pandemic time, starting from health workers can affect in the short term, with positive actions in terms of organization and management. The outcome of database, highlight that without these actions, may be amplified the severity of unresolved both organization and management problems. Furthermore, the deferral involves a high risk level if the pandemic time come back with unknown intensity. The fallout on health workers could be out of control requiring a rescheduling attentive to equity and efficiency healthcare services. Hospitals are complex network with multiple objectives and expectations. Several variables interact within Italian hospitals, which must be better understood and developed. These elements can help to improve the interaction between health workers and the organizations for which they work. The outcome of debates, related to research findings, rejects a perspective in which Italian and European health personnel are viewed as ultimately unchangeable. It must instead be viewed as always evolving and re-interpreting. The role of health workers is an open question, and the roles of health workers are strategic in order to strengthen the health sector and its performance.

References

- Burinskas, A., & Tvaronavičienė, M. (2021). The market structure simulation of heterogenous firms. *Economies*, 10(1), 9. <https://doi.org/10.3390/economies10010009>
- Bhamare, B. R., Jeyanthi, P., & Subhashini, R. (2019, September). Aspect Level Sentiment Analysis Approaches. In *2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBEA)* (pp. 1-5). IEEE. <https://doi.org/https://doi.org/10.1109/ICCUBEA47591.2019.9128706>
- Capone, V., Marino, L., & Donizzetti, A. R. (2020). The English Version of the Health Profession Communication Collective Efficacy Scale (HPCCE Scale) by Capone and Petrillo, 2012. *European Journal of Investigation in Health, Psychology and Education*, 10(4), 1065-1079 <https://doi.org/10.3390/ejihpe10040075>
- Chakhvadze, M. (2022). Social Capital in the Digital Age: Vocational Education and Training (VET) System in Georgia. <https://www.socialcapitalresearch.com/social-capital-in-the-digital-age/>
- Di Martino, B., Marino, A., Rak, M., & Pariso, P. (2020). Optimization and Validation of eGovernment Business Processes with Support of Semantic Techniques. In: Barolli, L., Hussain, F., Ikeda, M. (eds) *Complex, Intelligent, and Software Intensive Systems. CISIS 2019. Advances in Intelligent Systems and Computing*, 993. Springer, Cham. https://doi.org/10.1007/978-3-030-22354-0_76
- Enisa (2016) Smart Hospitals www.enisa.europa.eu
- Gavurová, B., Belás, J., Rowland, Z., & Kubák, M. (2021). The impact of agreement on government procurement use on the competition in Slovak healthcare sector. *Administratívne a Management Public*, 36, 102-115. <https://doi.org/10.24818/amp/2021.36-06>
- Grenčíková, A., Kordoš, M., & Berkovič, V. (2020). The impact of industry 4.0 on jobs creation within the small and medium-sized enterprises and family businesses in Slovakia. *Administrative Sciences*, 10(3), 71. <https://doi.org/10.3390/admsci10030071>
- Hair, J.F., Anderson, R.E., Tatham, R.L. & Black W.C. (1995). *Multivariate data analysis with readings*. Hemel Hempstead: Prentice-Hall. ISBN 0-13-187715-1
- Iqbal, T., & Ahmad, S. (2022). Transparency in humanitarian logistics and supply chain: the moderating role of digitalisation. *Journal of Humanitarian Logistics and Supply Chain Management*. <https://doi.org/10.1108/JHLSCM-04-2021-0029>
- Jašková, D. (2019). Assessment of social development in Slovakia in the context of human resources. *Central European Journal of Labour Law and Personnel Management*, 2(2), 21-32. ISSN: 2644-4542
- Jankelová, N., & Joniaková, Z. (2021, March). Communication skills and transformational leadership style of first-line nurse managers in relation to job satisfaction of nurses and moderators of this relationship. *Healthcare*, 9(3), 346. <https://doi.org/10.3390/healthcare9030346>
- Keakde, M. K., & Muddana, A. (2022). Study and analysis of various sentiment classification strategies: A challenging overview. *International Journal of Modeling, Simulation, and Scientific Computing*, 13(01), 2250001. <https://doi.org/10.1142/S1793962322500015>
- Khan, M., Parvaiz, G. S., Ali, A., Jehangir, M., Hassan, N., & Bae, J. (2022). A Model for Understanding the Mediating Association of Transparency between Emerging Technologies and Humanitarian Logistics Sustainability. *Sustainability*, 14(11), 6917. <https://doi.org/10.3390/su14116917>
- Kopencova, D., Rak, R., & Hudecova, V. (2021). Global phenomenon of threats and risk management in management and information technologies. *Issues in Information Systems*, 22(1), 75-83. https://doi.org/10.48009/1_iis_2021_75-83
- Leonov, S. L., Bilan, S., Yarovenko, H. M., Ostasz, G., & Kolotilina, O. V. (2021). Country's health profile: social, economic, behavioral and healthcare determinants. *Economics & Sociology*, 14(3) <https://doi.org/10.14254/2071-789X.2021/14-3/17>
- Lorincová, S., Čambál, M., Miklošik, A., Balážová, Ž., Gyurák Babel'ová, Z., & Hitka, M. (2020). Sustainability in business process management as an important strategic challenge in human resource management. *Sustainability*, 12(15), 5941. <https://doi.org/10.3390/su12155941>

- Marino, A., & Pariso, P., (2021) The Global Macroeconomic Impacts of Covid-19: Four European Scenarios, *Academy of Strategic Management Journal*, 20(2), 1–21 <https://doi.org/10.1544-1458>
- Marino, A., & Pariso, P. (2021b). Human resource management in public transports: organizational typologies and research actions. *VINE Journal of Information and Knowledge Management Systems* (51), 22-32 <https://doi.org/10.1108/VJKMS-01-2021-0006>
- Marino, A., & Pariso, P. (2021c). Digital economy: Technological, organizational and cultural contexts for the development of cooperation in Europe. *Entrepreneurship and Sustainability Issues*, 9(2), 363. [http://doi.org/10.9770/jesi.2022.9.3\(21\)](http://doi.org/10.9770/jesi.2022.9.3(21))
- Marino, A. & Pariso, P. (2021a). E-tourism: How ICTs Help the Local Tourist District Drive Economic Vitality. The Case of Campania, Italy. *International Journal of Innovation and Technology Management (IJITM)*, 18(03), 1-25. <https://doi.org/10.1142/S0219877021500097>
- Marino, A., Pariso, P., & Picariello, M. (2022). Information Networking and e-Government in United Nations and Europe. In *International Conference on Advanced Information Networking and Applications* (pp. 115-120). Springer, Cham. https://doi.org/10.1007/978-3-030-99619-2_11
- Marino, A., & Pariso, P. (2022a). The Digital Platform Experience of a Leading Country in Wine Tourism: From COVID-19 to the New Era. *International Journal of Innovation and Technology Management*, 2250021. <https://doi.org/10.1142/S0219877022500213>
- Mashhady, A., Khalili, H., & Sameti, A. (2021). Development and application of a service design-based process for improvement of human resource management service quality. *Business Process Management Journal*, 27(2). <https://doi.org/10.1108/BPMJ-04-2020-0164>
- Nevskaya, N. A. (2021). Post-COVID Economic Revival: Financial Aspects of Reform. In *Post-COVID Economic Revival*, I, 191-202). Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-83561-3_13
- Mikołajczak, P. (2021). What affects employment by NGOs? Counteraction to precarious employment in the Polish non-profit sector in the perspective of COVID-19 pandemic crises. *Oeconomia Copernicana*, 12(3), 761-788.
- Okunola, J. L., & Fakunle, S. O. (2021). Community participation: a pragmatic solution to negative impacts of COVID-19 on household's socioeconomic lives. *Insights into Regional Development*, 3(4), 21-33. [https://doi.org/10.9770/IRD.2021.3.4\(2\)](https://doi.org/10.9770/IRD.2021.3.4(2))
- Strielkowski, W., Firsova, I., Lukashenko, I., Raudeliūnienė, J., & Tvaronavičienė, M. (2021). Effective management of energy consumption during the COVID-19 pandemic: The role of ICT solutions. *Energies*, 14(4), 893. <https://doi.org/10.3390/en14040893>
- Sanders, K., Nguyen, P. T., Bouckenoghe, D., Rafferty, A., & Schwarz, G. (2020). Unraveling the what and how of organizational communication to employees during COVID-19 pandemic: Adopting an attribution allens. *The Journal of Applied Behavioral Science*, 56(3), 289-293. <https://doi.org/10.1177/0021886320937026>
- Singh, D., & Singh, B. (2020). Investigating the impact of data normalization on classification performance. *Applied Soft Computing*, 97, <https://doi.org/10.1016/j.asoc.2019.105524>
- Taburchak, A. P., Bychkova, S. M., & Butina, A. A. (2021). Analysis of Risk Factors for Applied Projects in the Ecosystem of Digitalization of the Economy, Transformation of science and business in new economic reality, International Scientific Conference, <https://doi.org/10.15388>
- WHO. (2019). Communicable disease surveillance and response systems Guide to monitoring and evaluating WHO, 16-17 https://data.unaids.org/publications/irc-pub04/surveillancestandards_en.pdf

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RESCUING FIRMS IN A CO-OPERATIVE WAY: WORKER BUYOUTS IN ITALY

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Abstract. We have carried out an empirical study of WBOs in Italy since 1985, describing the role of two key institutions - the legal framework and the cooperative associations. WBO operations were officially recognized in 1985 by the Italian policy-maker. The research has led to establishing a sample, wider than any previously done in Italy, resulting from the analysis of data collected by the Legacoop's Area Studi and provided by the main actors in the promotion and financing of WBOs (Cooperazione Finanza Impresa, COOPFOND, Federazione Trentina della Cooperazione) and the data published by Banca Etica and the Italian Network of Recovered Companies. This has led to being able to closely study the effectiveness and features of WBOs in Italy. We found that longer lifespans and higher rates of activity are associated with the membership of a cooperative association. The sectoral and geographic analysis confirms the conclusions of previous studies, highlighting a clear concentration of WBOs in the Central and North-Eastern regions of Italy and in the manufacturing sector. The average lifespan of the co-operatives, as well as the survival rate, proves the positive economic and social impact of WBOs in times of crisis. The findings have implications that go beyond Italy. We conclude discussing the importance of an appropriate legal framework supporting WBOs and the importance of cooperative associations, including their financial branches.

Keywords: Cooperatives; WBO; Workers Buy Out, Italy; Cooperative associations; employers' associations; institutions; employment policies

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1. Introduction

Worker buyouts (WBO), or worker-recuperated companies, involve the acquisition or salvaging of a company, or part thereof, by its existing workers (Bernardi & Monni, 2016; Vieta, 2013, 2015). This phenomenon is widespread throughout the world and, in Italy, as in many parts of Europe, takes place in the form of a co-operative (Barbot-Grizzo, 2020). However, this form of employee acquisition occurs in different forms depending on the national institutional contexts. WBOs are common in the US, Canada and South America (Martínez et al. 2010), while, in Europe, they are more commonly found in France, Italy and Spain. More isolated cases can be found in other countries, such as the UK, Greece, Turkey, Australia and Finland (Cicopa Europe, 2013; Tognonato, 2016; Azzellini, 2014; Cooperative News, 2015; Nolan et al. 2013; Vieta, 2016).

Generally, the acquisition of companies by its existing employees falls into three main types - the ‘labour conflict WBO’, the ‘Employee Share Ownership Plan (ESOP) WBO’, and the ‘negotiated WBO’ (Vieta, 2016, Monni et al., 2017c). In the first case, the workers acquire the company following a conflict between the owners and the workers themselves, with the latter actually often occupying the factory premises (Birchall, Ketilson, 2009). This type of WBO is typical of a good part of those set up in Latin America at the beginning of the 2000s (Kabat, 2011; Vieta, 2016) and, more recently, in Southern Europe in Greece, Turkey and Italy (Vieta, 2016). Instead, the ESOP type is probably the original form of this company ownership transfer originating in the USA and developing there from the 1950s. With this model, regulated in the USA only at the beginning of the 1970s (Menke and Buxton, 2010), the workers acquire a part or all of the company shares by means of a type of pension fund - the “ESOP Trust”-, or loans or using personal savings, while the owners enjoy tax advantages from the sale itself (Kruse et al., 2011). It has been particularly widespread in Canada (Hough, 2005) and the UK (Pendleton, 2002; Nolan et al. 2013), as well as in the USA (NCEO, 2021), foreseeing the possibility of a shared ownership involving the employees and traditional investors and, only in some rare cases, has the co-operative company form been adopted (Delgado et al., 2014). The third type provides for setting up WBOs in the co-operative form through a negotiation between the owner and employees, mediated by state authorities and facilitated and promoted under a clear juridical framework. This model is more widespread in Italy, France and Spain. These countries, where the co-operative culture is strongly rooted (Corcoran and Wilson, 2010), are today the only in Europe with a favorable legislation, measures and state mechanisms in place to accompany and support the employees in the company’s buyout (Cicopa Europe, 2013).

The theme of worker-recuperated companies has increasingly been attracting interest in the scientific and political debates; nevertheless, there is a very limited number of papers published on WBO in ranked international journals. Already with the 2008 economic recession and even more so following the immediate consequences of the present pandemic crisis, the questions regarding the safeguarding of employment and maintaining the productive cycle have become more and more relevant, with these types of operations presenting themselves as possible solutions (Nolan et al. 2013; Gulland, 2008; Orlando, 2021; Wright, 2014, Tognonato, 2016). Within each country, research on the issue is growing, even if it is still a long way from the possibility of mapping the actual dimensions of the phenomenon at international level. In table 1, we have listed some key academic contributions and reports by country.

Table 1. Literature on WBOs by country

Country	Key contributions
Argentina	Vieta 2019; 2020a, 2020b, Rebon, 2016; Ruggeri, 2010, 2014; Vigliarolo, 2011; Bryer, 2011; Fields, 2008; Villani, 2010; Ghibaudi 2004; de Almeida Martarello, 2016; Rebón, 2016
Australia	Albanese, 2015; Jensen, 2016;
Brazil	Henriques et al., 2013; Juvenal, 2006; Ghibaudi, 2004; de Almeida Martarello, 2016
Canada	Bernstein & Hodge, 2008, Long, 1995; Quarter & Brown, 1992; Hough, 2005; Gunderson et al., 1995; Morin, 2012; NCEO, 2021
Colombia	Huertas, 2011
France	Di Stefano, 2018
Italy	Bernardini, Viola, Lilli & Esposito, 2016, Vieta, 2015; Monni, Novelli, Pera & Realini, 2017a; Monni, Novelli, Pera & Realini, 2017b; Monni, Novelli, Pera & Realini, 2017c; De Micheli, Imbruglia & Misiani, 2017, Marchi, 2017
Mexico	Luna & Pacheco, 2018
New Zealand	EOA, 2021.
Spain	García & Gutiérrez, 1990; Martínez et al., 2010; 2012
UK	Nolan et al., 2013, Pendleton, 2002; EOA, 2021; Wright et al., 1989.
Uruguay	Martí et al., 2013; Rieiro, 2009
USA	Freeman, 2007; Blasi et al., 2017
Venezuela	Ríos, 2010

Where Italy is concerned, this article is based on previous works (Monni, 2017b) and is a step towards mapping WBOs. An up-to-date dataset has been created, based on Legacoop's Area Studi WBO data bank, integrating data from different sources to provide an overview. In the Italian legal system, WBO operations were officially recognized under Law n. 49 of February 27, 1985*, which defined their social and economic importance and laid down the conditions of their development through the setting up of a revolving fund to finance buyout projects by workers. From 1985 until today, the Italian policy-makers have intervened on numerous occasions to support these acquisitions, modifying the regulatory framework and the tools for promoting them (Cataudella, 2016). However, the setting up of WBOs can be separated into two different historical periods, marked by two main legislative frameworks (Vieta & Depedri, 2015) - the Marcora I Law (1985-2002), and its following reform in 2001 - the Marcora II Law (2003 - today).

1.1. The evolution of the Italian legislation

With the introduction of the Marcora Law in 1985 (Marcora 1), there occurred, for the first time, a system to promote and finance the conversion of a company into a co-operative through the buying of the company itself or part thereof by the workers laid off or by those on redundancy payments. This was based on two financial tools: Fooncooper, a revolving fund managed by Banca Nazionale del Lavoro (BNL, then a state-owned bank) and focused on providing loans to foster co-operative development plans (also including WBOs); and another fund, the Fondo speciale per la salvaguardia dei livelli di occupazione†, which was, instead, to provide economic contributions to financing institutes (CFI and SOFICOOP‡) to participate in the worker recuperated company's capital. The allocation of the public funding in the acquisition, through the participation of CFI and/or SOFICOOP was regulated by a ratio of 3:1 of public investment and of worker investment. In this context, under Decree 223/1991 (art. 7, subpara. 5), the possibility for workers of a company in crisis to acquire it requesting in

* The "Marcora Law", "Provisions for credit to co-operatives and urgent measures to safeguard employment levels".

† Special fund to safeguard employment.

‡ CFI and SOFICOOP are «institutional investors», operating since 1986 as the instruments to implement the Marcora Law, set up with "a specific mission of public interest" such as supporting employment in a cooperative form, and with the Ministry for Economic Development (MED) holding a 98.6% share of the capital and an overseeing role as a member in the administrative and supervisory board. In 2019, the Cooperation Finance Enterprise - CFI incorporated SOFICOOP

advance and in a single solution their expected social benefits was introduced, provided that this sum would be used for the company capitalization of the new cooperative. With the infringement proceedings set underway in 1993 by the European Community for a breach of the EU competition rules pertaining to the 1985 Marcora Law, at the end of the '90s, there emerged a deadlock in carrying out any company acquisitions in the form of a WBO. This came to an end only in 2001 with the reform of the first Marcora Law.

Under this reform, Law 57/2001, hereby called the Marcora II Law, some of the points raised by the European jurisdiction were included and the misunderstanding was clarified, being fueled at the time by the MED§ whereby the participation in the new cooperative companies' capital, by CFI and SOFICOOP, had been interpreted as state aid or non-payable grants to the cooperatives themselves. In particular, the ratio between public and private investments in the acquisition became 1:1, while it was specified that the non-payable grants of the Special Fund were not allocated to the cooperatives, but rather as a company capital of the financing companies, CFI and SOFICOOP, to be then invested by the latter as a share in the capital of the cooperative companies set up after their recovery. From that moment, the legislation remained practically unchanged in its basic structure. However, an important update to clarify the relevant Italian situation was introduced with Law 145/2013 (art. 11, subpara. 2), establishing the pre-emptive purchasing right on the part of the workers involving the acquisition of companies undergoing bankruptcy or liquidation proceedings, and a favorable tax agreement for financing deriving from the Marcora funds.

2. Mapping WBOs in Italy

Given the difficult socio-economic context Italy is dealing with today, worker buyouts could clearly be, in the near future, an important opportunity to counter the risks of a further industrial decline resulting from the effects of the crisis. In this paper, a mapping of the worker-recuperated companies in Italy from 1985 until the present has been carried out. The research, thanks to Legacoop's Area Studi WBO collection work, has led to establishing a sample, wider than any previously made in Italy. The Italian WBO dataset (AREA STUDI LEGACOOOP, 2020) results from the analyzes and processing of data kindly provided by the main actors in the promotion and financing of WBOs (CFI, COOPFOND, SOFICOOP, Federazione Trentina della Cooperazione), and the data collection available on the portals of Banca Etica** and the Rete Italiana Imprese Recupera††. The sources were further integrated with the data on balances, on company legal status and employment from the Aida Bureau van Dijk/Area Studi Legacoop databank. Following a description based on the sector, region, employment and association of WBOs set up in Italy, the failure rate and average lifespan of the WBOs were analyzed, then the main success factors were identified and, finally, the main economic indicators of the still active companies were evaluated (turnover, capital, net worth, profits). Furthermore, in the last paragraph, an initial estimation of the economic return, in terms of tax revenue generated by the worker-recuperated companies will be presented.

§ Following is the reconstruction of Professor Alberto Zevi, CEO of CFI from 1986 to 2011, of what happened leading up to the infringement proceedings by the European Commission: *"The activities of CFI during the first phase were marked by an interpretation of the law that came from the Ministry, as well as from the cumbersome nature of the procedures foreseen. In fact, the innovations found in the provision had implications resulting in calling for a change in the behavior of both the cooperative movement (and CFI), committed to implementing the law, and the public authority, called on to play a support and supervisory role. The first capital subscriptions only actually occurred in 1987 and the differences in the interpretation of the law resulted in a substantial delay in the successive allocation of the resources. In particular, while the company held that it would have been necessary to foresee, sooner or later, a repayment to CFI of the capital invested (and, consequently, had asked the cooperatives to consider this in their statutes), the MED and the Audit Courts asked to cancel this provision, with the risk being to block the disbursement of the funds. It is important to underline this point as, the adoption of the MED and Audit Courts indications were the basis of the following infringement proceedings of the European Commission. And precisely because no repayment of the capital invested in the cooperatives was forecasted, the European Union was forced to consider that capital as a form of state aid and, therefore, incompatible with the competition laws. From 1996, these proceedings caused CFI activities to be frozen until the reform of the Marcora Law in 2001. The reform, above all, showed itself to be necessary despite the MED, also on the basis of CFI suggestions, being able to come to an agreement with the European Commission. This agreement, however, was not formalized due to the enactment of the decree not being consequently registered by the Audit Courts. It was necessary to turn to the intervention of the parliament which, only in 2001, included in the reform law of the Marcora what had been previously agreed on with the EC".*

** Banca Etica <https://www.bancaetica.it/blog/storie-realta-finanziate/workers-buyout-miracoli-italiani-dai-lavoratori>

†† Rete Italiana Imprese Recupera <https://impreserecuperate.it/>

From the Marcora Law entering into force until today, 323 worker-recuperated companies (Tab. 2) in co-operative form have been identified. These acquisitions have involved 10,408 workers^{‡‡} with a company survival rate of 33%. Approximately 71% of these buyouts set up since 2003 (introduction of the Marcora II Law reform) are still active today.

Table 2. WBOs set up in Italy under the 2 main legislative frameworks

LEGISLATIVE FRAMEWORK	WBO 1987-2019				ACTIVE				INACTIVE			
	NO. ENTERPRISES		EMPLOYEES		NO. ENTERPRISES		EMPLOYEES		NO. ENTERPRISES		EMPLOYEES	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
MARCORAI LAW	218	67.5%	7,648	73.5%	32	15%	2,005	26.2%	186	85%	5,643	73.8%
MARCORAIILAW	105	32.5%	2,760	26.5%	75	71%	1,995	72.3%	30	29%	765	27.7%
TOTAL	323	100%	10,408	100%	107	33.1%	4,000	38.4%	216	66.9%	6,408	61.6%

Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

More than 63% of the sample (206 companies) includes cooperatives, which are, or were previously, members of cooperative associations (Tab. 3). Out of those still active, 88% belong to one of the main Italian co-operative associations^{§§}. The analysis on the operational status reveals that the member companies have an overall survival rate of 45.6%, clearly much higher than the 11.1% of non-members.

Table 3. WBOs set up in Italy from 1987-today - cooperative association membership

ASSOCIATION	WBO 1987-2019			ACTIVE				INACTIVE			
	No.	%	Empl.	No.	% Total Wbos	% Active Wbos	Empl.	No.	% Total Wbos	% Inactive Wbos	Empl.
NON-MEMBERS	117	36.2%	4,542	13	4%	12.1%	220	104	32.2%	48.1%	2,699
MEMBERS OF A COOPERATIVE ASSOCIATION	206	63.8%	5,866	94	29.1%	87.9%	3,780	112	34.7%	51.9%	3,709
TOTAL	323	100%	10,408	107	33%	100%	4,000	216	67%	100%	6,408

Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

At present, the region with the highest share of WBOs is Tuscany (20%), followed by Emilia-Romagna (16%), Lombardy (12%) and Marche (10%). The higher concentration of WBOs in the Northern and Central regions is probably due to the greater presence in those areas of companies working in the manufacturing sector. Southern and Island regions host in total only 11% of the WBOs (Fig. 1). In some regions, there is a high share of cooperatives, which are members of the main Italian cooperative associations. Amongst these regions, we find the Islands and Reggio-Calabria, Emilia-Romagna and Liguria, as well as Trentino Alto-Adige (Fig. 2).

^{‡‡} The data on employees in WBOs regarding active companies (109), and the 2018 balance data come from the Aida Bureau van Dijk databank. Where inactive companies are concerned, the highest value of the Aida Bureau van Dijk data of the last available year was considered, as well as that available in the year declared in the databanks of the main operators in WBO promotion and financing.

^{§§} The three main Italian cooperative associations are Legacoop, Confcooperative and AGCI.

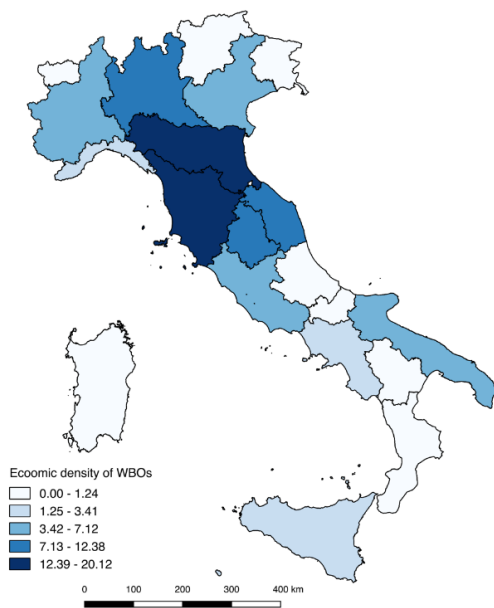


Figure 1. WBO distribution in Italian regions

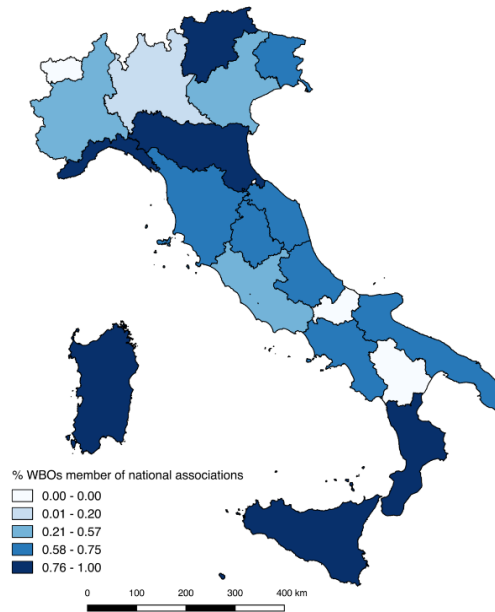


Figure 2. WBO members of national cooperative associations (%)

Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

WBOs set up in the Islands and the North-East register an above average survival rate, while the highest failure rates can be found in Lombardy, Liguria and Tuscany. Where sector is concerned (Fig. 3 and Tab. 4), most of the worker-recuperated companies (79.6%) can be found in manufacturing. This is compatible with the results in the database from the work of Vieta and Monni (Vieta et al., 2015; Monni et al., 2017), and is probably due to the peculiar composition of the Italian manufacturing sector, mainly made up of SMEs. These companies are highly labour-intensive, but of low capital injection and low entry costs (Ben-Ner, 1988), which helps in the setting up of WBOs (Vieta et al., 2015).

Within the manufacturing sector, WBOs tend to be more concentrated in the traditional categories and those typical of the so-called Made in Italy production such as fashion, leather goods, industrial design, glass and ceramics. In the other sectors where numbers are higher, we can find services - mainly in logistics and transport - and services linked to the cinematographic or information and communications industries.

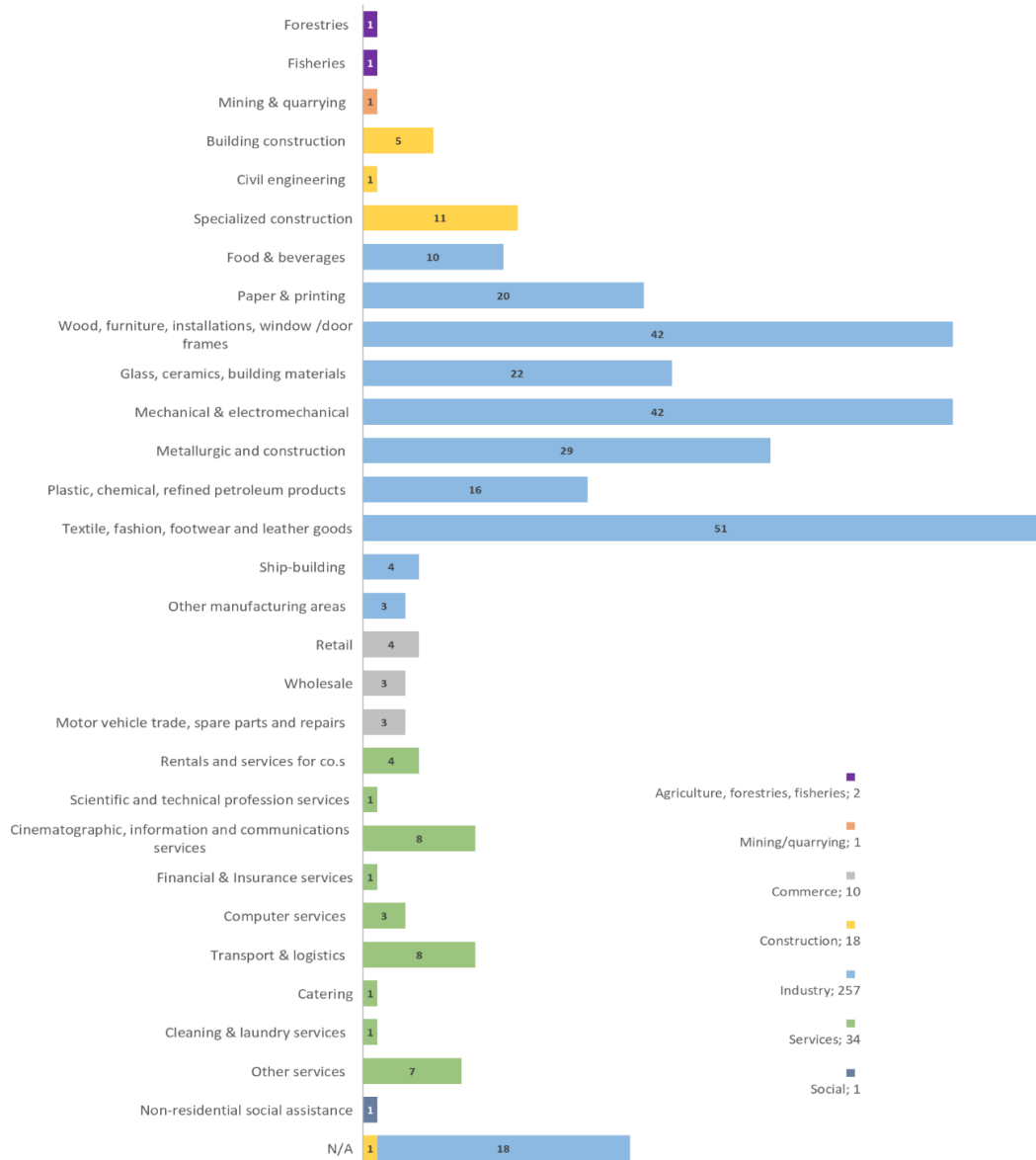


Figure 3. WBOs by sector set up in Italy from 1987-today

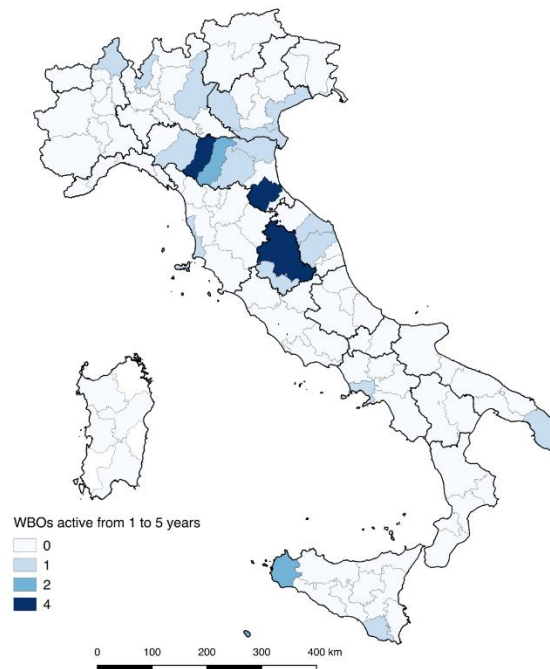
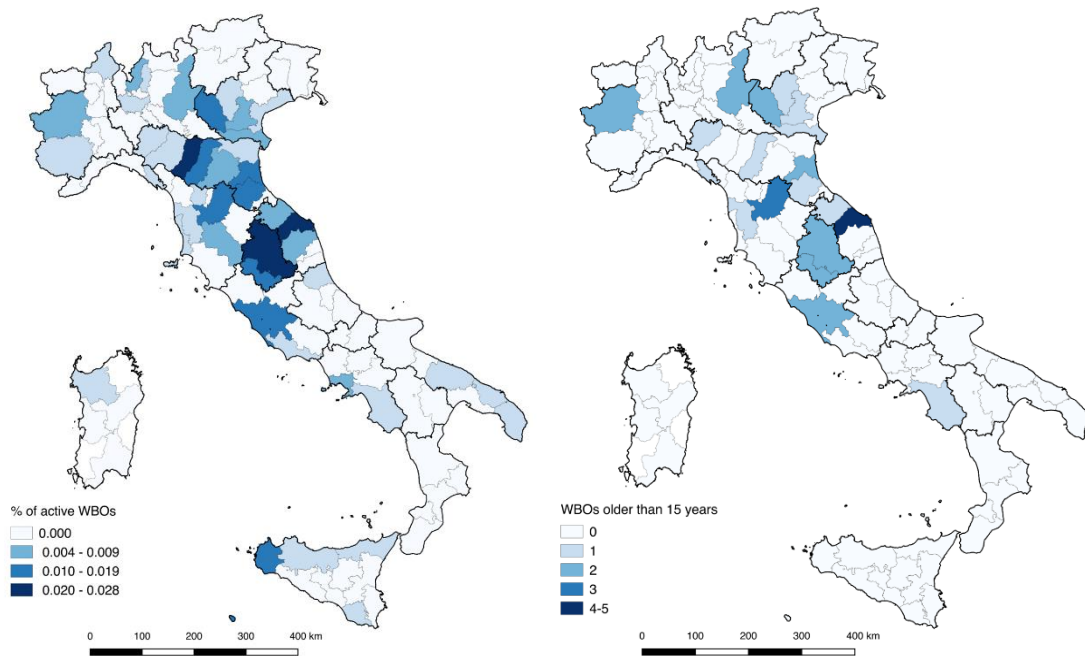
Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

Table 4. WBOs set up in Italy from 1987-today, by sector and cooperative association membership

SECTOR	WBO 1987-2019				ACTIVE				INACTIVE			
	NO. ENTERPRISES		COOPERATIVE ASSOCIATION MEMBERS		NO. ENTERPRISES		COOPERATIVE ASSOCIATION MEMBERS		NO. ENTERPRISES		CO-OPERATIVE ASSOCIATION MEMBERS	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture, forestry and fisheries	2	0.6%	2	100%	1	50%	1	100%	1	50%	1	100%
Mining	1	0.3%	1	100%	1	100%	1	100%	-	-	-	-
Wholesale/retail	10	3.1%	9	90%	7	70%	7	100%	3	30%	2	67%
Construction	18	5.6%	12	67%	9	50%	8	88.9%	9	50%	4	44%
Manufacturing	257	79.6%	159	61.9%	70	27%	64	91.4%	187	73%	95	51%
Service	34	10.5%	23	67.6%	18	53%	13	72.2%	16	47%	10	63%
Healthcare and social services	1	0.3%	0	-	1	100%	-	-	-	-	-	-
Total	323	100%	206	63.8%	107	33.1%	94	87.9%	216	66.9%	112	51.9%

Source: our elaboration on Italian WBO database of Area studi Legacoop, 2020

At the provincial level, the share of companies resulting active at present day compared to the total number of WBOs registered since 1987, is higher in Umbria, Marche and Emilia-Romagna. The provinces registering highest shares are Ancona (0.03%), Perugia (0.03%), Reggio-Emilia (0.02%) and Modena (0.02%) (Fig. 4). WBOs with a lifespan of more than 15 years can usually be found in regional or provincial main towns - Ancona (5), Firenze (3), Brescia, Verona, Ravenna, Perugia, Roma (2) (Fig 5). WBOs active from 1 to 5 years are found in the provinces of Reggio Emilia, Forli-Cesena, Perugia (4), Modena and Trapani (2) (Fig. 6).



Looking at company turnarounds aimed at maintaining employment levels and the production plants, the lifespan of these acquisitions (Tab. 5) should be considered (only measuring their success rate is not enough). For the WBOs set up before 2003 (introduction of the Marcora Law reform, L. 57/2001), the average lifespan of the 203 recovered companies, involving a total of 7,383 workers, is 18 years. Instead, for obvious reasons, the same analysis would not be very indicative if conducted on more recent companies. Yet, it should be highlighted that the companies set up from 2003 today register a success rate of 71%, and presently employ 1,995 workers (Tab. 2).

Table 5. Average lifespan of WBOs set up in Italy before 2003 by sector and legal status***

SECTOR	TOTAL		ACTIVE		INACTIVE	
	NO.	AVERAGE LIFESPAN (YEARS)	NO.	AVERAGE LIFESPAN (YEARS)	NO.	AVERAGE LIFESPAN (YEARS)
AGRICULTURE, FORESTRY AND FISHERIES	1	25			1	25.0
WHOLESALE/RETAIL SALE	1	28			1	28.0
CONSTRUCTION	9	20	2	30	7	17.1
MANUFACTURING	173	17.6	23	30.7	150	15.5
SERVICE	18	22.4	6	26.7	12	20.3
HEALTHCARE AND SOCIAL SERVICES	1	25	1	25		
TOTAL	203	18	32	29.8	186	16.1

Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

The data relative to the industrial sectors does not allow for drawing any definite conclusions on the average lifespans. However, as far as the associative aspect is concerned, cooperative association members (Tab. 6) have guaranteed their more than 7,000 employees a more constant employment compared to non-member companies.

Table 6. Average lifespan (by association) of the WBOs set up in Italy until 2003†††

ASSOCIATION	NO. ENTERPRISES	EMPLOYEES	AVG. LIFESPAN (YEARS)
COOPERATIVE ASSOCIATION MEMBERS	108	4,838	21
NON-MEMBERS	95	2,545	15
TOTAL	203	7,383	18

Source: our elaboration on Italian WBO database of Legacoop Area Studi, 2020

*** Out of the 218 WBOs set up before 2003 under the Marcora I Law, data was found on the setting up and winding up of 203 companies. Where data on winding up was not available in the databanks of the main WBO promotion and financing operators, in the first analysis, the last year of lodging a balance was used and, in the second analysis, the publication date in the Official Gazette of company liquidations and winding ups was found through a manual search of taxation codes. Where data on setting up was not available, the date of the first approval of institutional funding was used.

††† *Ut supra.*

Today, worker-recuperated companies record a company capital of €52 million and a net worth of €95 million with a total turnover of €472 million, generating €1.4 million in profits. 90% of active WBOs registering at least one balance in 2018-2020 belong to a cooperative association and generate 97% of the turnover and 104% of total profits.

Table 7. Active WBOs balance performance in Italy (K. Euros)^{***}

ASSOCIATION	NO. ENTERPRISES		EMPLOYEES			BALANCE SHEET DATA (K. EUR)			
	NO.	%	NO.	%	PERSONNEL COST	TOTAL TURNOVER	PROFITS	CAPITAL	NET WORTH
NON-MEMBERS	9	10%	151	4%	5,498.13	14,993.24	-62.67	1,257.16	2,373.31
COOPERATIVE ASSOCIATION MEMBERS	85	90%	3,578	96%	118,773.38	457,605.72	1,461.46	51,427.70	93,423.59
TOTAL	94	100%	3,729	100%	124,271.51	472,598.95	1,398.79	52,684.86	95,796.90

Source: our elaboration on Aida-Bureau Van Dijk data and Italian WBO database of Legacoop Area Studi, 2020

2.1. A first estimate of the return on WBO public investment in Italy

The Marcora Law outlined an active policy to safeguard employment and presented itself as an alternative to an income support for workers using the social cushions. An alternative which was not clearly in opposition to the latter but which, when the conditions allowed, could be an opportunity to change a simple income support of the workers into opportunities for the growth and development of the production system guaranteeing an income for the workers involved for a much longer term than that foreseen by any support measures. Therefore, what is the best way to evaluate the success of this policy at almost 40 years from its introduction? It is not intended here to measure the profitability of the intervention, but its sustainability and feasibility. With the first Marcora Law, €45 million were allocated to be used for investment in the company capital of the recuperated firms. Even assuming that the entire working capital managed by the financial institutions under the Marcora Law had been exhausted following the winding up of the companies where it had been invested, what appears to be a determining factor in assessing the effectiveness of the operations is their longevity.

The safeguarding of jobs has effectively avoided any public outlays such as extraordinary redundancy payments, universal basic income, early retirement, and obviously tax generated revenues for the state. As seen above, WBOs usually last a long time. If, on the one hand, the social benefits of supporting self-entrepreneurship are not to be ignored, even if they are difficult to quantify, what follows is a simple exercise that may help us to quantify, through the data available, the tax revenues generated by these operations.

For 33 WBOs (Tab. 8), the gathering of the balance data over the last 10 years in the historical series analysis was carried out. Based on this data, the return on public investment in creating WBOs was estimated, using the investment share of CFI and SOFICOOP in creating and developing these operations.

^{***} Out of the 107 active WBOs, balance figures for 2018-2020 are available for 94 companies. The last available year was used for the balance data

With a total CFI and SOFICOOP investment of €6.3 million, the total tax revenue generated by the funded cooperatives, over the last 10 years, amounted to €144 million, corresponding to the total cumulative taxation costs and 20%^{§§§} of the cumulative wage costs. Therefore, out of the 33 cooperatives with data available, with a good approximation, it can be confirmed that, over the 10 years, the public investment generated a return on public financing of about 23 times. Moreover, the annual average revenue generated by a single WBO operation is about €440,000 for an average public investment (net of other private and/or cooperative movement financing sources) for the setting up of a single WBO for about €200,000. With a good approximation, if the average annual tax revenue obtained from the above estimate is applied to the average lifespan of this form of enterprise (Tab.8), we can ascertain that, on average, the WBO operation over its lifespan, generates a return on public investment of about €7.9 million (in terms of tax revenue).

Table 8. WBOs with a balance in a historical time series of 10 years. Estimated tax revenues and public investments.

NO. OF COOPERATIVES WITH BALANCE DATA IN A HISTORICAL SERIES (10 YEARS)	33
IRPEF* Threshold at 20 % of the cumulative wage costs in the historical series of the last 10 years	80,662,071.2 €
Total Taxes in the historical series of the last 10 years	64,133,860.00 €
Total tax revenues generated (total taxes + IRPEF threshold)	144,795,931.2 €
Total investments managed by CFI-SOFICOOP in capital shares	6,299,021.36 €
public investment return in 10 years	22.99 times
average annual revenues for WBO cooperative	438,775.55 €
Average investment to set up a WBO by CFI-SOFICOOP	203,194.24 €

*Personal income taxes.

Source: our elaboration on CFI data - Aida-Bureau Van Dijk data - Italian WBO database of Legacoop Area Studi, 2020

3. Discussion

There are two main implications of our empirical study - the role of the regulation and the role of the co-operative associations are crucial.

The Italian case in a comparative perspective shows that the national legislation, as well as the specific funding measures, are key. Worker buyouts cannot flourish without a clear regulation of the ownership rights transition, coupled with a system of incentives. The policy-makers or the local authorities have many reasons to act in this direction. They may wish to minimize the risks of unemployment and look at supporting WBOs as a special tool of active labor market policy. They may wish to support a model of employment that contributes to better working conditions (Bernardi and Köppä, 2011) and higher productivity (Kociatkiewicz et al., 2020). They may want to facilitate the mutual ownership and management of community level utilities, services and facilities (see reports by the Employee Ownership Association, by Mutuo and by National Center for Employee Ownership for the US, UK and Australian cases).

^{§§§} For an estimate of the IRPEF (personal income tax), we chose a percentage of the real tax burden of 20%, net of deductions for an average annual wage of between €15,000 and €28,000 per year.

Another key ingredient is the presence of active and experienced cooperative associations. Longer life-spans and higher rates of activity are associated with membership to a cooperative association. It is thanks to them that workers can find expert guidance in the WBO process, which is not simple from a business, legal and financial point of view (Bernardi et al., 2022). To some extent, this is a case where cooperatives are better equipped than traditional firms. In fact, among the OECD countries we have observed a declining role and power of traditional employer associations (Meardi, 2018). In Britain, they are particularly weak and irrelevant. On the contrary, the co-operative associations have not lost ground, at least in the countries where they have always been strong. This is also, at times, the case elsewhere. For instance, in China, the national cooperative association is especially large and politically strong (although not independent from the Communist Party), and this may be a good omen for the future of the Chinese cooperative movement (Bernardi and Miani, 2014) in many sectors, including healthcare (Bernardi and Greenwood, 2014).

Unfortunately, the theme of company associations or meta-organizations (Berkowitz & Bor, 2018) has not received the interest it deserves in the management literature, despite the several positive spillovers that they can generate. The focus is usually on the role of employer associations in collective bargaining (Sheldon et al., 2016), although the activities to be shared among firms are several and range from research and development to marketing, insurance, lobbying and external relations. Here, the cooperative sector in Italy is not lagging behind its capitalist counterpart. As well, when conventional firms need to set up a meta-organization, this is often done in the form of a cooperative consortium for a transparent control.

Either way, it is thanks to the public authorities and the cooperative organizations that many firms (and their workforces) have survived a destiny of termination, failure or delocalization. External actors and events play a crucial role, and this is confirmed by studies of successful (Marens et al., 1999; Yildirim, 2021) and failed WBOs (McCollom & Gillette 1993). In a Darwinian perspective, this might appear unnecessary if not a threat to competition. However, the recovered factories once reorganized are subject to normal competition and market forces, hence, they do not represent a permanent anomaly. Furthermore, the same grants for worker-owned firms are available to everybody to do business adopting a cooperative legal form. And conventional firms are certainly free to make good use of their employer associations, as well as the many standard financial institutions available to them (Zevi, 2011).

4. Conclusions

This analysis has allowed for tracing in Italy, from 1985 until today, 323 cooperatives set up through worker-recuperated company acquisitions. Hence, it has been possible to closely study the effectiveness and features of the phenomenon based on the widest sample of Italian recovered companies carried out to date. The sectoral and geographic analysis confirms the conclusions of the previous studies (Vieta et al., 2015; Monni et al., 2017) highlighting a clear concentration of WBOs in the Central and North-Eastern regions of Italy and in the manufacturing sector. Moreover, the average lifespan of the cooperatives set up before 2003 (more than 15 years), as well as the survival rate (about 71%) for WBOs founded beginning from the same year, are witness to the economic and social success of this opportunity to manage and respond to company crises. The active recovered companies today employ 4,000 workers and generate a total turnover of about €472 million.

Two institutional elements appear to have played a major role - the favourable legal framework with the key role of the institutional funders and the presence and membership of the cooperative associations. The recovered companies that belong to, or belonged to, the main Italian cooperative associations during their years of activity make up more than 63% of the total sample and 88% of the active companies. As regards the balance performance and the survival rate and average lifespan, the study shows how the member companies, over the years, have recorded much higher results than non-members.

In conclusion, the active policy to safeguard employment, fostered in Italy by the Marcora Law, becomes highly important in the light of the evidence presented here and of the recent more evolutions in the national and international social and economic contexts. It is, in fact, realistically foreseeable that a good percentage of Italian SMEs will have difficulties in overcoming the catastrophic consequences of the COVID-19 emergency. This poses the need for a more in-depth knowledge of the WBO phenomenon and its implications. Therefore, in the light of these results, a further, more detailed study on this should be carried out.

References

- Albanese, M., & Jensen, A. 2015. Worker Co-operatives in Australia and Italy. Co-operative Enterprises in Australia and Italy: comparative analysis and theoretical insights, 172, 89.
- Area studi Legacoop 2020 Italy's Worker Buyout Mapping. An Historical Review. Retrieved from <https://areastudi.legacoop.coop/wp-content/uploads/2021/02/BNs-WBOs.pdf>
- Azzellini, D. 2014. ¿ Si, podemos! Empresas recuperadas por sus trabajadores en el hemisferio norte durante la crisis actual Yes, we can! Companies recuperated by their workers in the Northern hemisphere during the current crisis. Revista Org & Demo, 15(1). <https://doi.org/10.36311/1519-0110.2014.v15n1.3980>
- Barbot-Grizzo, M. C. 2020. Is a Workers' Co-operative an Effective Means for Transferring SMEs? Business Transfers, Family Firms and Entrepreneurship, 132. <https://doi.org/10.4324/9781003022527-13>
- Ben-Ner, A. 1988. Comparative Empirical Observations on Worker-owned and Capitalist Firms. International Journal of Industrial Organization, 6(1), 7-31. [https://doi.org/10.1016/0167-7187\(88\)90003-3](https://doi.org/10.1016/0167-7187(88)90003-3)
- Berkowitz, H., & Bor, S. 2018. Why Meta-Organizations Matter: A Response to Lawton et al. and Spillman. Journal of Management Inquiry, 27(2), 204-211. <https://doi.org/10.1177/1056492617712895>
- Bernardi A., & Greenwood, A. 2014. Old and New Rural Co-Operative Medical Scheme in China: The Usefulness of A Historical Comparative Perspective. Asia Pacific Business Review. <https://doi.org/10.1080/13602381.2014.922820>
- Bernardi A., & Miani, M. 2014. The Long March of Chinese co-operatives: towards market economy, participation, and sustainable development. Asia Pacific Business Review. <https://doi.org/10.1080/13602381.2014.931044>
- Bernardi A., & Köppä, T. 2011. A Better Place to Work: Finnish Co-operatives in a Comparative Organizational Climate Analysis. The international Journal of Co-operative Management, special issue on Finland, 5(2).
- Bernardi, A., Berranger, C., Mannella, A., Monni, S., & Realini, A. 2022. Sustainable but Not Spontaneous: Co-Operatives and the Solidarity Funds in Italy. Sustainability, 14(8), 4516. <https://doi.org/10.3390/su14084516>
- Bernardi, A., & Monni, S. 2016. The Co-operative Firm Keywords. Rome: Roma TrE-Press.
- Bernardini, A., Viola, A., Lilli, M., & Esposito, I. 2016. eds., L'Italia che ce la fa 1986 - 2016, Trent'anni di attività a sostegno dell'occupazione e della nascita di nuove imprese, Roma, CFI - Cooperazione Finanza Impresa.
- Bernstein, J., & Hodge B. 2008. Sale of businesses to employees in Canada: The leveraged buyout. Tax Notes International Special Reports, Dec. 15, pp. 891-915
- Birchall J., & Hammond Ketilson L. 2009. Resilience of the Co-operative Business Model in Times of Crisis, Ginevra, International Labour Organization.

- Blasi, J. R., Freeman, R. B., & Kruse, D. L. 2017. Shared Capitalism in the USA. In *The Oxford Handbook of Mutual, Co-Operative, and Co-Owned Business* (p. 25). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199684977.013.25>
- Bryer, A.R. 2011. The politics of the social economy: a case study of the Argentinean *empresas recuperadas*. *Dialectical Anthropology*. En prensa
- Cataudella M.C. 2016. Workers' Buyout e soci lavoratori di cooperativa, in Biasi M., Zilio Grandi G. (eds.) (2016), *Commentario breve alla riforma "Jobs Act"*, Wolters Kluwer Italia, pp. 437-450.
- Cicopa Europe, 2013. Business transfers to employees under the form of a co-operative in Europe. Opportunities and challenges, June 2013
- Co-operatives UK. 2013. Simply buyout: A guide to employee buyouts and becoming and employee-owned business, available at: http://www.uk.coop/sites/storage/public/downloads/8364_cuk_simply_buyout_prf4b.pdf [accessed on 18 Oct. 2021].
- Cooperative News, 2015. The path to Worker Buyouts: does the UK needs its own Marcora Law?", di Anca Voinea, *Co-operative News*, 2015. <https://www.thenews.coop/97306/sector/retail/path-worker-buyouts-uk-need-marcora-law/>
- Corcoran, H. & Wilson, D. 2010. The worker co-operative movements in Italy, Mondragon and France: Context, Success Factors and Lessons, Canadian Worker Co-operative Federation.
- Cori, A., Granata, M., Lelo, K., & Monni, S. 2021. Mapping cooperatives in Italy. *Entrepreneurship and Sustainability Issues*, 8(3), 136-163. [https://doi.org/10.9770/jesi.2021.8.3\(8\)](https://doi.org/10.9770/jesi.2021.8.3(8))
- de Almeida Martarello, R., de Brito Dias, R., & Picabea, J. F. 2016. Fábricas Recuperadas na América Latina: estudo comparado entre Brasil e Argentina. *NAU Social*, 7(12). <https://doi.org/10.9771/ns.v7i12.31345>
- De Micheli, P., Imbruglia, S., & Misiani, A. 2017. *Se chiudi ti compro. Le imprese rigenerate dai lavoratori*, Milano, Edizioni Guerini e associati SpA.
- Delgado N., & Dorian C., & Laliberté P. 2014. Job preservation through worker co-operatives: An overview of international experiences and strategies, Ginevra, International Labour Organization.
- Di Stefano, C. 2018. The business transfer through the co-operative model. A comparative analysis Italy-France. *Journal of Entrepreneurial and Organizational Diversity*, 7(2), 62-86. <https://doi.org/10.5947/jeod.2018.010>
- EOA NZ, Employee Ownership Australia and New Zealand, 2021. Website, available at: <http://www.employeeownership.com.au/>.
- EOA, UK, Employee Ownership Association, 2016. *Employee ownership: How to get started* (London). Available at: <http://employeeownership.co.uk/publications/newpublication-e-employee-ownership-how-to-get-started/>
- Fields, Z. 2008. Efficiency and equity. The *empresas recuperadas* of Argentina. *Latin American perspectives*, 35(6), 83-92 <https://doi.org/10.1177/0094582X08326013>
- Freeman, S. F. 2007. Effects of ESOP adoption and employee ownership: Thirty years of research and experience.
- García, J.M., & Gutiérrez, R. 1990. *Defendiendo el empleo*, Ministerio de Trabajo y Seguridad Social de España, Madrid
- Ghibaudi, J. 2004. Una aproximación comparativa a las empresas recuperadas argentinas y las autogeneradas en Brasil. Línea: <http://www.iisg.nl/laboragain/documents/ghibaudi.Pdf>
- Gulland, A. 2008. Redundancy? No! We bought the company, www.guardian.co.uk/money/2008/jan/12/workandcareers accessed 2 March 2022
- Gunderson, M., Sack, J., McCartney, J., Wakely, D. & Eaton, J. 1995. Employee buyouts in Canada. *British Journal of Industrial Relations*, 33(3), 417-442. <https://doi.org/10.1111/j.1467-8543.1995.tb00446.x>
- Henriques, F. C., Sígolo, V. M., & Rufino, S. et al. 2013. *Empresas recuperadas por trabalhadores no Brasil* (Rio de Janeiro, Multifoco) <https://doi.org/10.22296/2317-1529.2013v15n2p89>

Hough, P. 2005. Succession planning using the worker co-op option (Calgary, Canadian Worker Co-operative Federation). Available at: http://canadianworker.coop/sites/live.cwcf.anarres.ca/files/CWCF_RetOwnersRep_0.pdf

Huertas, O., Dávila, R., & Castillo, D. 2010. Transformaciones En Las Subjetividades De Los Trabajadores: Casos De Empresas Colombianas Recuperadas. *Universitas Psychologica*, 10(2), 581-94. <https://doi.org/10.11144/Javeriana.upsy10-2.tstc>

Jensen, A. 2016. The 1980s Worker Co-Operative Buyout Experience in Australia. *Learning from Praxis* (2016). *Journal of Entrepreneurial and Organizational Diversity*, 5(1), 54-78. <https://doi.org/10.5947/jeod.2016.004>

Juvenal, T. L. 2006. Empresas recuperadas por trabalhadores em regime de autogestão: reflexões à luz do caso brasileiro.

Kabat, M. 2011. Argentinean worker-taken factories. Trajectories of workers' control under the economic crisis, in I. Ness, D. Azzellini, a cura di (2011), pp. 365-81.

Kociatkiewicz, J., Kostera, M., & Parker, M. 2020. The possibility of disalienated work: Being at home in alternative organizations. *Human Relations*. <https://doi.org/10.1177/0018726720916762>

Kruse, D., Freeman, R.B., & Blasi, J.R., eds. 2011. Shared capitalism at work: Employee ownership, profit and gain sharing, and broad-based stock options, Chicago: University of Chicago Press. <https://doi.org/10.7208/chicago/9780226056968.001.0001>

Long, R. J. 1995. Employee buyouts: The Canadian experience, in *Canadian Business Economics* (Summer 1995), pp. 28—41. Available at: <https://www.cabe.ca/jmv3/index.php/documents?task=documentviewdoc&id=698>

Luna, H. A., & Pacheco, C. R. 2018. El estudio a empresas recuperadas y cooperativas de trabajo en México. *Veredas: Revista del Pensamiento Sociológico*, (35), 191-219.

Marchi, E. 2017. Le imprese cooperative nei momenti di crisi economica e sociale. Il caso della cooperativa 3elle di Imola, Faenza, Ed. Homeless Book (ebook).

Marens, R. S., Wicks, A. C., & Huber, V. L. (1999). Cooperating with the Disempowered. *Business & Society*, 38(1), 51-82. <https://doi.org/10.1177/000765039903800103>

Martí, J. P., Thul, F., & Cancela, V. 2013. Las empresas recuperadas como cooperativas de trabajo en Uruguay: Entre la crisis y la oportunidad (Montevideo, Universidad de la Republica).

Martínez, J. C., Mielgo, N. L., & Fernández, E. L. (2012). Recuperación de empresas por sus trabajadores en contextos de crisis: ¿qué podemos aprender de experiencias pasadas?. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, (76), 96-126.

Martínez, J. C., Mielgo, N. L., Fernández, E. L., Zardi, S., & Menéndez, M. M. 2010. Estudio sobre las empresas recuperadas por sus trabajadores en contextos de crisis.

McCollom M., & Gillette J. 1993. Time and Task in the Valley: A Case Analysis of an Employee Buyout Effort. *The Journal of Applied Behavioral Science*, 29(1), 96-116. <https://doi.org/10.1177/0021886393291006>

Meardi, G. 2018. Economic integration and state responses: Change in European industrial relations since Maastricht, *British Journal of Industrial Relations*, 56(3), 631-655 (winner of LERA's James Scoville prize for best international-comparative labor paper 2018) <https://doi.org/10.1111/bjir.12307>

Menke, J.D. & Buxton, D.C. 2010. The origin and history of the ESOP and its future role as a business succession tool. *Journal of Financial Service Professionals*, 64(3), 58-67.

Monni, S., Novelli, G., Pera, L., & Realini, A. 2017a. Workers' buyout: the Italian experience, 1986-2016. *Entrepreneurship and Sustainability Issues*, 4(4), 526-539. [https://doi.org/10.9770/jesi.2017.4.4\(10\)](https://doi.org/10.9770/jesi.2017.4.4(10))

Monni, S., Novelli, G., Pera, L., & Realini, A. 2017b. Workers' buyout: l'esperienza italiana in Demartini, P., Monni, S. (2017), *Workers' buyout Corporate Governance e sistemi di controllo*. Rome: Roma TrE-Press, Roma: 16-29.

Monni, S., Novelli, G., Pera, L., & Realini, A. 2017c. Workers' buyout: definizioni e caratteristiche in Demartini, P., Monni, S. (2017), *Workers' buyout Corporate Governance e sistemi di controllo*. Rome: Roma TrE-Press, Roma: 8-15.

Morin, P. 2012. The fonds de solidarité: Historical and political foundations, what lessons for economic democracy? Review of Radical Political Economics, 44(1), 82-99. <https://doi.org/10.1177/0486613411418057>

NCEO, National Centre for Employee Ownership, 2021. Employee Ownership by the Numbers, <https://www.nceo.org/articles/employee-ownership-by-the-numbers>

Nolan, S., Massebiaux, E. P., & Gorman, T. 2013. Saving jobs, promoting democracy: worker co-operatives. Irish Journal of Sociology, 21(2), 103-115. <https://doi.org/10.7227/IJS.21.2.8>

Orlando, G. 2021. Recovering solidarity? Work, struggle, and cooperation among Italian recovered enterprises. Economic Anthropology, 8(1), 74-85. <https://doi.org/10.1002/sea2.12186>

Pendleton, A. 2002. Employee ownership, participation and governance: a study of ESOPs in the UK. Routledge. <https://doi.org/10.4324/9780203185971>

Quarter, J., & Brown, J. 1992. Worker buyouts in Canada: A social networking analysis. Economic and Industrial Democracy, 13(1), 95-117. <https://doi.org/10.1177/0143831X92131005>

Rebón, J. 2016. Recuperated Enterprises in Argentina. Recuperated enterprises in Argentina. Global Dialogue, 6(1) <https://doi.org/10.1080/08854300.2016.1214006>

Rieiro, A. 2009. Gestión obrera y acciones colectivas en el mundo del trabajo: empresas recuperadas por sus trabajadores en Uruguay, Tesis del Master en Sociología, Sociedad y Desarrollo. Montevideo: Universidad de la República.

Ríos, T., & Piccone, J. 2010. Empresas Recuperadas de la República Bolivariana de Venezuela: Una Realidad Compleja y un Desafío Liberador. Observatorio Social sobre Empresas Recuperadas y Autogestionadas, (4).

Ruggeri A., (ed). 2014. Informe del IV relevamiento de empresas recuperadas in la Argentina, 2014, Buenos Aires: Facultad de Filosofía y Letras, SEUBE, Universidad de Buenos Aires.

Ruggeri, A. (ed.) 2010. Las empresas recuperadas en la Argentina, 2010, Informe del Tercer Relevamiento de Empresas Recuperadas por sus trabajadores, Programa Facultad Abierta, Facultad de Filosofía y Letras Universidad de Buenos Aires (Buenos Aires). Available at: http://www.recuperadasdoc.com.ar/Informesrelevamientos/informe_Tercer_Relevamiento_2010.pdf

Sheldon, P., Nacamulli, R., Paoletti, F., & Morgan, D. E. 2016. Employer Association Responses to the Effects of Bargaining Decentralization in Australia and Italy: Seeking Explanations from Organizational Theory. British Journal of Industrial Relations, 54(1), 160-191. <https://doi.org/10.1111/bjir.12061>

Tognonato, C. 2016. Le imprese recuperate. Aperte per fallimento. Sociologia del Lavoro, 142(2), 177-92. <https://doi.org/10.3280/SL2016-142011>

Vieta, M. (2016). B: Workers' Buyout, in Bernardi A., Monni S. (eds.) (2016). The Co-operative firm. Keywords, pp. 23-28.

Vieta, M., & Depedri S. 2015. Le imprese recuperate in Italia, in Borzaga C. (ed.) (2015), Economia cooperativa. Rilevanza, evoluzione e nuove frontiere della cooperazione italiana, Terzo Rapporto Euricse, Euricse.

Vieta, M. 2013. The emergence of empresas recuperadas por sus trabajadores: a political economic and sociological appraisal of two decades of self-management in Argentina. Euricse Working Paper, (55), 1-98. <https://doi.org/10.2139/ssrn.2267357>

Vieta, M. 2015. The Italian Road to Creating Worker Co-operatives from Worker Buyouts: Italy's Worker-Recuperated Enterprises and the Legge Marcora Framework. <https://doi.org/10.2139/ssrn.2641057>

Vieta, M. 2019. Chapter 2 Empresas Recuparadas pos sus Trabajadores: Why, Where, What, and How. In Workers' Self-Management in Argentina. Leiden, The Netherlands: Brill. https://doi.org/10.1163/9789004268951_004

Vieta, M. 2020a. Self-managed enterprise: Worker-recuperated cooperatives in Argentina and Latin America. The Handbook of Diverse Economies, 48-55. <https://doi.org/10.4337/9781788119962.00012>

Vieta, M. 2020a. Workers' self-management in Argentina: Contesting neo-liberalism by occupying companies, creating cooperatives, and recuperating autogestión. <https://doi.org/10.1163/9789004268951>

Vigliarolo, F. 2011. Le imprese recuperate. Argentina, dalla finanziarizzazione alla socializzazione dell'economia. Milán, Italia: Altreconomia-Città del Sole Editore.

Villani, D., 2010. «Las empresas reuperadas por sus trabajadores en Argentina y sus acceso a la financiación: subsidios y préstamos», *Visione Latinoamericane*, Anno 3, n. °2, Luglio 2010. Italia, pp. 97-108

Wright, C. 2014. *Worker Co-operatives and Revolution: History and Possibilities in the United States*. Chicago, IL.

Wright, M., Thompson, R.S., & Robbie K. 1989. Privatisation via management and employee buyouts Analysis and U.K. Experience. *Annals of Public & Cooperative Economics*. 60(4) <https://doi.org/10.1111/j.1467-8292.1989.tb01337.x>

Yildirim, E. 2021. Employee Buyouts and Industrial Relations under Employee Ownership: A Case Study of Karabuk Steel Mill. *Journal of Management*, 20(4). <https://doi.org/10.1177/0143831X99204004>

Zevi, A., Zanotti, A., Soulage, F., & Zelaia, A. 2011. Beyond the crisis: Co-operatives, work, finance. Generating wealth for the long term (Brussels, CECOP).

Zamagni, V. L'impresa cooperativa italiana: dalla marginalità alla fioritura XIV Congresso internazionale di storia economica Helsinki 21-25 agosto 2006 Retrieved from https://www.cooperazione.net/fileadmin/coop/uploads/impresa_cooperativa_italiana.pdf

Yildirim, E. 2021. Employee Buyouts and Industrial Relations under Employee Ownership: A Case Study of Karabuk Steel Mill. *Journal of Management*, 20(4). <https://cleo.rutgers.edu/articles/employee-buyouts-and-industrial-relations-under-employee-ownership-a-case-study-of-karabuk-steel-mill/>

Zevi, A., Zanotti, A., Soulage, F., & Zelaia, A. 2011. Beyond the crisis: Co-operatives, work, finance. Generating wealth for the long term (Brussels, CECOP).

Zamagni, V. L'impresa cooperativa italiana: dalla marginalità alla fioritura XIV Congresso internazionale di storia economica Helsinki 21-25 agosto 2006 Retrieved from https://www.cooperazione.net/fileadmin/coop/uploads/impresa_cooperativa_italiana.pdf

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DOES TAXONOMY IN BANKING SUPPORT SUSTAINABLE DEVELOPMENT OF POLISH COMPANIES?*

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Abstract. This paper is aimed at studying measures undertaken by financial institutions in the territory of Poland in the scope of adjusting the credit process to assumptions presented in the Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, commonly referred to as Taxonomy. The problem analysis was conducted based on data for companies employing more than nine persons between 2018 and 2021, that is, at the stage before and during the implementation of Taxonomy. In compliance with the obtained results, no distinct correlations were noticed between a change in the value of credits and loans in non-financial entities and changes in the number of entities, the value of revenues and profits in preferred industries, which shows a low level of Taxonomy's implementation in credit procedures. A positive correlation was noted only in the total revenues of industries covered with research with an overall value of credits. Furthermore, turbulence related to the COVID-19 pandemic, which changed the business environment of banks and the image of Polish entrepreneurship, is also crucial. Even though in the described models, the impact of the COVID-19 pandemic on studied relations proved to be statistically insignificant, differences and deviations are visible in each studied area. Introduction of Taxonomy assumptions to banking strategies, although 'unpopular' and lacking in marketing, may effectively support the sustainable development of Polish companies in the long term. The nine groups of entities indicated in Taxonomy constitute the beginning; however, the list will probably be gradually extended and supplemented with other groups, thus creating a synergetic system supporting the achievement of sustainable development objectives. Effective communication of main assumptions of taxonomy and their implementation in other areas of the business environment of Polish companies is also an important issue. Furthermore, they can be used to develop a better-oriented economic policy supporting green finance, favouring the establishment of green and sustainable entrepreneurship.

Keywords: taxonomy; sustainable development; green finance; banking; entrepreneurship

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1. Introduction

The idea of sustainable development encourages contemporary communities to reflect on the correlations between business, people and understanding of ecosystems and technological aspects as integral parts shaping the image of the contemporary world (Allen et al., 2019). Sustainable development refers not only to issues concerning monitoring and controlling the impact on the environment of various types of organizational practices, processes and products but is also related to protecting the wealth of global natural resources to equally ensure its accessibility for future generations (Docherty et al., 2008; Capasso et al., 2019; Chehabeddine et al., 2022). In the literature, the necessity to verify and extend the approach to sustainable development in management and business education is more and more often indicated, especially in the scope of identification and security of complex relations between communities and organizations and the natural environment (Sherman, Hansen, 2010; Coleman, 2013; Kurucz et al., 2014; Setó-Pamies, Papaoikonomou, 2016). Green growth can be implemented by increasing expenditures on research and development and innovation processes (Lin, Zhu, 2019), engagement of funds in sustainable activity (Mohamed et al., 2014), and introducing grants and tax incentives (Chang et al., 2020), creating conditions favouring long-term green investment (Guo et al., 2018; Adeel-Farooq et al., 2018), creating the green financial system (Zhang, Wang, 2019; Nassar, Strielkowski, 2022), including growing the green bonds market (Ngwenya, Simatele, 2020). One of the manners of supporting sustainable development constitutes the introduction of preferential terms and conditions of crediting for companies meeting criteria stipulated in the Regulation (EU) 2020/852 of the European Parliament and the Council on the establishment of a framework to facilitate sustainable investment, commonly referred to as Taxonomy. Taxonomy defines detailed parameters of classification of economic activity in terms of impact on adaptation to climate changes, or limitation of formation of these changes and allows uniform standardization of assessment of economic activity as environmentally sustainable. Among the main objectives of Taxonomy's implementation, the following ones should be specially indicated: limiting climate changes, adapting enterprises to climate changes, protection of water and marine resources, transition to a circular economy, pollution prevention and control, as well as protection and restoration of biodiversity of ecosystems. Addressees of provisions included in the aforementioned Regulation are, primarily: regulatory authorities of member states obliged to establish instruments and provisions necessary for the implementation of Taxonomy, companies operating in industries indicated in Taxonomy and financial market entities offering financial products and services defined as sustainable. Therefore, Taxonomy is a kind of a map facilitating navigation on the path to sustainable financing of the economy so that selected groups of enterprises direct their investment to sustainable, low-emission industries favourable to climate protection and biodiversity (Kotecki 2020). Support in the scope of sustainable development of enterprises is executed by constructing mechanisms of preferential financing of green investments (Mazzanti, 2018). Financial market entities have been obliged to include preferential financing terms and conditions in their business strategies for companies that meet the assumptions implemented by technical qualification criteria. This paper discusses whether, in the period of adaptation and introduction of Taxonomy into Polish banking, a significant trend concerning the gradual implementation of preferential terms and conditions of crediting for companies operating in sustainable industries has been noted. As a measure of implementation of pro-ecological parameters, the total value of credits and loans in non-financial enterprises, in industries indicated in the Regulation, employing 10 and more persons, operating in the territory of Poland in the years 2018 – 2021 (in 2021, the analysis covers first six months of the year), that is, in the period before and during the implementation of Taxonomy, has been adopted. As parameters characterizing the sustainable development of studied entities, the value of revenues and profit and the size of companies in particular groups have been adopted. Implementing Taxonomy assumptions in banking requires activating a series of pilot and informative measures, which should be reflected in the growing credit and financial parameters of the studied group of enterprises and the growing number of these entities. An important factor that influenced the implementation of Taxonomy in banking was the pandemic, which forced most financial entities to introduce frequent and unexpected changes to credit strategies. Numerous restrictions in the scope of the possibility of conducting specific forms of activity caused redirecting the attention of banks to the introduction of procedures securing the risk of crediting groups of enterprises at risk of insolvency. During the pandemic,

companies that belong to industries affected by bans and restrictions in activity faced rejection or difficulties in obtaining credits and loans much more frequently than companies operating in industries in which no restrictions were introduced. This situation was a consequence of avoiding financing entities included in the so-called 'list of COVID PKD', in particular, in the case of the following PKD: hotels, tourists, travel agencies, catering, restaurants, bars, event companies, exhibition companies, concert and entertainment companies, cultural institutions, cinemas, sports, recreation and swimming pools (Kamiński, 2021).

This paper analyses a group of enterprises of five of nine industries indicated in Taxonomy: industrial processing, transport, construction, information and communication, and professional, scientific and technical activity. Industrial processing is a sector responsible for approximately 21% of the European Union's direct emission of greenhouse gases. It is also a critical sector which has to limit greenhouse gas emissions. At the same time, transport consumes one-third of the whole energy in the European Union and is responsible for approximately 23% of the total direct emission of greenhouse gases. Decarbonization of the fleet and transport infrastructure is executed by focusing activities on limiting primary sources of emissions from this sector and simultaneously taking into account the need to apply solutions of lower levels of emissions and developing infrastructure allowing clean mobility. The third analyzed industry - construction and building- consumes 40% of energy and 36% of the EU's carbon dioxide emission. New technological criteria of direct qualification trends of changes in construction to energy-saving and ecological solutions, especially concerning the construction of new buildings, renovations of already existing structures, installations of energy-efficient devices, renewable energy sources and provision of energy services. Companies operating in the group 'information and communication' are actively supporting sustainable development of other sectors by providing a series of solutions supporting decision making processes in the scope of limiting emission of greenhouse gases. The last of the studied groups, that is, enterprises operating in the sector 'research, development and innovations' support achievement of the assumption of sustainable development mainly by concentrating their activities on creating innovative solutions, processes, technologies and other products in the scope of reduction of greenhouse gases which are ultimately used by other sectors of the economy (EC 2021).

Green economic growth is the future direction (Song et al., 2019), the answer to climate change and ecological collapse, and one of the critical elements in achieving sustainable development (Capsasso et al., 2019). More and more governments have introduced restrictive environmental protection provisions and regulations (Soewarno, Tjahjadi, 2020). However, environmental benefits are often at odds with single business entities' economic efficiency (Pan et al., 2019). Various regions struggle with different developmental and environmental challenges (Guo et al., 2020), and the choice of a policy in the scope of sustainable development objectives remains at the discretion of a given country. In the phase of Taxonomy implementation in Poland, no explicit tendency to redirect the attention of banks and financial institutions to issues related to supporting the sustainable development of industries indicated in Taxonomy was disclosed. Indeed, innovations within green financial products are becoming an important factor of contemporary businesses (Chen, Hung, 2014), building green organizational identity (Chang, Chen, 2013) and achieving competitive advantage as well as SME effectiveness (Lin, Zhu, 2019), however, this is only the beginning of a long and difficult path full of sacrifices and compromises, which will allow modern societies to develop in compliance with seventeen objectives of sustainable development.

2. Theoretical background

Taxonomy is the first document which systematized economic activities by the level of their impact on environmental objectives and sustainable economy. Although it does not block the process of investing in activities detrimental to the environment, it is also a tool that grants additional preferences to the benefit of pro-ecological solutions and initiatives. A lack of standardized provisions defining which investments are recognized as sustainable environment leads to the abuse of 'ecological' marketing by organizations representing their activity

as environment friendly in a situation when a given activity is not, in fact, sustainable. Provisions included in the Taxonomy document aim to standardize and specify manners of identifying and supporting enterprises operating sustainably. They constitute a group of harmonized European principles, which allow systematic and permanent support of pro-ecological measures undertaken in the European Union (PARP, 2021); they aim to ensure the status of the first climatically neutral continent for Europe until 2050. Taxonomy constitutes a source of new regulations related to sustainable development and financing, and implementation thereof allows directing the flow of capital to economic sectors considering the environmental aspect. It impacts the financial market and the real sphere of the economy (Kotecki, 2020). According to the assumptions presented in the Regulation, economic activity can be considered sustainable if it meets at least four criteria (EC Europa, 2019):

- ensures a significant impact on the implementation of at least one out of six environmental objectives that it affects climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, protection and restoration of biodiversity and ecosystems;
- is characterized by a lack of significant harm' to other environmental objectives, and is compliant with technical criteria;
- is in alignment with minimum safeguards concerning social security and management.

Following technical qualification criteria for defining terms and conditions in compliance with which the economic activity is qualified as making a significant contribution to mitigating climate changes and defining whether this economic activity does not significantly harm other environmental objectives, nine types of economic activity are indicated, for which framework was defined allowing verification of pro-ecological nature of the activity and the use of preferential terms in the scope of financing sustainable development. The aforementioned groups of enterprises include entities operating in the following areas (EC, 2021):

- forestry,
- measures in the scope of environmental protection and rehabilitation,
- industrial processing,
- energy industry,
- water supply, sewage and waste management and remediation,
- transport,
- construction and activity related to real estate,
- information and communication,
- professional, scientific and technical activity.

Taxonomy and technical criteria of qualification can be optionally used by banks and other financial institutions to implement green financing strategy and report on the scope of the so-called green revenues, investment expenditures, sustainable assets and measures (EC Europa, 2019a). Assumptions presented in the Regulation standardize, unify and offer ready-made solutions for financial institutions in the scope of ESG (environmental, social and governance) risk management. Financial institutions are gradually levelling their exposure to this type of risk. On the other hand, the problem of costs of implementing proposed solutions, their maintenance and monitoring, and expenses related to the risk of crediting an innovative pro-ecological solution arise (Zioło, 2020).

It should be remembered that green finance does comprise not only financing environmentally safe measures but also a fundamental change in the way of thinking about finance. Financing public and private green investment and investment aimed at preventing, minimizing and compensating damages suffered by the environment and climate are only some areas defined as green finance. This term also covers financing policies on environment protection and mitigating and adapting to environmental changes, as well as particular financial system elements (Kotecki 2020). Banks, as financial institutions granting loans and credits to companies, play a unique role in estimating the risk and cost of the capital and making decisions on approving or rejecting a transaction. They also

have a possibility of introducing additional parameters for assessing an entrepreneur, giving preference to environmentally sustainable companies and introducing a negative assessment of transactions in the case of entities and investments, consequences of which may prove socially or environmentally detrimental (Zioło, 2020).

Increasing the effectiveness of banks' activities to benefit sustainable development requires changing business models so that they are primarily based on establishing sustainable value. Exchanging traditional business models for ecological ones is a complex process that banks must prepare in organizational, financial and legal terms (Fisk, 2010). Climate risk should be considered in critical areas of activity of financial institutions, such as business strategy, organizational structure, risk management and disclosures (Kotecki, 2020). Therefore, depending on the adopted business strategy, banks can be an accelerator or a barrier to changes in the direction of sustainable development (Busch et al., 2016). However, it is in commercial banks' interest that their strategies are increasingly specific in legal, economic and institutional terms in compliance with the green finance strategy of redirecting capital to a sustainable economy (Kotecki, 2020). In compliance with research conducted by EY and IIF, until 2019, only every third bank included the impact of climate risk on credit exposures (WEF, 2019). The indicated situation was related to a lack of market standards in the scope of used methodologies and tools for measuring the climate risk, the necessity to introduce changes in the strategy and the situation resulting from the COVID-19 pandemic (Kotecki, 2020). Sustainable banking stabilizes a financial system by permanently searching for a rational balance between particular stakeholders, considering ecological and environmental aspects and creating an environment favouring sustainable entrepreneurship development (Raczkowski, Zioło, 2017). Studies on the effectiveness of traditional and sustainable banks covering, among others, the size of assets and capitals, profitability or incomes of banks, indicate higher effectiveness of activities of sustainable banks (Shah et al., 2019). At the same time, the development of the financial sector favours sustainable economic growth, especially in the long term (Shah et al., 2019; Durusu-Ciftci, 2017). Environmental issues have been regulated in banking provisions to ensure the concurrent development of financial and non-financial entities. In May 2020, the European Central Bank (ECB) started consultations on the scope of taking into account the climate risk by financial institutions. ECB's expectations concerned, among others:

- taking the climate risk into account in the business strategy and risk management system,
- monitoring and reporting climate risk exposure,
- quantification of the impact of climate risk on monitored types of risk (primarily credit, market, liquidity and operational),
- estimation of the climate risk impact on capital adequacy,
- taking the climate risk into consideration at all stages of the credit process, valuation of securities and monitoring risk in the credit portfolio,
- development of scenarios taking into account climate risk for stress tests,
- taking climate risk into account in the liquidity risk management and calibration of liquidity buffers,
- disclosing important information and measures related to climate risk.

The above requirements aim to verify the resistance of banks' business models, estimate the level of incurred risk, and verify how climate risk influences the institution's capital position (Kotecki, 2020). At the end of May 2020, EBA completed guidelines for granting and monitoring credit facilities implementing the ESG agenda in the credit process. The guidelines indicate, among others, that financial institutions should assess the exposure of a borrower to ESG factors, especially related to climate risk and environmental threats (EBA, 2020). Whereas, Taxonomy is a document indicating the three most essential obligations of entities from the financial industry concerning transparency of offered products, in compliance with which (EC, 2021):

- 1) in the case of financial products used in investment in economic activity contributing to the achievement of an environmental objective, the entrepreneur applying for funding must disclose information about the purpose of investment and a detailed description of how and to what extent a given investment will be implemented within environmentally sustainable economic activity,

- 2) suppose a financial product promotes an environmental aspect. In that case, meeting the terms and conditions included in point one is necessary. Additionally, the following statement must be attached to the application: *'The principle 'do not cause severe damage' applies only to investments executed within the financial product, which consider the European Union criteria concerning environmentally sustainable economic activity.'*
- 3) The following statement should be attached concerning other financial products: *'Investments within this financial product do not consider the European Union criteria concerning environmentally sustainable economic activity.'*

A lack of limited access to funds for companies that do not consider environmental aspects increase industrial activity, leading to further degradation of the environment and rising carbon dioxide emissions (Sadorsky, 2010; Shahbaz, 2015). Therefore, the financial sector should pursue funding and invest in environmentally friendly technologies and ventures aimed at limiting excessive use of natural resources (Yahya, 2022), as well as supporting the development of sustainable sectors.

3. Methodology

The assessment of taxonomy in credits and loans in selected industries is complex due to the short time series. For this analysis panel models were used. These models allowed the relationship assessment even though the time series are very short. With a cross-sectional time series, including 4-year data for five sections: (1) industrial processing, (2) transport, (3) construction and real estate activities, (4) information and communication, as well as (5) professional, scientific and technical activities, it was possible to evaluate the importance of taxonomy in credits and loans. Apart from panel models, basic measures of the structure and dynamics of phenomena were used.

Panel models may take the form of: models with decomposition of the intercept (FEM - fixed effects model) or models with random component decomposition (REM – random effects model). The FEM and REM models can generally be written as follows:

$$y_{it} = m_i + bx_{it} + e_{it}$$

where:

m_i - general intercept,

b - structural parameter expressing the influence of the explanatory variable X ,

x_{it} - realization of the explanatory variable for the i -th object in the t -th period,

e_{it} - classical scene representation: $E(e_{it}) = 0$ and $Var(e_{it}) = E(e_{it}^2) = 0$ i $Var(e_{it}) = S_e^2$.

In the FEM model m_i is decomposed into intercepts (constants) for individual groups. The model has the form (Suchecky, Antczak 2012):

$$y_{it} = a_1 d_{1it} + a_2 d_{2it} + \dots + a_k d_{kit} + bx_{it} + e_{it} = a_i + bx_{it} + e_{it}$$

where:

a_i - specific intercepts,

d_i - zero-one variables, with value 1 when $j = i$.

In the REM model m_i expresses random components. This model can be written (Greene 2008, p. 388):

$$y_{it} = a + bx_{it} + e_{it} + u_i,$$

where:

$$E(u_i) = 0, \text{Var}(u_i) = \sigma^2, \text{Cov}(e_{it}, u_i) = 0$$

When analyzing the one-factor model (with group effects), the significance of the individual effects should be checked using the Wald test. The zero hypothesis assumes that the conditions imposed on the model ($\alpha_1 = \alpha_2 = \dots = \alpha_N = \mu$) are the rules of the model and that model estimation should take place without individual effects. If $p < \alpha$, the zero hypothesis is rejected for an alternative hypothesis, - individual effects appear. The validity of introducing individual effects into the model with random effects is verified by examining whether the variance of the random component is different from zero. The zero variance indicates the lack of variation of the individual component and its constant value for all test objects, which makes it possible to replace it with a common intercept. The LM test statistic is used to verify the hypotheses of the Breusch-Pagan test. If the test statistic converges to the distribution $\chi^2(1)$, then there is no reason to reject the zero hypothesis. If, on the other hand, the value of the test statistic exceeds the critical value, it is rejected, which suggests the significance of individual effects in the model with random effects (Witkowski, 2012).

Suppose all the assumptions for the models with fixed effects and models with random effects are met. In that case, deciding which model is better suited to the analyzed phenomenon is necessary. For this purpose, the Hausman test is performed, determining the nature of the specific effects. It examines the correlation between explanatory variables and random effects (Czyżewska, Staniszewski, 2016). A p value below the set limit level means that the model with fixed effects (with decomposition of the intercept) is better. The zero hypothesis says that the assumption about the independence of exogenous variables from individual effects is met, and the estimator of random effects is more effective. Rejecting the zero hypothesis means that the fixed effects estimator is unbiased and more efficient than the random effects estimator (Czyżewska, Staniszewski, 2016). Panel models were estimated with the use of the Gretl program. MS Excel and IBM SPSS Stastics 25.0 were used for the remaining analyzes.

4. Results and Discussion

The implementation process of assumptions included in Taxonomy is related to the necessity of undertaking a series of measures in the scope of adjusting strategy, provisions and parameters of the credit process of sustainable economic activity by Polish banks. Given the time that has passed since publishing the *Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment* until activating provisions included therein (18 June 2020 - 1 January 2022), banks and other financial institutions had almost two years to adjust procedures to the requirements of the Regulation. Work on the implementation of the new ecological approach in banking requires a lot of preliminary and preparatory work, which, in consequence, should be reflected in the growing number of companies and an increase in revenues, profits and credits in the case of entities acting in preferred industries.

In the years 2018-2021, non-financial entities for five studied sections, which in compliance with the *Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment* are covered with Taxonomy, constituted slightly over a half of the total number of enterprises employing at least 10 persons (table no. 1). This percentage remained at a similar level in the whole period – at the end of 2018 these entities constituted 53.1%, and at the end of the 1st half of 2021 – 53.7%. This share in each studied year was similar at the end of the 1st and the 2nd half a year. Whereas the number of entities operating at the end of December was by approx. 3 thousand higher than at the end of June – at the end of the 1st half of a year it amounted to 22.8-23.9 thousand, while at the end of the year – 26.5-26.9 thousand.

Table no. 1. Non-financial entities registered in Poland employing 10 persons or more – in total and covered with Taxonomy, in the years 2018-2021 (status at the end of June and December)

Specification	2018		2019		2020		2021
	6	12	6	12	6	12	6
Number of enterprises							
IN TOTAL	45,177	50,013	44,676	50,158	43,886	49,485	42,465
including those covered with Taxonomy, in total	23,931	26,553	23,747	26,878	23,473	26,660	22,819
Industrial processing	13,012	13,975	12,672	13,987	12,394	13,734	12,049
Construction	4,233	4,760	4,108	4,807	4,048	4,881	3,942
Transport and warehouse management	2,673	3,097	2,644	3,161	2,647	3,088	2,524
Information and communication	1,653	1,982	1,804	2,071	1,841	2,090	1,851
Professional, scientific activity	2,360	2,739	2,519	2,852	2,543	2,867	2,453
in % (in total = 100)							
Covered with Taxonomy, in total	53.0	53.1	53.2	53.6	53.5	53.9	53.7
Industrial processing	28.8	27.9	28.4	27.9	28.2	27.8	28.4
Construction	9.4	9.5	9.2	9.6	9.2	9.9	9.3
Transport and warehouse management	5.9	6.2	5.9	6.3	6.0	6.2	5.9
Information and communication	3.7	4.0	4.0	4.1	4.2	4.2	4.4
Professional, scientific activity	5.2	5.5	5.6	5.7	5.8	5.8	5.8

Source: Financial results of business entities, Statistics Poland, Warsaw.

Over half of the entities covered with Taxonomy are non-financial enterprises representing industrial processing – their number in the studied periods approximated 12-14 thousand. While comparing the status at the end of a given half a year, changes in the number of entities in particular sections were small (apart from a few cases, they did not exceed 5% with regard to a previous analogous period, only for the information and communication section, at the end of the 1st half of 2019 the number of entities increased by 9%, and in the professional and scientific activity section – by 7%). Therefore, the pandemic period did not bring drastic changes in their case. However, it should be underlined that similarly to the total number of non-financial enterprises employing over 9 employees, also in sections covered with Taxonomy (in total), a small drop in the number of entities was noted. The upward trend also continued in the years 2020-2021 in the information and communication section and in 2020 in transport and warehouse management as well as a professional and scientific activity.

In the studied period, a decrease in revenues of non-financial entities was noted at the beginning of the COVID-19 pandemic – in the 1st half of 2020, compared with the 1st half of 2019, the total number of entities dropped by 5%. This decrease in entities covered with Taxonomy was even more significant – it reached 6%. This situation was different in different sections – while in the industrial processing revenues decreased by 8.7% and in transport and warehouse management – by 3.4%, in construction they increased by 3.7%, in information and communication – it increased by 4.2%, and in professional and scientific activity – it increased by 2.6%. Another year brought a significant improvement of the situation in this scope for non-financial enterprises in total (an increase of 18.6% in comparison with the 1st half of 2020 and by 12.4% in the 1st half of 2019), analogous increases (by 20.1% and 12.7%, respectively) concerning entities covered by Taxonomy. The strongest growth was noted in the case of revenues of companies from the industrial processing section (by 22.8% in comparison to the 1st half of 2020 and 12.1% for 2019), information and communication (by 18.3% and 23.3%, respectively) as well as Transport and warehouse management (17.2% and 13.2%, respectively). Per capita the most robust growth (1st half of 2021 vs 2020) concerned industrial processing (23.5%) and transport and warehouse management (22.9%). Revenues of enterprises covered with Taxonomy constituted slightly over half of revenues generated by non-financial entities, and this share was stable over time. Their value in the 1st half of a year reached on average approx. PLN 900

milliard, and in 2021 it exceeded PLN 1 billion. Whereas, at the end of the year it got approx. PLN 1.9 billion, and the year 2020 was no exception in this scope.

Table no. 2. Revenues of non-financial entities registered in Poland employing 10 persons or more – in total and covered with Taxonomy, in the years 2018-2021 (in the period between 1-6 and 1-12)

Specification	2018		2019		2020		2021
	1-6	1-12	1-6	1-12	1-6	1-12	1-6
Revenues (in PLN million)							
IN TOTAL	1,695,798.1	3,645,426.7	1,809,167.7	3,834,527.8	1,714,579.7	3,782,212.2	2,033,287.2
including those covered with Taxonomy, in total	882,555.9	1,898,369.9	929,844.6	1,987,458.7	873,087.1	1,940,653.1	1,048,327.2
Industrial processing	652,177.9	1,355,801.0	682,963.4	1,412,678.9	623,223.7	1,365,911.6	765,353.0
Construction	65,359.0	175,537.7	67,942.9	176,207.9	70,440.6	174,942.0	73,352.9
Transport and warehouse management	78,623.7	175,537.7	85,341.9	190,185.2	82,461.2	183,916.5	96,615.5
Information and communication	54,677.6	121,409.0	59,430.4	129,069.9	61,906.8	135,409.9	73,261.6
Professional and scientific activity	31,717.7	70,084.5	34,166.0	79,316.8	35,054.8	80,473.1	39,744.2
% (in total = 100)							
Covered with Taxonomy, in total	52.0	52.1	51.4	51.8	50.9	51.3	51.6
Industrial processing	38.5	37.2	37.8	36.8	36.3	36.1	37.6
Construction	3.9	4.8	3.8	4.6	4.1	4.6	3.6
Transport and warehouse management	4.6	4.8	4.7	5.0	4.8	4.9	4.8
Information and communication	3.2	3.3	3.3	3.4	3.6	3.6	3.6
Professional and scientific activity	1.9	1.9	1.9	2.1	2.0	2.1	2.0
Revenues per enterprise (in PLN billion)							
IN TOTAL	37.54	72.89	40.50	76.45	39.07	76.43	47.88
including those covered with Taxonomy, in total	36.88	71.49	39.16	73.94	37.20	72.79	45.94
Industrial processing	50.12	97.02	53.90	101.00	50.28	99.45	63.52
Construction	15.44	36.88	16.54	36.66	17.40	35.84	18.61
Transport and warehouse management	29.41	56.68	32.28	60.17	31.15	59.56	38.28
Information and communication	33.08	61.26	32.94	62.32	33.63	64.79	39.58
Professional and scientific activity	13.44	25.59	13.56	27.81	13.78	28.07	16.20

Source: Financial results of business entities, Statistics Poland, Warsaw.

The year 2021 was exceptional in terms of the gross financial result of non-financial enterprises – in the 1st half of 2021, it reached over PLN 142 milliard, whereas, in the 1st half of 2020, it was lower by a half (approx. PLN 76 milliard), whereas, in the previous years it reached approx. PLN 90 milliard (table no. 3). At the end of 2020, the financial result of non-financial entities was slightly higher than for 1-12.2021 (approx. PLN 163 milliard). Entities from sections covered with Taxonomy generated the gross financial result constituting approx. 2/3 of entities in total – at the end of 2018 and 2019, it was 66.4-67.7%, in the 1st half of 2021 – 60.5%, a year earlier – 52.5%. In the 1st half of 2020, they noted a higher decrease than non-financial entities in total – it reached 28%, whereas a 66 per cent drop was recorded in transport, in industrial processing – 34%, in professional and scientific activity – 23%, while information and communication noted a 16 per cent increase and construction – 13 per cent.

Table no. 3. Gross financial result of non-financial entities registered in Poland employing 10 persons or more – in total and covered with Taxonomy, in the years 2018-2021 (in the period between January and June, and June and December)

Specification	2018		2019		2020		2021
	1-6	1-12	1-6	1-12	1-6	1-12	1-6
Gross financial result (in PLN million)							
IN TOTAL	87,717.0	167,942.5	91,815.1	164,377.4	76,163.6	163,433.1	142,421.7
including those covered with Taxonomy, in total	51,968.1	111,521.9	55,209.1	111,332.5	39,980.8	103,534.4	86,147.2
Industrial processing	39,147.7	73,804.0	39,211.7	73,309.9	25,848.8	66,380.0	56,736.8
Construction	2,582.7	18,307.1	3,521.0	10,963.3	3,986.4	11,581.4	5,502.6
Transport and warehouse management	3,674.7	7,744.2	4,067.3	8,615.1	1,376.6	4,511.0	5,146.7
Information and communication	3,865.4	6,965.5	5,067.3	11,802.2	5,857.1	13,796.6	13,874.2
Professional and scientific activity	2,697.6	4,701.1	3,341.8	6,642.0	2,911.9	7,265.4	4,886.9
% (in total = 100)							
covered with Taxonomy, in total	59.2	66.4	60.1	67.7	52.5	63.3	60.5
Industrial processing	44.6	43.9	42.7	44.6	33.9	40.6	39.8
Construction	2.9	10.9	3.8	6.7	5.2	7.1	3.9
Transport and warehouse management	4.2	4.6	4.4	5.2	1.8	2.8	3.6
Information and communication	4.4	4.1	5.5	7.2	7.7	8.4	9.7
Professional and scientific activity	3.1	2.8	3.6	4.0	3.8	4.4	3.4
Gross financial result per enterprise (in PLN million)							
IN TOTAL	1.94	3.36	2.06	3.28	1.74	3.30	3.35
including those covered with Taxonomy, in total	2.17	4.20	2.32	4.14	1.70	3.88	3.78
Industrial processing	3.01	5.28	3.09	5.24	2.09	4.83	4.71
Construction	0.61	3.85	0.86	2.28	0.98	2.37	1.40
Transport and warehouse management	1.37	2.50	1.54	2.73	0.52	1.46	2.04
Information and communication	2.34	3.51	2.81	5.70	3.18	6.60	7.50
Professional and scientific activity	1.14	1.72	1.33	2.33	1.15	2.53	1.99

Source: Financial results of business entities, Statistics Poland, Warsaw.

Furthermore, for the whole year of 2020, a decrease in the gross financial result in sections covered with Taxonomy (7%) was higher than in financial entities in total (0.6%), and in transport amounted to almost half (47.6%). In industrial processing for the whole year, a decrease in the gross financial result was also noted – by 9.5%. Whereas, in the information and communication section in 2020 an increase was noted in comparison to 2019 – by 16.9%, however, in the previous year this increase reached 69%. Similarly, an upward trend was noted by the professional and scientific activity section (an increase by almost 10% in 2020 and by 41% in 2019). Construction reported an increase of 5.6%, although it 'started' from a low level and did not recover its position from 2018 when the gross profit reached in the whole industry approx. PLN 18 milliard, and per capita – PLN 3.85 million. Calculated per enterprise, in the 1st half of 2021, companies from the information and communication section are explicitly distinct (PLN 7.5 million), and this result is higher than at the end of 2020 (PLN 6.6 million) and approximately thrice as high as in the 1st half of 2018 and 2019.

Moreover, a high profit was noted per industrial enterprise (PLN 4.71 million per capita in the 1st half of 2021, 4.83 at the end of 2020, although this result remains lower than in previous years). Transport has been recovering – in the 1st half of 2021, the gross profit reached PLN 2 million per capita, which is four times more than in the previous year. The year 2021 brought a significant improvement in the financial result in the whole economy, including also enterprises covered with Taxonomy (table no. 3) – in comparison with the 1st half of 2020 this

increase more than doubled, and in the information and communication – it increased almost 2.5 times (in comparison with the 1st half of 2019 the increase was the highest, it was almost thrice as high). Due to the significant decrease in the gross financial result in transport, in the 1st half of 2021, this increase was the strongest – it was almost 4 times higher. However, compared with the analogous period of 2019, it reached 27%. Only construction and professional and scientific activity generated an increase lower than average in the sector of non-financial enterprises (however, their situation also improved in the 1st half of 2021 both in comparison with the analogous period of the previous year and in 2019). The value of liabilities of non-financial entities in total remains at a similar level in the studied period of time – approx. PLN 500 milliard, whereas at the end of the 1st half of 2018, it reached approx. PLN 450 milliard, in next 12 months – approx. PLN 480 milliard, and as of the end of 2019, it exceeded PLN 500 milliard (maximum for December 2020 – PLN 539 milliard) (table no. 4).

Table no. 4. Long-term and short-term credits and loans in non-financial entities registered in Poland employing 10 persons or more – in total and covered with Taxonomy, in the years 2018-2021 (status at the end of June and December)

Specification	2018		2019		2020		2021
	6	12	6	12	6	12	6
The total value of loans and credits (in PLN million)							
IN TOTAL	459,386.4	482,108.8	482,132.5	515,106.0	524,588.6	538,736.3	513,218.6
including those covered with Taxonomy, in total	256,636.6	262,859.3	260,613.5	273,737.4	285,022.7	286,641.2	262,929.8
Industrial processing	148,780.8	157,645.1	161,973.1	167,922.9	178,878.9	178,134.9	169,421.0
Construction	18,531.7	13,613.4	18,241.4	15,388.5	14,281.2	14,562.6	13,159.0
Transport and warehouse management	31,090.8	32,167.7	26,923.8	32,966.1	38,128.3	39,397.3	40,139.9
Information and communication	44,055.9	41,490.9	36,106.6	39,714.8	36,577.7	36,104.6	27,281.8
Professional and scientific activity	14,177.4	17,942.2	17,368.6	17,745.1	17,156.6	18,441.8	12,928.1
% (in total = 100)							
Covered with Taxonomy, in total	55.9	54.5	54.1	53.1	54.3	53.2	51.2
Industrial processing	32.4	32.7	33.6	32.6	34.1	33.1	33.0
Construction	4.0	2.8	3.8	3.0	2.7	2.7	2.6
Transport and warehouse management	6.8	6.7	5.6	6.4	7.3	7.3	7.8
Information and communication	9.6	8.6	7.5	7.7	7.0	6.7	5.3
Professional and scientific activity	3.1	3.7	3.6	3.4	3.3	3.4	2.5
Value of loans and credits per enterprise (in PLN million)							
IN TOTAL	10.17	9.64	10.79	10.27	11.95	10.89	12.09
including those covered with Taxonomy, in total	10.72	9.90	10.97	10.18	12.14	10.75	11.52
Industrial processing	11.43	11.28	12.78	12.01	14.43	12.97	14.06
Construction	4.38	2.86	4.44	3.20	3.53	2.98	3.34
Transport and warehouse management	11.63	10.39	10.18	10.43	14.40	12.76	15.90
Information and communication	26.65	20.93	20.01	19.18	19.87	17.27	14.74
Professional and scientific activity	6.01	6.55	6.90	6.22	6.75	6.43	5.27

Source: Financial results of business entities, Statistics Poland, Warsaw.

Enterprises from sections covered with Taxonomy declared related liabilities at a level slightly above half of credits and loans of the total number of non-financial entities employing at least 10 persons; however, this share was somewhat decreasing in consecutive periods (apart from the 1st half of 2021 – 54.3%), and currently is the lowest in the studied period (51.2%). The value of these liabilities in sections covered with Taxonomy at the end of June 2021 reached PLN 263 milliard, and as calculated per enterprise – PLN 11.5 million (that is, it was at a

similar, slightly lower level than in the previous year). For comparison, in the total number of non-financial companies at the end of the 1st half of 2020 and 2019, the value of credits stayed at a similar level (approx. PLN 12 million), although, in comparison with 2019 an increase by 11% was noted (that is, analogous as for sections covered with Taxonomy). In the 1st half of 2021, in areas covered with Taxonomy in comparison with the identical period in the previous year, generally speaking, a decrease in the value of credits and loans (in total and per capita) was noted, the only exception being transport and warehouse management, where the upward trend also continued in 2021 (an increase by 5% for their general value and 10% per capita), which started in the 1st half of 2020. Whereas, in sections: information and communication and Professional and scientific activity in 2020, the value of credits hardly changed, and in 2021 – it dropped in comparison with the 1st half of 2020 by 20-25% (table no. 4). Figure no. 1 shows that generally speaking, non-financial entities covered with Taxonomy maintained per capita liabilities due to credits and loans at a comparable level (only slightly higher) as for entities in total, whereas, at the end of a year their amount was somewhat lower than in the half of a year, and in the 1st half of 2021 – by approx. 5% higher than for entities in total.

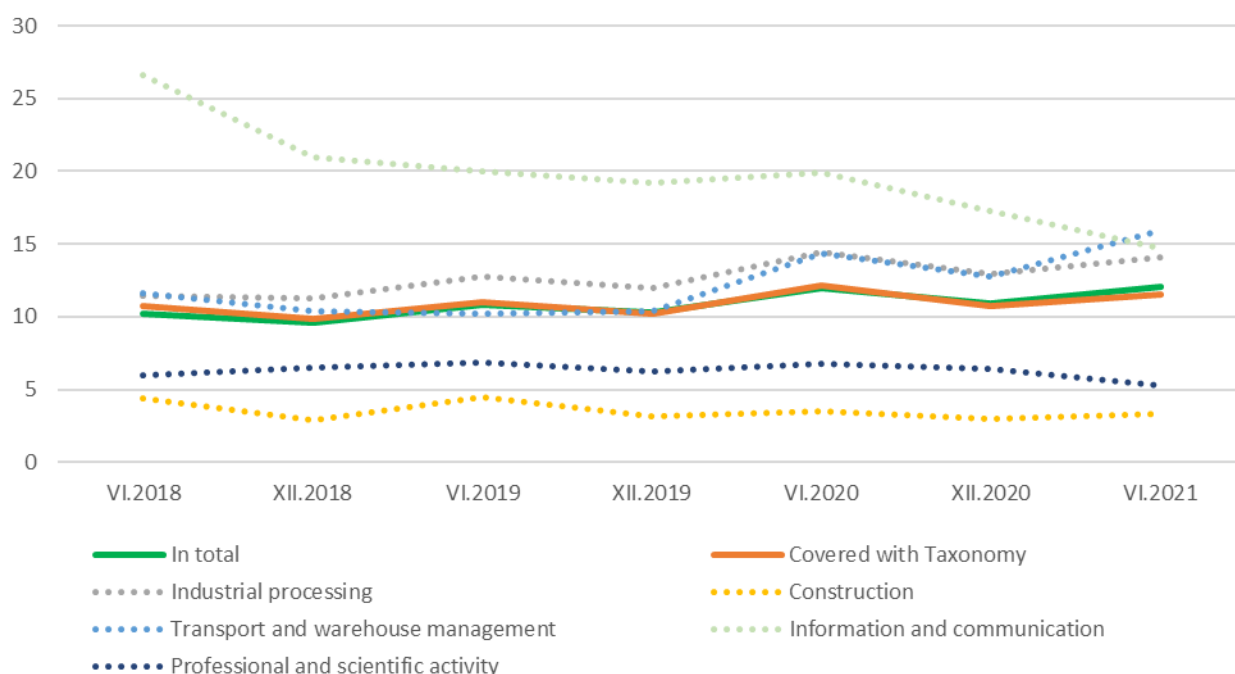


Figure no. 1. The value of credits and loans per enterprise in the years 2018-2021

Source: Financial results of business entities, Statistics Poland, Warsaw.

Credit commitments (per capita) of construction enterprises and enterprises running professional and scientific activity are significantly below average for sections covered with Taxonomy. Their level was relatively stable in the studied period (figure no. 1). Credit commitments in the industry were also slightly above average, yet, at quite a steady level. Whereas in transport and warehouse management, these commitments were until the end of 2019 at an average level, although the pandemic affected this sector – 2020 and 2021 are the years of growing credit commitments. Different trends concern the information and communication section, which in the 1st half of 2018 was the most significantly encumbered with credits and loans – per capita they reached over PLN 25 million; however, at the end of 2018, they decreased to approx. 20 million and at this level, more or less, stayed until the end of the 1st half of 2020, and in the consecutive periods they dropped to approx. PLN 15 million per capita achieved a level similar to transport, warehouse management, and industrial processing.

By comparing data concerning credits and loans with the financial result of enterprises (figure no. 2) it can be noticed that changes in the value of credits and loans for sections covered with Taxonomy (in total, marked with a continuous line) had weaker correlation with the gross financial result than in the case of a total number of non-financial entities. The COVID-19 pandemic changed regularities in this scope. In the 1st half of 2020 the financial result decreased, while the value of credits and loans increased and at the end of 2020 the situation was opposite (an increase in the gross profit – higher in sections covered with Taxonomy, a decrease in the value of credits). At the end of the 1st half of 2021, the growth rate of profit (for the total number of companies and companies covered with Taxonomy) was higher than in the previous year; however, simultaneously, the value of credits also increased a little, whereas the discrepancy between dynamics of the increase in the financial result and credit commitments was higher in entities covered with Taxonomy than in the total number of non-financial entities (figure no. 2).

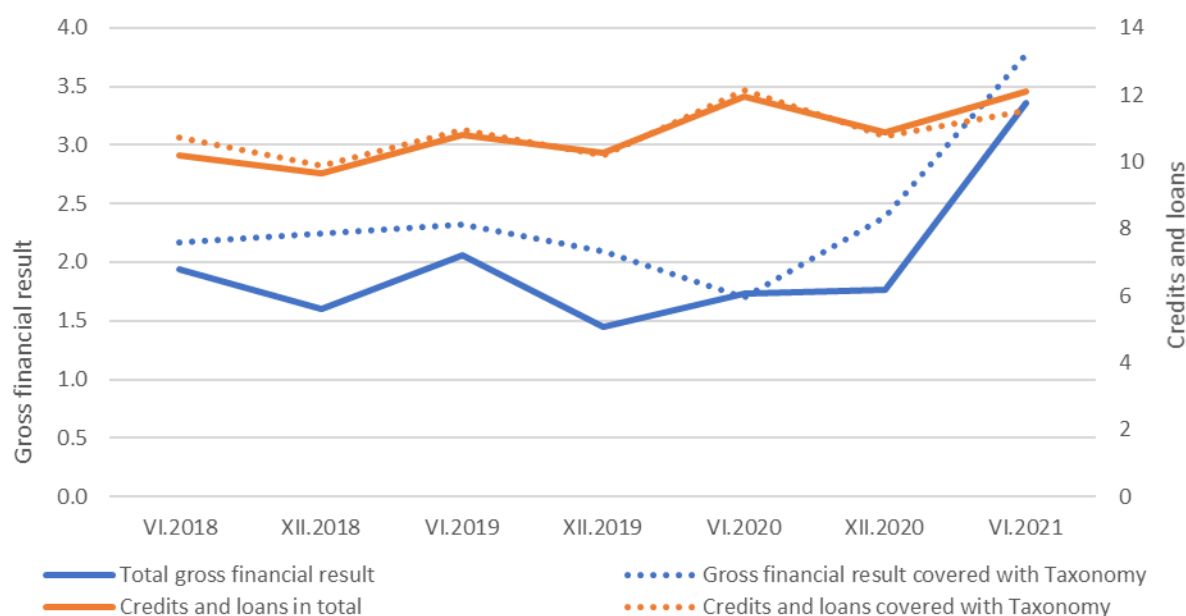
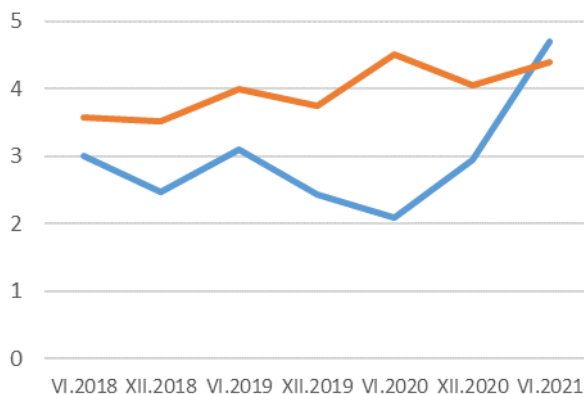


Figure no. 2. The value of credits and loans vs financial result – in total and in sections covered with Taxonomy, in the years 2018-2021 in total (per enterprise)

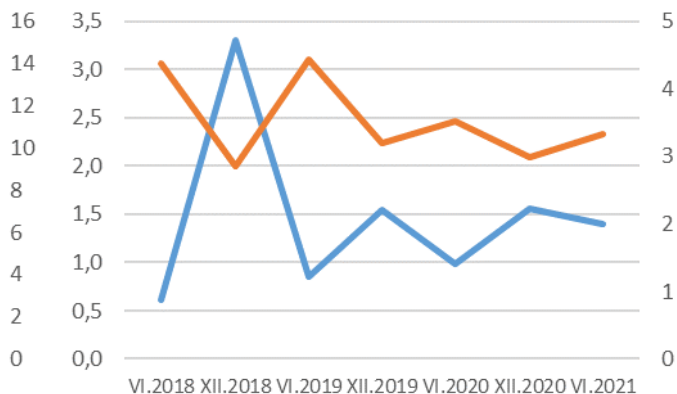
Source: Financial results of business entities, Statistics Poland, Warsaw.

In particular, in sections covered with Taxonomy, these relations had different courses (figure no. 3). In the case of information and communication as well as professional and scientific activity, the dynamics of the financial result were similar to the values of credits and loans, but the direction of changes was opposite.

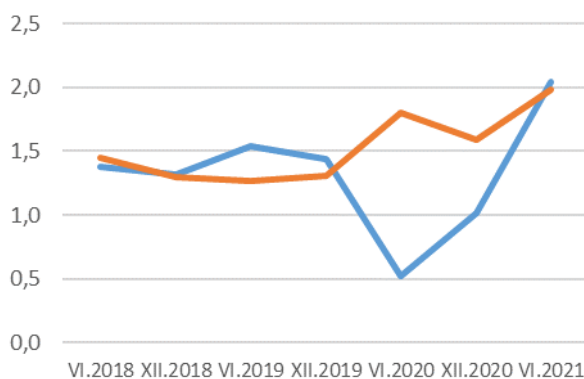
Industrial processing



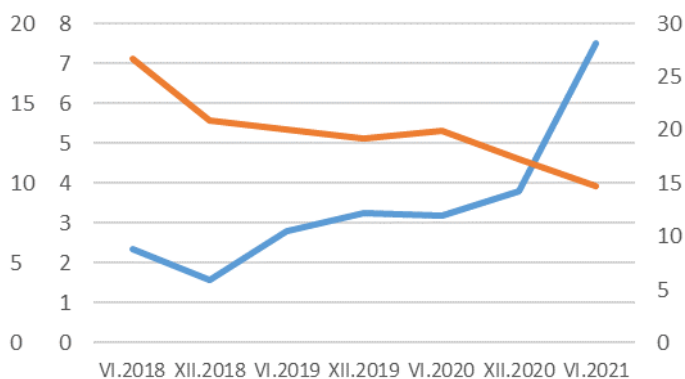
Construction



Transport and warehouse management



Information and communication



Professional and scientific activity

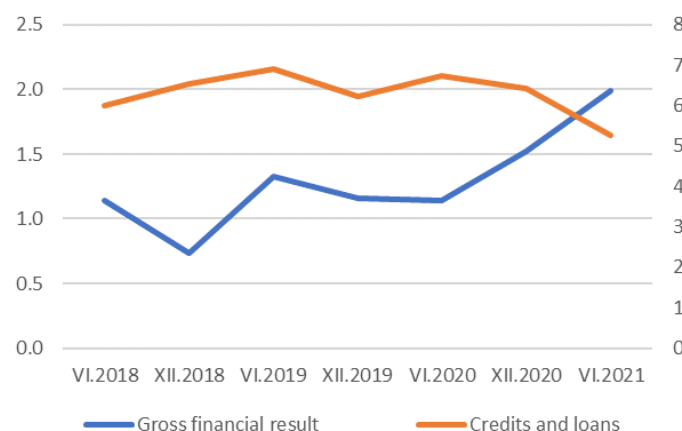


Figure no. 3. The value of credits and loans (right axis) vs financial result (left axis) in particular sections covered with Taxonomy, in total, in the years 2018-2021 (per enterprise)

Source: Financial results of business entities, Statistics Poland, Warsaw.

Similar, although not that strong, tendencies were noted for the second section. Whereas, in transport, until 2019, both amounts stayed at more or less the same level, while in the 1st half of 2020, the financial result plummeted and credits increased. In consecutive periods the financial result was growing significantly faster than the value of credits and loans. Similar, although not that strong, tendencies were noted for industrial processing. The situation in construction was completely different since at the end of the 1st half of a year, the financial results were significantly lower than at the end of a year, and the value of credits and loans – was higher. These changes were massive at the beginning of the studied period (until June 2019), and these changes were minor. However, the seasonal character is still visible both in the profit value and credit commitments (figure no. 3).

The gross financial result per enterprise (*FinancialResults_pc*) is negatively correlated with the value of credits per capita ($B = -0.333$; $p = 0.0002$ – it is higher when the value of credits per capita is lower. Ceteris paribus the gross financial result is on average lower by PLN 0,333 million when the value of credits and loans per enterprise is higher by PLN 1 million (table no. 5). It should be remembered that the model is estimated on the grounds of a time and cross-section trial, and takes into account diversity between sections. The zero-one variable has also been included, taking the value of 1 for the 1st half of a year. Its importance is also statistically significant ($B = -1.024$; $p = 0.0018$). The zero-one variable distinguishing pandemic periods has also been included in the model; however, its impact has not proven to be statistically significant.

This model was estimated with a fixed model method (the validity of this choice is confirmed by the results of F-test ($p < 0.0001$) and Hausman Test ($p < 0.0001$)). The estimated model explains the variability of the gross financial result at 80.8%.

Table no. 5. Results of per capita financial result model – model 1: *Financial Results_pc = f(Credits_pc)*

	<i>B</i>	<i>S(B)</i>	<i>t</i>	<i>p</i>	
const	6.977	0.838	4.521	<0.0001	***
Credits_pc	-0.333	0.078	-4.259	0.0002	***
U01	-1.024	0.297	-3.450	0.0018	***
LSDV R ²	0.8077				
F-test	F(4; 28) = 16.360; $p < 0.0001$ ***				
Joint test on named regressors	F(2; 28) = 20.090; $p < 0.0001$ ***				
Hausman Test	$\chi^2(1) = 25.333$; $p < 0.0001$ ***				

B – regression coefficient, *S(B)* – standard error, *t* – t-statistics, *p* – probability in the t test. U01 – binary variable, *x* = 1 for the 1st half of a year. Estimation method – fixed model.

While discussing the potential of sections covered with Taxonomy (the level of their development), one may also use revenues generated from the entire activity. Total revenues (*Revenues*) are positively correlated with the general value of credits ($B = 6.123$; $p < 0.0001$) – ceteris paribus, the total value of credits higher by PLN 1 million is related to total revenues higher on average by PLN 60,123 million (table no. 6). Zero-one variable taking the value of 1 for the 1st half of a year is statistically significant. The zero-one variable distinguishing pandemic periods has also been included in the model; however, its impact has not proven to be statistically significant. This model was estimated with the CLS method (validity of this choice is confirmed by the results of F-test ($p = 0.2121$)). The estimated model explains the variability of the gross financial result at 87.4%.

Table no. 6. Results of total revenues model estimation – model 4: $Revenues = f(Credits)$

	B	S(B)	t	p	
const	52370.4	43946.8	1.192	0.2422	
Credits	6.123	0.427	14.350	<0.0001	***
U01	-191807	49199	-3.899	0.0005	***
LSDV R ²	0.8744				
F-test	F(2; 28) = 1.561; p < 0.2121***				
Joint test on named regressors	F(4; 28) = 9.042; p < 0.0009***				
Hausman Test	$\chi^2(1) = 1.472$; p = 0.2251				

B – regression coefficient, S(B) – standard error, t – t-statistics, p – probability in the t test. U01 – binary variable, x = 1 for the 1st half of a year. Estimation method – Panel CLS.

Analogous models were also constructed for the total gross financial result (table no. 7) and revenues per capita (table no. 8).

Table no. 7. Results of total financial result estimation model – model 2: $Financial Results = f(Credits)$

	B	S(B)	t	p	
const	36597.9	12762.1	2.868	0.0078	***
Credits	-0.270	0.230	-1.176	0.2494	
U01	-10532.6	2585.1	-4.074	0.0003	***
LSDV R ²	0.8947				
F-test	F(4; 28) = 3.158; p < 0.0292***				
Joint test on named regressors	F(2; 28) = 8.477; p < 0.0013***				
Hausman Test	$\chi^2(1) = 7.485$; p = 0.0062***				

B – regression coefficient, S(B) – standard error, t – t-statistics, p – probability in the t test. U01 – binary variable, x = 1 for the 1st half of a year. Estimation method – fixed model.

Total gross financial result (*Financial Result*) is negatively correlated with the total value of credits (B = -0.270; p = 0.2494); however, this correlation is not statistically significant (table no. 8). Zero-one variable taking the value of 1 for the 1st half of a year is statistically significant. The zero-one variable distinguishing pandemic periods has also been included in the model; however, its impact has not proven to be statistically significant. This model was estimated with the fixed model method (validity of this choice is confirmed by the results of F-test (p = 0.0292) and Hausman Test (p = 0.0062)). The estimated model explains the variability of the gross financial result at 89.5%.

Revenues per enterprise (*Revenues_pc*) are negative, yet, statistically insignificant, correlated with the value of credits per capita (B = -0.059; p = 0.9178 (table no. 7)). The zero-one variable taking the value of 1 for the 1st half of a year has also been included. Its importance is statistically significant (B = -26.157; p < 0.0001) – in the 1st half of a year, the gross financial result is, on average by PLN 26.2 million lower. The zero-one variable distinguishing pandemic periods has also been included in the model; however, its impact has not proven to be statistically significant. This model was estimated with the random model method (validity of this choice is confirmed by the results of F-test (p < 0.0001) and Hausman Test (p = 0.1167)).

Table no. 8. Results of per capita revenues model estimation – model 3: $Revenues_{pc} = f(Credits_{pc})$

	B	S(B)	z	p	
const	57.486	10.719	5.363	<0.0001	***
Credits_pc	-0.059	0.573	-0.103	0.9178	
U01	-26.157	2.331	-11.220	<0.0001	***
LSDV R ²	0.9397				
F-test	F(4; 28) = 50.225; p < 0.0001***				
Joint test on named regressors	F χ^2 (2) = 134.127; p < 0.0001***				
Hausman Test	χ^2 (1) = 2.468; p = 0.1167				

B – regression coefficient, S(B) – standard error, z – z statistics, p – probability in the z test. U01 – binary variable, x = 1 for the 1st half of a year. Estimation method – random model.

The conducted analysis indicates the lack of a visible trend in changing the strategy of banks to support the sustainable development of companies operating in areas shown in Taxonomy. The dynamics of the increase in the value of loans and credits in studied industries is similar to the dynamics noted in the case of companies in total. Furthermore, correlations between the value of credits and loans and the amount of revenues in the group of studied entities have not been confirmed. Admittedly, some previous studies indicate the importance of green innovations and green financing in increasing the profitability of enterprises and decreasing the risk (Lin, Zhu 2019); however, in other studies, it was stated that innovations in the scope of green products do not have a significant impact on the efficiency and results of an organization (Testa, D'Amato 2017; Trumpp and Guenther 2015). The financial market can effectively allocate funds, reduce financing costs and facilitate the acquisition of energy-saving technologies to lower environmental pollution (Tamazian 2009). Development of financial markets taking into consideration assumptions and guidelines in the scope of sustainable development actively promotes the use of environment friendly technologies (Yahya, Rafiq 2019) and an increase in enterprises whose activities meet the requirements presented in Taxonomy (Huchet-Bourdon et al. 2018), however, for the moment, measures undertaken by financial institutions in Poland to the benefit of sustainable development of preferred industries are not reflected in financial results of business entities. Moreover, the COVID-19 pandemic significantly disturbed financial and economic activity since numerous and long-term restrictions had harmed the implementation of ongoing projects and investment in new ones to benefit sustainable development (Anser et al. 2021; Yahya et al. 2021). Concerning the pandemic, ensuring progress in achieving sustainable development objectives slowed down in most countries, mainly due to the lack of additional financial support and the lack of favourable conditions for execution thereof (Barbier, Burgess 2020). Turbulences related to the COVID-19 pandemic changed the business environment of banks and the image of Polish entrepreneurship; therefore, although in the described models, the impact of the COVID-19 pandemic on the relation between credits and results of organizations operating in studied industries proved to be statistically insignificant, the differences and divergences are visible in each of the studied areas.

Conclusions

Taxonomy is a document that creates preferential areas of green financing, as envisaged, that should support sustainable entrepreneurship development. The transitional period between the publication date and the binding date of the document should be used by Polish banks to prepare and implement mechanisms allowing the full implementation of taxonomy assumptions in the processes of financing enterprises. Following the obtained research results, during the phase of implementing taxonomy in Poland, no distinct tendency to redirect the attention of banks and financial institutions to issues related to supporting sustainable development of preferred industries was observed, which indicated the necessity to verify and, ultimately, improve the flow of information in the scope of communicating the aim and assumptions of Taxonomy between financial and non-financial entities operating on the Polish market with the active support of the State's economic policy. Among main research restrictions, in particular, the short period of data subject to the analysis (2018 – June 2020) should be indicated, resulting from the initial phase of introducing Taxonomy in banking. A critical issue impacting the

research results was also the COVID – 19 pandemic, which, due to the introduction of numerous restrictions in conducting business activity in Poland, directed the attention of banks to the introduction of procedures securing the risk of crediting groups of enterprises at risk of insolvency. Due to the lack of obligatoriness and long-term implementation, taxonomy and green finances were postponed. Nevertheless, since January 2022, taxonomy has been a binding provision which should be explicitly reflected in banking strategies and products. The analysis of the level and manner of Taxonomy's implementation in Polish banking will be the subject of research in another study, including the analysis of data for the first year when the document has been binding in Poland.

References

- Adeel-Farooq, R.M., Abu Bakar, N.A., & Olajide Raji, J. (2018). Green field investment and environmental performance: A case of selected nine developing countries of Asia. *Environmental Progress and Sustainable Energy*, 37, 1085–1092. <https://doi.org/10.1002/ep.12740>
- Allen, S., Cunliffe, A. L., & Easterby-Smith, M. (2019). Understanding sustainability through the lens of ecocentric radical-reflexivity: Implications for management education. *Journal of Business Ethics*, 154(3), 781–795. <https://doi.org/10.1007/s10551-016-3420-3>
- Anser, M. K., Khan, M. A., Zaman, K., Nassani, A. A., Askar, S. E., Abro, M. M. Q., & Kabbani, A. (2021). Financial development during COVID-19 pandemic: the role of coronavirus testing and functional labs. *Financial Innovation*, 7(1), 1–13. <https://doi.org/10.1186/s40854-021-00226-4>
- Barbier, E.B., & Burgess, J.C. (2020). Sustainability and development after COVID-19. *World Development*, 135, <https://doi.org/10.1016/j.worlddev.2020.105082>
- Busch, T., Bauer, R., & Orlitzky, M. (2016). Sustainable development and financial markets: Old paths and new avenues. *Business & Society*, 55(3), 303–329. <https://doi.org/10.1177/2F0007650315570701>
- Capasso, M., Hansen, T., Heiberg, J., Klitkou, A., & Steen, M. (2019). Green growth – A synthesis of scientific findings. *Technological Forecasting and Social Change*, 146, 390–402. <https://doi.org/10.1016/j.techfore.2019.06.013>
- Chehabeddine, M.R., Grabowska, S., & Adekola, A.F. (2022). Building a model for securing regional development from ecological threats. *Insights into Regional Development*, 4(2), 22–40. [https://doi.org/10.9770/IRD.2022.4.2\(2\)](https://doi.org/10.9770/IRD.2022.4.2(2))
- Chang, K., Wan, Q., Lou, Q., Chen, Y., & Wang, W. (2020). Green fiscal policy and firms' investment efficiency: New insights into firm-level panel data from the renewableenergy industry in China. *Renewable energy*, 151, 589–597. <https://doi.org/10.1016/j.renene.2019.11.064>
- Coleman, G. (2013). Sustainability as a learning challenge. *Journal of Management Development*, 32(3) <https://doi.org/10.1108/02621711311318292>
- Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives (Text with EEA relevance), C/2021/2800, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32021R2139&from=EN>
- Czyżewska, A., & Staniszewski, J. (2016). Application of panel regression to evaluate the productivity and profitability in agriculture in the European Union countries after 2005. *Roczniki Naukowe Ekonomii Rolnictwa I Rozwoju Obszarów Wiejskich*, 103(3), 14 p.
- Docherty, P., & Kira, M., & (Rami) Shari, A.B. (2008). What the World Needs Now is Sustainable Work Systems, In *Creating Sustainable Work Systems: Developing Social Sustainability*, edited by Peter Docherty, Mari Kira, and AB (Rami) Shari, 1–22, <https://doi.org/10.4324/9780203890028>

- Durusu-Ciftci, D., Ispir, M.S., & Yetkiner, H. (2017), Financial development and economic growth: Some theory and more evidence. *Journal of Policy Modeling*, 39(2), 290-306, <https://doi.org/10.1016/j.jpolmod.2016.08.001>
- Fisk, P. (2010). People planet profit: How to embrace sustainability for innovation and business growth. *Kogan Page Publishers*.
- Greene, W.H. (2002). *Econometric Analysis*, 5, Auflage.
- Guo, R., Lv, S., Liao, T., Xi, F., Zhang, J., Zuo, X., Cao, X., Feng, Z., & Zhang, Y., (2020), Classifying green technologies for sustainable innovation and investment. *Resources, Conservation and Recycling*, 153, 104580 <https://doi.org/10.1016/j.resconrec.2019.104580>
- Huchet-Bourdon, M., Le Mouél, C., & Vijil, M. (2018). The relationship between trade openness and economic growth: Some new insights on the openness measurement issue. *The World Economy*, 41(1), 59-76, <https://doi.org/10.1111/twec.12586>
- Insight Report, The Global Risks Report 2019, 14th Edition, *World Economic Forum*, Geneva. Final Report - Guidelines on loan origination and monitoring, EBA/GL/2020/06, 29 May 2020.
- Kotecki, L. (2020). Green finance in Poland, EKF online 15-17.06.2020, https://iof.org.pl/wpcontent/uploads/2020/06/ZIELONE_FINANSE_w_POLSCE.pdf (07.05.2022)
- Kurucz, E.C., Colbert, B.A., & Marcus, J., (2014), Sustainability as a provocation to rethink management education: Building a progressive educative practice, *Management Learning*, 45(4), 437-457, <https://doi.org/10.1177%2F1350507613486421>
- Lin, B., & Zhu, J. (2019). Fiscal spending and green economic growth: Evidence from China. *Energy Economics*, 83, 264–271, <https://doi.org/10.1016/j.eneco.2019.07.010>
- Mazzanti, M. (2018). Eco-innovation and sustainability: dynamic trends, geography and policies. *Journal of Environmental Planning and Management*, 61(11), 1851-1860, <https://doi.org/10.1080/09640568.2018.1486290>
- Mohamed, N., Maitho, E., Masviken, E., Fourie, R., Tilly, M., & Zondi, N. (2014). The Green Fund of South Africa: Origins, establishment and first lessons. *Development Southern Africa*, 31(5), 658–674, <https://doi.org/10.1080/0376835X.2014.935295>
- Nassar, N., & Strielkowski, W. (2022). Transition towards green financial sector for gaining newly perceived competitiveness by adopting a green management model. *Insights into Regional Development*, 9(3), 71-88. [http://doi.org/10.9770/IRD.2022.4.1\(5\)](http://doi.org/10.9770/IRD.2022.4.1(5))
- Ngwenya, N., & Simatele, M.D. (2020). Unbundling of the green bond market in the economic hubs of Africa: Case study of Kenya, Nigeria and South Africa, *Development Southern Africa*, <https://doi.org/10.1080/0376835X.2020.1725446>
- Pan, W., Pan, W., Hu, C., Tu, H., Zhao, C., Yu, D., Xiong, J., & Zheng, G. (2019). Assessing the green economy in China: An improved framework. *Journal of Cleaner Production*, 209, 680–691, <https://doi.org/10.1016/j.jclepro.2018.10.267>
- PKD and the loan for the company. (2021). *Kamiński finanse*, <https://kaminski-finance.pl/pkd-a-kredyt-dla-spolki> (07.05.2022)
- Rackowski, K., & Ziolo, M. (2017). The financial sphere, in the face of the challenges of sustainable development, CeDeWu Warszawa, pp. 59-81.
- Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance)*, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32020R0852&from=EN>
- Sadorsky, P. (2010). The impact of financial development on energy consumption in emerging economies. *Energy Policy*, 38(5), 2528-2535. <https://doi.org/10.1016/j.enpol.2009.12.048>
- Setó-Pamies, D., & Papaoikonomou, E. (2016). A multi-level perspective for the integration of ethics, corporate social responsibility and sustainability (ECSRS) in management education, *Journal of Business Ethics*, 136(3), 523-538. <https://doi.org/10.1007/s10551-014-2535-7>

- Shah, A.A., Wu, D., & Korotkov, V. (2019). Are sustainable banks efficient and productive? A data envelopment analysis and the Malmquist productivity index analysis. *Sustainability*, 11(8), 2398 <https://doi.org/10.3390/su11082398>
- Shahbaz, M., Mallick, H., Mahalik, M. K., & Loganathan, N. (2015). Does globalization impede environmental quality in India? *Ecological Indicators*, 52, 379-393. <https://doi.org/10.1016/j.ecolind.2014.12.025>
- Sherman, P., & Hansen, J. (2010). The new corporate social responsibility: a call for sustainability in business education. *International Journal of Environment and Sustainable Development*, 9(1-3), 241-254. <https://doi.org/10.1504/IJESD.2010.029974>
- Soewarno, N., & Tjahjadi, B. (2020). Eco-oriented culture and financial performance: Roles of innovation strategy and eco-oriented continuous improvement in manufacturing state-owned enterprises of Indonesia. *Entrepreneurship and Sustainability Issues*, 8(2), 341-359. [https://doi.org/10.9770/jesi.2020.8.2\(20\)](https://doi.org/10.9770/jesi.2020.8.2(20))
- Song, X., Zhou, Y., & Jia, W. (2019). How do Economic Openness and R&D Investment Affect Green Economic Growth?—Evidence from China, *Resources, Conservation and Recycling*, 146, 405–415. <https://doi.org/10.1016/j.resconrec.2019.03.050>
- Sucheck, B., & Antczak, E. (2012). Spatial panel models, [in:] Sucheck B. (eds.), *Spatial Econometrics II. Advanced models*, C.H. BECK, Warszawa.
- Tamazian, A., Chousa, J.P., & Vadlamannati, K.C. (2009). Does higher economic and financial development lead to environmental degradation: evidence from BRIC countries. *Energy policy*, 37(1), 246-253, <https://doi.org/10.1016/j.enpol.2008.08.025>
- What is Taxonomy? On new EU law on classifying economic activities as environmentally sustainable, (2021), PARP, https://www.parp.gov.pl/component/content/article/75026:czym-jest-taksonomia-o-nowym-prawie-ue-dotyczacym-klasyfikowaniadzialalnosci-gospodarczej-jako-zrownowazonej-srodowiskowo#_edn1 (07.05.2022)
- Witkowski, B. (2012). Panel data models, [in:] Gruszczyński, M. (eds.), *Microeconometry*, Wolters Kluwer Polska Sp. z o.o., Warszawa, pp. 282-283.
- Yahya, F., & Rafiq, M. (2019). Unraveling the contemporary drivers of renewable energy consumption: Evidence from regime types. *Environmental Progress & Sustainable Energy*, 38(5), 13178, <https://doi.org/10.1002/ep.13178>
- Yahya, F., Abbas, G., Hussain, M., & Waqas, M. (2022). Financial Development and Sustainable Competitiveness in Arctic Region: A Dynamic Panel Data Analysis. *Problemy Ekorozwoju*, 17(1), 267-278, <https://doi.org/10.35784/pe.2022.1.24>
- Yahya, F., Shaohua, Z., Abbas, U., & Waqas, M. (2021). COVID-19-induced returns, attention, sentiments and social isolation: Evidence from dynamic panel model. *Global Business Review* <https://doi.org/10.1177%2F0972150921996174>
- Zhang, B., & Wang, Y. (2019). The Effect of Green Finance on Energy Sustainable Development: A Case Study in China. *Emerging Markets Finance and Trade*, <http://doi.org/10.1080/1540496X.2019.1695595>
- Zioło, M., 2020, Sustainable Finance, *Polskie Wydawnictwo Ekonomiczne*.

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DEVELOPMENT PLANNING PECULIARITIES IN THE CITY OF TSHWANE, SOUTH AFRICA: A CASE STUDY

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Abstract. The cooperative governance model espoused in the democratic South African Constitution requires the three spheres of the local, provincial and national governments to coordinate their service delivery strategies and institutional plans to strengthen efficiency, coherence and accountability toward improving performance efficacy and the quality of citizens' life. However, political and ideological contestations in a situation where different political parties are in power at national, provincial and local government levels result in the lack of alignment between the Integrated Development Plan and the National Development Plan, which denies citizens access to good quality services. This study reviewed various literature sources, governance policies and strategies to analyse whether the Integrated Development Plan of the City of Tshwane Metro Council under the governance of the multi-party coalition led by the Democratic Alliance can align with the National Development Plan, which is a creation of the African National Congress-led national government. A Qualitative approach informed the study, guided by a literature review to collate data and arrive at findings. The findings revealed a lack of alignment between the Integrated Development Plan of the City of Tshwane and the National Development Plan during the Democratic Alliance's control, which results in a disjointed approach to planning; poor implementation of local government services; and slow social-economic development that hamper the improvement of the quality of lives of citizens in Tshwane Metropolitan Municipality, perpetuating societal inequalities. It is recommended that institutional and political leaders in the three spheres of government in South Africa, and the citizenry, should put 'all hands on deck' and work together for the betterment of the country, despite differences in political strategies and policy approaches.

Keywords: alignment; City of Tshwane Metro Municipality; Integrated Development Plan; National Development Plan; service delivery

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1. Introduction

The Democratic Alliance (DA) is a governing party in the City of Tshwane Metro Municipality and an official opposition party to the governing African National Congress (ANC) at national government level (Independent Electoral Commission, 2019). This analysis of the development planning peculiarities in Tshwane City, as run by the Democratic Alliance, is significant in order to assess how different ideological outlooks, policy directions and political agendas between the Democratic Alliance and governing African National have a bearing on the national developmental trajectory (African National Congress, 2007; National Planning Commission, 2011). The Integrated Development Plan (IDP) of a local municipality in South Africa is framed on a participatory democratic process at local government level, as promulgated in the Municipal Systems Act of 2000 to ensure that local communities are consulted to identify programmes and projects meant to improve service delivery (Republic of South Africa, 2000). Whilst the IDP process is a mandatory legal framework that enables community participation in local government planning of service deliverables, its formulation process is susceptible to challenges due to political and social contestations, thereby defeating its intended purpose of coordinating and consolidating local government services to promote and improve the quality of service delivery (Huchzemeter & Mayekison, 2003; Gauteng Provincial Government, 2006; Harrison, Skosana, 2006).

The IDP process in South Africa should be aligned to the strategic objectives and goals of the National Development Plan Vision 2030, which is a national policy guiding framework on how local governments are expected to provide and improve the quality of services when delivering electricity, waste management, water and other bulk services. Local government in South Africa is viewed as the coalface of improving the quality of citizenry's lives in an endeavour to build a capable transformational and developmental state that is responsive to addressing the triple challenges of poverty, inequality and unemployment by underscoring local socio-economic development and governance prospects (National Planning Commission, 2012; Wust, 2022). In the City of Tshwane, the Democratic Alliance (DA) is presently the governing party in the metro municipal council, while the African National Congress (ANC), which is the national governing party that spearheaded the conceptualization of the National Development Plan, is in opposition benches together with the Economic Freedom Fighters (EFF) and other minority parties as per the local government election of 2016 (Independent Election Commission, 2016).

This study seeks to explore how the local government in the City of Tshwane, which is controlled by the Democratic Alliance, an opposition party at the national government level, aligns the city council's Integrated Development Plan with the National Development Plan's strategic objectives and goals. Alignment of the two important strategies for the improvement of service delivery for local citizens should be irrespective of the DA's opposition to the governing ANC's policies and strategies pertaining to governance in South Africa. The study is significant due to its critical analysis that the South African government is very effective in designing policy trajectory but poor on the implementation of agreed policies at the three spheres of national, provincial and local governments where there is a plethora of poor service delivery and protests across the country (Public Service Commission, 2018; Touchston & Wampler, 2014; Twala, 2014; Alexander et al., 2022). One mechanism to streamline performance efficiency and efficacy during the fourth administration in 2014 was to establish a specialized Ministry of Planning, Monitoring and Evaluation housed in the Presidency at an executive authority level to guide governance and institutional planning, as well as monitor and evaluate government's programmes and projects across all spheres of government (Department of Monitoring and Evaluation, 2015; National Planning Commission, 2012). Institutionalized pathways and developmental trajectories are necessary to achieve the strategic objectives and goals of the National Development Plan Vision 2030 (National Planning Commission, 2012).

2. Theoretical Background

2.1 Developing a rationale for the analytical inquiry

The concept of 'new' national planning is utilised to describe the new environment in which the present generation of national development planning activities is taking shape. The "new" paradigm of national planning is defined by a paradigm shift towards more closely aligning plans with election cycles and locally set goals, while nevertheless taking into account new global norms. An Integrated Development Plan (IDP) is construed as a chief planning tool for municipalities, with the intended goal of ensuring a bottom-up consultative process between the ward councillors and citizens in a particular ward to identify and propose service delivery programmes and projects (Municipal Systems Act, 2000). Service delivery priorities such as water and sanitation; roads and storm water; refuse removal; environmental planning and management, alongside the bouquet of local economic development initiatives (i.e. tourism facilitation, economic facilitation, development and growth; investment promotion; social and welfare responsibilities, including power generation, electricity distribution and management; and running a bus fleet) are identified to guide and be embedded in the IDPs of local and metro municipalities (Skosana, 2006). The IDP should therefore guide integrated planning for service delivery within local government, and be consolidated for effective service delivery programmes and projects across all municipal wards.

A practical observation from the vantage point of being at the coalface is that consultative processes normally degenerate into a political competition between community members and ward councillors influenced by party political loyalties rather than the best interests of the citizens in a municipality. A consultative process with local citizens is critical to drive and guide the IDP planning process (Republic of South Africa, 2000). Moatshe (2020) posits that due to the nature of political contestations, consultative processes for service deliverables degenerate into local political infighting characterized by a culture of disruptions which impede the IDP process. Furthermore, the failure of local ward councillors to conduct the IDP process in a mature and non-partisan manner denies community members opportunities to contribute and become service delivery partners in the planning process. Local political contestations during the development of the IDP in a ward area impact negatively on service delivery and result in a lack or poor alignment of the IDP of the City of Tshwane Metro Council with the strategic objectives and goal of the National Development Plan, which is supposed to guide the public service planning and development of the country (National Planning Commission, 2012). Moreover, a lack of skills amongst local politicians at ward and local government levels to strategically guide their communities during the development process of the Integrated Development Plan in municipalities poses serious challenges to the realisation of the strategic objectives and goals of the National Development Plan, namely building a capable state that is responsive to community needs (Moatshe, 2020).

2.2 Problematising performance challenges within the South African local government context

The City of Tshwane Metro, under the previous leadership of the African National Congress, has made great strides in improving local institutional integrated development planning by factoring in the City Development Strategy (Manuel, 2012). However, the apartheid legacy challenges such as poor quality of service delivery and lack of economic development in poor northern areas; unreliable power supply and management; lack of safety and security; HIV-AIDS; and lack of skills development amongst local citizens are still pervasive in the City of Tshwane (Skosana, 2006; Manuel, 2012). The Democratic Alliance in the Tshwane Metro is accused of failing to supply clean water to the poor area of Hammanskraal (Moatshe, 2020; Ramokgopa, 2018). The City of Tshwane Municipality re-directed financial expenditure to maintain well-resourced areas in the east of Tshwane; is unable to maintain infrastructure in township areas such as Ga-Rankuwa, Winterveldt and Mamelodi; and lacks the ability to revitalise local economic development for job-creation for local citizens (Mail & Guardian, 2019). The current governing Democratic Alliance faces a major challenge of legitimacy amongst poor black communities in the City of Tshwane as they were not outright winners in the 2016 local government election but assumed power

by cobbling together a minority coalition government that suffered major paralysis and collapsed in March 2020 (Pretoria News, 2020). While the Democratic Alliance blames the ANC's policy of cadre deployment for poor service delivery in the three spheres of government, the Minister of Public Service and Administration rebuts the DA's policies for not being in congruence with the strategic objectives of the National Development Plan to improve the quality of lives and services for the majority of South Africans (Masuabi, 2021).

The city's growing urbanisation necessitates a focus on sustainable and smart expansion. Tshwane is the most populous and economically significant metropolitan municipality in the country. For policy analysis, the jurisdiction tends to be a well-structured administrative jurisdiction with different state-urban development rules (Kumar & Dhote, 2021). However, the Democratic Alliance in the City of Tshwane has been limping from one governance, leadership and management crisis to another as it was forced to remove two mayors; suspend a municipal manager who is the accounting officer; faced work stoppage protests from workers affiliated to the South African Municipal Workers Union; and failed to carry out programmes which impacted municipal service delivery during its term of 2016 to 2021 (Moatshe, 2020). A major challenge for the Democratic Alliance in governing the City of Tshwane Metro is mistrust by the community as it is perceived to have undone the gains of the African National Congress-led previous administration's efforts to improve the quality of life of black South Africans by being in opposition to affirmative action, employment equity and broad-based black economic empowerment policies (Democratic Alliance Manifesto, 2016). Community members in the City of Tshwane accentuate that the Democratic Alliance has positioned itself as an anti-African majority that does not align its governance policies and municipal strategies with the National Development Plan that seeks to improve the quality of life for black South Africans by creating decent jobs and improving their economic development prospects in an effort to build a capable state that is responsive to the social and economic needs of previously disadvantaged South African citizens (Ramokgopa, 2018; Masuabi, 2021).

3. Research methodology

Creswell (2014) posits that the qualitative research methodology encourages an in-depth review and analysis of data from written documentary sources like strategic plans, policy documents and textual materials like newspapers, journal articles and other documentary artefacts. Labuschagne (2003) mentions that one of the analytical methods that the researcher can employ is to identify and select relevant documents and examine them to synthesize data. Data from documents can be "organized into categories, themes and case examples using content or thematic analysis" (Angers & Machtmes, 2005:780). Additionally, Karppinen (2010) asserts that document analysis is an important data collection tool for policy and programmatic intervention improvement due to ease of access. Young (2003) reflects that social science researchers in favour of interviews and questionnaires have neglected document analysis. Atkinson and Coffey (2004:59) describe documents as "social facts that are produced, shared and used in socially organized ways". A qualitative research approach was used to source policy documents, strategic and operational plans of the City of Tshwane Metropolitan Council and South African government, as well as newspapers articles to conduct an analytical description pertaining to the alignment of the Integrated Development Plan and National Development Plan. The intention is to assess whether efforts are made by the City of Tshwane Metro to deliver local government services in line with the developmental agenda of South Africa which can accrue socio-economic dividends for the local citizenry and improve their quality of life. The use of primary documentary sources was significant to gather first-hand insight into how institutional processes are generated and align to drive the societal development agenda at local and national government levels.

The literature review derived numerous themes from primary and secondary documents in order to analyse how the City of Tshwane and South Africa approach developmental planning and governance performance. The primary and secondary documentary analyses of collated data was significant to provide a picture of how the City of Tshwane aligns its strategic and pragmatic plans and activities with the National Development Plan,

which is an overarching strategy for South Africa to improve its quality-of-service provision and quest to achieve its national development goals. Document analysis focuses on written documents or materials not produced by the researcher but generated from primary and secondary sources within an institution (Bowen, 2008). Primary and secondary documents were sourced from the City of Tshwane's strategic and annual performance plans for the past 15 years; national government policies and programmes pertaining to governance and planning; journal articles and recent newspaper articles. Analysed documents were the City of Tshwane's Development Strategy by the previous African National Congress to improve local government services in the City of Tshwane; the city's annual report of 2018/2019; South Africa's diagnostic report of 2011; National Development Plan of 2012; and numerous journal and newspaper articles on the City of Tshwane. The following themes were generated: *city development strategy for the City of Tshwane by the African National Congress; developing countries' national development plans for countries' developmental pathways; adoption of the National Development Plan in South Africa to guide local government processes and performance; alignment between City of Tshwane's Integrated Development Plan and National Development Plan; and poor integrated approach to institutional planning between local and national spheres of governments in South Africa.*

4. Results and Discussion

4.1 City Development Strategy for the City of Tshwane by the African National Congress

The City of Tshwane Metro adopted the City Development Strategy (CDS) in 2004 during the ANC's governance of the metro council to coalesce institutional processes and tools with the Integrated Development Plan through their Tshwane Development Management Cycle, which seeks to enhance local service delivery activities (Skosana, 2006). The intention of the CDS, which was the brain trust of the governing African National Congress in the Tshwane Metro, was purposed to institutionalize local government planning to be responsive to community needs by improving the quality of municipal services; reducing levels of poverty in poor and neglected northern areas of the city like Soshanguve, Hammanskraal, Winterveldt, Mabopane and Ga-Rankuwa from the apartheid spatial planning legacy as they are inhabited by a majority of black people; and catering for inclusivity and equity for the improvement of living standards (After Cities Alliance, 2001). The Tshwane Development Management Cycle designed factor performance indicators in an effort to incrementalize institutional growth and learning in a manner that is innovative and coherent, and which seeks to achieve service delivery mandates guided by seven pillars, namely the development of poorer and neglected areas in the north of the city; strengthening economic activities; building social coherence; the application of sound financial planning and management fundamentals in local sectors of the economy; the development of strong municipal institutions; celebrating the municipality as a capital of the country; and monitoring the efficiency and efficacy of local services, i.e. local economic development, bulk services, water and electricity supplies, and the management of rates and utilities in local areas (Skosana, 2006).

4.2 Formulation of national development plans to frame the developmental pathways of some developing countries

In many developing countries that are on industrial development pathways, such as China, Malaysia, Ethiopia and Namibia, local government performance systems have been integrated and institutionalized within their national development plans (Department of Planning, Monitoring and Evaluation, 2018). Some of these countries have developed comprehensive plans with sector indicators, such as macroeconomic, productive, economic infrastructure, social, good governance and capacity building, that drive their five-year medium-term performance strategic targets. These strategic pillars and targeted plans are further supported by the highest level of political leadership and require public participation with strong accountability measures and consequence management for poor performance and the lack of service delivery. A priori is that systems and strategy alignment between local and national governments can streamline performance and improve institutional functionality and service deliverables (Liu et al., 2022).

Logical analysis is critical to evaluate how developing countries derived elements of good practices when institutionalizing national development planning in the developmental trajectory. The Ugandan government linked its Comprehensive National Development Planning Framework with national work plans and budgets to guide short, medium and long-term planning in their 30-year vision (Department of Planning, Monitoring and Evaluation, 2018). The Namibian government integrated its national plan to be driven by four strategic pillars, social transformation, economic progression, good governance and environmental sustainability, in an effort to strengthen its sustainable developmental approach (Carver, 2020, Office of the President, 2021). Furthermore, the Chinese government established the National Development and Land Reform Commission to be a central planning agency to execute state policies and involve local government to drive its developmental pathway and create prosperity for its citizenry (Department of Planning, Monitoring and Evaluation, 2018). The National Vision of Malaysia was divided into five-to-ten-year developmental phases to drive waves of development in different thematic and sector areas (Lee & Chew-Ging, 2017). Moreover, the Ethiopian Comprehensive Plan embedded five-year sectoral performance indicators in their overarching national development plan, driven and supported by political leadership at the highest governmental level (Bekele & Kjosavik, 2016). These developing countries' national developmental models can assist local government in Tshwane to analyse the importance of aligning its Integrated Development Plan with the National Development Plan, which can encourage these two critical spheres of government to align service delivery and socio-economic developmental pathways rather than adopting a silo approach.

4.3 The National Development Plan in South Africa to guide local government processes and performance

South Africa's National Development Plan (NDP) is conceptualised as a blueprint for a better and promising future for South Africans that requires institutional leaders and citizens to put 'all hands on deck' and work together for the betterment of the country. The National Development Plan (NDP) emphasizes the significance of improving the abilities of local government to fulfil its transformational developmental mandate (Department of Cooperative Government and Traditional Affairs, 2018). The NDP's strategic objectives envision that Integrated Development Plans (IDPs) at the local government level should focus attention on the strategic and critical priorities of the NDP such as the improvement of spatial planning, infrastructure and basic services to improve quality and the living standards of the South African citizenry at local spheres of governance (National Planning Commission, 2012). The six strategic pillars that drive the National Development Plan in South Africa are: unity of South Africans around a common purpose; active citizenry through democratic participation; growing an inclusive economy; the need to improve capabilities; a capable and developmental state; and leadership responsibilities in resolving problems (De Lange, 2018). Deeper analysis reveals that all these six strategic pillars of the NDP are critical at the local government level to drive service delivery implementation and improvement through an Integrated Development Plan, which calls for alignment between these two institutional frameworks of governance and the management of public affairs. This means that irrespective of the political party that is governing a municipality, its IDP activities should align with the strategic priorities, objectives and goals of the NDP, notwithstanding the fact that such a party has its own different governance and service delivery strategy guided by its political and ideological outlook.

The governing African National Congress conceptualises its notion of a developmental state guided by its 2007 Strategy and Tactic policy document that framed Chapter 13 of the National Development Plan (African National Congress National Policy, 2007). A major emphasis of the National Development Plan characterises a developmental state that "brings about rapid and sustainable transformation in a country's social and economic conditions through intensive, active and effective intervention in the structural causes of economic and social under-development" (National Planning Commission Diagnostic Plan, 2011: 409). Moreover, the National Development Plan conceptualises the state as being developmental by crafting policies which are meant to lift South Africans out of poverty, create sustainable jobs, and eradicate apartheid structural and societal inequalities. This requires the developmental state to be effectively capacitated and capable to drive transformational and developmental policies by improving institutions and infrastructure for optimal economic performance. Chapter

13 of the National Development Plan provides an over-arching guiding framework relating to the successful implementation of the NDP at local, provincial and national government spheres (National Planning Commission, 2012).

The National Development Plan (NDP) advances an idea of radical economic transformation within the structure of the South African society to realize socio-economic changes and the culture of society to dismantle dispossession and exploitation (National Planning Commission, 2012). The NDP envisions a South African society where opportunities are not determined by birth, but by education, potential and ability, and hard work. The National Development Plan accentuates cooperative relationships and governance across three spheres of national, provincial and local governments that are diffused to private, labour and civil society sectors (Department of Planning, Monitoring and Evaluation, 2018). A collaborative approach by the three spheres of local, provincial and national government is critical for the alignment of functions and powers, planning processes and budget allocation processes to strengthen service delivery and seamless governance which undermine bureaucratic stagnation. While national and local governments in Tshwane and across South Africa demonstrate pockets of good planning, the poor implementation and execution of policies have denied communities much needed economic development dividends and service delivery. Poor implementation and execution of policy mandates meant to drive socio-economic development and improve the quality of national and local government services resulted in the establishment of the National Planning Commission and Department of Planning, Monitoring and Evaluation to be strategic centres of comprehensive institutional planning frameworks to drive the developmental agenda and meet the goals of a democratic society (Republic of South Africa, 2013).

4.4 Poor alignment between the City of Tshwane's Integrated Development Plan and the National Development Plan

In 2014, the South African government adopted the Medium-Term Strategic Framework (MTSF) to be a five-year implementation plan towards the achievement of the goals National Development Plan (Republic of South Africa, 2014). The MTSF intended to identify critical action plans to be undertaken in the five-year cycle of 2014-2019 across local, provincial and national government spheres which puts the country on a developmental pathway towards the achievement of the strategic objectives and goals of the National Development Plan Vision 2030. Departmental strategic plans and performance targets at all spheres of government are to accommodate and reflect performance indicators and targets set out in the Medium-Term Strategic Framework and National Development Plan (Department of Planning, Monitoring and Evaluation, 2018). While there are some green shoots of progress in economic, social and local government services in some departments in the City of Tshwane, such performance progress is minuscule and uneven across the City (City of Tshwane, 2019). Poor and a lack of cooperation across multiple departments, local government and governance stakeholders characterise poor implementation and the state of governance and management. Poor performance in the City of Tshwane is a consequence of too many strategic priorities in a currently poor economic environment. Moreover, a lack of an integrated and aligned approach across departments and institutional units results in poor and ineffective information systems to track, monitor and evaluate performance as per set NDP and local government targets (Ntshangase & Msosa, 2022).

4.5 Poor integrated approach to institutional planning between local and national spheres of government in South Africa

Twala (2014) and Touchton and Wampler (2014) postulate about the lack of synergies to guide integrated planning at inter-departmental and inter-governmental levels in South Africa, which undermine abilities to meet the strategic objectives of the National Development Plan for improved services provision, job creation and building an effective and capable state. This is due to the fact that local and national governments and their institutions operate in silos and do not liaise with each other, which makes it more challenging to align service delivery provisions and the improvement of local economic development opportunities in the City of Tshwane

with identified strategic national priorities such as the provision of water and sanitation; building economic zones for job-creation; and allocating land infrastructure and bulk services for housing development (Ramokgopa, 2018; Department of Planning, Monitoring and Evaluation, 2018). The major impediments that cripple a strategic alignment between the City of Tshwane and national government plans and strategies are political contestations, policy dichotomy and ideological discordance between the Democratic Alliance and African National Congress. One may argue that the Democratic Alliance and African National Congress have divergent roadmaps for South Africa's developmental pathway going in parallel and opposite directions. One roadmap leads to the developmental state guided by values of social democracy to liberate South Africa from its apartheid legacy, whilst the other is the neo-liberal path to maintain apartheid inequalities (African National Congress Policy Conference, 2007; Democratic Alliance Election Manifesto, 2019). Despite an intention of the National Development Plan to signify the integration and alignment of governmental and institutional planning in South Africa, government spheres at provincial and local levels persisted with institutional autonomy in their planning cycles, which failed to sequence government economic development and service delivery activities. The disjointed approach to developmental planning in the City of Tshwane and national government undermines optimal resource allocation and utilization, the consequence of which is not being able to measure and monitor government's impact on improving the lives of citizens through its developmental agenda (Department of Planning, Monitoring and Evaluation, 2018; Ramokgopa, 2018). Poor service delivery due to the lack of an integrated approach to spatial and institutional planning between the City of Tshwane and the national government dis-empowers the local populace, which in some instances results in the scapegoating of foreign nationals for the citizens' lack of jobs and economic opportunities (Mkhiza & Makau, 2018; Khoza, Mashele & Mukonza, 2021).

Conclusions

This study sought to analyse the development planning peculiarities in the city of Tshwane. The analysis from documentary sources revealed a lack of alignment between the Integrated Development Plan in the City of Tshwane and the National Development Plan during the Democratic Alliance's control, which resulted in a disjointed approach to planning; the poor implementation of local government services; and uneven social-economic development, thus hampering the improvement of the quality of life of citizens in Tshwane Metropolitan Municipality and perpetuating societal inequalities. It must be noted that the dynamics of a local area are often not understood by the national government, which prevents it from creating policies that are appropriate for that area. Thus, the functioning of local governments is under intense political pressure from the national government. The local government structure's independence might be compromised by this circumstance, which could also result in a concentration of political power. South Africa's numerous and complex development concerns need a holistic approach to preparing for the future. IDPs are essential tools for municipalities to use in identifying and addressing specific needs in both the urban and rural areas they serve. Conflicts and inefficiencies will undoubtedly arise if the national government's IDPs and those of other government domains are not coordinated or properly aligned. A municipality's planning must thus be coordinated with and supplement the national government's development plans and strategies, as well as those of other impacted municipalities. Integrated Development Planning needs to also be developed into a process that is shared across the three domains of government. Moreover, both vertical and horizontal alignment ought to be enhanced so that it is the business of everyone. This should be done whilst simultaneously making sure that the community is aware of the potential and restrictions as a result of the resources that are available. In addition, the legislative and functional establishment of municipalities as independent organisations within a contained structure and boundary does not exempt them from the fact that in order to achieve their goals and be fully effective, the municipalities' interface with the other spheres of government must be carefully managed and optimised. Integration beyond municipal lines, as well as integration across other levels of government, is essential to both the success and the successful management of the Integrated Development Plans.

References

- African National Congress. (2007). *ANC national policy conference: Report of the commission on strategy and tactics*, 30 June 2007. Gallagher Estate: ANC Publication.
- Alexander, C., Berrisford, S., Nkula-Wenz, L., Ndhlovu, D., Siame, G., Watson, V. & Zinnbauer, D. (2022). Challenges and opportunities of curbing urban corruption and building professional integrity: Experiences of planners in South Africa and Zambia. *Habitat International*, 122(102541) <http://doi.org/10.1016/j.habitatint.2022.102541>
- Angers, J. & Machtmes, K. (2005). An ethnographic-case study of beliefs, context factors, and practices of teachers integrating technology. *The Qualitative Report*, 10(4), 771-794.
- Atkinson, P.A., & Coffey, A. (2004). Analysing documentary realities. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (2nd ed.). London: Sage.
- Bekele, Y. & Kjosavik, D. (2016). Decentralised Local Governance and Poverty Reduction in Post-1991 Ethiopia: A Political Economy Study, *Politics and Governance*, 4(4) <http://dx.doi.org/10.17645/pag.v4i4.590>
- Carver, R. (2020). Lessons for blue degrowth from Namibia's emerging blue economy. *Sustainability Science*, 15(1), 131-143. <https://doi.org/10.1007/s11625-019-00754-0>
- City of Tshwane. (2019). *City of Tshwane Annual Report 2018/19*. Pretoria: City of Tshwane.
- Creswell, J.W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks: Sage Publication.
- Democratic Alliance. (2019). *The manifesto for change*. Bruma Lake: Democratic Alliance.
- Department of Planning, Monitoring and Evaluation. (2018). *Concept note on the NDP five year implementation plan*. Pretoria: Department of Planning, Monitoring & Evaluation.
- Department of the Presidency. (2015). *National Development Plan 2030, Our Future make it works*. Pretoria: National Planning Commission.
- Gauteng Provincial Government. (2006). Available at <http://www.tshwane.org.za> (Accessed on March, 14 2022).
- Harrison, P., Huchzermeter, M., & Mayekison, M. (2003). *Confronting fragmentation: Housing and urban development in a democratizing society*. Cape Town: UCT Press.
- Independent Electoral Commission. (2016). *Detailed result data: 2016 Municipal election*. Centurion: Independent Electoral Commission.
- Karppinen, K. (2010). *Rethinking media pluralism. A critique of theories and policy discourses*. Ph.D. thesis. Helsinki: University of Helsinki.
- Khoza, H.H., Mashele, R., & Mukonza, R.M. (2021). The “butterfly effects” that emerged to xenophobia outbreaks in South Africa: Xenophobia, a timeless boom. *African Journal of Peace and Conflict Studies*, 10(1), 101-122. <https://doi.org/10.31920/2634-3665/2021/v10n1a5>
- Kumar, S. & Dhote, K.K. (2021). A grounded theory approach for the assessment of urban development policies in Indian cities. *Current Science*, 121(12), 1561-1571 <http://doi.org/10.18520/cs/v121/i12/1561-1571>
- Labuschagne, A. (2003). The Qualitative Report Qualitative Research -Airy Fairy or Fundamental? *The Qualitative Report*, 8 (1), 100-103. <http://doi.org/10.2514/6.1986-1409>
- Lee, C., & Chew-Ging, L. (2017). The evolution of development planning in Malaysia. *Journal of Southeast Asian Economies*, 436-461. <https://doi.org/10.1355/ae34-3b>

Liu, W.W., Liu, Z.W., Wang, L., Liu, H.M., & Wang, Y (2022). Regional Social Development Gap and Regional Coordinated Development Based on Mixed-Methods Research: Evidence from China. *Frontiers in Psychology*, 13 (927011) <http://doi.org/10.3389/fpsyg.2022.927011>

Masuabi, Q. (2021). *Mchunu: Cadre deployment myth is a DA hype*. City Press, April 19, 2021. Johannesburg: Media24.

Moatshe, R. (2020). *Governance crisis in City of Tshwane*. March 2, 2020. IOL. Johannesburg: Independent Media.

National Planning Commission. (2012). *National Development Plan 2030: Our Future-Make It Work*. Pretoria: National Planning Commission.

Ntshangase, B.A., & Msosa, S.K. (2022). Enhancing service delivery for Metropolitan municipalities in South Africa via Project Management. *Insights into Regional Development*, 4(3), 127-138. [http://doi.org/10.9770/IRD.2022.4.3\(8\)](http://doi.org/10.9770/IRD.2022.4.3(8))

Ramokgopa, K. (2018). *Leadership in establishing the Gauteng city-region: The case of the City of Tshwane Metropolitan Municipality*. Doctorate in Public Affairs thesis. Pretoria: University of Pretoria.

Office of the President. 2021. Namibia's Second Voluntary National Review Report on the Implementation of the Sustainable Development Goals towards Agenda 2030. Available online: https://sustainabledevelopment.un.org/content/documents/279462021_VNR_Report_Namibia.pdf (Accessed 10 March 2022).

Republic of South Africa. (2000). *Municipal Systems Act, No. 32*. Pretoria: Government Printers.

Skosana, A. (2006). *A transformational city development strategy*. 4th ISO-Carp Congress.

Twala, C. (2014). The African National Congress (ANC) and the Cadre Deployment Policy in the Post-Apartheid South Africa: A Product of Democratic Centralisation or a Recipe for a Constitutional Crisis? *J Soc Sci*, 41(2), 159-165. <https://doi.org/10.1080/09718923.2014.11893352>

Touchton, M. & Wampler, B. (2014). Improving social well-being through new democratic institutions. *Comparative Political Studies*, 47(10), 1442–1469. <https://doi.org/10.1177/0010414013512601>

Wust, F. (2022). The South African IDP and SDF contextualised in relation to global conceptions of forward planning - A review. *Town and Regional Planning*, 80, 54-65. <http://doi.org/10.18820/2415-0495/trp80i1.6>

Young, T.K. (2003). Review of research on aboriginal populations in Canada: relevance to their health needs. *Bmj*, 327(7412), 419-422. <https://doi.org/10.1136/bmj.327.7412.419>

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ASSESSMENT OF THE INNOVATION POTENTIAL OF THE REGIONS OF LATVIA, LITHUANIA AND BELARUS *

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Abstract. The concept of innovation potential is complicated and complex, its evolution is closely related to the concept of innovation. There are several approaches to define the innovation potential. Some scientists and researchers define innovation potential as a set of several resources, other scientists - as a result of innovative activity. The author is a supporter of the resource approach and explores the potential of innovation from the perspective of resources. There are several approaches to determining the innovation potential from the resource perspective, however, they are mostly intended for the evaluation of the innovation potential at the national level or at the level of large regions. In addition, most of the assessment methodologies are tailored to the analysis of specific regions and it is difficult to adapt them to the evaluation of other regions. Therefore, the author develops his own methodology for assessing innovation potential, adapted for NUTS3 regions, and uses it to assess the innovation potential of Latvian, Lithuanian and Belarusian regions. The given approach makes it possible to promptly evaluate existing resources and define opportunities, thus providing the region with a stable market position, especially within the regional context, which is required by the ever-increasing and fierce competition.

Keywords: innovation; innovation potential; innovation capacity; resources of the innovation potential; concept of the innovation potential; quantitative and structural differences in innovation potential; cluster analysis; development vector

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JEL Classifications: O11, O31, R11

1. Introduction

The modern regional economics is a complex management mechanism where various structural components interact. In order for the regional economics to develop effectively, transformations in the form of innovations are required. Therefore, the introduction of innovations is considered an essential factor in the social and economic development of any region.

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Regional cooperation problems has been supported by the implementation of various EU cross-border cooperation programs, e.g. European Neighborhood and Partnership Instrument 2007-2013, 2008; European neighbourhood instrument Cross-border cooperation programme Latvia - Lithuania - Belarus 2014-2020, 2015.

In the conditions of Covid 19, regional studies become even more relevant, as regional cooperation is difficult. Due to several reasons: epidemiological security measures limit the movement of people between countries, the operation of several institutions has been suspended or liquidated, several regional cooperation connections have been lost, which are quite difficult to restore even if the measures to limit Covid 19 are lifted.

As part of the study of the innovation potential of the regions of Latvia, Lithuania and Belarus, the author elaborated his evaluation methodology and, based on the results, analyzed the level of development of the innovation potential of the regions of these countries, which is extremely important to improve the competitiveness, image and recognition of these regions in the world, attract investments and improve the quality of life of the inhabitants of these regions.

The following materials were used to implement the research tasks: statistical data, data from various organizations engaged in the study of regional economic problems, research materials, as well as the works of various scientists and researchers.

2. Theoretical and methodological framework of innovation potential

The concept of innovation is multifaceted. In order to measure innovation, it is necessary to examine the definitions of the given concept in the scientific literature. Scientists distinguish various classical approaches, within the framework of which innovation is analyzed. One of them embraces changes, resources, processes, result (Schumpeter, 1939; Schlesinger Jr., 1986; Twiss, 1989; Chekulina & Tamakhina, 2011; Freeman, 1995, 2017; Zhits, 2007; Danko, 1999; Porter & Stern 2002; Hudakova, Fila & Marosh, 2018; Zhizhlovsky, 2011; Zholnierski, 2005; Alekseyev, 2009; Pichlak, 2012; Chehabeddine, Grabowska & Adekola, 2022; Atwa, 2022; Davies, Gann & Douglas, 2009; Waldron & Wetherbe, 2020; Prud'homme van Reine, 2022; Sinclair-Desgagne, 2022; Acemoglu, Akcigit & Celik, 2022; Agarwal et al., 2022; Andriushchenko et al., 2022; Birkner, Meszaros & Szabo 2022; Bora, Brazda & Sliva 2021; Bychin, 2022; Cantarelli & Genovese, 2021; Carlström, 2022; Erdin & Caglar, 2022; Farrow, 2021; Franco et al., 2022; Gijon, Lozano & Molina, 2022; Giuliano et al., 2022; Heilala, 2022; Jaiswal et al., 2022; Krivosheya, 2022; Kulakov, Verstina & Meshcheryakova, 2022; Langham & Paulsen, 2020; Liu & Shao, 2022; Mikelsone et al., 2022; Nikina-Ruohonen, 2022; Paraska et al., 2022; Repeshko, 2022; Rodivilov, 2022; Saloff-Coste, 2022; Samson, Ellis & Black, 2022; Sawalkar et al., 2022; Sheffield, Kars Unluoglu & Jarvis 2022; Shvets & Dubiei, 2021; Sundaram, Murgod & Sowmya, 2022; White, 2022). Latvia has adopted the following definition of innovation (Ministry of Economy of the Republic of Latvia 2019): “Innovation is a process in which new scientific, technical, social, cultural or other ideas, developments and technologies are implemented in a market-demanded and competitive product or service”. Definition of the Law on scientific activity of the Republic of Latvia – innovation is the implementation of new scientific, technical, social, cultural or other ideas, developments and technologies in a product or service.

Economic theory and practice widely use the concept of innovation potential. Anyway, the definition of the management and development of the innovation potential of is still under discussion.

The idea of “innovation potential” is introduced by Freeman (1995), by which the scientist understands the systems’ growth, using measures for development of production, economic, social and organizational potentials, their acquisition and performance.

The practical aspect of the concept of innovation potential is reflected in Drucker's works, in which he studies the sources of modern industrial development (Drucker 2009). For example, he notes that innovation begins with the analysis of existing potential in order to use it effectively.

Researchers provide different definitions of innovation potential:

- Zhits (2007) understands with the innovation potential the economic resource amount, which may be used in the society for own development at the given moment. He mentions scientific-technical, educational potential and investment potential. The set of these factors, according to Zhits, constitutes the innovation potential of the macrosystem;
- Danko (1999) defines the innovation potential as accumulated specific amount of information about scientifically technical work, invention, the results of the introduction of design developments, new techniques and products;
- Porter and Stern (2002) understand the national innovation potential as the ability of the national economy to develop and commercialize the flow of new technologies in the long term. Thus, only technological innovations are considered within this approach. According to the authors, the national innovation potential consists of three main parts: the national innovation infrastructure, the economic environment (innovation clusters), the connection between clusters.
- Poznanska (1998) claims that innovation potential is the ability to effectively implement innovations, i.e. new products, new technologies, organizational methods and marketing innovations. Potential understood in this way depends on four main elements: financial potential, human potential, material potential, knowledge;
- Hudakova, Fila and Marosh (2018) considers the innovation potential of regions as the main source of their competitiveness for achieving their economic, social and environmental goals;
- Zhizhlavsky (2011) understands innovation potential as a description of the existing innovation environment, in which innovations are created, developed and implemented;
- Zholnierski (2005) recognizes the narrow understanding in the definition of innovation potential. He believes that it is determined by internal innovation potential and access to external sources of innovation. The internal innovation potential is formed of: personnel (their knowledge and experience, skills and qualifications, as well as the way available resources are managed, information management), research and development (isolated research and development objects, completed research and production, etc.), technologies (computers and ICT, machines and facilities and the degree of their technological development), while external sources of innovation are mainly higher education institutions and research and development departments, as well as competing companies, customers and suppliers;
- Alekseyev (2009) mentions the availability of all necessary resources and opportunities in the region for the implementation of innovative measures as the main factor that determines innovation potential;
- Pichlak (2012) Pichlak's approach states that a company's model depends on its determinants. Pichlak mentions research resources, communication system, culture of innovation and its characteristics (leadership style dominates in the organization), characteristics of the members of the management team, size of the organization and intensity of cooperation in innovative activities;
- Lunarski and Stadnicka (2007) emphasize that an organization's innovation potential consists of nine elements. These elements are marketing and personnel potential, research and development, technology and production, management style and system, adopted information system, external contacts of the organization and financial potential;

- Fathulina and Shabaltina (2011) think that the innovation potential is a set of human, social, legal, material, technical, informational and other resources intended for the region's innovation development;
- Sangadiyev and Ayusheva (2006) assume that the innovation potential is the ability of all structures of the region to implement innovations, taking into account resource opportunities, as well as changes and trends in the external environment;
- Chekulina and Tamakhina (2011) think that it is a set of scientific, personnel, technical, financial, economic, information and communication resources that ensure the activity of innovation and determine the level of development of the regional economy;
- Chehabeddine, Grabowska, and Adekola (2022); Maâlej (2022) point out that innovation play important role in the environmental dimensions of economic growth;
- Atwa (2022) believes that the creation of an artificial intelligence innovation hub is related to the unification of entertainment, educational and commercial resources, which improves the leadership positions of the country and regions;
- Davies, Gann and Douglas (2009) argue that the innovation potential can only be realized with collaborative behavior between different structures;
- The GII (Global Innovation Index) 2021 model includes 81 indicators, which fall into three categories: quantitative data (63 indicators), index data (15 indicators) and qualitative data (3 indicators), including indicators relating to the political situation, education system, infrastructure and knowledge creation in each country;
- Waldron and Wetherbe (2020) emphasize that innovations do not sustain, transform and create value themselves– it requires intention, attention and action;
- Prud'homme van Reine, P. (2022) argues that successful innovation requires integral approach. Product innovation cannot be considered separately from process and service innovation. Product, process and service innovations must be embedded in innovation strategy;
- Shvindina, Taraniuk, Kotenko, Abayomi, Taraniuk and Qiu (2022) understand the innovation potential as a difference between the system's current state in terms of innovation performance and its potential outcomes based on existing innovative capabilities;
- Sinclair-Desgagne (2022) sees innovation as the key to economic growth, sustainable development, productivity improvement, strong competitiveness and social cohesion. Therefore, the government and companies must invest significant resources to promote innovation.

The object of the research is the innovation potential of the regions in Latvia, Lithuania and Belarus.

The subject of the study is the quantitative and structural differences of innovation potential.

The aim of the study is to develop a methodology for assessing the innovation potential of regions, with its help to evaluate the resources of the innovation potential of the regions of Latvia, Lithuania and Belarus and to analyze the quantitative and structural differences of the innovation potential.

Tasks of the research:

- analyze the theoretical and methodological foundations of the region's innovation potential;
- determine the innovation potential resources of the regions of Latvia, Lithuania and Belarus;
- define the determinant indicators of innovation potential resources;
- develop a methodology for the assessment of innovation potential in the regions;
- appraise the developed methodology and with its help to assess the innovation potential of the regions of Latvia, Lithuania and Belarus;
- assess the regional quantitative and structural differences of innovation potential and the development vector in the regions of Latvia, Lithuania, and Belarus;

- assess the resource structure of the innovation potential of the regions of Latvia, Lithuania and Belarus and divide them into clusters;
- determine the resource profile and location of the innovation potential of the regions of Latvia, Lithuania and Belarus;
- determine the degree of influence of innovation potential on the level of economic development of the regions of Latvia, Lithuania and Belarus.

Research methods for the implementation of tasks - methods of logical analysis and synthesis, monographic, analytical, logical-constructive, statistical quantitative data processing and analysis methods of researching economic theoretical and empirical sources at the international level – the largest dependent variable, the method of the sum of the coefficients of determination by the explanatory variable, the method of the linear scaling principle, frequency analysis, correlation analysis, cluster analysis, analysis of the sum method, the method of grouping into quintiles, the cartographic method, etc. methods of statistical analysis.

In determining innovation potential even within the EU at NUTS 3 level, there is a problem of lack of statistical data. The problem of the limitation of the study increases even more when the comparative analysis with non-EU countries is to be carried out, as some statistical data cannot be compared at all due to differences in their calculation and definitions of indicators. The following limitations should be taken into consideration when performing a comparative analysis:

- a person of working age (women aged 16-58, men aged 16-63) without work and income, who is registered in employment institutions, looking for work and is ready to work, is considered unemployed in Belarus, while in Latvia and Lithuania the category of unemployed is much wider - they are persons aged 15-74 who are unemployed, actively looking for work and ready to start working within two weeks;
- in Belarus, the retirement age for women starts at 55, for men at 60, in Latvia at 62 for both women and men, at 62 for women and 64 for men in Lithuania;
- in Belarus, the average number of employees in a micro-enterprise should be up to 15 people per calendar year, in Latvia and Lithuania - up to 9 employees; In Belarus, a small company has 16-100 employees, in Latvia, Lithuania - 10-49 employees; In Belarus, the average company has 101-250 employees, in Latvia, Lithuania - 50-249 employees;
- author does not analyze GII (Global Competitiveness Index) indicators, which is due to the fact that many of these indicators are not collected in official statistics in the regions of the given research, some of them are not available at all or are only available at the national level or are available in several regions. Thus, the author uses selected (Schumpeter, 1939; Freeman, 1995; Schlesinger Jr., 1986; Carlström, 2022; Erdin & Caglar, 2022.; Farrow, 2021; Franco et al., 2022.; Jaiswal et al., 2022; Liu & Shao 2022) and available indicators, which will be used for evaluation of innovation potential of the regions of Latvia, Lithuania and Belarus.

3. Evaluation methodology of the innovation potential

The authors adopt resource approach and studies the resources of the region's innovation potential according to the following components (see Figure 1):

- scientifically technical and educational, which include the number of scientific research centers and the number of people employed in them, the number of students in secondary schools of general education, the number of students enrolled in vocational schools and universities, etc. indicators in relative units of measurement;

- labor force resources which include population density, population up to working age, at the working age, above working age, natural increase, migration rate, level of demographic burden, economic activity, etc. indicators in relative units;
- economic investment resources, which include GDP, value-added indicators by types of activity, distribution of companies by main types of activity, volumes of accumulated direct foreign investments, volumes of non-financial investments, inflation, average wages, number of companies, etc. indicators in relative units;
- infrastructure resources, which include the relative indicators of the region's territorial area, distribution of the territory by land type, road density, computer and Internet availability, purposes of Internet use, provision of passenger cars, etc. indicators in relative units;
- ecological health which includes indicators of emissions of harmful substances into the atmosphere (kg per capita), relative indicators of the chemical composition of harmful substances.

The author optimizes the number of influencing resources by combining several factors into one and eliminating less important factors whose indicators are not available in the required quantity.

The resource structure of innovation potential is different for different levels of the economy. When determining the resources of the region's innovation potential, the level of innovation development of the regional economy must be assessed, as well as the innovation development opportunities of existing organizations in the specific territory. Therefore, the assessment of the resources of the innovation potential of the region should be carried out comprehensively and in relation to various components (see Figure 1).

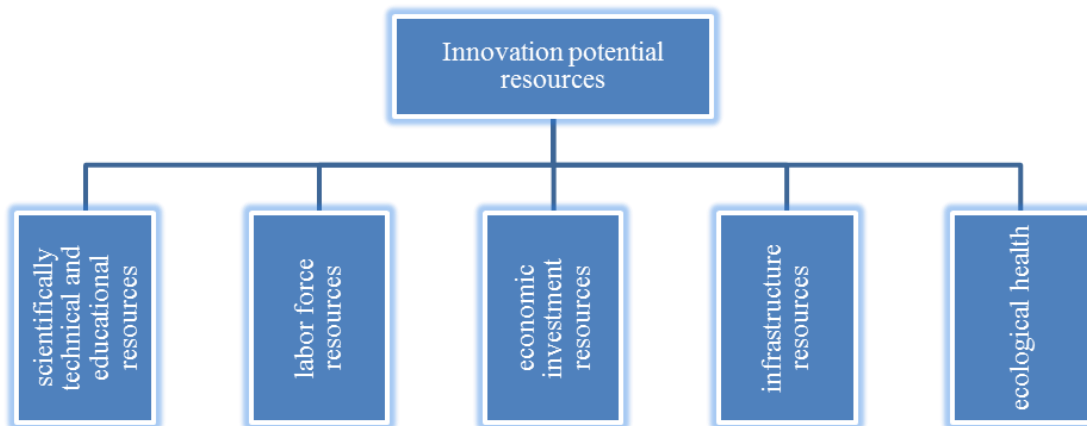


Figure 1. Structure of the innovation potential resources in the innovation system

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

The previous approach classification also is not final. The set of these approaches can be created in a completely different way if other criteria are adopted and used, for example, directly using approaches to the definition of the concept of innovation potential.

The pool of innovation potential resources at the regional level is a strategic factor in the market, which is part of the overall business development strategy aimed at gaining or maintaining a leading position in the sector. Without the development of innovation potential resources, it is almost impossible to create competitive products to ensure long-term development

Based on various research methodologies, as well as taking into account the positive experience accumulated by many scientists and trying to avoid the shortcomings of existing innovation potential evaluation methods, the author develops his own evaluation methodology.

The author determines that the concept of innovation potential is a complex and complicated category, it is determined by various statistical indicators that can be represented in the form of a two-dimensional matrix:

$$X = \begin{bmatrix} x_{11}, x_{12}, \dots, x_{1n} \\ \dots\dots\dots \\ x_{i1}, x_{i2}, \dots, x_{in} \\ \dots\dots\dots \\ x_{m1}, x_{m2}, \dots, x_{mn} \end{bmatrix},$$

where m – number of regions and n – number of indicators, which describes the innovation potential.

The construction of an integral indicator shall be applied to evaluate this type of data. (Soshnikova et al., 1999). The method of creating the integral indicator consists of several stages:

- unification of statistical indicators,
- dimension reduction for the selection of diagnostic indicators of the innovation potential from the wide range of available statistical indicators, which can replace all other indicators, without decreasing impartiality of the results, and conclude the indicators with doubling or similar value,
- creation of the integral indicator based on the selected indicators.

Unification of statistical data

The author performs the unification of statistical data according to the principle of linear scaling - transformation, the result of which is the range of possible values in a certain interval [0;10] (Ayvazyan 2005):

- indicators-stimulants: $x'_{ij} = \frac{x_{ij} - x_{\min j}}{x_{\max j} - x_{\min j}} * 10,$ (1)

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

where x'_{ij} – “j” indicator’s unified value for the “i” region,

x_{\min} – the smallest (worst) value of the output indicator in the studied period,

x_{\max} – the highest (best) value of the output indicator in the studied period.

The given method includes the negative or positive impact of a set of indicators on the integral indicator of the innovation potential of regions, and the scale of values is limited to the range from 0 to 10, which allows for a quick and convenient comparison of regions (Lavrinenko 2008). As a result, the influencing indicators of innovation potential resources are obtained in numerical terms from 0 to 10 for each region, which determine the level of attractiveness and significance of these factors.

Dimension decrease

The author uses the method of the sum of the coefficients of determination of the **largest dependent variable after the explanatory variable to reduce dimensions and optimize statistical indicators** (Ayvazyan 2005). The given analysis method is used to select the number of indicators from a relatively small number of initial indicators, as well as to select the most informative criteria from the indicators of the initial list of each factor, excluding unimportant indicators, as well as indicators that duplicate the phenomena. First of all, the correlation coefficient for statistical indicators is calculated according to the following formula:

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{(n-1)s_x s_y}, \quad (3)$$

where x_i, y_i - value of indicators x, y ,

\bar{x}, \bar{y} - mean arithmetical value of indicators x, y ,

s_x, s_y - standard deviation of indicators x, y ,

n – number of observations.

At this stage, the coefficient of determination is calculated for each statistical indicator, for which the value of the correlation coefficient is within the interval from 0.01 to 0.05 according to the formula:

$$R^2 = r^2. \quad (4)$$

The determination of the coefficient of values shows what part (proportion) of the variation of the dependent variable is determined by the variation of the explanatory variable. The resulting analysis identifies pairs or larger groups of closely related variables to select one indicator from each set of indicators. The strength of the connection can be judged by the size of the coefficient of determination, if it is close to one ($0.9 < R^2 < 1$).

For a correct assessment of the innovation potential of regions, from several available indicators of various factors, it is necessary to select those that have the greatest influence on the given category according to the sum of the coefficients of determination of the largest dependent variable according to the explanatory variable. Therefore, for each statistical indicator, the sum of the obtained coefficients of determination is calculated according to the formula:

$$y_i = \sum_{i=1}^n R^2_{ij}, \quad (5)$$

where y_i - the sum of the coefficients of determination of the dependent variable by the explanatory variable,

R^2_{ij} - value of determination coefficient „ j ” for the region „ i ”,

n – number of observations.

Those groups of indicators that have the largest sum of the coefficient of determination of the dependent variable after the explanatory variables are considered to be the most influential. The selection of the qualitative composition of the set of statistical indicators takes place in each specific case, harmonizing the theoretical (substantive) knowledge and the requirements for the minimum permissible values of the coefficients of determination R^2_{min} (Ayvazyan 2005).

The dimension reduction process to exclude similar and duplicate indicators without reducing the objectivity of the results consists of several steps:

- calculation of correlation coefficients (r(Pearson)) for statistical indicators by the formula: (6)

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

- calculation of coefficients of determination for statistical indicators whose value of correlation coefficients is in the range [0.01;0.05] according to the formula:

$$R^2 = r^2, \quad (7)$$

- calculation of the sum of the obtained coefficients of determination for each statistical indicator:

$$y_i = \sum_{j=1}^m R^2_{ij}, \quad (8)$$

- selection of statistical indicators based on the obtained sums of determination coefficients, using the logical and largest sum principle.

Creating an integral indicator by the selected indicators

Complex evaluation with the **sum method** (Tsindin & Akzhigitova 2006) provides for summing up of the actual values of the innovation potential resources indicators:

$$y_i = \sum_{j=1}^n x_{ij}, \quad (9)$$

where $i = \overline{1, n}$,

y_i – complex evaluation for the region i ;

x_{ij} – j indicator's value for the region i .

The best rating is the rating based on the maximum sum of indicators-stimulators and the minimum sum of indicators-destimulators.

The author applies the given method in the research, because there is a one-way effect of the studied indicators on the innovation potential and its structural components, as well as the most optimal differentiation of the quantitative and structural differences of the regions.

The creation of an integral indicator consists of the following stages:

- summing-up of indicators of determining factors of innovation potential:

$$y_{ij} = \sum_{j=1}^m x_{ij} , \quad (10)$$

- unification of the obtained values of the factors of the innovation potential, determining the value in the row interval [0;10] according to the formula 1,
- summing up of the obtained unified values of the factors of the innovation potential to create the integral indicator of the innovation potential of the region:

$$y_i = \sum_{j=1}^m x_{ij} , \quad (11)$$

- unification of the obtained values of the factors of the innovation potential, determining the value in the row interval [0;10] according to the formula 1.

In order to achieve the aim of the research, the author groups the regions of Latvia, Lithuania and Belarus into quintiles according to the obtained results and displays them on maps for the most convenient perception and visualization. After the typology of regional innovation potential, 5 groups of regions were obtained, where 5 – the best rating, 1 – the worst rating.

The author uses the complex assessment with the sum method to evaluate the innovation potential of the regions, because this method most optimally differentiates the quantitative and structural differences of the regions in comparison with other methodologies, which differentiate the regional differences too much or the differentiation is too weak, because these regions are economically rather poorly developed. The objective factor analysis has not been structurally established, it has not been possible to express the weights of factors or indicators, therefore, in order to avoid subjectivity in determining the weight coefficients, the author assumes the weight coefficients to be equal to one. In this case, there is a one-way influence of the studied innovation potential indicators, which determines the choice of the given method.

4. Empirical data and analysis

Latvia and Lithuania are members of the EU, Belarus is a member of the CIS, thus the studied regions are cross-border territories of the EU and the CIS.

In the studied countries, according to the administrative-territorial division, the following administrative-territorial and statistical units are distinguished:

- Latvia - 6 statistical regions (Order of the Cabinet of Ministers No. 911 of 07.12.2021 “About the statistical regions of the Republic of Latvia and the administrative units included in them” 2021): Riga region, Pieriga region, Vidzeme region, Kurzeme region, Zemgale region, Latgale region;
- Lithuania - 10 counties (Law of Republic of Lithuania No I-558 “Law on the Territorial Administrative Units and their Boundaries” 1994): Vilnius county, Alytus county, Kaunas county, Klaipeda county, Marijampole county, Panevezys county, Siauliai county, Taurage county, Telšiai county, Utena county;
- Belarus (Law of Republic of Belarus 154-3 “On the administrative and territorial division and the procedure for solving the issues of the administrative and territorial organization of the Republic of Belarus” 1998): 6 oblasts. i.e. Brest oblast, Vitebsk oblast, Gomel oblast, Grodno oblast, Minsk oblast, Mogilev oblast, and Minsk (capital).

According to the nomenclature of the EU Territorial Statistics Units, the studied regions of Latvia and Lithuania are considered NUTS3 level regions (Regulation (EC) No 1059/2003 of the European Parliament and of the Council 2003).

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

- scientifically technical and educational resources:
 - the number of scientific research centers per 100,000 inhabitants,
 - the number of people employed in scientific research centers per 100,000 inhabitants,
 - the number of students enrolled in vocational colleges per 10,000 inhabitants,
 - the number of students enrolled in higher education institutions per 10,000 inhabitants,
 - number of general education schools per 10,000 inhabitants,
 - number of library visitors per 100,000 inhabitants,
 - distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - scientific and technical services;
- labor force resources:
 - population density (people/sq.km),
 - number of population up to working age, %,
 - number of population at the working age, %,
 - the level of the demographic burden - in total,
 - employment level, %,
 - unemployment level, %,
 - economic activity, %;
- economic investment resources:
 - GDP per 1 inhabitant, euro,
 - distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - production,
 - distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - power industry,
 - distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - information and communication,
 - distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - education, healthcare, social work,
 - the amount of accumulated foreign direct investment in the region relative to the total amount in the country, %,
 - amount of non-financial investments, in act. prices, in the region relative to the total volume of the country, %,
 - inflation,
 - average salary (gross), euro,
 - total number of enterprises (micro (small), small, medium, large) per 1000 inhabitants,
 - purposes of inhabitants' internet use – for internet banking, %,
 - purposes of inhabitants' internet use – for goods sale, %;
- infrastructure resources:
 - the proportion of cities in the total number of cities, counties or districts of the country, %,
 - the proportion of the area of the region in the total area of the three countries, %,
 - agricultural land, %,
 - land of other type, %,
 - road density per 1000 km² of the territory,
 - internet availability in various households, %,
 - provision of passenger cars per 1000 inhabitants,
 - purposes of inhabitants' internet use – for information search, %,
 - purposes of inhabitants' internet use – receiving/sending e-mails, %,
 - purposes of inhabitants' internet use – for communication with the state, %;

- ecological health:
 - emissions of harmful substances into the atmosphere (kg per inhabitant),
 - emissions of harmful substances into the atmosphere, kg per inhabitant - solid particles,
 - emissions of harmful substances into the atmosphere, kg per inhabitant – carbon monoxide,
 - emissions of harmful substances into the atmosphere, kg per inhabitant - other substances.

Analysis of innovation potential in the context of the regions of Latvia, Lithuania and Belarus

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

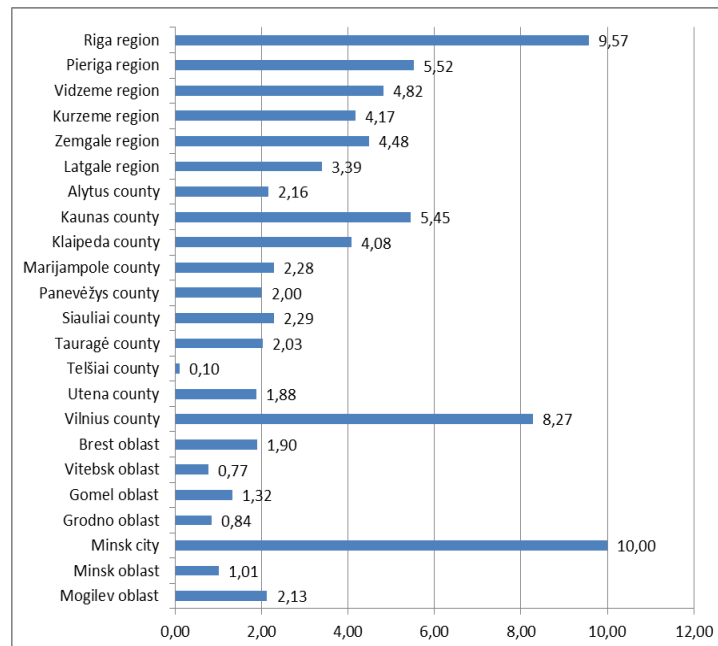


Figure 2. Assessment of innovation potential of regions of Latvia, Lithuania, Belarus

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

According to the obtained results, the author classifies the regions of Latvia, Lithuania and Belarus, dividing the value series into quintiles. The first quintile group includes regions with a very low level of innovation potential, while the fifth quintile group includes regions with a very high level of innovation potential.

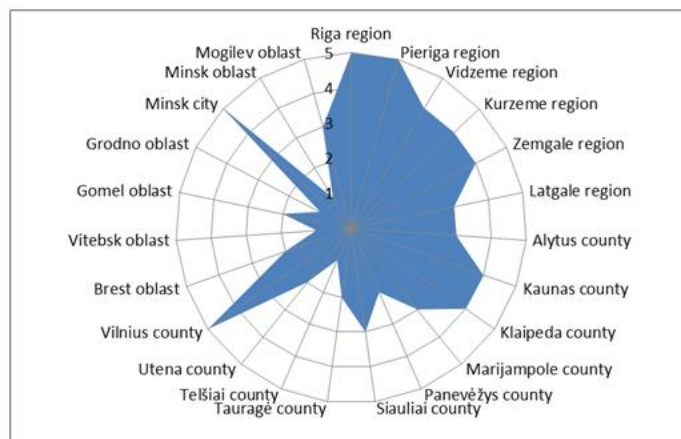


Figure 3. Map of quintile groups of innovation potential of regions of Latvia, Lithuania, Belarus

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

According to the map of the quintiles of the innovation potential of the regions of Latvia, Lithuania, Belarus, it can be seen that the regions of Latvia have a fairly high level of the innovation potential, Lithuanian counties have a lower level of innovation potential, while Belarusian oblasts have a very low level of innovation potential. A very high level of innovation potential has been found in the capital cities, but in other regions – a much lower level of innovation potential, which, according to the author, is related to the direction of the flow of resources towards the capital cities.

The biggest quantitative and structural differences in innovation potential between capital cities and other oblasts can be observed in Belarus. The highest rating according to the level of innovation potential is obtained by Minsk, while the other oblasts have lower values. The China-Belarus Innovation Commercialization Center (see Annex A) operates in Minsk, which largely determines the development of the innovation potential of Minsk. The center implements scientific, technical and innovative projects, seeks investors with the aim of establishing joint ventures “on the basis of the industrial park “Great Stone”. The park “Great Stone ” is designed to service high-tech production and innovations in this field. The task of the park is to provide the infrastructures already existing and still developing with various types of projects.

The Innovation and Technology Transfer Center of Riga Technical University (RTU) operates in Riga (RTU Innovation and Technology Transfer Center homepage 2019), which contributes greatly to the high assessment of the innovation potential of Riga (see Annex A). The center promotes the development of innovation and technology transfer, ensuring the commercialization of scientific research results, creates sustainable relationships and professional communication with external partners, represents the interests of RTU, promotes recognition locally and internationally.

A laser research and production company operates in Vilnius - „Šviesos konversija” (Vilnius city website 2019), which conducts scientific research, implements various projects related to the implementation of innovations and produces new products that are in demand on the world market. Many other innovation potential development centers also operate in Vilnius, which determine the degree of innovation potential development of the Vilnius county (see Annex A).

The author presents the obtained research results using the cartographic method (see Figure 4).

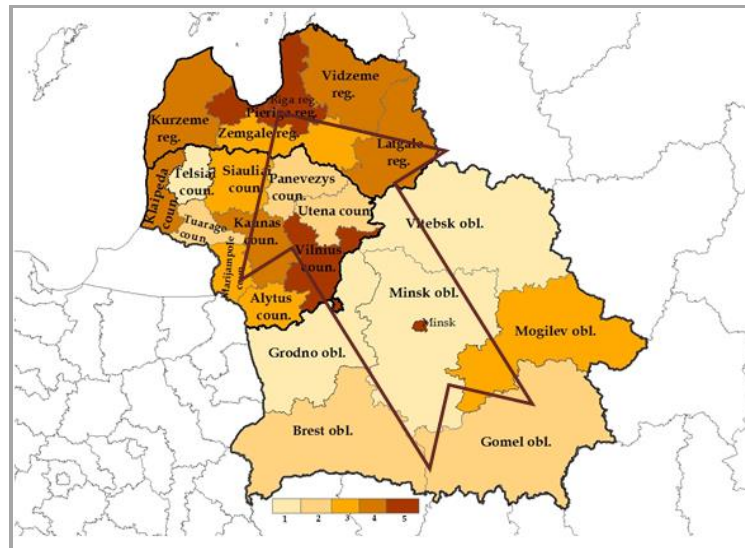


Figure 4. Classification map of the regions of Latvia, Lithuania, Belarus according to the values of the integral indicator of innovation potential in quintiles

Source: the author's drawing in the ArcGis 10 program after calculating the statistical indicators of the regions of Latvia, Lithuania, Belarus, using the developed methodology for evaluating the of innovation potential

The highest innovation potential level indicator is for the regions of Riga (9.57 standardized values), Pieriga (5.52), Vilnius (8.27) and Minsk (10.00). These regions are associated with national capitals, which also determine a high level of the innovation potential. The resources included in the innovation potential of the Riga and Vilnius region get a very high rating, with the exception of labor resources, which are rated as high in the Riga region, and as average in the Vilnius region. In Minsk, scientific, technical and educational resources, as well as economic investment resources, receive a high rating, the others - a very high rating. The investment resources of Pieriga's economy are rated as very high, the others as high.

The regions of Vidzeme (4.82), Kurzeme (4.17), Zemgale (4.48), Kaunas (5.45) and Klaipėda (4.08) have a high index of innovation potential. They belong to the 4th quintile. Scientific, technical and educational resources are very high in Vidzeme and Kaunas regions, in Kurzeme, Zemgale regions they are rated as high, in Klaipėda region - as average. Economic investment resources in the Vidzeme region are rated as very high, in the other regions - as high, in the Kaunas and Klaipėda regions, the infrastructure resources are also rated as high, in the Klaipėda region - the ecological health also gets a high rating. In the regions of the fourth quintile, low ratings are obtained: in the regions of Vidzeme and Kurzeme - infrastructure resources are very low, as well as labor resources are low, but ecological health is also rated low in the Vidzeme region, ecological health is rated low in the Zemgale region. There are no resources in the Kaunas and Klaipėda regions that are rated as low and very low, but an average rating is obtained in the Kaunas region for labor resources and ecological health, in the Klaipėda region for scientific, technical and educational, as well as labor resources.

The regions of Latgale (3.39), Alytus (2.16), Marijampole (2.28), Šiauliai (2.29) and Mogilev (2.13) are ranked in the third quintile with a medium level of innovation potential. In the Latgale region, scientific, technical and educational resources, as well as ecological health, receive a high rating, while labor and infrastructure resources receive a very low rating. In the Alytus region, ecological health has a high rating, but very low, as in the Latgale region, for labor and infrastructure resources. In the Marijampole region, infrastructure resources get a very high rating and ecological health gets a high rating, but labor resources get a very low rating. In the Šiauliai region, almost all resources get an average rating, except for labor resources, which get a low rating. In the Mogilev

oblast, labor and infrastructure resources are highly valued, but economic investment and ecological health is poorly valued.

The regions of Panevėžys (2.00), Tauragė (2.03), Utena (1.88), Brest (1.90) and Gomel (1.32) are ranked in the second quintile. In the Panevėžys region, scientific, technical and educational, labor and economic investment resources are rated low, while infrastructure and ecological health is rated as average. In the Tauragė county, scientific, technical and educational resources are rated very low, labor and economic investment resources are rated low, but ecological health receives a very high rating. The Utena county has a very low assessment of labor resources, a low assessment of infrastructure resources as well. Economic investment resources are rated very low in the Brest oblast, and scientific, technical and educational, infrastructure and ecological health is also rated low. On the other hand, labor resources are rated as very high. In the Gomel oblast, ecological health is rated very low, scientific-technical and educational, economic investment resources are also rated low, labor and infrastructure resources are highly rated.

In the first quintile are the regions of Telšiai county (0.01), Vitebsk oblast (0.77), Grodno oblast (0.84), Minsk oblast (1.01), which get a very low assessment of innovation potential. Scientific, technical, educational, and ecological health has a very low rating in the Telšiai county, the others have an average rating. In the Vitebsk oblast, there is a very low assessment of economic investment resources and ecological health, a low assessment of scientific and technical and educational, infrastructure resources, but labor resources are assessed as high. In the Grodno oblast, scientific, technical and educational, economic investment, ecological health gets a very low rating, infrastructure resources get a low rating, but labor resources are rated as very high. In the Minsk oblast, scientific, technical and educational, economic investment resources get a very low rating, infrastructure resources and ecological health get a low rating, but labor resources are rated as very high.

The author created an innovation potential development vector - the values of the innovation potential level increase in the direction from southeast to northwest.

The author assesses the correlation of the innovation potential of the region with the development of the national economy.

The author finds that there is a moderate linear positive relationship between the level of innovation potential and GDP ($r(\text{Pearson})=0,6$, $p\text{-value}=0,002$).

There is a moderate linear positive relationship between scientific, technical and educational resources and GDP ($r(\text{Pearson})=0,535$, $p\text{-value}=0,009$).

There is a weak linear negative relationship between labor resources and GDP ($r(\text{Pearson})=-0,422$, $p\text{-value}=0,045$). In Belarus, specific unemployment registration is carried out, which also, according to the author, determines the negative dependence between these indicators.

There is a strong linear positive relationship between the investment resources of the economy and GDP ($r(\text{Pearson})=0,804$, $p\text{-value}=0,000$).

No linear relationship was found between infrastructure resources and GDP ($r(\text{Pearson})=0,290$, $p\text{-value}=0,180$).

There is a moderate linear positive relationship between ecological health and GDP ($r(\text{Pearson})=0,624$, $p\text{-value}=0,001$).

To provide opportunities for comparison and analysis, the author estimates the innovation potential by dividing them into quintiles of the value series (see Table 1).

Table 1. Quintile groups of the innovation potential of the regions of Latvia, Lithuania and Belarus, 2017

Region	Scientifically technical and educational resources	Labor resources	Economic investment resources	Infrastructural resources	Ecological health
Riga region	5	4	5	5	5
Pieriga region	4	4	5	4	4
Vidzeme region	5	2	5	1	2
Kurzeme region	4	2	4	1	3
Zemgale region	4	3	4	3	2
Latgale region	4	1	3	1	4
Alytus county	3	1	3	1	4
Kaunas county	5	3	4	4	3
Klaipeda county	3	3	4	4	4
Marijampole county	2	1	2	5	4
Panevėžys county	2	2	2	3	3
Siauliai county	3	2	3	3	3
Taurage county	1	2	2	3	5
Telšiai county	1	3	3	3	1
Utena county	3	1	3	2	3
Vilnius county	5	3	5	5	5
Brest oblast	2	5	1	2	2
Vitebsk oblast	2	4	1	2	1
Gomel oblast	2	4	2	4	1
Grodno oblast	1	5	1	2	1
Minsk city	4	5	4	5	5
Minsk oblast	1	5	1	2	2
Mogilev oblast	3	4	2	4	2

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

In order to study in more detail the influence of each resource type in the regions of Latvia, Lithuania and Belarus on the overall level of the innovation potential, the author conducts an analysis of the innovation potential of the regions using quintile and cartographic methods.

Analyzing scientific, technical and educational resources as an element of the innovation potential according to the values of the integral indicator of scientific, technical and educational resources, the author concludes that the level of scientific, technical and educational resources is very high in the regions of Riga (8.40), Vidzeme (9.40), Kaunas (10.00) and Vilnius (8.97) (5th quintile). Such results were achieved in the Riga region thanks to the following indicators: “The number of scientific research centers per 100,000 inhabitants”, “The number of students enrolled in higher education institutions per 10,000 inhabitants” and “Distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - scientific and technical services”, Vidzeme region: “Number of library visitors per 100,000 inhabitants” and “Distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - scientific and technical services”, Kaunas and Vilnius counties: “The number of people employed in scientific research centers per 100,000 inhabitants”, “The number of students enrolled in higher education institutions per 10,000 inhabitants”, In the Kaunas county, this indicator also has a great impact “The number of students enrolled in vocational colleges per 10,000 inhabitants”.

The regions of Pieriga (5.35), Kurzeme (6.65), Zemgale (7.51), Latgale (8.31) and Minsk oblast (6.00) have a high level of the mentioned resources (4th quintile). The counties of Alytus (3.44), Klaipėda (4.12), Šiauliai (2.95), Utena (2.54), Mogilev oblast (2.76) receive an average rating for scientific, technical and educational resources (3rd quintile). A low assessment of scientific, technical and educational resources (2nd quintile) is in the counties of Marijampole (1.73), Panevėžys (1.92), Brest oblast (1.36), Vitebsk oblast (2.09), Gomel oblast (2.26), very low (1st quintile) – for Tauragė (0.01), Telsiai (0.59), Grodno (1.23), Minsk oblast (0.38). According to the values of the integral indicator of labor resources, the labor resources (5th quintile) in the Brest oblast (8.09), Grodno oblast (8.40), Minsk oblast (8.69) and Minsk city (10.00) are very highly rated. Labor force resources in Riga region (4.75), Pieriga region (5.13), Vitebsk oblast (7.64), Gomel oblast (7.62) and Mogilev oblast (7.75) receive a high rating (4th quintile).

Labor resources (3rd quintile) get an average rating in the regions of Zemgale (2.82), Kaunas (3.07), Klaipėda (3.75), Telsiai (3.07), Vilnius (4.68). Labor resources (2nd quintile) get a low rating in the regions of Vidzeme (2.50), Kurzeme (2.68), Panevėžys (1.83), Šiauliai (1.94), Tauragė (2.33), very low (1st quintile) – in the regions of Latgale (0.22), Alytus (0.74), Marijampole (1.56), Utena (0.01).

According to the values of the integral indicator of economic investment resources, a very high rating is obtained (5th quintile) in the regions of Riga (10.00), Pieriga (6.29), Vidzeme (6.59), Vilnius (8.93), high (4th quintile) – in Kurzeme (5.56), Zemgale (4.75), Kaunas (4.23), Klaipėda (4.02) regions and the city of Minsk (5.76). Average rating (3rd quintile) of economic investment resources is obtained in the regions of Latgale (3.95), Alytus (3.29), Šiauliai (3.07), Telšiai (3.43), Utena (3.66). Low evaluation of economic investment resources (2nd quintile) is in the regions of Marijampole (2.49), Panevėžys (2.99), Tauragė (2.22), Gomel (0.73), Mogilev (0.46), very low (1st quintile) – in the regions of Brest (0.01), Vitebsk (0.05), Grodno (0.19) and Minsk region (0.35). According to the values of the integral indicator of infrastructure resources, infrastructure resources (1st quintile) are very highly underestimated in the regions of Riga (7.19), Marijampole (3.38), Vilnius (4.08) and Minsk (10.00). A high assessment of infrastructure resources (2nd quintile) is in the regions of Pieriga (2.89), Kaunas (3.27), Klaipėda (2.99), Gomel (2.97) and Mogilev (3.05). The regions of Zemgale (2.76), Panevėžys (2.60), Šiauliai (2.38), Tauragė (2.40), Telšiai (2.37) get an average rating of infrastructure resources (3rd quintile). Low assessment of given resources (2nd quintile) is in the regions of Utena (2.16), Brest (1.86), Vitebsk (2.04), Grodno (2.25) and Minsk oblast (2.13), very low (1st quintile) – in the regions of Vidzeme (1.45), Kurzeme (1.59), Latgale (0.01), Alytus (1.35). According to the values of the integral indicator of ecological health, the regions of Riga (10.00), Tauragė (9.07), Vilnius (9.47) and Minsk (9.96) have a very high assessment (quintile 5), high (quintile 4) – for the regions of Pieriga (7.61), Latgale (7.91), Alytus (7.60), Klaipėda (7.75), Marijampole (7.67), average (3rd quintile) – Kurzeme (6.43), Kaunas (6.47), Panevėžys (6.58), Šiauliai (6.50), Utena (7.17) counties, low (2nd quintile) – Vidzeme (5.08), Zemgale (6.08), Brest (4.28), Mogilev (2.32), Minsk oblast (1.16), very low (1st quintile) – Telšiai (0.01), Vitebsk (0.11), Gomel (0.14), Grodno oblast (0.11).

Cluster analysis of innovation potential indicators of regions of Latvia, Lithuania and Belarus

The author divides the regions of Latvia, Lithuania and Belarus into clusters according to the resource structure of the regions' innovation potential (see Figure 5).

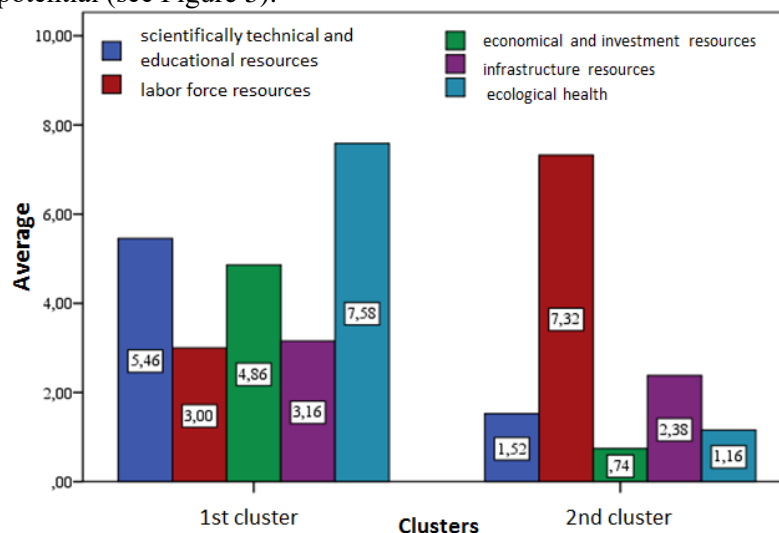


Figure 5. The structure of innovation potential clusters in the regions of Latvia, Lithuania and Belarus according to the integral normalized values of the objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus

The resource structure of the innovation potential of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of the objective indicators (see Figure 5) shows that these regions can be divided into two clusters. In the first cluster, ecological health has the highest value with an absolute value of 7.58, while infrastructure resources (3.16) and labor resources have the lowest values (3.00). In the second cluster, labor resources are in first place with an absolute value of 7.32, which greatly exceeds the values of the other resources: the absolute values of infrastructure resources are three times lower, scientific, technical and educational resources – 5 times, ecological health – 6 times, and the absolute value of economic investment resources is almost 10 times lower.

The distribution of regions in clusters is as follows:

- 1st cluster: Riga region, Pieriga region, Vidzeme region, Kurzeme region, Zemgale region, Latgale region, Vilnius county, Alytus county, Kaunas county, Klaipeda county, Marijampole county, Panevezys county, Siauliai county, Taurage county, Utena county, Minsk city.
- 2nd cluster: Telšiai county, Brest oblast, Vitebsk oblast, Gomel oblast, Grodno oblast, Minsk oblast, Mogilev oblast.

The first cluster includes all regions and counties of Latvia and Lithuania, except for the Telši county, which is included in the second cluster, and Minsk city - the capital of Belarus, and the second cluster - all oblasts of Belarus, except for the capital of the country.

According to the author, it would be useful to develop cooperation between the regions of the two clusters by attracting labor resources from the second cluster to the regions of the first cluster, because there is a large surplus of them in the second cluster and they are not used fully, but the regions of the second cluster have a rather low level of infrastructural resources and absolutely certainly – the level of other resources is extremely insufficient. By combining resources, the development of the studied regions would reach a new level of development.

The resource analysis of the innovation potential of the first cluster regions is reflected in Table 2.

Table 2. Analysis of the innovation potential resources of the first cluster regions

Region	Scientifically technical and educational resources	Labor force resources	Economic investment resources	Infrastructural resources	Ecological health
Riga region	8,40	4,75	10,00	7,19	10,00
Pierigas region	5,35	5,13	6,29	2,89	7,61
Vidzeme region	9,40	2,50	6,59	1,45	5,08
Kurzeme region	6,65	2,68	5,56	1,59	6,43
Zemgale region	7,51	2,82	4,75	2,76	6,08
Latgale region	8,31	0,22	3,95	0,01	7,91
Alytus county	3,44	0,74	3,29	1,35	7,60
Kaunas county	10,00	3,07	4,23	3,27	6,47
Klaipeda county	4,12	3,75	4,02	2,99	7,75
Marijampole county	1,73	1,56	2,49	3,38	7,67
Panevezys county	1,92	1,83	2,99	2,60	6,58
Siauliai county	2,95	1,94	3,07	2,38	6,50
Taurage county	0,01	2,33	2,22	2,40	9,07
Utena county	2,54	0,01	3,66	2,16	7,17
Vilnius county	8,97	4,68	8,93	4,08	9,47
Minsk city	6,00	10,00	5,76	10,00	9,96
Average	5,46	3,00	4,86	3,16	7,58
Median	5,68	2,59	4,13	2,68	7,60
Standard deviation	3,14	2,41	2,23	2,39	1,43

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

In the regions of the first cluster, after evaluating the scientific, technical and educational resources, the highest value is obtained by the Kaunas county (10.00 normalized values), and the lowest by the Tauragė county (0,01), after evaluating labor resources, the highest value is obtained by Minsk (10.00), and the lowest by Utena county (0,01), according to the assessment of economic investment resources, the highest value is for the Riga region (10.00), and the lowest - for the Tauragė county (2,22), after assessing the infrastructure resources, the highest value is obtained by Minsk (10.00), and the lowest by the Latgale region (0,01), after evaluating ecological health, the highest value is for the Riga region (10.00), and the lowest for the Vidzeme region (5,08).

The analysis of the innovation resources of the regions of the second cluster is shown in Table 3.

Table 3. Analysis of innovation potential resources of the second cluster regions

Region	Scientifically technical and educational resources	Labor force resources	Economic investment resources	Infrastructural resources	Ecological health
Telšiai county	0,59	3,07	3,43	2,37	0,01
Brest oblast	1,36	8,09	0,01	1,86	4,28
Vitebsk oblast	2,09	7,64	0,05	2,04	0,11
Gomel oblast	2,26	7,62	0,73	2,97	0,14
Grodno oblast	1,23	8,40	0,19	2,25	0,11
Minsk oblast	0,38	8,69	0,35	2,13	1,16
Mogilev oblast	2,76	7,75	0,46	3,05	2,32
Average	1,52	7,32	0,74	2,38	1,16
Median	1,36	7,75	0,35	2,25	0,14
Standard deviation	0,88	1,92	1,21	0,46	1,62

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

In the regions of the second cluster, after evaluating scientific, technical and educational resources, the highest value is obtained by the Mogilev oblast (2.76), and the lowest by the Minsk oblast (0.38), after evaluating labor resources, the highest value is obtained by the Minsk oblast (8.69), and the lowest by the Telsiai county (3.07), according to the assessment of economic investment resources, Telšiai county has the highest value (3.43), and Brest oblast has the lowest value (0.01), after evaluating infrastructure resources, Mogilev oblast gets the highest value (3.05), and the lowest goes to Brest oblast (1.86), after evaluating ecological health, the highest value is for Brest oblast (4.28), and the lowest - for Vitebsk (0.11) and Grodno (0.11) oblasts.

The author's analysis shows that the standardized values of innovation potential resources in the regions of the second cluster are very low for all resources, except for the labor resource, which also determines the low level of the innovation potential of the regions of the second cluster. In order to more accurately analyze the reasons for the creation of innovation potential clusters in the regions of Latvia, Lithuania, Belarus and their structure, the author studies the profile of each innovation potential resource by cluster.

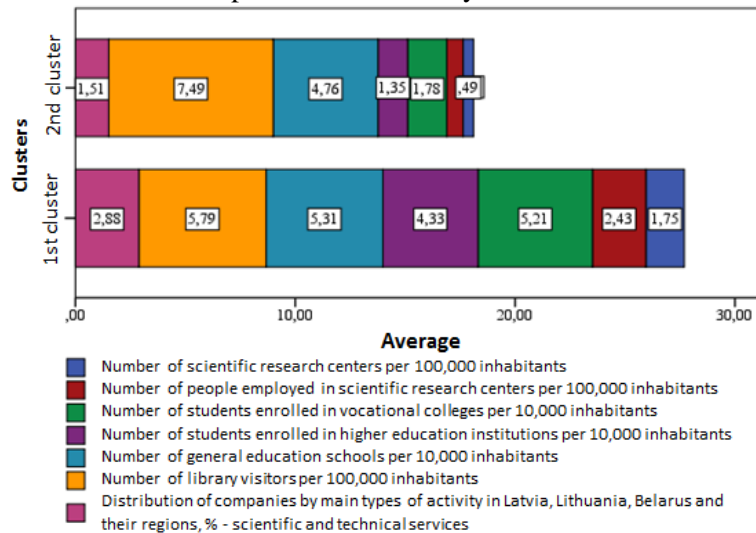


Figure 6. Profile of the scientific, technical and educational resources of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus. In both clusters, the following indicators generally have the same influence on the creation of scientific, technical and educational resources (see Figure 6): “number of general education schools per 10,000 inhabitants” and “number of library visitors per 100,000 inhabitants”. In the first cluster, “the number of students enrolled in vocational colleges per 10,000 inhabitants”, “the number of students enrolled in higher education institutions per 10,000 inhabitants” and “the distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - scientific and technical services” have a great influence. In the formation of the first cluster, all indicators have a rather high importance compared to the second cluster, where some indicators, such as “the number of scientific research centers per 100,000 inhabitants”, “the number of people employed in scientific research centers per 100,000 inhabitants” have a very weak importance.



Figure 7. Profile of labor resources of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of the objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus

The formation of labor resources of the first cluster (see Figure 7) is largely influenced by an indicator such as “population of working age, %”, but practically has no effect on “population density (person/sq.km)”, the other indicators have almost the same effect.

The formation of the second cluster is influenced by the following indicators: “population up to working age, %”, “demographic load level – total”, “employment rate, %”, “unemployment rate, %”, “economic activity, %”, the level of influence of which is practically the same. The influence of the indicator “population of working age, %” is much weaker than the other indicators, which is due to the fact that the regions of the second cluster have an abundance of labor potential.

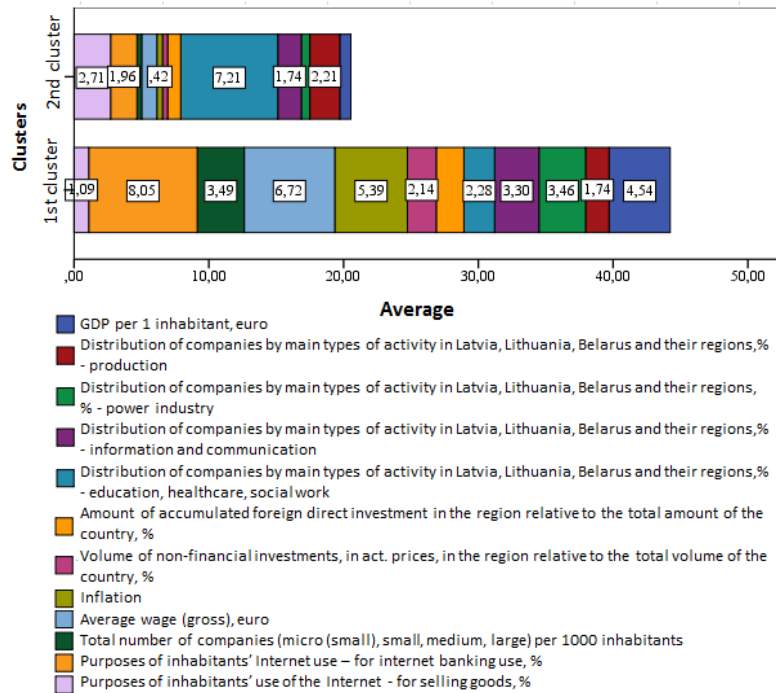


Figure 8. Profile of economic investment resources of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus

In the first cluster, in the creation of economic investment resources (see Figure 8), the indicator “purposes of inhabitants’ Internet use – for internet banking use, %” has the greatest impact, indicators such as “average wage (gross), euro”, “inflation”, “GDP per 1 inhabitant, euro” also have a great influence, as well as the average impact of indicators such as “total number of companies (micro (small), small, medium, large) per 1000 inhabitants”, “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions,% - information and communication”, “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - power industry”. Indicators such as “volume of non-financial investments, in act. prices, in the region relative to the total volume of the country, %”, “the amount of accumulated foreign direct investment in the region relative to the total amount of the country, %”, “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions,% - education, healthcare, social work”.

In the second cluster, the indicator “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions,% - education, health care, social work” has the greatest impact”, lower than average is for the indicators “purposes of inhabitants’ use of the Internet - for selling goods, %”, “purposes of inhabitants’ use of the Internet – for Internet banking use, ,, distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions,% - production”, “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions,% - information and communication”.

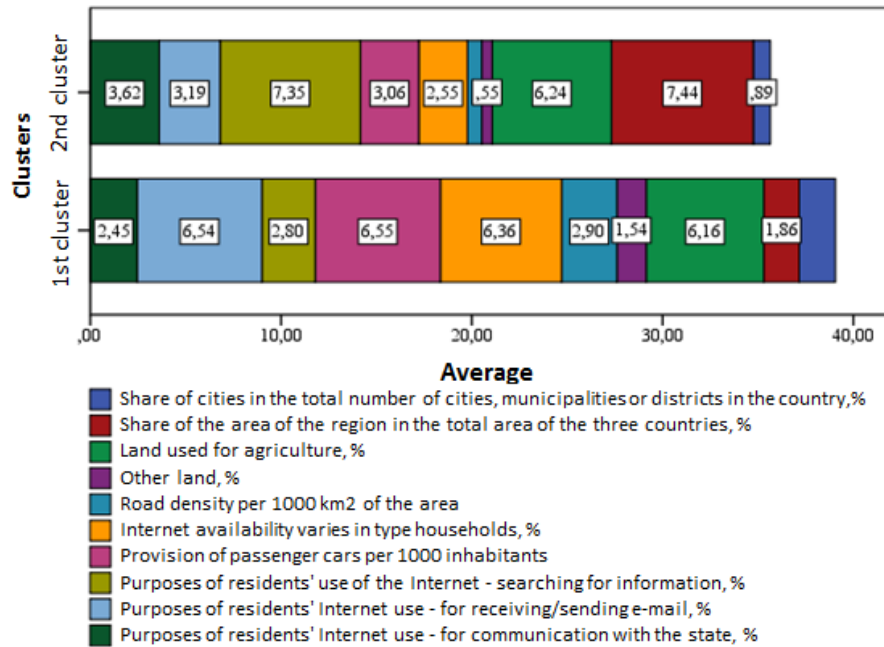


Figure 9. Profile of the infrastructure resources of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of the objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus

Indicators such as “provision of passenger cars per 1000 inhabitants”, “purposes of residents' Internet use - for receiving/sending e-mail, %” are of great importance in the creation of infrastructure resources of the first cluster (see Figure 9), “internet availability varies in type households, %”, “land used for agriculture, %”, which are evenly distributed between each other. In the second cluster, the following factors have a great influence: “the share of the area of the region in the total area of the three countries, %”, “purposes of residents' use of the Internet - searching for information, %”, “land used for agriculture, %”. The distribution of the indicators of the first cluster is more even, the quantitative and structural differences of the indicators affecting the regions of the second cluster are clearly expressed.

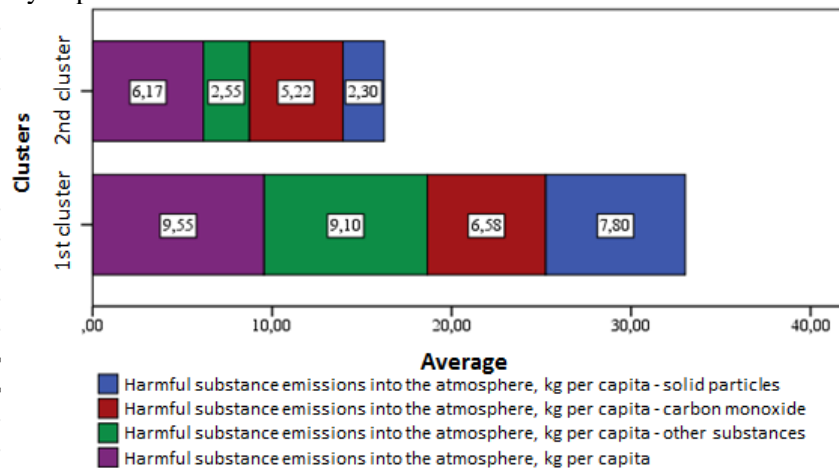


Figure 10. Profile of the ecological health of the regions of Latvia, Lithuania and Belarus according to the integral normalized values of the objective indicators

Source: created by the author in the SPSS program based on statistical data calculations of the regions of Latvia, Lithuania and Belarus

In the creation of ecological health of the first cluster (see Figure 10), the following indicators have the greatest influence: “harmful substance emissions into the atmosphere, kg per capita” and “harmful substance emissions into the atmosphere, kg per capita - other substances”. The indicators “harmful substance emissions into the atmosphere, kg per capita - solid particles” and “harmful substance emissions into the atmosphere, kg per capita - carbon monoxide” also have a great influence. In the second cluster, the following producers have the greatest impact: “harmful substance emissions into the atmosphere, kg per capita” and “harmful substance emissions into the atmosphere, kg per capita - carbon monoxide”. The influence of indicators “harmful substance emissions into the atmosphere, kg per capita - solid particles”, “harmful substance emissions into the atmosphere, kg per capita - other substances” is lower than the average. The indicators of the first cluster are evenly distributed, but the second cluster shows large regional quantitative and structural differences of the influencing creators.

Assessment of regional and national quantitative and structural differences in innovation potential

In order to study the quantitative and structural differences in innovation potential of the regions of Latvia, Lithuania and Belarus, the author calculates σ -convergence indicators.

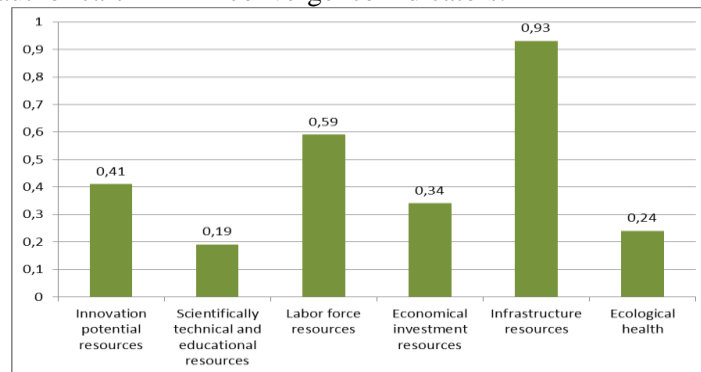


Figure 11. Variation coefficients of innovation potential in Latvian regions, 2017

Source: the author’s calculations based on the data of the regions of Latvia, Lithuania, Belarus, obtained using the developed innovation potential assessment methodology

The calculations of σ -convergence indicators in Latvian regions (see Figure 11) show that the fluctuations of the individual values of the innovation potential level are high, the set is heterogeneous, its average value is not stable.

Analyzing the resources of innovation potential, the author concludes that Latvian regions are homogeneous in terms of scientific, technical, educational resources, and ecological health, their average sizes are stable, and the fluctuations of individual sizes are small.

Fluctuations of individual values of other resources are high, their average values are not stable, regional quantitative and structural differences are quite large.

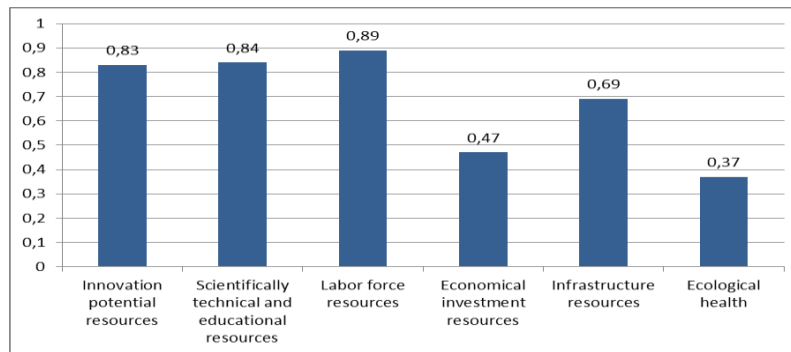


Figure 12. Variation coefficients of innovation potential and its resources in Lithuanian counties, 2017

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

The calculations of σ -convergence indicators in the counties of Lithuania (see Figure 12) show that the fluctuations of the individual values of the innovation potential level are high, their average value is not stable, the set is heterogeneous, the quantitative and structural differences of the regional innovation potential are big. Analyzing the resources of the innovation potential, the author concludes that the resources forming the innovation potential are generally heterogeneous, the fluctuations of their individual values are also high, the average values are not stable, the quantitative and structural differences of the factors of the regional innovation potential are large.

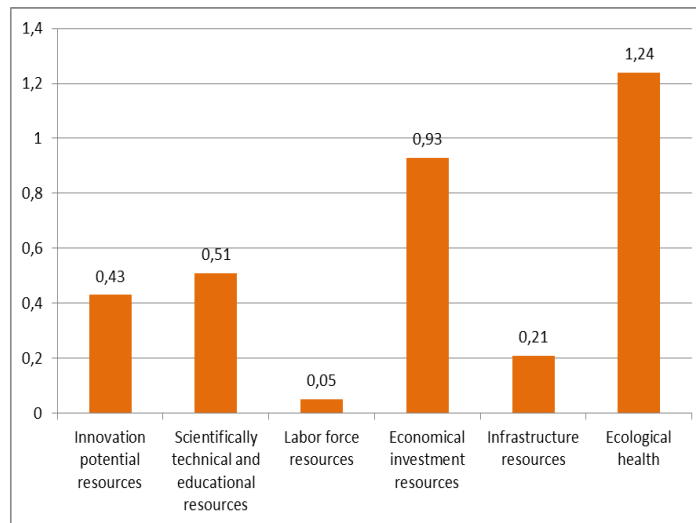


Figure 13. Variation coefficients of innovation potential and its resources in the oblasts of Belarus, 2017

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

The calculations of σ -convergence indicators in the oblasts of Belarus (see Figure 13) show that the set of innovation potential resources is heterogeneous, the fluctuations of individual values are high, their average value is not stable, and the quantitative and structural differences of the regional innovation potential are quite high. Analyzing the resources of innovation potential, the author concludes that labor and infrastructure resources are a homogeneous set. The fluctuations of their individual sizes are small, the average sizes are stable.

Regional quantitative and structural differences in scientific, technical and educational, economic investment resources and ecological health are large, the fluctuations of their individual values are high, and the average values are not stable.

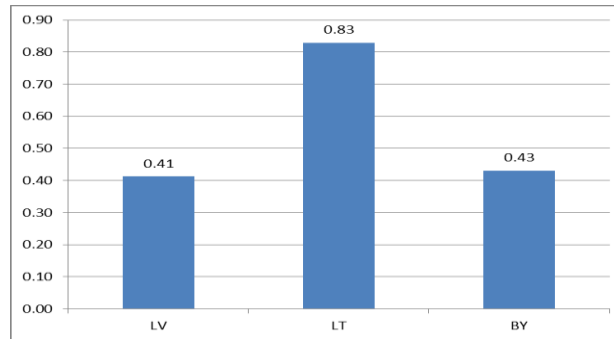


Figure 14. Coefficients of variation of the pool of innovation potential in the regions of Latvia, Lithuania and Belarus, 2017

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

Analyzing the regional quantitative and structural differences of the innovation potential of Latvia, Lithuania and Belarus (see Figure 14), it has been established that in all the studied countries the sets of the innovation potential are heterogeneous, the fluctuations of their individual values are high, and the average values are not stable. Regional quantitative and structural differences are almost at the same level in Latvia ($V\sigma = 0.41$) and Belarus ($V\sigma = 0.43$), but in Lithuania regional quantitative and structural differences are twice as large ($V\sigma = 0.83$). In Lithuania, along with very high and highly developed counties (Vilnius county - 5th quintile, Kaunas, Klaipėda counties - 4th quintile), there are poorly developed counties, which get a very low evaluation in terms of development of scientific and technical, educational, labor force resources, ecological health, for example, Telšiai county. It also creates large regional quantitative and structural differences in Lithuania.

In order to investigate in more detail the reasons for the formation of regional quantitative and structural differences of the innovation potential of Latvia, Lithuania and Belarus, the author studied the quantitative and structural differences of the innovation potential of each region at the national level (see Figure 15).

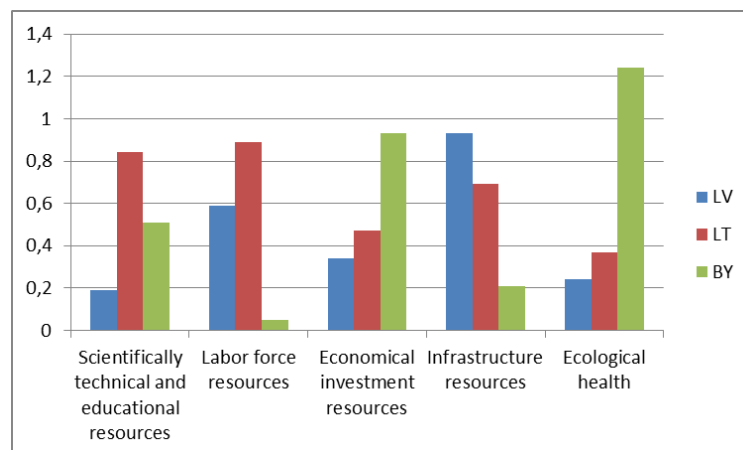


Figure 15. Variation coefficients of innovation potential resources in the regions of Latvia, Lithuania and Belarus, 2017

Source: author's calculations based on the data of the regions of Latvia, Lithuania, Belarus, using the developed methodology for evaluating the innovation potential

The set of scientific, technical and educational resources of the regions in Latvia is homogeneous. The fluctuations of its individual values are small, the average values are stable. In Lithuania and Belarus, sets of

scientific, technical and educational resources are heterogeneous, the fluctuations of their individual values are high, and the average values are not stable.

The sets of regional innovation potential in Latvia and Lithuania are heterogeneous, the fluctuations of their individual values are high, and the average values are not reliable. In Belarus, the level of regional quantitative and structural differences in labor resources is very low, the fluctuations of the total individual values are small, and the average values are stable.

Small regional quantitative and structural differences can be observed in Latvia in terms of economic investment resources, in Lithuania they are more pronounced, but in Belarus the sets of economic investment resources are very heterogeneous, the level of regional quantitative and structural differences is twice as high as in Lithuania and three times as high as in Latvia, the fluctuations of the individual values of the aggregates are high, the average values are not stable.

In terms of infrastructural resources, the regions of Belarus have homogeneous groups, the fluctuations of their individual values are small, and the average values are stable. On the other hand, in Latvia and Lithuania there are large regional quantitative and structural differences of infrastructure resources, the fluctuations of the individual values of the aggregates are high, the average values are not reliable.

Ecological health is homogenous in Latvia, regional quantitative and structural differences are small, fluctuations of individual sizes of aggregates are small, average sizes are stable. In Lithuania, the sets of ecological health are quite heterogeneous, while in Belarus there are very large regional quantitative and structural differences of ecological health, the fluctuations of the individual sizes of the sets are high, the average sizes are not stable.

5. Results

Evaluating the innovation potential of the regions of Latvia, Lithuania and Belarus, the author finds that the regions of Latvia have an uneven and relatively high level of innovation potential, the highest is the Riga and Pieriga regions (5th quintile), while the lowest level of innovation potential is the Latgale region (3rd quintile). The counties of Lithuania have a lower level of innovation potential than the regions of Latvia and it is very uneven: the highest – for Vilnius county (5th quintile), as well as there are representatives in each quintile, in contrast to Latvia, where only representatives of the 3rd, 4th and 5th quintiles are found. The oblasts of Belarus have the lowest level of innovation potential, except for Minsk city, which is in the 5th quintile, the other counties are in the 1st-3rd quintiles.

The regions of Latvia, Lithuania and Belarus can be divided into two clusters according to the integral normalized values of the objective indicators. The first cluster includes regions with a large shortage of labor resources and fairly high values of other resources. This cluster includes regions of Latvia and Lithuania and Minsk city. The second cluster includes regions with extremely high levels of labor resources and very low values of other resources. There are a little more infrastructure resources, but their level is certainly not sufficient either. This cluster includes all oblasts of Belarus, except Minsk city, and also the Telsiai county. Latvian and Lithuanian state administration institutions and local government institutions should develop cooperation with Belarus by attracting free labor resources, and develop cross-border cooperation programs.

The regions of Latvia and the counties of Lithuania have an average level of economic investment resources and a lower than average level of labor resources. The oblasts of Belarus have a low level of economic investment resources with a high level of labor resources. Only in capital regions, economic investment resources get a fairly high rating. Infrastructural resources in the oblasts of Belarus have a low rating, in the regions of Latvia and the

counties of Lithuania - approaching average values, in the capital regions - a rather high rating. The author recommends the development of cross-border cooperation for the equalization of the mentioned quantitative and structural differences.

In the first cluster, the impact of indicators of scientific, technical and educational resources is much more homogeneous than in the second cluster, and it is most affected by the following indicators: “number of general education schools per 10,000 inhabitants” and “number of library visitors per 100,000 inhabitants”. The formation of the first cluster is also largely influenced by the “number of students enrolled in vocational colleges per 10,000 inhabitants”. Regional quantitative and structural differences in both clusters are strongly expressed.

On the other hand, the creators of labor resources are more evenly distributed in the second cluster. In the first cluster, the greatest impact has the “population of working age, %”, while in the second cluster, the impact of this indicator is low. However, the other indicators in the second cluster are of great importance, except for the population density (person/sq.m) indicator.

In the first cluster, the impact of indicators of economic investment resources is more homogeneous than in the second cluster, however, the regional quantitative and structural differences are sufficiently large. The indicators have the greatest influence: “purposes of residents' internet use - internet banking use, %”, “average salary (gross), Euro”. In the second cluster, regional quantitative and structural differences are very clearly expressed. The indicator “distribution of companies by main types of activity in Latvia, Lithuania, Belarus and their regions, % - education, health care, social work” has the greatest influence, the influence of other factors is weak. The indicators of infrastructure resources have smaller quantitative and structural differences in the first cluster, however, heterogeneity remains in both clusters. The range of values in the second cluster is much larger than in the first. The formation of the first cluster is largely influenced by the following indicators: “provision of passenger cars per 1000 inhabitants”, “purposes of citizens' Internet use – for receiving/sending e-mail, %”, “internet availability in different types of households, %”, “agricultural land, %”. The values of these indicators are generally similar. The formation of the second cluster is influenced to a greater extent by “the share of the area of the region in the total area of the three countries, %”, “purposes of residents' use of the Internet - searching for information, %”, “land used for agriculture, %”.

The first cluster is relatively homogeneous in terms of ecological health, all indicators have a fairly equal impact. However, regional quantitative and structural differences are observed in the second cluster, such indicators have the greatest influence: “emissions of harmful substances into the atmosphere (kg per inhabitant)” and “emissions of harmful substances into the atmosphere, kg per inhabitant – carbon monoxide”.

The author created a development vector of the innovation potential of the studied regions and found that its values increase in the direction from southeast to northwest.

The author finds an average linear positive relationship between GDP and the set of innovation potential, and also, when studying innovation potential resources, determines an average linear positive relationship between GDP and scientifically technical and educational resources, a weak linear negative relationship between GDP and labor resources, a strong linear positive relationship between GDP and economic investment resources, average linear positive relationship between GDP and ecological health.

Conclusions

The evolution of the concept of innovation potential is related to the concept of innovation and innovation potential. Several approaches are used to explain the concept of innovation, within which innovation is defined as a change, process or result. In defining the concept of innovation potential, world scientists use two basic

approaches - they consider it as the result of a combination of resources or the result of an activity. The author is a supporter of the resource approach, and the innovation potential is evaluated as a set of resources.

As a result of the research, new data have been obtained on the innovation potential of regions and the essential interrelationships of resources, as well as the methodology for determining the innovation potential of regions has been developed and approved.

The author developed the following algorithm for creating an integral indicator for the evaluation of the innovation potential of the regions of Latvia, Lithuania and Belarus:

- unification of statistical indicators with a linear scaling technique in the interval from 0 to 10, sorting it into stimulants and destimulants,
- selection of determinant indicators of innovation potential from a wide set of available statistical indicators, which excludes indicators with similar or duplicate meaning without reducing the objectivity of the results,
- creating integral index by the selected indicators.

For the assessment of the innovation potential of the regions of Latvia, Lithuania and Belarus, the author uses the complex assessment with the sum method, because, compared to other methods, this methodology more optimally differentiates the quantitative and structural differences of the regions, there is a one-way effect of the indicators of the innovation potential, the given regions are economically underdeveloped.

The author assesses the innovation potential of regions of Latvia, Lithuania, and Belarus, its structure that provides for the assessment of the existing regional quantitative and structural differences and determining the innovation potential development vector. The author specifies the profile of factors influencing the innovation potential of regions of Latvia, Lithuania, and Belarus, that provides for in-depth analysis of the innovation potential development aspects.

The present research may be put to practice in national structures of diverse levels to elaborate a policy stimulating innovation introduction and development in particular regions. Within his research, the author determines the innovation potential structure of regions of Latvia, Lithuania, and Belarus according to the factors influencing the innovation potential, lack of influencing factors or their excess, that makes it possible to work out guidance for successful implementation of cross-border innovative development policy.

The author classifies regions of Latvia, Lithuania, and Belarus into clusters according to the innovation potential factor analysis, states regions with excess/lack of different potentials that facilitates the implementation of cooperation and development programmes on regional and national level. The author determines the innovation potential development level and vector that is an essential prerequisite for the elaboration of investment policy.

According to the analysis produced by the author, Minsk possesses a very high innovation resource potential level, whereas that of Minsk district is very low. Minsk is located in quintile 5, whereas Minsk district in quintile 1. In regions of Latvia and Lithuania these quantitative and structural differences are slightly less expressed, yet such a tendency is characteristic of these regions as well. This tendency is very distinct in capital city regions with dynamically developing capital city but poorly developing other regions. The flow of investments, labour force and other resources is oriented only towards the capital city development. State and local government institutions are to elaborate new programmes and promote the development of the existing ones for levelling of regional quantitative and structural differences, work out recommendations for their efficient use and uptake of EU structural fund appropriations, form separate development project financing budgets for capital cities and regions.

No monitoring of innovation resource potential is produced, there is no controlling innovation resource potential development in dynamic, the stimulating and impeding factors are not specified. There is no unified institution in Latvia to implement innovation policy. Economic policy development bodies are to elaborate innovation resource potential monitoring and control system, carry out innovation resource potential monitoring in national and regional context based on statistical data. The integral indicator for innovation resource potential assessment produced by the author may be applied as an element of innovation resource potential monitoring.

Regions of Latvia and Lithuania (cluster 1) greatly lack labour force. State and local government bodies are to elaborate programmes for attracting labour force from other regions with excess of labour force, facilitate cooperation between state and local government structures and the private sector, work out recommendations for the implementation of labour force attracting programmes.

Districts in Belarus (cluster 2) possess extremely large labour force resources, whereas indicators of economic investment, scientific technical resources and ecological health are very low, infrastructure resources are insufficient. Administration bodies of the Republic of Belarus, regional and district executive committees are to elaborate programmes of development including cross-border development programmes within which financing is attracted for various kinds of projects including cross-border financing, economic and culture relation development, improving the image of region and raising recognisability level that leads to the development of economy, science and other resources.

Accessibility of statistical indicators in widely available published collections is rather limited; there is no unified statistical indicator inventory system in various countries, especially on regional level, that aggravates the opportunities of assessing the innovation resource potential and comparing different country regions. National statistical institutions (in Latvia – Central Statistical Bureau of Latvia, in Lithuania – Statistics Lithuania, in Belarus – National Statistics Committee of the Republic of Belarus) are to improve opportunities for statistical data accessibility, within national programmes expand the range of statistical data, especially in regional perspective, within cross-border cooperation elaborate a unified system of statistical data calculating and processing.

References

- Acemoglu, D., Akcigit, U., & Celik, M. (2022). Radical and Incremental Innovation: The Roles of Firms, Managers, and Innovators. *American Economic Journal: Macroeconomics*, 14(3), 199-249. <http://doi.org/10.1257/mac.20170410>
- Agarwal, R., Green, R., Patterson, E., & Pugalia, S. (2022). Innovation. <http://doi.org/10.4324/9780429346033> ISBN: 9780429346033
- Alekseyev, S.G. (2009). Otsenka innovatsionnogo potentsiala i innovatsionnoy aktivnosti regionov Sibirskogo federalnogo okruga. *Vestnik BGU*, 111-117.
- Andriushchenko, K., Liezina, A., Vasylchak, S., Manylich, M., Shterma, T., & Petrynyak, U. (2022). Management of the Development of the Innovative Potential of the Region. *Tem Journal-Technology Education Management Informatics*, 11(1), 339-347. <http://doi.org/10.18421/TEM111-43>
- Asociacija Gedimino legionas. (2022). Gedimino legionas. Available: <https://gediminolegionas.lt/gedimino-legionas/> Accessed 12.03.2022
- Atwa, A. (2022). A Journey Through Innovation. AI innovation Hub. Thesis for: Bachelor of Architecture. Advisors: Ms. Suman Faruqui, Dr. Tamsen Anderson. Available: https://www.researchgate.net/publication/361224867_A_Journey_Through_Innovation_AI_innovation_Hub Accessed 28.07.2022
- Ayvazyan, S.A. (2005). Razrabotka i analiz integralnyh indikatorov kachestva zhizni naseleniya Samarskoy oblasti. Moskva: TSEMI RAN.

- Birkner, Z., Meszaros, A., & Szabo, I. (2022). Handling regional research, development and innovation (RDI) disparities in Hungary: New measures of university-based innovation ecosystem. *Regional Statistics* <http://doi.org/10.15196/RS120402>
- Bora, T., Brazda, R., & Slíva, A. (2021). Innovation potential at universities. *Conference: 13th International Conference on Education and New Learning Technologies* <http://doi.org/10.21125/edulearn.2021.0129>
- Bychin, V.B. (2022). Innovative potential of the organization's personnel: opportunities and prospects. <http://doi.org/10.33920/pro-3-2201-01>
- Cantarelli, C. C., & Genovese, A. (2021). Innovation potential of megaprojects: a systematic literature review. *Production Planning and Control*. <http://doi.org/10.1080/09537287.2021.2011462>
- Carlström, E. (2022). Collaborative Leadership and Innovation. Strategy for innovation. Edition 1st Edition. Imprint Routledge, p.16 eBook ISBN 9781003211655 <http://doi.org/10.4324/9781003211655-10>
- Chehabeddine, M. R., Grabowska, S., & Adekola, A. F. (2022). Building a model for securing regional development from ecological threats. *Insights into Regional Development*, 4(2), 22-40. [https://doi.org/10.9770/IRD.2022.4.2\(2\)](https://doi.org/10.9770/IRD.2022.4.2(2))
- Chekulina, T. A., & Tamakhina, Y. A. (2011). Innovatsionnyy potentsial regiona: sodержatelnyye osobennosti i teoreticheskiye aspekty issledovaniya. *Vestnik TGU*, 2(94), 65-70.
- Danko, M. (1999). Innovatsionnyy potentsial v promyshlennosti Ukrainy. *Ekonomist*, 10, 26-32.
- Davies, A., Gann, D., & Douglas, T. (2009). Innovation in Megaprojects: Systems Integration at London Heathrow Terminal 5. *California Management Review*, 51 (2), 101–126. <https://doi.org/10.2307/41166482>
- Drucker, P. (2009). Business and Innovation. Moscow: I.D.Vilyams.
- Erdin, C., & Caglar, M. (2022). National innovation efficiency: a DEA-based measurement of OECD countries. *International Journal of Innovation Science* <http://doi.org/10.1108/IJIS-07-2021-0118> Early Access MAY 2022
- European Innovation (2021). European Innovation Council and SMEs Executive Agency (EISMEA). European Capital of Innovation Awards (iCapital) 2021: discover this year's semi-finalists! Available: https://eismaa.ec.europa.eu/news/european-capital-innovation-awards-icapital-2021-discover-years-semi-finalists-2021-09-02_en Accessed 12.03.2022
- European Neighborhood and Partnership Instrument 2007-2013. (2008). Cross Border Cooperation Programme Latvia-Lithuania-Belarus. Available: http://www.enpi-cbc.eu/go.php/eng/Programme_territory/326 Accessed 06.12.2021
- European neighbourhood instrument Cross-border cooperation programme Latvia – Lithuania - Belarus 2014-2020. (2015). Available: https://www.eni-cbc.eu/lb/data/public/uploads/2016/03/lv-lt-by_eni_cbc_2015_final.pdf Accessed 10.12.2021
- Fathulina, L. Z., & Shabaltina, L. V. (2011). Faktory rosta innovatsionnogo potentsiala regiona. *Vestnik VEGU*, 2(52), 61-68.
- Farrow, R. (2021). The innovation potential of open educational resources. *Conference: 14th annual International Conference of Education, Research and Innovation*. <http://doi.org/10.21125/iceri.2021.1931>
- Franco, D., Segers, J., Herlaar, R., & Richt Hannema, A. (2022). Trends in Sustainable Energy Innovation - Transition Teams for Sustainable Innovation. *Journal of Innovation Management*, 10(2), 22-47. http://doi.org/10.24840/2183-0606_010.002_0002
- Freeman, C. (2017). The Economics of Industrial Innovation. Abingdon: Routledge.
- Freeman, C. (1995). The National Systems of Innovation in historical perspective. *Cambridge Journal of Economics*, 19, 5-24.
- GII (Global Innovation Index). (2021). Available: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf Accessed 13.08.2022
- Gijon, C., Lozano, I., & Molina, J. M. (2022). Perception of innovation in Spain. *Digital Policy Regulation and Governance*. <http://doi.org/10.1108/DPRG-09-2021-0109>

Giuliano, K. K., Sup, F. C., Benjamin, E., & Krishnamurty, S. (2022). Innovate. *Nursing Administration Quarterly*, 46(3), 255-265. <http://doi.org/10.1097/naq.0000000000000529>

Glavnoye upravleniye nauki BGU (2022). Belorussko-Kitayskiy innovatsionnyy tsentr. Available: http://research.bsu.by/innovative-activity/int_sci_tech_cooperation/inter-innov-centre/belchine-centr/ Accessed: 09.03.2022

Heilala, J. (2022). A full range of innovation leadership supports global innovativeness. *Innovation in the Era of Climate Change*. Hamburg, Germany. Available: https://www.researchgate.net/publication/362143351_A_FULL_RANGE_OF_INNOVATION_LEADERSHIP_SUPPORTS_GLOBAL_INNOVATIVENESS Accessed 28.07.2022

HPC Center homepage (2022). HPC center of Riga Technical University. Available: <https://hpc.rtu.lv/> Accessed 11.03.2022

Hudakova, J., Fila, M., & Marosh, M. (2018). Innovation Potential of the Regions in the Slovak Republic. Nitra. Available: https://www.researchgate.net/publication/324803643_Innovation_Potential_of_the_Regions_in_the_Slovak_Republic Accessed 10.03.2022

Intelligent Energy Lab (2021). Intelligent Energy Lab in the city of Vilnius. Available: <https://iel.lt/en/> Accessed 12.03.2022

Jaiswal, J., Tiwari, A., Gupta, S., & Agarwal, R. (2022). Frugal innovation. In book *Innovation*. (pp.332-361). <http://doi.org/10.4324/9780429346033-21>

Krivosheya, Y. (2022). Innovative potential of regional development. *Black Sea Economic Studies*, 73-13. <http://doi.org/10.32843/bses>

Kulakov, K. Y., Verstina, N. G., & Meshcheryakova, T. S. (2022). Innovation infrastructure and innovation climate: innovation development ecosystem. *E-Management*, 5(1), 32-42 <http://doi.org/10.26425/2658-3445-2022-5-1-32-42>

Langham, J., & Paulsen, N. (2020). Innovation Potentiality: Measuring Organisational Innovation Potential in the Canadian Public Sector. *Academy of Management Annual Meeting Proceedings 2020*, 1, 18077 <http://doi.org/10.5465/AMBPP.2020.18077abstract>

Lavrinenko, O. (2008). Influence of Economical Development on the Welfare of Population (Example of EU Countries). *2nd International Interdisciplinary Scientific Conference "Society. Health. Welfare"*

Law of Republic of Belarus 154-3 «On the administrative and territorial division and the procedure for solving the issues of the administrative and territorial organization of the Republic of Belarus». (1998). Minsk.

Law of Republic of Lithuania No I-558 "Law on the Territorial Administrative Units and their Boundaries". (1994). Vilnius.

Liu, P., & Shao, Y. (2022). Innovation and new business formation: the role of innovative large firms. *Small Business Economics*, 59(2), 1-30. <http://doi.org/10.1007/s11187-022-00603-y>

Lunarski, J., & Stadnicka, D. (2007). Metoda samooceny potencjalu innowacyjnego organizacji. *Technologia i Automatyzacja Montazu*, 7, 37-41.

Maãlej, A. (2022). The role of entrepreneurship and innovation in the environmental and economic dimensions of growth. *Insights into Regional Development*, 4(2), 85-95. [https://doi.org/10.9770/IRD.2022.4.2\(7\)](https://doi.org/10.9770/IRD.2022.4.2(7))

Mikelsone, E., Spilbergs, A., Volkova, T., & Liela, E. (2022). Idea Management Systems in Developing Innovation Capacity. *International Journal of Innovation and Technology Management*, 19(3), Article Number 2240001 <http://doi.org/10.1142/S0219877022400016>

Ministerstvo obrazovaniya Respubliki Belarus (2020). Mezhvuzovskiy tsentr marketinga nauchno-issledovatel'skikh razrabotok. Belorussko-Kitayskiy innovatsionnyy tsentr, BGU. Available: <https://icm.by/centry-dvukhstoronnego-sotrudnichestva/belorussko-kitayskiy-innovacionnyy-centr-bgu> Accessed 20.05.2021

Ministry of Economy of the Republic of Latvia. (2019). Innovations. Available: <https://www.em.gov.lv/lv/inovacija> Accessed 23.10.2022

Nikina-Ruohonen, A. (2022). Innovation. <http://doi.org/10.4324/9780429346033-13>

Order of the Cabinet of Ministers No. 911 of 07.12.2021 “About the statistical regions of the Republic of Latvia and the administrative units included in them”. (2021). Riga.

Paraska, O. A., Horban, A. Y., Matselyukh, B. P., Shchur, S. A., & Shenderovskiy, V. A. (2022). Chemosynthesis: a history of innovation. <http://doi.org/10.32902/2663-0338-2022-2-50-56>

Pichlak, M. (2012). Uwarunkowania innowacyjności organizacji. *Studium teoretyczne i wyniki badań empirycznych*. Warszawa.

Porter, M.E., & Stern, S. (2002). National Innovative Capacity. *The Global Competitiveness Report 2001—2002*.

Poznanska, K. (1998). Uwarunkowania innowacji w małych i średnich przedsiębiorstwach. Warszawa: Dom Wydawniczy ABC.

Prud'homme van Reine, P. (2022). Innovation Culture: Learning from the history of innovation. ISBN: ISBN 978-90-810209-3-0 Available: https://www.researchgate.net/publication/361780621_Innovation_Culture_Learning_from_the_history_of_innovation Accessed 27.07.2022

Regulation (EC) No 1059/2003 of the European Parliament and of the Council. (2003). *Official Journal of the European Union*, 154, 1-41.

Repeshko, A. (2022). The concept of innovation potential and methods of its management. *Business Strategies*, 10(2), 47-49. <http://doi.org/10.17747/2311-7184-2022-2-47-49>

Rodivilov, A. (2022). Monitoring Innovation. *Games and Economic Behavior* <http://doi.org/10.1016/j.geb.2022.06.011>

RTU homepage (2022). Science and Innovation Center. Available: <https://www.rtu.lv/lv/zinatne/zinatnes-un-inovaciju-centrs> Accessed 10.03.2022

RTU Innovation and Technology Transfer Center homepage. (2019). Available: www.inovacijas.rtu.lv Accessed 27.04.2021

Saloff-Coste, M. (2022). Innovation ecosystems. Available: https://www.researchgate.net/publication/362181745_Innovation_ecosystems Accessed 28.07.2022

Samson, D., Ellis, A., & Black, S. (2022). Business Model Transformation. <http://doi.org/10.4324/9781003255529-6>

Sangadiyev, Z.G., & Ayusheva, L.A. (2006). Otsenka innovatsionnogo potentsiala regiona. *Vestnik Sibirskogo Gosudarstvennogo Aerokosmicheskogo Universiteta*, 5, 211-215.

Sawalkar, A. S., Shinde, T. R., Mali, M. M., Parlikar, M. A., & Mortale, S. L. (2022). Innovations in Nanotechnology. <http://doi.org/10.48175/IJAR SCT-5101> ISBN: 2581-9429

Schlesinger Jr., A. (1986). *Cycles of American History*. Boston: Houghton Mifflin.

Schumpeter, J.A. (1939). *Business Cycles: a Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. Oxford: Oxford University Press.

Sheffield, R., Kars Unluoglu, S., & Jarvis, C. (2022). Climate for innovation. In book: *Innovation* (pp.40-60). Available: https://www.researchgate.net/publication/361913773_Climate_for_innovation Accessed 28.07.2022

Shvets, V. Y., & Dubiei, Y. V. (2021). Management of innovative potential of Ukrainian industrial enterprises. *Economic Bulletin of Dnipro University of Technology* <http://doi.org/10.33271/ebdut/76.106>

Shvindina, H., Taraniuk, L., Kotenko, S., Abayomi, A., Taraniuk, K., & Qiu, H.Z. (2022). Cross-Country Analysis of Competitiveness towards Innovation Potential Assessment for Industrials. *Journal of Eastern European and Central Asian Research*, 9(2), 165-182. <http://doi.org/10.15549/jeecar.9i2.711>

Sinclair-Desgagne, B. (2022). Measuring innovation and innovativeness: a data-mining approach. *Quality & Quantity*, 56(1), 1-20. <http://doi.org/10.1007/s11135-021-01231-6>

Soshnikova, L.A., Tamashevich, V.N., Uebe, G., & Shefer, M. (1999). *Mnogomernyj statisticheskij analiz v ekonomike: Ucheb. posobie dlya vuzov*/Pod red. Prof. V.N.Tamashevicha. Moskva: YUNITI-DANA, 598 s.

Sundaram, S. M., Murgod, T. R., & Sowmya, M. (2022). Technology-Based Innovation for Business Model Innovation. In book: *Emerging Technologies for Innovation Management in the Software Industry* (pp.223-236). <http://doi.org/10.4018/978-1-7998-9059-1.ch014>

Tsindin, N. S., & Akzhigitova, A. N. (2006) *Ekonomicheskij analiz*. Penza IITS PGU.

Twiss, B. (1989). *Managing Technology For Competitive Advantage: Integrating Technological And Organisational Development: From Strategy To Action*. Trans-Atlantic Publications.

Waldron, T. L., & Wetherbe, J. C. (2020). Which Innovations Should You Keep When the Crisis is Over? *Entrepreneur & Innovation Exchange* <http://doi.org/10.32617/515-5eb2ec4445258>

White, J. C. (2022). A Theory of Art Innovation. In book: *Innovation in the Arts*, pp. 22-43. ISBN: 9781003142393 <http://doi.org/10.4324/9781003142393-3>

Vilniaus miesto internetinis puslapis (2022). Available: <https://vilnius.lt/lt/vilnius-2in/kibernetinis-saugumas/> Accessed 13.03.2022

Vilnius city website. (2019). Available: www.vilnius.lt Accessed 24.04.2021

Zhits, G.I. (2007). Strategiya innovatsionnogo razvitiya promyshlennykh predpriyatiy: podkhody k formirovaniyu. *Problemy Sovremennoy Ekonomiki: Investitsii, Innovatsii, Logistika, Trud*, 25-31.

Zhizhlovsky O. (2011). Factors of an innovation potential development are known, but not always mastered. *Economics and Management*, 16, 1019-1024.

Zholnierski, A. (2005). *Potencjal innowacyjny polskich malych i sredniej wielkosci przedsiebiorstw*. Warszawa: Polska Agencja Rozwoju Przedsiębiorczości.

Annex A

Examples of innovation potential development in Latvia, Lithuania, Belarus

The management of the innovation system in Belarus takes place at different levels of government, from local governments to the orders of the President of the country. Each level of innovation management is assigned certain powers and functions. A strategy has been prepared and approved in the country „Science and innovations: 2018-2040”. The given document defines the priority directions and tasks for the development of the innovation potential of Belarus. According to the given strategy, the innovative development of the country is regulated by the following theses:

- science is the foundation of advanced technologies;
- innovations must correspond to basic world trends and society’s interests;
- the country must reach a new level of competitiveness;
- scientific and technical activity must be based on own resources and international scientific cooperation.

According to the Global Innovation Index, Belarus ranks 88th (2017). In two years, the ranking of Belarus according to the GII decreases by 35 positions.

The low level of development of the innovation potential in Belarus is related to the fact that the innovation potential is mostly developed in the capital Minsk, while the innovation potential develops very slowly in the oblasts. Several innovation potential development and promotion projects are developed only in Minsk, however, state support for innovation potential development projects increases every year.

The Belarus China Innovation Center operates in Minsk, which was established in 2010, implementing Innovation Development State Program 2007-2010 of the Republic of Belarus (Glavnoye upravleniye nauki BGU 2022). The purpose of the establishment of the center is to promote the expansion of the business and scientific relations of the structural units of the State University of Belarus with the scientific institutions and companies of the People’s Republic of China and to develop effective coordination of the implementation of joint scientific and technical projects. Belarus China Innovation Center is founded by the Belarus State University and the Science and Technology Administration of the People’s Government of Harbin City, Heilongjiang Province. The following documents were signed during the operation of the center (Ministerstvo obrazovaniya Respubliki Belarus 2020):

- Agreement on the establishment of the Belarus-China Joint Institute with Dalian Polytechnic University;
- Memorandum of cooperation in the field of education and science with Zhejiang University of Science and Technology;
- Memorandum on the long-term scientific and technical cooperation program with the Petrochemical Institute of the Heilongjiang Academy of Sciences;

- Protocol on cooperation in the field of polymer synthesis with the Institute of Synthetic Chemistry of Mongolia;
- Memorandum of cooperation with Keqiao Industrial Region.

In Riga, the Science and Innovation Center operates on the basis of Riga Technical University (RTU), the purpose of which is to ensure the implementation and growth of RTU's strategy and sustainable valorization goals, promoting scientific activity and the involvement of academic staff and students in the processes of innovation creation and knowledge transfer, as well as developing cooperation with industry and scientific institutions (RTU homepage 2022). The center develops students' innovation and entrepreneurial abilities, offers innovative product development services, and actively engages in local and international innovation ecosystems (RTU homepage 2022). The Science and Innovation Center consists of several structural units:

- Design factory;
- Innovative product development department;
- Department of Innovation Ecosystem Development;
- Research Equipment Division.

The design factory (RTU homepage 2022) develops innovative thinking, creative skills and entrepreneurial abilities in students. It has several basic functions:

- to ensure the availability of the open-type workshop "theLAB";
- implement the project "Innovation grants for students" (ERAF co-financed project No. 1.1.1.3/18/A/001 "RTU innovation grants for students").

Basic functions of the innovative product development department:

- efficient creation of innovative products with high added value;
- research and improvement of existing products and services.

The department cooperates with various industries and scientific institutions.

The Innovation Ecosystem Development Department promotes RTU's involvement in national and international innovation and technology ecosystems, including implementing programs of the European Institute of Innovation and Technology (EIT), conducting educational work and supporting start-ups in the implementation of sustainable business ideas (RTU homepage 2022).

The Research Equipment Division (RTU homepage 2022) supports the development of science by providing modern research equipment. The High Performance Computing or HPC Center operates within the department, which develops the use of digital technologies in research.

HPC center's (HPC Center homepage 2022) mission is:

- to develop the use of digital technologies in research,
- to promote modern and more internationally competitive Latvian science.

Basic tasks of the center are:

- to provide a powerful computing infrastructure,
- to provide modeling services,
- to provide simulation services,
- to maintain scientific software for research and teaching,
- to arrange digital science courses and seminars.

HPC center (HPC Center homepage 2022) cooperates with the largest Latvian scientific institutes and universities, as well as European e-infrastructures.

Vilnius (European Innovation 2021) received the third place in the finals of the competition European Capital of Innovation (iCapital)m, where 38 cities participated with the population number not less than 50 000 people.

European Capital of Innovation (iCapital) is an annual recognition award given to European cities that best promote innovations. The eighth edition specifically recognizes the contribution of cities to the development of local innovation ecosystems to benefit from breakthrough innovations and improve public well-being. The commission evaluated Vilnius projects for 2020: Vilnius 2IN, Hack Me if You Can, IT MUST, Intelligent Energy Lab, volunteers' project Gedimino legionas etc.:

- Vilnius 2IN (Vilniaus miesto internetinis puslapis 2021) project's strategic direction is guided by the six principles of activity:
 - o municipal excellence is the best practice in the international management;
 - o knowledge in general – ability to detail existing knowledge, share it and try to create new applied knowledge;
 - o innovation is the application of smart solutions, not the destination, but a practical benefit to the result for all participants;
 - o digital equality – all members of society deserve access to technology and equal opportunities to pay for its use;
 - o intelligence – the intelligent society accepts technologies, does not focus on digitization, it is vision-oriented; solve current problems in a clear, convenient way;
 - o spreading initiatives, activities and results among all members of society to involve as many initiators, advisors and users as possible.
- Hack Me if You Can (Vilniaus miesto internetinis puslapis 2022) program allows every person, without violating the legal framework established in the country, to identify cyber security threats free of charge, notify them to the Vilnius city municipality and share the given information after the threats have been eliminated.
- Intelligent Energy Lab (2021) aim is to create an open platform for idea generation and development in the city of Vilnius.
- Gedimino legionas (Asociacija Gedimino legionas 2022) is an association of volunteers whose goal is to provide assistance to the surrounding environment in difficult and unexpected situations. The task of the association is to educate volunteers to use various technologies – cybernetics, internet, drones, data, etc.

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EMOTIONAL INTELLIGENCE TRAINING AS AN INTERVENTION TO DIMINISH CONSUMER MATERIALISM*

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Abstract. Research confirms the existence of links between a personality's propensity for materialism, and various social and psychological ills: compulsive buying, poorer mental health, etc. The development of emotional intelligence (EI) helps to solve such issues. However, the creation of EI development programme is complex. In addition, such programmes developed tend to lack a clear EI model, are not differentiated according to specific participant problems (e.g., materialism), underestimate certain aspects of the change in the EI level, etc. Thus the purpose of the present paper is to present essential EI programme curriculum methodological guidelines and recommendations for the creation of a specialised materialism reduction programme. *Results and conclusions.* The curriculum must implement the following principles: adaptation according to the participant age and nature of the demonstrated behaviour (in this case – materialism); linking certain tasks to a practical application to develop real-life skills; establishment of objective criteria to assess the EI level and materialism changes at the end of training. The recommended format of the three-stage EI curriculum is: I. Development of self-awareness; II. Self-management training; III. Application of learnt emotional competencies in a group by modelling various situations relevant to participants. A qualified coach must provide ongoing feedback consisting of reinforcement and constructive criticism. Recommended EI training methods: discussion, modelling, role play, etc. Essential factors for the effectiveness of the EI curriculum: selection of motivated participants, coach competence, reliability, validity and objectivity of EI and materialism change measurement tools, transfer of tasks to real-life situations, and measurement of the impact stability after at least 3 months.

Keywords: emotional intelligence; consumer materialism; training

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1. Introduction

As overconsumption has been continuing to rise, researchers have been increasingly seeking to understand the motivation behind the endorsement of materialism and the resulting maladaptive consumption. With the increasing awareness about the negative environmental consequences originating from the widespread consumer culture, consumers are still incapable of resisting indulgence in materialistic possessions and acquisitions, and they have been proven to be unable to abandon materialistic values. Even the rapidly rising environmental consciousness and the acknowledgement of the detrimental effect of overconsumption on the societal well-being are slow in inhibiting the materialistic value orientation. Consumers struggle in reconciling the coexistence of pro-environmental and materialistic values, whose conflict negatively affects their subjective well-being (Furchheim, Martin & Morhart 2020). Literature suggests that the susceptibility to materialistic inclinations and the resulting compulsive buying is, in most cases, determined by the emotional vulnerability and negative emotional states which persist despite the efforts to compensate for personal deficiencies with material objects (Donnelly et al. 2016).

Moreover, the continuous belief in the power of materialistic objects to help arrive at the aspirational-self results in the materialism perpetuation cycle (Richins, 2017). Individual differences in generating, perceiving, and regulating emotions can explain why people react differently to stress. This ability is referred to as *Emotional Intelligence* (EI). Emotionally intelligent consumers are skilled at managing their emotions and, as a result, they should be less vulnerable to maladaptive coping strategies. For example, research findings suggest that, by improving emotional ability, consumers can gain control over their food choices (Kidwell, Hasford & Hardesty 2015). Extrapolating from the previous findings, we assume that emotional intelligence ability development through appropriate training programmes should contribute to the prevention of materialism through increased emotional self-awareness and self-regulation. The ability to understand and manage one's own emotions should motivate the consumer to re-consider their excessive-consumption based habitual behaviour. Since the emotional responses of materialists compromise their subjective well-being, the coping modes and educational programmes that could help cope with the triggers of materialistic orientation have become highly necessitated.

Furthermore, effective interventions, such as training aimed at coping with unpleasant emotional events in a more adaptive way than materialistic orientations and excessive buying, would improve the sustainability of the everyday consumption and personal well-being. Effective training-based interventions can be used in the experimental research within the materialism and compulsive buying literature so that to examine the effect of an educational training programme on the EI level and, in turn, the impact of emotional intelligence on materialistic orientations and behavioural outcomes. This study reviews what is already known and understood about emotional intelligence training programmes. It makes a case for further developments in this area's context-specific emotional intelligence training curriculum. The conclusions summarise the findings of the review and propose an emotional intelligence programme curriculum methodological guidelines and recommendations for the creation of a specialised materialism reduction programme.

2. Theoretical background

The concept of emotional intelligence. Emotional intelligence (EI) can be defined in various ways, but, in the broad sense, it is the ability to recognize, assess and control your own and other people's emotions as a whole. EI reflects how well an individual manages to process their emotions and the emotional information received from others (Mayer, Salovey & Caruso, 2008), both of which are crucial aspects of everyday functioning and successful interpersonal relationships (Mikolajczak, Brasseur & Fantini-Hauwel, 2014). Even more so, EI is one of the main sources of human well-being, health and efficiency. For example, high emotional intelligence correlates with better mental health (Martins, Ramalho & Morin, 2010; Manju, 2016). An improved emotional and psychological condition leads to a higher quality of life, and overall health (Abascal-Bolado & Dulohery,

2016; Zysberg, 2018; Matthews et al., 2018; Benzo). Individuals exhibiting high EI levels are more able to moderate their emotions and are less impulsive, they tend to empathise with others better, which leads to their better functioning in the society and the forming of closer relationships with other people (Manhas & Sharma, 2015). A high EI is also associated with the improved social support, a decreased likelihood of interpersonal relationship issues, better stress management, and greater health (Ermer et al., 2012). Those who possess a superior EI tend to be more successful in many areas of life: at work, academically, and in interpersonal relationships (Mattingly & Kraiger, 2019). Conversely, those with a low EI are not as empathic, they fail to empathise with other people's state or situation, and they are prone to acting impulsively (Henley & Long, 1999). A low emotional intelligence is also statistically significantly related to aggression and criminal behaviour (Ermer et al., 2012; Megreya, 2013; García-Sancho, Salguero, & Fernández-Berrocal, 2014).

Emotional intelligence depends on a variety of factors: it is believed to be influenced by the childhood environment and upbringing, by the examples that a child is exposed to in their immediate environment, as well as by favourable and adverse or stressful situations, traumatising events, and so on (McNulty, 2016). Despite an abundance of EI research, the scientific community is still engaged in discussion over how to identify and define emotional intelligence as a theoretical concept (Papadogiannis, Logan, & Sitarenios, 2009).

Emotional intelligence models. Various emotional intelligence models have been suggested, but two EI conceptual trends stand out. The proponents of the first approach define EI as an intersection of the emotional and intellectual spheres, i.e., as cognitive processing of emotional information (Mayer, Caruso & Salovey, 2016). This model focuses on social relationships and is called the *abilities model*. Its alternative – the *trait model* – is centred on self-understanding and the constellation of one's own emotional world (Petrides et al., 2016). This model underlines non-cognitive abilities, knowledge and competencies allowing individuals to successfully solve various complicated situations of life. The advocates of the EI ability model evaluate the ability to operate emotional information by using performance tests, which are, in principle, largely related to IQ tests, while the proponents of the trait theory apply questionnaires, constructed on the basis of introspection that may remind of personality assessment tests (Petrides, Pita & Kokkinaki, 2007). In addition, researchers identify a third – hybrid – model that intertwines the two previously mentioned approaches. A brief overview of the aforementioned models is presented below.

Ability model of Emotional Intelligence. Salovey and Mayer (1990) were the first to define emotional intelligence as the “ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions” (Salovey, Mayer, 1990, p. 189). Mayer, Salovey & Caruso (2004, 2008) interpret emotional intelligence as a construct within the broader category of intelligence and claim that abilities reflecting EI can be evaluated through standardised cognitive criteria. In other words, EI is defined as the ability to employ emotions and feelings in the thought process. This entails the ability to understand and use emotions in a precise manner, which assists the conveying and comprehension of thoughts, and allows the reflective management of feelings, which, in turn, spurs emotional and intellectual growth (Mayer, Salovey & Caruso, 2004).

Mayer, Salovey and Caruso's (2004) EI model emphasises that EI is a set of abilities for responses to events that constitute emotions. The authors distinguish four complementary structural parts of EI: perceiving and identifying emotions, using emotions to facilitate thought, understanding emotions, and managing emotions.

Perceiving and identifying emotions refers to the ability to perceive one's own and other people's emotional states and feelings. This part of EI is immensely important, as unperceived or suppressed feelings remain unidentified and unrecognised. Perception of emotions encompasses the recognition and decoding of emotional signals (i.e., facial expressions, voice tone) (Papadogiannis, Logan & Sitarenios, 2009).

The second structural part of EI – using emotion to facilitate thought – indicates that the ability to recognise emotions entails placing one's attention on a person and decoding their emotions and feelings (Papadogiannis, Logan & Sitarenios 2009). This ability is used to endorse cognitive processes and to make decisions, hence, in other words, this part of EI aids thinking. Those individuals who are able to create the appropriate emotions and to integrate them into the thinking process are more adaptive, able to regard the world from different perspectives, reflect on problems in-depth and more creatively, and they are also able to change their mood accordingly to a specific situation.

Understanding emotions comprises the ability to make sense of emotions, their succession, causes and effects. (Rivers et al., 2007). Those individuals who are able to understand emotions know their real meaning, subtle combinations and sense the differences between similar emotions, know how emotions merge and change with time (Fiori & Vesely-Maillefer, 2017).

Managing emotions refers to the ability to regulate one's own and others' emotions effectively. Management of emotions is observed when one perceives and understands them well and is able to use them to change moods. This ability allows an individual to maintain positive emotions, change negative emotions into positive ones, and to appropriately employ emotions in particular situations (Papadogiannis, Logan & Sitarenios, 2009).

To summarise, this model examines four different but closely related EI abilities. Despite the criticism of the model by certain scientists, this four-part structural EI model remains the main contemporary theoretical EI ability model.

Trait Model of Emotional Intelligence. EI can be understood as certain personality traits that are revealed through the individual's self-reflection which determine the person's ability to cope with demands and pressure coming from the immediate surroundings (Ekman, Friesen, & Ellsworth, 2013). This model breaks away from the previously mentioned emotional intelligence as an ability-based construct and establishes that people have, as part of their personality, emotional traits or emotional self-perceptions.

This conception of emotional intelligence emphasises that EI is a personality trait that permits the understanding and management of emotions (Petrides, Pita & Kokkinaki, 2007). One of the most famous proponents of this approach, Bar-On, defines EI as a non-cognitive ability or skill that significantly facilitates dealing with pressure and demands that come from one's environment (Bar-On, 1997, 2006). The model proposed by Bar-On is multifactorial and eclectic. It not only encompasses the abilities that are traditionally ascribed to EI, but also includes traits that supplement EI and are important to the level of EI one has attained.

Bar-On compiled a list of 15 emotional skills, which was reshaped in 2011 by Multi-Health Systems (MHS) and expanded to 16 emotional skills, grouped into five categories: intrapersonal category (emotional self-awareness, self-regard, independence, self-actualisation, assertiveness); interpersonal category (social responsibility, empathy, interpersonal relationship), adaptability (flexibility, testing of reality, problem solving), stress management (impulse control, stress tolerance, flexibility, correct application of thought and behaviour) general mood (sense of happiness, optimism) (Bar-On, 1997).

Afterwards, the EI trait model by Petrides (2011) was proposed. Petrides suggested the idea that EI encompasses social intelligence, cognitive intelligence, self-awareness, and certain personality traits. Also, the trait model involves individual convictions related to the perception, processing and regulation of emotions. Petrides attempted to describe EI as a trait and distinguished 15 elements of the construct which are divided into four groups: well-being (self-esteem, happiness, optimism, self-motivation), self-control (regulation of emotions, low impulsiveness, stress management, adaptivity), emotionality (understanding one's own and other people's

emotions, emotional literacy, empathy, management of other people's emotions), sociability (relationships, social perception, perseverance).

According to the EI trait model, emotional intelligence is a set of traits located at the lower levels of personality. Precisely due to this, EI can be evaluated in two directions: when EI traits are explained by an already existing personality taxonomy, or when EI traits are understood as separate and independent (Petrides, Pita & Kokkinaki 2007).

The concept of materialism. Consumer materialism is related with the degree of the importance that consumers attach to possessions (Belk 1995). The most commonly accepted definition of materialism is “set of centrally held beliefs about the importance of possessions in one's life” (Richins & Dawson, 1992, p. 308). Basing on Kasser (2002), materialism is uniquely identified with consumption that leads to happiness that can be enhanced through possessions.

Materialistic people are attached to possessions, and possessions take the infinitely important place in their lives. Fitzmaurice and Comegys (2006) state that the continual acquisition of goods becomes a primary goal for materialists. They observe that materialists often become overly focused on purchases, and direct their energy and resources towards acquiring possessions.

Literature analysis reveals that scholars have two perspectives on the development of materialistic values of individuals, i.e., the socialisation and psychological perspectives. Moschis (2007) notes that both states are related with events at the early age of individuals. He determined that the weaker self-esteem and relationship between parents and their children are expected to grow the individual vulnerability to stressful situations in further life and increase inclination toward material wealth. Weaver et al. (2011) established that family communication and television at an early age is related with the materialistic values of individuals. Some scholars (e.g., Roberts et al., 2003) have also come to a conclusion that those individuals who experienced such events as divorce and separation in their families during their teen years as well as those who were brought up by materialistically oriented parents (Chaplin & John, 2010) are more prone to materialism and compulsive buying as they feel more stress and insecurity.

The research on materialism is definitely extensive, yet it is far from being conclusive. Literature review shows that various authors have conceptualised the construct of materialism as a single entity, but have measured it as a multidimensional construct. As a matter of fact, researchers have developed two perspectives on conceptualising materialism. Belk (1985) proposed three measures of materialistic traits – possessiveness, non-generosity, and envy. Belk (1984) also defined possessiveness as “an inclination and tendency to retain control or ownership of one's possessions.” Non-generosity involves reluctance to give away possessions, or to share those with others (Belk 1985). In addition, Belk (1984) emphasised that envy can be treated in both ways, i.e., as a benign characteristic that motivates striving to acquire the desired object, and as a destructive characteristic leading to crime, such as vandalism, murder, etc. Gilovich et al. (2015) indicated that this process is never-ending as the pleasure from the purchase quickly fades away, and the individuals have a new desire, and they ultimately become victims of their own desires and excessive needs.

Richins and Dawson (1992) proposed three components to measure value-oriented materialism among individuals. In the opinion of these authors, the more a consumer values material remuneration as the essential goal of life, the more s/he sees material possession or its acquisition as the main path to success and happiness, and the more they use material possession to determine their identity, the more materialistic they are considered to be. Basing on this approach, consumer materialism is measured by using three related facets: centrality, happiness and success (Richins & Dawson 1992; Richins, 2004). The centrality facet discloses the scope of the consumers' belief on the essentiality of things in their lives. The success domain of materialism is related with the trust that

one's and others consumers' success depends on their evident material wealth and acquisitions. The happiness facet is related with the belief that possessions and their purchase is the central way to happiness and satisfaction with life. This approach is well known and generally accepted by researchers of consumer materialism.

Emotional intelligence and materialism. The conceptualisation of materialism based on consumer values is widespread in the consumer behavioural research (Richins & Dawson, 1992; Richins, 2004). The enormous value which consumers tend to place on acquisitions and possessions drives their corresponding behaviour, which manifests as maladaptive consumption, overconsumption, and compulsive buying. Material objects are viewed as a source of happiness and success by those consumers due to earning them a special place in their lives.

There is no single definition of 'emotional intelligence' in the scientific literature. Two approaches can be highlighted. The concept of emotional intelligence based on personality traits includes emotion-related self-awareness, hierarchical systems of personality traits (Petrides, 2011; Bar-On et al., 2006; Petrides & Furnham, 2003). The ability-based concept of emotional intelligence emphasises an individual's cognitive capability to use emotional information – that is, to perceive, use, understand and manage one's emotions and the emotions of others (Salovey & Mayer, 1990; Mayer et al., 2004).

It is well documented that the materialistic value orientation is negatively associated with the personal, social, and environmental well-being, thus implying a bidirectional relationship manifested in the vicious cycle of being trapped in over-relying on material objects that do not bring happiness and the expected relief (Dittmar & Isham, 2022). Materialists, more than others, set unrealistically high standards for themselves. As materialistic expectations are unattainable in most cases, materialists experience more negative emotions than those consumers who are less concerned with materialistic pursuits (Donnelly et al., 2016). The excess of negative emotions is also more characteristic of the consumers of a lower emotional intelligence. Materialists are also more emotionally responsive to daily events and are more vulnerable to them (Richins, 2017). Meanwhile, psychologically resilient people are described as having higher emotional intelligence (Salovey et al., 1999). In addition, those consumers whose intrinsic ability to manage negative emotions (especially mourning) is better developed, less frequently use hedonistic consumption to control negative emotions (Kemp & Kopp, 2011). Studies also show that the experience of positive emotions contributes to the more effective management of emotions, faster recovery after negative emotional excitement, and positive meaning in negative life situations (Tugade & Fredrickson, 2004).

Those consumers who are high on materialism are more susceptible to the painful self-discrepancy which results in suffering and negative feelings for the same reason. The usual response to adversity is compensatory consumption, which can also manifest as a strong attachment to material objects (Mandel et al., 2017). Materialists are prone to using shopping with the objective to regulate their negative emotions. According to research, emotional dysregulation is linked to various forms of addictive behaviour that are used to regulate and avoid negative affective states. For example, Estévez et al. (2020) discovered a positive relationship between the buying-shopping disorder severity, materialism, and emotion dysregulation levels. The same study found that emotional dysregulation was associated with excessive buying behaviour in clinical samples, thus implying that people with emotional dysregulation prioritise the immediate reward over the long term negative consequences. Furthermore, the study of Ozimek, Bierhoff and Hamm (2020) determined that difficulties with emotion regulation were positively correlated with the intensity of the social use of Facebook. In addition, research (Ozimek & Förster, 2017) indicates that people use Facebook more intensely when they are high in both materialism and social comparison motivation.

The reviewed findings are indicative of the negative relationship between emotional intelligence and materialistic orientations. The development of emotional intelligence abilities may alter the materialistic view of life and its negative consequences. Literature suggests that the development of the emotional intelligence ability should contribute to reducing harmful materialistic value orientations. Hence, the potential of emotional intelligence

development programmes to counteract materialistic stances demonstrates their relevance and the need for such programmes to be developed and validated.

Challenges of Designing Emotional Intelligence Development Programmes. Recent years have brought a significant increase in EI interventions (Hodzic et al., 2017; Kotsou et al., 2018). The following key issues may be highlighted as a result of the analysis of EI development programmes and scientific literature dealing with the topic.

Programmes often lack foundations of scientific theory, and, as a rule, their content does not reflect the concept of EI; for example, the rationale of intervention is based on a construct different to that of EI (e.g., mindfulness, meditation) (Kotsou et al., 2018); programmes often include contentious elements or are simply focused on personality development, such as creativity, leadership, problem-solving skills, active citizenship, etc. (Zeidner, Roberts, & Matthews, 2002). Campo, Laborde and Weckemann (2015) pointed out that many programmes are developed by practitioners who rely solely on their own experience or popular psychology. Developers of high-quality EI curricula tend to base them on a theoretical EI model, provide a clear structure of the programme, and emphasise proper programme execution (Pool & Qualte, 2012; Hodzic et al., 2017).

There is no consensus on what the most appropriate and effective training method is. Various authors recommend the following methods of developing emotional intelligence: discussion, reflection and feedback, modelling, role-playing, examples, paired exercises, emotions diaries, readings, art therapy, and video (Hinsch & Pfingsten, 1998; Beigi & Shirmohammadi, 2010; Clarke, 2010; Kotsou et al., 2011; Nelis et al., 2011; Zijlmans et al., 2011; Campo, Laborde, & Weckemann, 2015). The benefits of role-playing in a group are particularly emphasised: the group participant learns that other people share similar problems; the situations offered by the participants create a wide range of learning situations (the participant can compare different patterns of behaviour, determine which options are successful or misguided); participants receive feedback and reinforcement not only from the coach but also from other participants, which motivates them to try new behaviours. However, we conclude it to be difficult to analyse the effects of the programmes in a complex way if they employ a variety of methods.

There is also no leading opinion regarding the duration of the programme, i.e., how long the programme should be for a positive change in a person's emotional intelligence. Researchers choose very different intervals: from long-term to relatively short-term options, such as a 2-year programme (Ruiz-Aranda et al., 2012), a 4-month programme including three 90-min video feedback sessions (Zijlmans et al., 2011), or a 2.5 day programme (15hr) (Kotsou et al., 2011). Data on whether the programme duration affects its effectiveness are conflicting (Grant, 2007; Kruml & Yockey, 2011). Overall, even a short one-day EI development session may prove to be beneficial since it provides specific knowledge; however, it is questionable whether the effects can be long-lasting (Zeidner et al., 2008). More effective long-term EI education strategies are expected to take longer so that to provide not only knowledge and skills, but also sufficient time for self-analysis and independent EI development. In this context, it is also relevant to assess how much time the participants are ready to commit in order to achieve the result, i.e., the motivation of the participants is also pertinent in choosing the duration of the programme.

Emotional intelligence development programmes often do not cover the evaluation of the change in EI: programmes do not provide tools for measuring changes in EI at various levels (emotion recognition, emotion management, etc.). The more reliable and valid is the methodology used to measure the change in EI, the more convincing are the outcome of the curriculum. Subjective methodologies (questionnaires, personality inventories, etc.) primarily measure changes at the cognitive level, which may be closely related to self-esteem, attributional habits, self-confidence, as well as emotional states (e.g., fear, depressed mood, etc.) (Hinsch & Pfingsten 1998). Meanwhile, objective measurement methods can first include role-playing, which should be filmed before the start of the curriculum and after the completion of the programme, and then these recordings should be evaluated by independent experts. However, this relies on the assumption that the simulated situations reflect the real

environment of the programme participants. In our opinion, the real effects of the programme can only be measured by the participant's ability to transfer the acquired knowledge to real life situations, especially such that were not play-acted during the programme. Measurements of the stability of the effect after a certain time when comparing the results of the Pre-/Post-test can be considered as an even more important criterion for the effectiveness of the programme. However, even in this regard there is no consensus on when a post-test could most realistically reflect the effect of the training (e.g., Hinsch and Pfingsten (1998) cites measurements at 3, 6, and 12 months; Beigi and Shirmohammadi (2010) performed measurements at 2 weeks; Kotsou et al. (2011) measured the change after 1 month and 1 year; Nelis et al. (2011) did that immediately after programme implementation and after 6 months; Slaski and Cartwright (2003) conducted measurements after 6 months, etc.). It is obvious that the evaluation showing the sustainability of the positive effect after 1 year prove the quality of the programme much more than the one taken immediately after the implementation of the programme: long-term assessment is essential to assess the sustained learning transfer and the acquisition of EI competencies; any results that occur shortly after an intervention may be due to the participant's increased knowledge of EI from the intervention, which may not translate into abilities or behaviours that would last long-term (Kotsou et al., 2018). However, taking measurements after a longer period of time is quite complicated, as it involves the consent of the programme's participants to continued cooperation.

The design of emotional intelligence programme for decreasing consumer materialism. The analysis of the problematics of the EI programme design provided guidelines for the foundation of the programme that could be used for consumer materialism issues. First, this programme is built on scientific theory, as it enables the selection of the appropriate intervention techniques and increases the likelihood of programme effectiveness. Secondly, due to the restrictions brought about by the global pandemic, face-to-face training should be given up and an online contact method should be chosen instead – 3 long-distance trainings of 2 hours each. Third, the format should be engaging, and this influences the choice of the training methods: discussion, examples, paired exercises, emotions diaries, readings, reflection and feedback. Some of the tasks in the programme are linked to the practical application of the acquired knowledge in real life so that to turn the knowledge into skills (in the form of self-assigned tasks). Fourth, the assessment of the change in EI should be performed immediately after the programme and three months later according to the overall EI indicator and the individual components. Thus, the curriculum established objective criteria to assess the change in the level of emotional intelligence of the personality after the end of the programme.

Below we list some essential activities and tasks of our three-part (three-session) programme. The aim of the *first session* was to develop the participants' ability to accurately identify their own and others' emotions at a particular moment and to understand their goals, motives, incentives to act; and to teach to analyse and adequately decode nonverbal and verbal signs. The session started with the coach's presentation and introductions by all the group participants, a brief description of the concept of EI, a presentation of the goals of the EI curriculum and the first session identifying the participants' expectations, and a discussion of the rules in the working group. The first task of the session was aimed at expanding one's vocabulary of emotions, i.e., the ability to identify emotions. The participants were asked to write down columns of as many words as possible that reflect positive and negative emotions. Studies show that a rich emotional vocabulary can mitigate the effects of negative emotions, which is especially important in regulating emotions. Knowing the words that describe emotions helps to express one's emotions and to recognise the emotions of others better. In turn, it improves the well-being and relationships with other people. After the exercise, the participants reflected on the expanded vocabulary and compare the number of words in the columns. An effort was made to involve all the participants in the discussion.

The following task was aimed at testing the participants' ability to identify emotions. The group was shown portraits reflecting various emotions (see examples in Picture 1).



Picture 1. Portraits reflecting various emotions
 Source: authors

The participants were asked to observe and individually decide what emotions were reflected in the photographs. After the task, the group discussed which emotions were easy or difficult to recognise; what were the differences between recognising negative and positive emotions; and what made it easier to recognise emotions.

After completing these and other similar tasks, the participants were given homework – a compulsory task of *Self-Reflection of Emotional Intelligence* for a self-assessment of the participants' emotional abilities, and an optional task of *Coloured Emotions*. The latter exercise was designed to promote a clearer understanding of one's emotions by colouring a mandala. Mandala drawing and colouring is a form of art therapy which combines elements of meditation. Through colouring, a person diverts his/her thoughts and feelings from the dominating negative aspects, which helps to more clearly understand emotions experienced in certain situations.

The goal of the **second session** was to help develop the ability to use the acquired information about one's emotions (especially the negative ones) and to adjust one's emotional reactions to oneself, different situations and other people accordingly. The session commenced with a reflection on the first session, discussing the homework, and identifying the purpose of the second session. The first exercise, *Vocabulary of Emotions*, was aimed at creating a personal map of feelings to help reveal the thoughts which cause emotions. This exercise helped to identify the roots of poor well-being. Thoughts that cause anger, frustration, resentment, guilt, shame, and so on were identified. The influence of thoughts on behaviour was then discussed based on the ABC model (A – Activating event, B – Belief, C – Consequences). Other tasks in the second session, for example, *Dialogue with Emotion*, *Zoom Out*, *Eraser*, and so on, also focused on negative emotion mitigation. The final task *Rain of Positive Emotional Thoughts* was designed to generate positive emotions that a person experiences infrequently or insufficiently in everyday life. At the end of the training, the task *Determining Needs According to Emotions* was assigned as homework. This exercise aimed to help understand that emotions are useful because they contain valuable information about oneself. This exercise explained why it is important to listen to emotions instead of suppressing them. In addition, the task can help change a person's attitude towards negative emotions.

The third and final session aimed to strengthen the newly formed emotional competencies in the group by modelling various situations. It started with a reflection on the second session, discussing the homework and identifying the purpose of the final meeting. Before completing the practical tasks, the participants were introduced to the technique of cognitive change, according to which the participants would continue to work after completing each task. Changes in an individual's cognitive level affect the recognition of emotions and the choice of the behaviour pattern. Therefore, in addition to the tasks of developing emotional skills, the session also included self-regulation training. Self-regulation involved three stages: 1. Self-awareness: each participant commented on their behaviour after the role play. 2. Self-esteem: the participants compared their behaviour to a given standard (e.g., the ideal behaviour). If the standard was too high for a participant, the coach adjusted the criteria of the standard. 3. Self-reinforcement: after the self-assessment, the participant self-reinforced (was satisfied, felt good) or punished themselves (suffered, was dissatisfied with themselves). The goal was to keep self-reinforcement separate from the environment, as this is important in EI education. That was done through self-awareness, self-esteem and self-reinforcement while performing the tasks. The third session tasks included *Visualisation of Behavioural Tendencies*, *Chair of the Wise Men*, *Hot Buttons* and others, focused on finding and establishing effective coping strategies when faced with strong emotional situations. At the end of the meeting, the coach gave an overview of the work of the group.

Conclusions

Analysis of the scientific literature and emotional intelligence education programmes has revealed the approach of researchers that emotional intelligence can only be developed through effective, evidence-based programmes. While developing EI, various skills are improved – understanding, recognising emotions, their regulation, etc. The idea of the possibility of developing emotional intelligence is supported by the authors who adhere to both the trait and mixed theoretical approaches, but research shows that programmes based on the theoretical approach to emotional intelligence skills are more effective than the above mentioned trait and mixed types.

The number of emotional intelligence intervention programmes in the psychological practice has increased significantly in the recent years. The curricula vary widely in their theoretical and methodological validity, objectives, duration, context in which they are applied, and so on. However, some emotional intelligence training programmes are not evidence-based, their effectiveness is not empirically proven, and it is dangerous to trust their results, and to prove their effectiveness and usefulness.

The analysis indicated that interventions aimed at developing emotional intelligence cause positive changes not only for their target points but also for other psychological constructs. It has been found that developing emotional intelligence increases life satisfaction, improves self-esteem, relieves depressive symptoms, reduces alcohol consumption, and so on.

Consequently, emotional intelligence is also developed to overcome certain risk factors or difficulties. It is one of the most important protective measures for a person ensuring his/her mental resilience as well as good mental health, and it can act as a protective factor in reducing a person's materialism. In addition, for EI educational interventions to be effective and reduce consumer materialism, they must meet a number of methodological requirements detailed in this article.

References

- Bar-On, R. (1997). The Emotional Intelligence Inventory (EQ-i): Technical manual. *Multi-Health Systems*. <https://artieisaac.com/wp-content/uploads/2020/02/EQ-i-2-PIS-web.pdf>
- Bar-On, R., Handley, R., & Fund, S. (2006). The impact of emotional intelligence on performance. *Linking emotional intelligence and performance at work: Current research evidence with individuals and groups*. Taylor and Francis, 3-19.
- Beigi, M. & Shirmohammadi, M. (2010). Training Employees of a Public Iranian Bank on Emotional Intelligence Competencies. *Journal of European Industrial Training*, 34(3), 211-225. <https://doi.org/10.1108/03090591011031728>
- Belk, R. W. (1984). Three scales to measure constructs related to materialism: Reliability, validity, and relationships to measures of happiness, in NA - Advances in Consumer Research. Volume 11, ed. Thomas C. Kinnear, Provo, UT: Association for Consumer Research, 291-297.
- Belk, R. W. (1985). Materialism: Trait aspects of living in the material world? *Journal of Consumer Research*, 12(3), 265-280. <https://doi.org/10.1086/208515>
- Belk, R. W. (1995). ACR Fellow's Address Awards, Rewards, Prizes, and Punishments. ACR North American Advances. <https://www.acrwebsite.org/volumes/7660/volumes/v22/NA-22/full>
- Benzo, R. P., Abascal-Bolado, B., & Dulohery, M. M. (2016). Self-management and quality of life in chronic obstructive pulmonary disease (COPD): The mediating effects of positive affect. *Patient Education and Counseling*, 99(4), 617-623. <https://doi.org/10.1016/j.pec.2015.10.031>
- Chaplin, L. N., & John, D. R. (2010). Interpersonal influences on adolescent materialism: A new look at the role of parents and peers. *Journal of Consumer Psychology*, 20(2), 176-184. <https://doi.org/10.1016/j.jcps.2010.02.002>
- Clarke, N. (2010). Developing emotional intelligence abilities through team-based learning. *Human Resource Development Quarterly*, 21, 119-138. <https://doi.org/10.1002/hrdq.20036>
- Dittmar, H., & Isham, A. (2022). Materialistic value orientation and wellbeing. *Current Opinion in Psychology*, 101337. <https://doi.org/10.1016/j.copsyc.2022.101337>
- Donnelly, G. E., Ksendzova, M., Howell, R. T., Vohs, K. D., & Baumeister, R. F. (2016). Buying to blunt negative feelings: Materialistic escape from the self. *Review of General Psychology*, 20(3), 272-316. <https://doi.org/10.1037/gpr0000078>
- Donnelly, G. E., Ksendzova, M., Howell, R. T., Vohs, K. D., & Baumeister, R. F. (2016). Buying to blunt negative feelings: Materialistic escape from the self. *Review of General Psychology*, 20(3), 272-316. <https://doi.org/10.1037/gpr0000078>
- Ekman, P., Friesen, W. V., & Ellsworth, P. (2013). *Emotion in the human face: Guidelines for research and an integration of findings* (Vol. 11). Elsevier.
- Ermer, E., Kahn, R. E., Salovey, P., & Kiehl, K. A. (2012). Emotional intelligence in incarcerated men with psychopathic traits. *Journal of Personality and Social Psychology*, 103(1), 194. <https://doi.org/10.1037/a0027328>
- Estévez, A., Jauregui, P., Granero, R., Munguía, L., López-González, H., Macía, L., ... & Jiménez-Murcia, S. (2020). Buying-shopping disorder, emotion dysregulation, coping and materialism: a comparative approach with gambling patients and young people and adolescents. *International Journal of Psychiatry in Clinical Practice*, 24(4), 407-415. <https://doi.org/10.1080/13651501.2020.1780616>

- Faltas, I. (2017). Three models of emotional intelligence. *Public Policy & Administration* article accessible online at <https://www.researchgate.net/publication/314213508>
- Fiori M., & Vesely Maillefer A. (2017). Emotional Intelligence as an Ability: Theory, Challenges, and New Directions. *Emotional Intelligence in Education* https://doi.org/10.1007/978-3-319-90633-1_2
- Fitzmaurice, J., & Comegys, C. (2006). Materialism and social consumption. *Journal of Marketing Theory and Practice*, 14(4), 287-299. <https://doi.org/10.2753/MTP1069-6679140403>
- Furchheim, P., Martin, C., & Morhart, F. (2020). Being green in a materialistic world: Consequences for subjective well-being. *Psychology & Marketing*, 37(1), 114-130. <https://doi.org/10.1002/mar.21285>
- García-Sancho, E., Salguero, J. M., & Fernández-Berrocal, P. (2014). Relationship between emotional intelligence and aggression: A systematic review. *Aggression and Violent Behavior*, 19(5), 584-591. <https://doi.org/10.1016/j.avb.2014.07.007>
- Gilovich, T., Kumar, A., & Jampol, L. (2015). A wonderful life: Experiential consumption and the pursuit of happiness. *Journal of Consumer Psychology*, 25(1), 152-165. <https://doi.org/10.1016/j.jcps.2014.08.004>
- Grant, A. M. (2007). Enhancing coaching skills and emotional intelligence through training. *Industrial and Commercial Training*, 39(5), 257-266. <https://doi.org/10.1108/00197850710761945>
- Henley, M., & Long, N. J. (1999). Teaching emotional intelligence to impulsive-aggressive youth. *Reclaiming Children and Youth*, 7(4), 224.
- Hinsch R. & Pfungsten U. (1998). Gruppentraining sozialer Kompetenzen (GSK). Munchen: Belz.
- Hodzic, S., Scharfen, J., Ripoll, P., Holling, H., & Zenasni, F. (2017). How Efficient are Emotional Intelligence Trainings: A Meta-analysis. A manuscript version (pre-print) of a paper accepted for publication in the *Emotion Review*. <https://doi.org/10.1177/1754073917708613>
- Hou, X., & Shao, X. (2016). Theory of Emotional Intelligence Development both at Home and Abroad. In 2016 4th International Education, Economics, Social Science, Arts, Sports and Management Engineering Conference (IEESASM 2016) (pp. 31-36). Atlantis Press. <https://doi.org/10.2991/ieesasm-16.2016.7>
- Kemp, E., & Kopp, S. W. (2011). Emotion regulation consumption: When feeling better is the aim. *Journal of Consumer Behaviour*, 10(1), 1-7. <https://doi.org/10.1002/cb.341>
- Kidwell, B., Hasford, J., & Hardesty, D. M. (2015). Emotional ability training and mindful eating. *Journal of Marketing Research*, 52(1), 105-119. <https://doi.org/10.1509/jmr.13.0188>
- Kotsou, I., Mikolajczak, M., Heeren, A., & Grégoire, J. (2018). Improving Emotional Intelligence: A Systematic Review of Existing Work and Future Challenges. *Emotion Review*, 1-15. <https://doi.org/10.1177/1754073917735902>
- Kotsou, I., Nelis, D., Grégoire, J., & Mikolajczak, M. (2011). Emotional plasticity: Conditions and effects of improving emotional competence in adulthood. *Journal of Applied Psychology*, 96, 827-839. <https://doi.org/10.1037/a0023047>
- Kruml, S. M. & Yockey, M. D. (2011). Developing the emotionally intelligent leader: *Instructional Issues*. <https://doi.org/10.1177%2F1548051810372220>
- Mandel, N., Rucker, D. D., Levav, J., & Galinsky, A. D. (2017). The compensatory consumer behavior model: How self-discrepancies drive consumer behavior. *Journal of Consumer Psychology*, 27(1), 133-146. <https://doi.org/10.1016/j.jcps.2016.05.003>
- Manhas, S., & Sharma, A. (2015). Relationship between quality of life and emotional intelligence of the sample youth. *International*

Journal of Current Research and Review, 7(2), 1-5. https://ijcrr.com/uploads/646_pdf.pdf

Manju. (2016). Emotional Intelligence as Predictor of Mental Health among Chronic Disease Group. *The International Journal of Indian Psychology*, 3(4), 43-49. <https://doi.org/10.25215/0304.043>

Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences*, 49(6), 554-564. <https://doi.org/10.1016/j.paid.2010.05.029>

Matthews, H., Turner, A., Williamson, I., & Clyne, W. (2018). 'It's a silver lining': A template analysis of satisfaction and quality of life following post-mastectomy breast reconstruction. *British Journal of Health Psychology*, 23(2), 455-475. <https://doi.org/10.1111/bjhp.12299>

Mattingly, V., & Kraiger, K. (2019). Can emotional intelligence be trained? A metaanalytical investigation. *Human Resource Management Review*, 29(2), 140-155. <https://doi.org/10.1016/j.hrmr.2018.03.002>

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review*, 8(4) 290-300. <https://doi.org/10.1177/1754073916639667>

Mayer, J. D., Salovey, P., & Caruso, D. R. (2004). Authors' responses: A further consideration of the issues of emotional intelligence. *Psychological Inquiry*, 15(3), 249-255. https://doi.org/10.1207/s15327965pli1503_05

Mayer, J. D., Salovey, P., & Caruso, D. R. (2004). Target articles: Emotional Intelligence: Theory, Findings, and Implications. *Psychological Inquiry*, 15(3), 197-215. https://doi.org/10.1207/s15327965pli1503_02

Mayer, J. D., Salovey, P., & Caruso, D. R. (2008). Emotional intelligence: New ability or eclectic traits? *American Psychologist*, 63(6), 503. <https://doi.org/10.1037/0003-066X.63.6.503>

McNulty, J. P., Mackay, S. J., Lewis, S. J., Lane, S., & White, P. (2016). An international study of emotional intelligence in first year radiography students: The relationship to age, gender and culture. *Radiography*, 22(2), 171-176. <https://doi.org/10.1016/j.radi.2015.10.008>

Megreya, A. M. (2013). Criminal thinking styles and emotional intelligence in Egyptian offenders. *Criminal Behaviour and Mental Health*, 23(1), 56-71. <https://doi.org/10.1002/cbm.v23.1>

Mikolajczak, M., Brasseur, S., & Fantini-Hauwel, C. (2014). Measuring intrapersonal and interpersonal EQ: The short profile of emotional competence (S-PEC). *Personality and Individual Differences*, 65, 42-46. <https://doi.org/10.1016/j.paid.2014.01.023>

Mikolajczak, M., Nelis, D., Hansenne, M., & Quoidbach, J. (2008). If you can regulate sadness, you can probably regulate shame: Associations between trait emotional intelligence, emotion regulation and coping efficiency across discrete emotions. *Personality and Individual Differences*, 44(6), 1356-1368. <https://doi.org/10.1016/j.paid.2007.12.004>

Moschis, G. P. (2007). Life course perspectives on consumer behavior. *Journal of the Academy of Marketing Science*, 35(2), 295-307. <https://doi.org/10.1007/s11747-007-0027-3>

Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing Emotional Competence Improves Psychological and Physical Well-Being, Social Relationships, and Employability. *Emotion*, 11, 354-366. <https://doi.org/10.1037/a0021554>

Ozimek, P., & Förster, J. (2017). The impact of self-regulatory states and traits on Facebook use: Priming materialism and social comparisons. *Computers in Human Behavior*, 71, 418-427. <https://doi.org/10.1016/j.chb.2017.01.056>

Ozimek, P., Bierhoff, H. W., & Hamm, K. M. (2020). How we use Facebook to achieve our goals: a priming study regarding emotion regulation, social comparison orientation, and unaccomplished goals. *Current Psychology*, 41, 1-14. <https://doi.org/10.1007/s12144-020-00859-1>

Papadogiannis, P. K., Logan, D., & Sitarenios, G. (2009). An ability model of emotional intelligence: A rationale, description, and application of the Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT). *Assessing Emotional Intelligence*, 43-65. https://doi.org/10.1007/978-0-387-88370-0_3

Petrides, K. V. (2011). Ability and trait emotional intelligence. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *The Wiley-Blackwell handbook of individual differences* (pp. 656-678). Wiley Blackwell. <https://doi.org/10.1002/9781444343120.ch25>

Petrides, K. V., & Furnham, A. (2003). Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality*, 17(1), 39-57. <https://doi.org/10.1002/per.466>

Petrides, K. V., Mikolajczak, M., Mavroveli, S., Sanchez-Ruiz, M. J., Furnham, A., & Pérez-González, J. C. (2016). Developments in trait emotional intelligence research. *Emotion Review*, 8(4), 335-341. <https://doi.org/10.1177/1754073916650493>

Petrides, K. V., Pita, R., & Kokkinaki, F. (2007). The location of trait emotional intelligence in personality factor space. *British Journal of Psychology*, 98(2), 273-289. <https://doi.org/10.1348/000712606X120618>

Pool, L. D. & Qualte, P. (2018). *An Introduction to Emotional Intelligence*. Wiley-Blackwell.

Richins, M. L. (2004). The material values scale: Measurement properties and development of a short form. *Journal of Consumer Research*, 31(1), 209-219. <https://doi.org/10.1086/383436>

Richins, M. L. (2004). The material values scale: Measurement properties and development of a short form. *Journal of Consumer Research*, 31(1), 209-219. <https://doi.org/10.1086/383436>

Richins, M. L. (2017). Materialism pathways: The processes that create and perpetuate materialism. *Journal of Consumer Psychology*, 27(4), 480-499. <https://doi.org/10.1016/j.jcps.2017.07.006>

Richins, M. L., & Dawson, S. (1992). A consumer values orientation for materialism and its measurement: Scale development and validation. *Journal of Consumer Research*, 19(3), 303-316. <https://doi.org/10.1086/209304>

Richins, M., & Fournier, S. (1991). Some theoretical and popular notions concerning materialism. *Journal of Social Behavior and Personality*, 6(6), 403-414.

Rindfleisch, A., Burroughs, J. E., & Denton, F. (1997). Family structure, materialism, and compulsive consumption. *Journal of Consumer Research*, 23(4), 312-325. <https://doi.org/10.1086/209486>

Rindfleisch, A., Burroughs, J. E., & Wong, N. (2009). The safety of objects: Materialism, existential insecurity, and brand connection. *Journal of Consumer Research*, 36(1), 1-16. <https://doi.org/10.1086/595718>

Rivers, S. E., Brackett, M. A., Salovey, P., & Mayer, J. D. (2007). Measuring emotional intelligence as a set of mental abilities. In G. Matthews, M. Zeidner, & R. D. Roberts (Eds.), *The science of emotional intelligence: Knowns and unknowns* (pp. 230-257). Oxford University Press. <https://psycnet.apa.org/record/2007-12449-009>

Roberts, J. A., Manolis, C., & Tanner Jr, J. F. (2003). Family structure, materialism, and compulsive buying: A reinquiry and extension. *Journal of the Academy of Marketing Science*, 31(3), 300-311. <https://doi.org/10.1177/0092070303031003007>

Ruiz-Aranda, D., Castillo, R., Salquero, J. M., Cabello, R., Fernandez-Berrocal, P., & Balluerka, N. (2012). Short and midterm effects of emotional intelligence training on adolescent mental health. *Journal of Adolescent Health*, 51, 462-467. <https://doi.org/10.1016/j.jadohealth.2012.02.003>

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, 9(3), 185-211. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>

- Salovey, P., Bedell, B. T., Detweiler, J. B., & Mayer, J. D. (1999). Coping intelligently. Coping: The psychology of what works, 141-164.
- Shatali, D. A. (2011). Effect of emotional intelligence on leadership behaviour: a case study on UNRWA-Gaza Health Centers. Islamic University-Gaza Dean of Postgraduate Studies Faculty of Commerce Business Administration, 46-47
- Slaski, M., & Cartwright, S. (2003). Emotional intelligence training and its implications for stress, health and performance. *Stress and Health: Journal of the International Society for the Investigation of Stress*, 19(4), 233-239. <https://doi.org/10.1002/smi.979>
- Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*, 86(2), 320. <https://doi.org/10.1037/0022-3514.86.2.320>
- Weaver, S. T., Moschis, G. P., & Davis, T. (2011). Antecedents of materialism and compulsive buying: A life course study in Australia. *Australasian Marketing Journal*, 19(4), 247-256. <https://doi.org/10.1016/j.ausmj.2011.04.007>
- Zeidner, M., Roberts, R.D., & Matthews, G. (2002) Can Emotional Intelligence Be Schooled? A Critical Review. *Educational Psychologist*, 37(4), 215-231. https://doi.org/10.1207/S15326985EP3704_2
- Zijlmans, L. J., Embregts, P. J., Gerits, L., Bosman, A. M., & Derksen, J. J. (2011). Training emotional intelligence related to treatment skills of staff working with clients with intellectual disabilities and challenging behaviour. *Journal of Intellectual Disability Research*, 55, 219-230. <https://doi.org/10.1111/j.1365-2788.2010.01367.x>
- Zysberg, L. (2018). Emotional intelligence, anxiety, and emotional eating: A deeper insight into a recently reported association? *Eating Behaviors*, 29, 128-131. <https://doi.org/10.1016/j.eatbeh.2018.04.001>

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ON DISINFORMATION AS A HYBRID THREAT SPREAD THROUGH SOCIAL NETWORKS*

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Abstract. Disinformation today poses a serious hybrid threat, the severity of which is exacerbated by the dynamic development and massive use of social networks. The development of the Internet, connectivity and information and communication technologies has caused that information are disseminated 24 hours a day, 7 days a week. In the history of mankind, it has never been easier to receive, search and spread. However, this progress has many positives and many negatives. In the avalanche of information that comes to us on a daily basis, it is undoubtedly very difficult to distinguish which information is true, objective, based on real events and, conversely, which information is misleading, distorted or completely fabricated, created in order to obtain economic, political or other profit. Many non-state actors, but also, unfortunately, state actors, have begun to use this fact to disseminate false information to advance their financial, political, or power interests. Information, resp. disinformation has become a weapon and social networks, which are an excellent tool for spreading disinformation in today's modern information society, have become a battleground for hostile hybrid activities performed on the target audience in the so called Gray zone between peace and war.

Keywords: Disinformation; sustainability; social networks; hybrid threats; Internet; technologies

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1. Introduction

In the first two decades of the new millennium, the way of life and functioning of all areas of contemporary human society, from political, through social, economic, technological to security, has changed significantly in connection with the spread and increasing use of information and communication technologies. With the

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constantly increasing “internetization” and “informatization” of society, rapid development, and massive use not only of technologies, but also of various information and communication systems, means and tools and the related dynamic advent of new media, a new range of options how to search, receive, create, and spread information has emerged. At the same time, however, a new, relatively wide range of opportunities have emerged, such as modern technology, tools, or the media, to misuse and disseminate misleading, false information through them in order to influence people's actions and make political, economic or other profits. The misuse of modern technologies, means, and media and the dissemination of such information thus poses a very dangerous threat, which may be part of hybrid threats, resp. part of a hybrid war.

The primary goal of the authors, using relevant methods of qualitative theoretical interdisciplinary scientific research (especially analytical-synthetic methods, qualitative, content and comparative analysis, methods of theoretical generalization of knowledge, as well as methods of document study and other research methods), is to contribute to a scientific and professional discussion on the issues of the dissemination of disinformation, as a tool for hybrid warfare and hybrid threats and the roles that social networks play.

2. Theoretical basis for the study of hybrid warfare and hybrid threats

The terms hybrid threats and hybrid warfare are the subject of several publications, studies, or articles in which foreign or domestic authors deal with hybrid threats or hybrid warfare in general or focus their individual aspects in their research. For this reason, it is possible to come across several definitions. One of them states *"the term hybrid threat refers to an activity carried out by state or non-state actors whose purpose is to undermine or damage a target by a combination of open and covert military and non-military means"* (Hybrid CoE, 2022:9).

Glenn defines hybrid threats as *"an enemy who simultaneously and adaptably uses various combinations of political, economic, social and information means as well as conventional, irregular, catastrophic, terrorist and subversive criminal methods of fighting"* (Glenn, 2009:2). According to Hoffman, *"hybrid threats include a range of conventional and unconventional ways of fighting and irregular tactics, as well as criminal and terrorist acts, which include unrestricted violence, coercion, social unrest and disruption"* (Hoffman, 2007:14).

Hybrid warfare can be understood as *"a wide range of hostile activities in which the role of the military component is rather small, as political, informational, economic and psychological influence becomes the main means of waging war. Such methods help to achieve significant results: the territorial, political and economic losses of the enemy, the chaos and disruption of the system of exercise of state power and the weakening of the morale of society"* (Manko & Mikhieiev, 2018). Hybrid warfare can also be understood as *"a set of lethal and non-lethal means that a state or non-state actor uses to assert his interests against the will of another actor. At the same time, hybrid warfare combines several methods of fighting: classic military operations, operations in cyberspace or cyber-attacks, espionage, dissemination of false information in order to influence the public opinion of the enemy, etc."* (Danyk et al., 2017:12).

Another definition states, *"A hybrid war is an armed conflict waged by a combination of non-military and military means in order to force the enemy to take steps that it would not take on its own. The state is at least one side of the conflict. Non-military means in the form of information and psychological operations, propaganda, economic sanctions, embargoes, criminal activities, terrorist activities and other subversive activities of a similar nature play a key role in achieving the objectives of the war. These activities are conducted against the whole society, especially against its political structures, state administration and self-government bodies, the state economy, the morality of the population and the armed forces"* (Kříž et al., 2015:8).

It can also be said that *"in the case of hybrid warfare, it is a way of waging a modern armed conflict. A conflict that does not begin with a shot and not with a declaration of war at all. The conflict that the attacked company*

initially does not know has been attacked and is at war. It is a dynamic combination of military, political, diplomatic, economic, humanitarian, diverse, terrorist, and criminal activities carried out by state and non-state actors, regular and irregular formations, using propaganda and the implementation of information, cyber and psychological operations" (Ivančík, 2016:148)

In connection with the hybrid war, the information war is mentioned quite often. In her case, it is a general term encompassing several types of combat management, which have certain characteristics in common. As the name implies, the emphasis is on the information that is taken in this type of conflict (war) as a key element necessary to achieve victory. Different authors explain the concept of information warfare in different ways, and therefore, as in the case of hybrid warfare, in the case of information warfare, it is possible to meet with several definitions in the professional literature (Ivančík, 2021).

One of the most general and probably also the simplest and at the same time most frequently used definitions characterizes the information war as *"the struggle for control over the enemy's information activities and the effort to save their own"* (Bayer, 2006:36). Another, more comprehensive definition says: *"Information warfare is a wide range of activities whose tool or goal is information and information technology. These activities include, for example, the dissemination of disinformation, psychological operations, and cyber-attacks – disruption of communication networks and intrusion into them in order to obtain strategic information. These activities can take place in peacetime without having to prevent any conflict at all. The main goal of the information war is not to weaken the enemy from the outside, but to weaken, disorient and destabilize him from the inside"* (Halpin et al., 2006:79).

The information war is also understood as an ideological influence of the adversary, while a wide range of tools are used for this purpose, such as disinformation or propaganda, or diplomacy, military coercion, etc. It can therefore be characterized as a *"concept aimed at gaining information dominance"* (Ivančík, 2021:140). Information dominance is defined as *"the ability to gather, process, and disseminate information while exploiting or suppressing the adversary's efforts to do the same"* (US DoD, 2000:26). It is clear from the above definitions that information warfare is a narrower term than hybrid warfare.

3. Disinformation as a hybrid threat phenomenon

Disinformation, as follows from the above, is an integral part of hybrid threats, as the purpose of their use in hybrid war is to act on the enemy to weaken, disorient, destabilize, disrupt its political structures, the functioning of state and non-state bodies, its security, defence, economy, the ability to respond to threats, and to influence public opinion and morality of the population.

In close connection with the concept of disinformation, it is necessary to take a closer look at other concepts such as false news and propaganda. These two terms are quite often confused or used as synonyms in the public debate. Some authors consider false reports to be all reports that are not based on facts but are nevertheless published as truthful reports (Allcott & Gentzkow, 2017) or reports that deny the principles of quality and objective journalism (Baym, 2005). Other authors, in turn, distinguish between media that spread false news and so-called political media that regulate news in such a way that they try to set the political agenda of a related political party or movement (Vargo et al., 2017).

Silverman, on the other hand, claims that fake news is news that is not based on truth and is created mainly for financial gain. Motivation to make a profit is crucial, because in the absence of a financial motive, it is according to him propaganda (Silverman, 2016). Propaganda can then be characterized as the dissemination of false reports,

which are not produced for the purpose of economic profit but are information that is to force them to think or act in a certain way. It is mostly associated with political, religious, or ideological goals.

The term disinformation covers both groups of false reports, whether it is the spread of propaganda or false reports published in order to attract the readers' attention and thus increase the profits from the sale of advertising (Andrassy & Grega, 2015; Korauš & Kelemen, 2018). The starting point is the definition of the concept of disinformation, prepared and presented by an independent group of experts for false reports and online disinformation. According to this expert group: *"Disinformation is all forms of false, fraudulent, untrue and misleading reports that are created, presented and disseminated with the intent to cause public damage or profit"* (European Commission, 2018a:10). However, this definition of the term does not include unintentional errors of information or political satire.

A similar definition can be found in the Short Dictionary of Hybrid Threats (2022:11) of the National Security Office of the Slovak Republic: *"Disinformation is verifiably false, misleading or manipulative information that is intentionally created, presented and disseminated with the unequivocal intent to deceive or mislead, cause harm or secure any profit (for example, economic or political). Disinformation often contains an element that is clearly true, which adds to its credibility and can thus complicate its detection. Disinformation does not include unintentional errors in news, satire, and parody, nor one-sided reports and comments, which are thus clearly marked."*

Other definitions found in the relevant dictionaries are also used quite often. For example, in the Oxford Dictionary (2021), disinformation is briefly defined as *"intentionally providing false information"*, in the Cambridge Dictionary (2021) as *"false information disseminated to deceive people"*, and in the MacMillan Dictionary (2021) as *"false information to persuade people to believe something that actually is not true"*.

Although information about disinformation appears in some media as a new security threat, this is not the case. Disinformation is not an achievement of the 21st century or today's information society. As early as the 6th century BC, Chinese general and thinker Sun Tzu[†] wrote in his Art of War about the strategy of indirect combat using lies and false, fraudulent reports. Textbook examples of the use of disinformation in practice can also be found in ancient Greece from the Greco-Persian wars, when, for example, the Athenian duke Temistocles defeated the Persian king Xerxes in some battles with the help of false messages sent from seemingly escaped slaves.

Another good example of the use of disinformation from ancient times can be the strategy used by the Mongol conqueror Genghis Khan. Before the attack, he sent spies into enemy territory, who infiltrated the population and spread false reports about the approaching huge and cruel Mongol army. In this way, he tried to weaken and demoralize the enemy in advance and gain an advantage. As confirmed, this tactic was successful as he was able to win multiple battles in which the enemy was outnumbered. Of course, the creation and spread of various disinformation has also been used successfully in other, well-known, or lesser-known wars and armed conflicts, including the two largest - in World War I and World War II.

What has changed in the first two decades of the third millennium is the means used to spread disinformation. With the development and increasing availability of the Internet and the closely related mass use of social networks, it is much easier to create and disseminate information that is tailored to individual users, as well as narratives in which events, facts and their interpretation are subject to a certain purpose (political, ideological,

[†] Sun Tzu (in the 6th century BC) was a Chinese general, philosopher, strategist, and tactician whose work The Art of War had a great influence on Eastern and Western military thinking, and many famous dukes were inspired by this work. He is still studied at many military academies. The general, also known as Master Sun, focuses on alternatives to battle, such as robbery, delay, the use of spies, lies and false, fraudulent information, or the creation and maintenance of alliances.

religious, etc.), and are served to the public. Social networks have created a new space in which people form opinions about what is happening around them – about various events, personalities, processes, policies, etc. At the same time, it is a space in which it is relatively easy to give people various distorted, fabricated, untrue information or information taken out of context, and thus influence them in the desired direction.

The spread of disinformation is considered a hybrid security threat, mainly because it undermines citizens' trust in democratic institutions and processes and spreads a hateful ideology. Several authors agree that a large number of disinformation and disinformation websites present and spread especially right-wing ideology. We could observe this phenomenon, for example, in elections in several European countries, when disinformation sites in various countries supported far-right candidates and spread disinformation about their opponents, migrants, etc. In the Netherlands, it was Geert Wilders, in France Marine Le Pen, and in Germany, it was representatives of the Alternative for Germany party. From the point of view of the spread of violent propaganda, the dominant actor is primarily the Islamic State, which is extremely effective in spreading narratives on social networks (Prior, 2017).

An example of a state actor who uses disinformation extensively for his political purposes is Russia, for example in spreading disinformation in the context of the conflict in Ukraine (Danyk et al., 2017) or in spreading disinformation and propaganda in the Baltic countries and Scandinavia (Aro, 2016). Several mechanisms used by Russian propaganda are also relatively well mapped, either in influencing democratic processes in Western countries or in disseminating disinformation and using paid debates. The spread of Russian propaganda is a problem identified not only in individual European countries, but also at the level of the European Union ("EU") as a whole. According to the EU Strategic Communication Report, Russian propaganda concerns the spread of several meta-narratives in combination with conspiracy theories. According to the report, the underlying meta-narratives vary greatly over time, but the constant is the presentation of the West on the one hand as an aggressive and expansive entity, on the other hand as an entity on the verge of collapse. Russia Today and Sputnik are considered the most significant disseminators of disinformation. Local media networks and friendly think tanks in target countries are also used to spread disinformation (Kovanič, 2017).

Disinformation, as mentioned above, poses a hybrid security threat because it can affect democratic processes in countries. In the United States, several inquiries are still under way to clarify the role played by the spread of disinformation on social media in the 2016 and 2020 presidential elections. There are also reasonable suspicions that some of the UK population who voted to leave the EU did so on the basis of various false information disseminated primarily through social networks. The result of the referendum was close, 52% in favour and 48% against leaving the EU, so it can be assumed that false information played a very important, if not decisive, role. For example, it is proven that, among other politicians, the current Prime Minister Johnson or MEP Farage deceived their own people (TA3, 2017).

In addition, disinformation undermines the credibility of traditional information channels. Today, it is very easy to create a site that looks like a serious news server, but its real goal is to spread disinformation, either for the benefit of advertising or for political, ideological or religious reasons. Such websites often spread various conspiracy theories and do not follow the principles of serious journalism. By presenting themselves as credible media, they undermine people's trust in classic, serious news.

4. Development of disinformation spread

As mentioned above, the spread of disinformation is not a phenomenon that originated in the 21st century. In fact, this phenomenon is practically as old as humanity itself. However, what has changed dramatically is the way disinformation is spread. This is due to the already mentioned progress in the introduction and use of fast internet, the deepening informatization of society, the massive use of information and communication technologies, systems, and tools, and finally the fact that virtually every user has unrestricted access to information 24 hours a

day, 7 days of the week. However, this progress brings with it, in addition to many positives, also several negatives, such as those in the form of receiving and disseminating disinformation

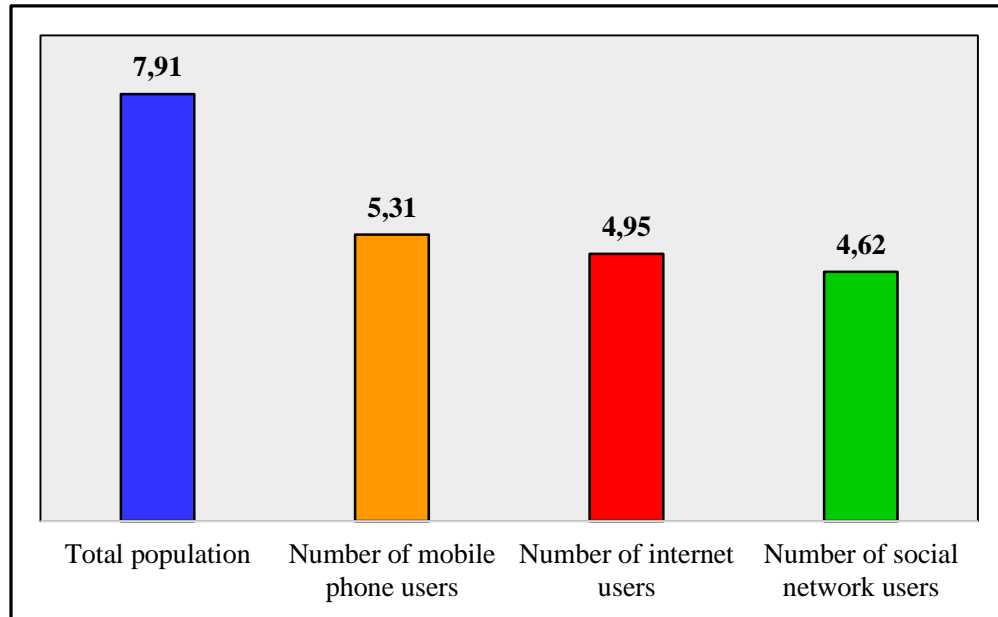


Figure 1. Overview of mobile phone, internet, and social network users in 2022 worldwide (in billions)

Source: DataReportal, 2022

The development of the Internet and the use of social networks, which are an excellent tool for disseminating, have a great deal of credit for the fact that disinformation is considered to be an increasing and more urgent security problem. Social networks bring together huge numbers of people from different parts of the world and allow them to communicate and exchange information with each other. Today, about 5.31 billion people use the mobile phone, representing more than two-thirds (67.1%) of the world's population, about 4.95 billion people use the Internet, more than three-fifths (62.5%) of the world's population, and active users of social networks amount to about 4.62 billion, which represents a share of the total population of the planet at 58.4% (Fig. 1). Up to 95% of their users use social networks via their mobile phones.

The dynamic growth of internet and social network users is evidenced by the fact that the number of internet users worldwide has increased by more than one third (36%) in the last five years. While in 2017 about 3.64 billion people used the Internet, in 2022 it was about 4.95 billion. The growth of social network users is even more dynamic, as it increased by almost two thirds (by 65.6%) in the evaluated years. While in 2017 about 2.79 billion people used social networks, in 2022 it is already about 4.62 billion (Fig. 2). Of these, one user spends an average of 2 hours and 27 minutes a day on social networks and uses an average of 7.5 different social networks per month (DataReportal, 2022).

The world's most popular social network is Facebook, which in January 2022 was used by about 2.91 billion active users, second is YouTube with 2.56 billion active users and third is WhatsApp, which is currently actively used by about two billion people. Other popular social networks that have more than one billion active users include Instagram, WeChat, TikTok and Messenger, and to the social networks with more than half a billion active users belong Douyin, QQ, Sina Weibo, Kuaishou, Snapchat and Telegram boast (Fig. 3).

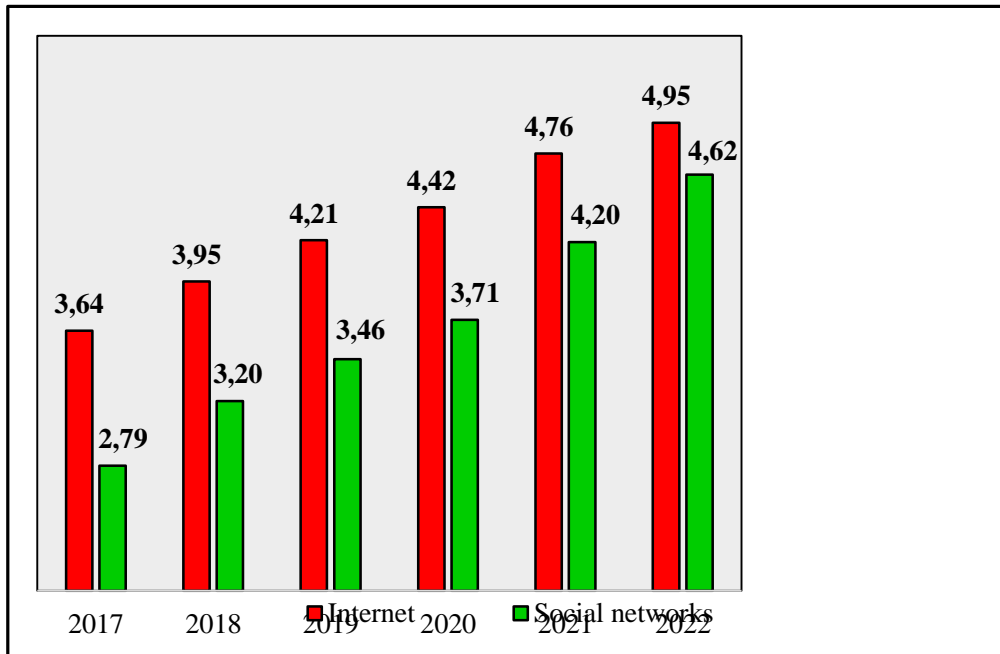


Figure 2. Overview of the growth of Internet and social network users in the years 2017 to 2022 (in billions)

Source: DataReportal, 2022

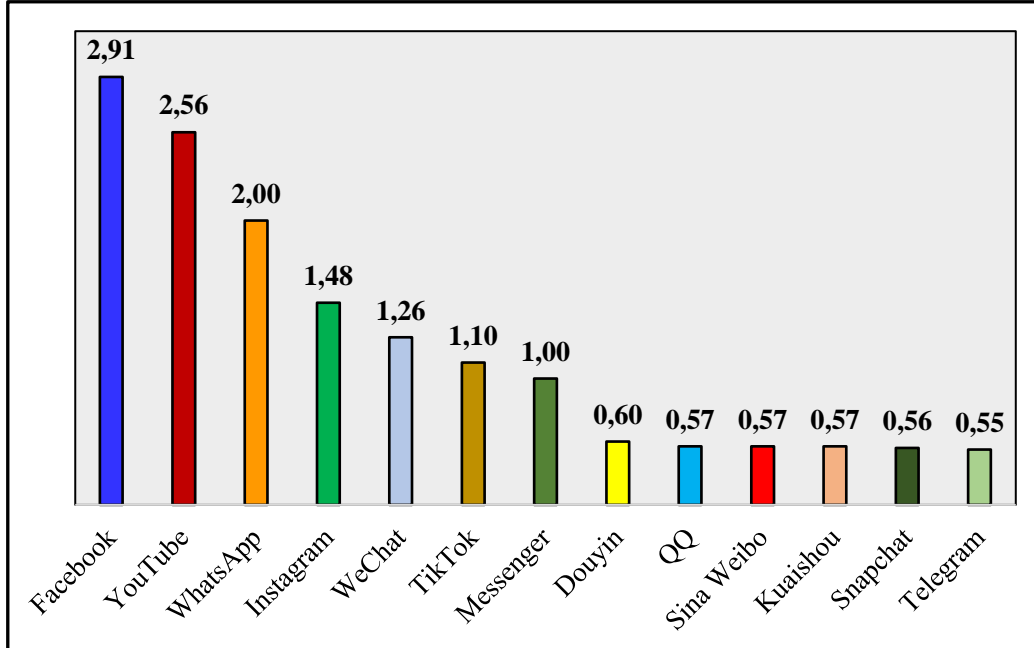


Figure 3. Overview of social networks with the largest number of active users in 2022 (in billions)

Source: DataReportal, 2022

The almost unlimited reach, combined with the high speed of information flow, low costs, and availability 24/7, creates ideal conditions for disinformation to spread virally (Bialy, 2017). Although traditional news media are still the primary source of information for most people, the fact that more and more people use social networks, especially as a source to follow new events in the world and at home, exacerbates the threat posed by the disinformation on social networks. In addition, social networks create social bubbles. This means that people tend to connect on social networks with people with a similar worldview, which in turn creates the so-called closed homophilic groups, where their individual members confirm each other in their opinions (Prier, 2017). As a result, people gradually lose sight of the wider context and think critically about the arguments used in such groups. The problem arises especially when disinformation begins to spread in the groups in question.

All the above factors have made social networks a tool for mobilizing, disseminating various narratives, conducting hybrid operations and, in some cases, even conducting combat operations in the real world. Both state and non-state actors are increasingly using social networks as a tool to influence the behaviour, attitudes, moods, and opinions of their target group. This trend is called the weaponization of social networks, which means that they are turning into a battlefield where the target group is attacked through disinformation (Bialy, 2017).

Social network users are often unaware of the risk involved and have full confidence in the online environment. They believe that when they control the circle of people who have access to their content, they also have control over the information that comes to them. Disinformation is most often spread through two social networks – Facebook and Twitter.

As mentioned above, Facebook is the largest and most popular social network in the world and is therefore the main target of virtually all disinformation campaigns. Unlike Twitter, Facebook is based on much more personal contact between users, because they themselves decide who becomes their friend and thus gain access to their content. Users then usually approach the information that their Facebook contacts disseminate uncritically, and since they consider it trustworthy, they usually do not verify this information further. Another way in which disinformation can reach a Facebook user is through posts published by various Facebook sites.

The user chooses them based on his own decision, usually when:

- the site clearly disseminates disinformation from the beginning, but the user sympathizes with this type of message and shares the site's views,
- the site initially produces neutral content that the user identifies with, decides to follow, but in the next phase the site begins to spread disinformation, in order to influence the attitudes, opinions and values of the user, who did not initially sympathize with this type of information (Biteniece et al., 2017).

The greatest credit for the dissemination of disinformation goes to those contributions which, thanks to the algorithm used, become viral. Facebook basically offers three operations options that can be used to wage a hybrid war:

- targeted collection of personal data of users[‡], which are later used to disseminate disinformation, the content of which is adapted to the user's preferences,
- content production,
- artificial distribution of content (usually done by machines, not real users).

Although Twitter is not as popular as Facebook, it currently has about 436 million active users (DataReportal, 2022), but it is still becoming one of the main targets, especially for political manipulation, as it is widely used

[‡] This was the case with the Cambridge Analytica scandal, which collected personal data from hundreds of thousands of users. Thanks to the data obtained, it was then able to personalize the content of the information she provided to the users. Cambridge Analytica provided data for political campaigns in various countries around the world. There are currently suspicions that this was not an isolated case, and that other state or non-state actors may be operating in this way (The Guardian, 2022).

mainly by Western politicians, traditional media, and world thinkers. With a feature that allows you to track individual topics in the form of threads, it is becoming an increasingly common source of daily news for many people, especially in the United States and Western Europe. Unlike Facebook, Twitter offers less personal contact between individual users. In most cases, users who follow each other's content don't know each other personally, and the content they add to Twitter is less personal than Facebook.

The purpose of Twitter is primarily to publish opinions on individual topics. The length of one post is currently limited to 280 characters,[§] which automatically means that posts have the character of short statements. As the limited number of characters does not allow arguments to be developed and sources to support individual claims, such contributions do not give rise to caution to users; on the contrary, they consider them credible. The so-called trolls^{**} and fake profiles in the form of boots^{††}. The dissemination of disinformation most often takes place in such a way that a number of contributions are automatically generated for one specific topic, which will receive this topic in the so-called trends that are visible to all Twitter users (Biteniece et al., 2017).

5. Tools of disinformation dissemination

Disinformation is spread on social networks in several ways. Among the most used today are the use of:

- hybrid internet trolls,
- automatic boots with artificial intelligence,
- algorithms for creating so-called echo effect.

5.1 Use of hybrid internet trolls

One of the basic means for disseminating disinformation on social networks is the use of so-called Internet trolls that aim to spread or destroy a narrative. The operation of Internet trolls is not directly related to the development of social networks. The first cases of Internet trolls appeared in discussions on various websites and blogs before the emergence of social networks. Originally, it was about labelling users who were extremely aggressive in their views and hiding behind the anonymity that the Internet was already providing at the time Hannan (2018). These trolls were characterized by a very vulgar language.

Gradually, as social networks became more popular and became more and more weaponized^{‡‡}, the behaviour of trolls on social networks also changed. Some experts refer to such Internet trolls as hybrid trolls. In their case, they are a kind of fighters in the media, who are mostly hired by state or non-state actors who, in addition to spreading disinformation, spread the narratives of their employers (tenants) and, conversely, try to destroy the enemy's narrative. To this end, they produce a large number of contributions in which they use various manipulation techniques. Hybrid trolls are aggressive and often vulgarly insult their opponents, discouraging them and other readers or discussants who do not share the opinion of the trolls from further discussion (Aro, 2016).

[§] In one contribution, it was possible to write a text with a maximum of 140 characters before 2017. In 2017, a change came when the limit rose to 280 characters, but even such a range was not enough for many users. Therefore, Twitter has made it possible to split a longer post into several parts, which is displayed as a separate thread. It seems that soon it will be possible to post texts on Twitter without a limit on the number of characters. It will offer a new content format "Twitter Articles".

^{**} A troll is an Internet user who, with his comments and behavior on the Internet, deliberately provokes others or distracts the discussion from the original topic (Short Dictionary of Hybrid Threats, 2022).

^{††} A bot is a computer program that autonomously performs automated tasks on the Internet, e.g., simulation of human communication in communication with the customer (chatbot). Bot can be misused to spread messages on social networks, attacks on Internet services or increase the number of responses to a specific post - the so-called Likes (Short Dictionary of Hybrid Threats, 2022).

^{‡‡} In the weaponization of the social network, the target group is attacked by hostile information, members of the target group are mobilized, and information operations are conducted in order to influence the behaviour, attitudes, moods and opinions of the target group (Short Dictionary of Hybrid Threats, 2022).

Russia in particular uses hybrid internet trolls to spread disinformation. Ongoing investigations suggest that there is a headquarters in St. Petersburg, which is estimated to have about four hundred such hybrid trolls, whose main job is to conduct trolls on social networks. Former headquarters employees say that people take turns here in twelve-hour shifts and their monthly earnings are around a thousand US dollars. There are about twenty people working in one room, following well-defined scenarios and instructions. Each room is supervised by three editors who are authorized to impose fines if the set daily contribution limits are not reached, or the contributions are not governed by an established manual (Prier, 2017; Bialy, 2017; Aro, 2016).

5.2 Use of bots and artificial intelligence

The second, very often used tool for disseminating disinformation is the use of so-called bots (Bialy, 2017). Bot is something that pretends to be a real social user, but it's computer software that is programmed to automatically create and distribute some kind of posts at regular intervals. With these contributions, he then tries to flood the public space on social networks and thus promote his narrative. Bots try to behave like real people, so they often use artificial intelligence to imitate human behaviour. It is currently estimated that bots account for approximately 5 to 15% of all users on Twitter, with a similar ratio estimated for the largest social network Facebook, where bots account for about 5 to 11% of all users (Biteniece et al., 2017).

The use of bots was very popular, especially before the US presidential election in 2016. It is estimated that in the key period between spring and autumn 2016, up to 30% of all messages sent in the United States via social networks were not created by human users but by bots (Bialy, 2017). As indicated above, the bots are mainly used on Twitter and Facebook. According to research, up to 20% of contributions belonging to the Islamic State are automatically generated by bots. Even more worrying is the findings of the North Atlantic Alliance's Centre of Excellence for Strategic Communications.^{§§} According to their reports, in Poland and the Baltic countries, up to 70% of all Russian-language contributions that talk about NATO are the work of boots (Biteniece et al., 2017).

5.3 Misuse of algorithms

The third relatively frequently used tool for disseminating disinformation is the misuse of algorithms that work on social networks. These are algorithms that recommend different posts to social network users based on their behaviour on the social network. They also consider posts posted by their acquaintances and posts read by users of sites and groups of which they are members. Algorithms push users that are viral, that reach a large number of shares, and so-called likes. This creates the so-called echo effect. Just one click on an article and the social network will automatically start offering other articles with similar topics to the user. That is, if a user clicks on a hoax or fake message once because of the article's title, the social network will automatically start subtracting other similar articles and posts. Also based on this aspect, disinformation actors try to focus on breath-taking and emotionally sensitive topics in order to force users to click on their message or post with a shocking headline. The algorithms used monitor all articles and contributions and based on this, evaluate the frequency of occurrence of

^{§§} The Center of Excellence for Strategic Communications is a NATO-accredited international military organization that is not part of NATO's command structure and is not subordinate to any other NATO body. Based in Riga, Latvia, it contributes to improving strategic communication capabilities within the Alliance and Allied countries. Strategic communication is an integral part of the Alliance's political and military objectives, so it is increasingly important for the Alliance to communicate in an appropriate, timely, accurate and sensitive manner about its evolving tasks, objectives and missions. The Centre's mission is to make a concrete contribution to the strategic communication capabilities of NATO, NATO Allies and NATO Partners. Its strength is built by transnational and cross-sectoral actors from the civil and military, private and academic sectors and using modern technologies, virtual tools for analysis, research and decision-making. At the heart of NATO's StratCom COE is a diverse group of international experts with military, governmental and academic backgrounds - trainers, educators, analysts, and researchers. For more details see: NATO. 2022. NATO Center of Excellence for Strategic Communications, 2022

individual words. The ones with the highest frequency are then marked as trends, which are displayed to all users (Prier, 2017). The combined efforts of trolls, bots and users are used to create trends. By artificially and collectively distributing a large number of posts, the algorithms are able to evaluate that the topic is popular among users and then automatically offer the posts to other users.

Conclusions

Social networks are one of the most dynamically developing communication and information platforms. Over the course of a few years, they have undergone many significant changes. From small, scattered local community websites, they have evolved to consolidated companies with global reach and influence. Social networks have also been part of the leap into the world of mobile technologies, which have a huge impact on human behaviour, including patterns of social network use. Over time, users' motivations to engage in social media discussions have also changed. The initial, purely "social" motivation was gradually replaced by other motivations, such as the search for information, the provision of which brought social platforms much closer to the traditional media. In this information environment, a dramatic change has gradually taken place, which can be called the weaponization of social networks, which means the transformation of social networks into a battlefield in which hostile hybrid activities take place on the target audience in the Gray zone^{***} between peace and war.

Due to their exceptional characteristics, such as global reach, high availability, low costs, huge volume and speed of information exchange, and to some extent the anonymity of users, social networks are attractive to several actors with hostile agendas. Paradoxically, what was a great advantage became a visible weakness. Platforms, which were born "social", have become the site of a large number of activities that are clearly anti-social in nature. Therefore, in our opinion, it is justified to call social networks a battleground in which there is an intense struggle for people's hearts and minds. It is a battlefield where you can observe various military and non-military strategies and tactics and the use of tools such as disinformation, propaganda, false reports, conspiracy theories, threats against opponents, mobilization of supporters, coordination of actions and activities, etc. The dynamic development of technology plays an important role here, making all these activities simpler and more efficient. Robots and various applications help or even replace human actors to a large extent, and content (news, information) is becoming more and more attractive due to the development of multimedia.

In this context, the question arises as to what the democratic world can take, what measures it can take to deal effectively and efficiently with hostile activities on social networks and hybrid threats in general, as adversaries do not follow the same legal rules and ethical principles as democratic societies and do not share democratic values. Moreover, while adversaries are cunning, fast, flexible, and adaptable given the specific nature of their organizations and their establishment, democratic countries, and institutions are obliged to follow specific procedures with lengthy decision-making processes. Social networks, as it turns out, are therefore a very powerful and effective tool for manipulating the population on a mass scale. Their current mass use facilitates the dissemination of disinformation to state and non-state actors more than ever before. That is why it is very important not only to continue research in this area, but to deepen it even more. The achieved research results should contribute to the impossibility to use, resp. to abuse social networks as a hybrid weapon to influence people's thinking and behaviour and to jeopardize the democratic processes taking place in developed democracies.

^{***} The Gray zone is an area where hybrid warfare is taking place, taking advantage of the ambiguity of national and international law. These are activities of one state that are detrimental to another state, but legally they are not acts of war. This is the so-called acts below the border of armed conflict (Short Dictionary of Hybrid Threats, 2022).

References:

- Allcott, H., & Gentzkow, M. (2017). Social Media and Fake News in the 2016 Election. *Journal of Economic Perspectives*, 31 (2), 211-236. <https://doi.org/10.3386/w23089>
- Andrassy, V., & Grega, M. (2015). Možnosti optimalizácie informačných systémov v bezpečnostnom systéme. *Košická bezpečnostná revue*, 5 (2), 11-18. ISSN 1338-4880.
- Aro, J. (2016). The Cyberspace War: Propaganda and Trolling as Warfare Tools. *European View*, 15(1), 121-132. <http://dx.doi.org/10.1007/s12290-016-0395-5>
- Bayer, M. (2006). Strategic Information Warfare: An introduction. *Cyberwar, Netwar and the Revolution in Military Affairs*, 32-48. https://doi.org/10.1057/9780230625839_3
- Baym, G. (2005). The daily show: discursive integration and the reinvention of political journalism. *Political Communication*, 22 (3), 259–276. <https://doi.org/10.1080/10584600591006492>
- Bennett, L., & Livingston, S. (2018). The disinformation order: Disruptive communication and the decline of democratic institutions. *European Journal of Communication*, 33 (2), 122-139. <http://dx.doi.org/10.1177/0267323118760317>
- Biały, B. (2017). Social Media - From Social Exchange to Battlefield. *The Cyber Defense Review*, 2 (2), 69-90. Retrieved May 9, 2022, from https://cyberdefensereview.army.mil/Portals/6/Documents/CDR%20Journal%20Articles/Social%20Media%20From%20Social%20Exchange_Bialy.pdf?ver=2018-07-31-093711-437
- Biteniece, N., Bertolin, G., Agarwal, N., Bandeli, K. K., & Sedova, K. (2017). *Digital Hydra: Security Implications of False Information Online*. Riga: NATO Strategic Communications Centre of Excellence
- Cambridge Dictionary. (2021). Disinformation. Retrieved May 6, 2022, from <https://dictionary.cambridge.org/dictionary/english/disinformation>
- Davison, W. P. (1971). Some Trends in International Propaganda. *The Annals of the American Academy of Political and Social Science*, 1-13. <https://doi.org/10.1177/000271627139800102>
- DataReportal. (2022). Global Digital Overview. Retrieved May 15, 2022, from <https://datareportal.com/reports/digital-2021-global-overview-report>
- European Commission. (2018). Final report of the High-Level Expert Group on Fake News and Online Disinformation. Brussels: European Commission. Retrieved May 12, 2022, from <https://www.ecsite.eu/activities-and-services/resources/final-report-high-level-expert-group-fake-news-and-online>
- European Parliament. (2016). Report on EU strategic communication to counteract propaganda against it by third parties. In *European Parliament*. Brussels: European Commission. Retrieved May 12, 2022, from https://www.europarl.europa.eu/doceo/document/A-8-2016-0290_EN.html
- European Union External Action. (2021). *Questions and Answers about the East StratCom Task Force*. Brussels: European Union External Action. Retrieved May 12, 2022, from https://www.eeas.europa.eu/eeas/questions-and-answers-about-east-stratcom-task-force_en
- Glenn, R. W. (2009). Thoughts on Hybrid Conflict. *Small Wars Journal*. Retrieved May 13, 2022, from <https://www.smallwarsjournal.com/blog/188-glenn.pdf>
- Griscioli, G. (2016). *Intelligence. The Hybrid War*. Roma: Aracne
- Halpin, E., Trevorrow, P., Webb, D., & Wright, S. (2006). *Cyberwar, Netwar and the Revolution in Military Affairs*. London: Palgrave MacMillan <https://doi.org/10.1057/9780230625839>
- Hannan, J. (2018). Trolling ourselves to death? Social media and post-truth politics. *European Journal of Communication*, 33(2), 214-226. <http://dx.doi.org/10.1177/0267323118760323>
- Hoffman, F. G. (2007). Conflict in the 21st Century: The Rise of Hybrid Wars. *Potomac Institute for Policy Studies*, Retrieved May 8, 2022, from https://potomac institute.org/images/stories/publications/potomac_hybridwar_0108.pdf

Hybrid Centre of Excellence. (2022). Hybrid Threats. Retrieved May 8, 2022, from <https://www.hybridcoe.fi/hybrid-threats/>

Ivančík, R. (2016). Teoretické východiská skúmania problematiky hybridnej vojny – vojny 21. storočia. *Medzinárodné vzťahy*, 14(2), 130-156. Retrieved May 3, 2022, from https://fmv.euba.sk/www_write/files/dokumenty/veda-vyskum/medzinarodne-vztahy/archiv/2016/2/mv_2016_2_130-156_ivancik.pdf

Ivančík, R. (2021). Informačná vojna – jeden z multidisciplinárnych fenoménov súčasnej ľudskej spoločnosti. *Politické vedy*, 24(1), 135-152. <https://doi.org/10.24040/politickevedy.2021.24.1.135-152>

Jurčák, V. (2020). Súčasný pohľad na definovanie pojmov hybridná hrozba a hybridná vojna. *Hodnoty trestného práva, kriminalistiky, kriminológie, forenzných a bezpečnostných vied v teórii a praxi*. Plzeň: Vydavateľství a nakladatelství Aleš Čeněk, 2020, 753-769.

Korauš, A., & Kelemen P. (2018). Protection of persons and property in terms of cybersecurity. *Ekonomické, politické a právne otázky medzinárodných vzťahov*, 18(1), 234-244. Retrieved May 7, 2022, from https://fmv.euba.sk/www_write/files/Virt_zbornik.pdf

Kovanič, M. (2017). Dezinformácie a ruská propaganda ako bezpečnostné hrozby. *Bezpečnostní teorie a praxe*, 2, 121-132. ISSN 1801-8211.

Krátky slovník hybridných hrozieb. (2022). *Dezinformácia*. Retrieved May 6, 2022, from <https://www.nbu.gov.sk/urad/o-urade/hybridne-hrozby-a-dezinformacie/kratky-slovník-hybridnych-hrozieb/index.html>

MacMillan Dictionary. (2021). *Disinformation*. Retrieved May 6, 2022, from <https://www.macmillandictionary.com/dictionary/british/disinformation>

Manko, O., & Mikhieiev, Y. (2018). Defining the Concept of 'Hybrid Warfare' Based on Analysis of Russian Aggression against Ukraine. *Connections. Information & Security: An International Journal*, 41, 11-20. <https://doi.org/10.11610/isij.4107>

Miller, M. (2015). *Hybrid Warfare: Preparing for Future Conflict*. Montgomery: Air War College <https://doi.org/10.21236/ADA618902>

NATO. (2022). *NATO Strategic Communications Centre of Excellence*. Retrieved May 8, 2022, from <https://connections-qj.org/article/defining-concept-hybrid-warfare-based-analysis-russias-aggression-against-ukraine> <https://www.stratcomcoe.org/about-strategic-communications>

Oxford Learner's Dictionary. (2021). *Disinformation*. Retrieved May 6, 2022, from <https://www.oxfordlearnersdictionaries.com/definition/english/disinformation?q=disinformation>

Prier, J. (2017). Commanding the Trend: Social Media as Information Warfare. *Strategic Studies Quarterly*, 11 (4), 50-85. Retrieved May 9, 2022, from https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-11_Issue-4/Prier.pdf

Silverman, C. (2016). This analysis shows how viral fake election news stories outperformed real news on Facebook. *BuzzFeed.News* Retrieved May 10, 2022, from <https://www.buzzfeednews.com/article/craigsilverman/viral-fake-election-news-outperformed-real-news-on-facebook>

The Guardian. (2022). *The Cambridge Analytica Files*. Retrieved May 10, 2022 from <https://www.theguardian.com/news/series/cambridge-analytica-files>

US DoD. (2000). *United States Department of Defense: Joint Vision 2020*. Washington: United States Government Printing Office. May 12, 2022, from <https://www.hsdl.org/?abstract&did=446826>

Vargo, C. J., & Guo, L., & Amazeen, M. A. (2017). The agenda-setting power of fake news: A big data analysis of the online media landscape from 2014 to 2016. *New Media & Society*, 20 (5), 2028-2049. <http://dx.doi.org/10.1177/1461444817712086>

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IMPACT OF SELECTED FACTORS ON DIGITALIZATION OF FINANCIAL SECTOR*

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Abstract. The financial sector is introducing new services to meet consumer needs at a time of information society and rapid technological awareness growth. The study aims to summarize the existing global trends in banking sector digitalization and informatization and assess the impact of selected macroeconomic indicators on them. The World Bank's data were used for the principal analysis. We offer a novel model for evaluating relationships between banking digitalization and macroeconomic processes based on theoretically grounded assumptions. For a detailed study of banking informatization, countries with similar indicators of Researchers in R&D per million people to Ukraine were selected (Romania, Cyprus, Ukraine, Malta, Croatia, Bulgaria, Latvia, Italy, and Poland). The research results allowed finding how our selected indicators affect the development of digitalization of the financial sector. The obtained results may have practical economic policy implications.

Keywords: investments; loans; analysis; risk; information; banks; digitalization; informatization; financial sector

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1. Introduction

In today's world, the primary mechanism for achieving high economic efficiency in any economic sector is the ability to respond to changes in the market and its resource base. At a time of information society and rapid economic and technological awareness growth, the financial sector is introducing new resource bases to meet consumer needs. There is a need for further digitalization and informatization (in our paper, we will use those terms as synonymous). The banking sector of every country with an efficient economy is a centre of innovative products and results of human intellectual activity. The introduction of technologies in countries with economies in transition, including Ukraine, is a rather complex process, as it requires significant financial resources. Given this, the study of current global trends in banking informatization of the financial sector is relevant. A common feature in the technological development of the banking system of Ukraine and Europe is active investment in improving operations, optimizing customer interaction and improving the level of integration of banks with other systems (social networks, online shopping, etc.) (Jankovic, 2020; Mazurek, 2021; Radavičius & Tvaronavičienė, 2022; Nassar & Strielkowski, 2022).

Modern banking systems concentrate on the main financial risks that are associated with the shortcomings of a particular economic system and are cyclical. Therefore, the economic crisis of a country or region causes a problem in the banking system and vice versa. Each country's economic development process is inextricably linked with the functioning mechanism of the efficient financial market infrastructure, at the centre of which is the banking system. The success of market relations, ensuring intensive economic growth, increasing the country's competitiveness on the world market and increasing the population's welfare is determined by how effectively banks can operate in different segments of the banking services market. The need to study banking informatization is growing under the influence of globalization and asymmetry in the development of financial markets and intensification of competition in the global banking space.

The study aims to summarize the existing global trends in banking informatization of the financial sector and assess the impact of selected macroeconomic indicators on them.

2. Theoretical Basis

Many scholars' scientific works are devoted to studying the development of banking in general and banking informatization.

Billio, Getmansky, Lo and Pelizzon (2012) offer several econometric connectivity indicators based on Granger analysis of major components and networks of causation. Benhabib, Liu, and Wang (2016) investigated how friction in financial information can lead to fluctuations in asset prices and self-realization of business cycles due to sentiment.

Eisenbach, Kovner and Lee (2022) modelled how cyberattacks can be amplified through the financial system by focusing on the wholesale payment network. The reverse stress test shows that attacks on groups of small banks can also damage much of the network. Xu, Saunders, Xiao and Li (2020) studied the impact on a firm when it is forced to switch its relationship with a bank. The opacity of firm information mitigates the consequences of losing a relationship. Liao, Chen and Lu (2009) investigate the impact of agency and information asymmetry issues embedded in structural credit models on bank credit risk assessment. Bessler and Nohel (2000) argue that banks face informational externalities in an asymmetric information environment because of their role as intermediaries.

Nevrla (2020) analyzed systemic risk in Europe's financial and energy sectors using the daily time series of CDS spreads. There is a much higher systemic risk in the financial industry compared to the energy sector. Melecky

and Podpiera (2020) argue that financial sector strategies enable a holistic view of their country's economic development needs. A significant link between the strategy and efficiency has not been confirmed.

Chang and Yang (2022) explored the role of cash reserves during crises and whether a firm with more extensive cash reserves will be able to resume operations quickly after the financial crisis. Chien-Lee and Wang (2021) examine whether geopolitical risks affect firms' cash reserves. Researchers have found that firms tend to accumulate more cash as a precaution when faced with geopolitical risk. Xiao, Zhao and Zhou (2022) study individual and macro-financial factors influencing the convergence of corporate debt.

Schelling and Towbin (2022) studied the transfer of negative interest rates on bank lending around an unexpected political rate, which the National Bank of Switzerland reduced to a resounding negative (-0.75%). Garel, Petit-Romec and Vander Vennet (2022) investigated the relationship between institutional ownership and bank capital. Researchers find supporting evidence that the excellent ability of institutional investors to monitor reduces the seriousness of the agency's costs.

Karakaya, Michalsk and Örsç (2022), using deregulation of interstate banking regulation, create measures for banking integration and industry specialization, which take into account both direct and indirect links created by expanding networks of multibank holding companies. Anagnostopoulos, Husa, and Noikokyris (2022) studied the differences in efficiency between EU and US banks during 2000-2018. European banks lag behind the United States regarding technical efficiency before and after the crisis.

Yuan, Gu, Yuan, Lu and Ni (2022) analyzed the mechanism of banking competition's impact on stability, which will help financial regulators and commercial banks formulate differentiated regulatory policies and business strategies. Ampudia, Skander and Van den Heuvel (2022) study the impact of lower interest rates on the value of European banks' shares - an effect usually positive - has become negative as interest rates in the euro area have reached zero and below. Baik, Han, Joo and Lee (2022) expand the existing literature on the bank's capital structure, applying the model of parameters that change over time to the structure of partial adjustment. Altunbas, Marques-Ibanez, Leuvensteijn, and Zhao (2022) investigated how market power in the 2007-2009 crisis caused banks' systemic risk during the crisis and whether this effect was influenced by two key factors: securitization and bank capital.

Yun and Cho (2022) argue that monetary policy affects business loans more significantly than household loans. Aldasoro, Ehlers and Eren (2022) record significant and persistent price changes between US money market funds and highly rated world banks in secured and unsecured wholesale dollar-denominated markets. Rizwan, Ahmad and Ashraf (2022) assessed the systemic risk of countries with a systemically crucial Islamic banking sector. Their research also identifies determinants of financial institutions' systemic importance (measured by side effect indices). Ornelas, Soaresdade Silva and Nazar Van Doornik (2022) explore the links between credit market competition and bank loan spreads.

Auer, Matyunina, and Ongena (2022) studied structural changes in bank supply, using their differentiated effect on activating the countercyclical capital buffer, which targets banks' mortgage risks. Zou and Wang (2022) studied whether the distance between branches and competition of local banks affect bank lending. Hu, Schclarek, Xu and Yan (2022) argue that developing countries often lack long-term funding. Chen (2022) argues that the interconnectedness of banks exacerbates banks' errors in underestimating risk when making capital decisions. The relationship of banks increases systemic risk.

Beutler, Gubler, Hauri and Sylvia Kaufmann (2021) note that economic uncertainty affects lending in specific periods and compensates for changes in interest rates. Cappelletti, Reghezza, Rodríguez d'Acari, and Spaggiari (2022) studied the impact of capital requirements on bank lending between institutional sectors, focusing on the

channels of their transmission and interaction with monetary policy. Özlem Dursun-de Neef and Schandlbauer (2022) argue that during the pandemic, households accumulated savings in their deposit accounts due to cost reductions due to limited mobility. This has led to a significant increase in bank deposits.

Georgescua and Jefleab (2015) emphasized the characteristic feature of banking information systems from an integrative point of view by identifying and justifying their place, role, evolution and perspective. Hrabchuk, Kachula, Lysiak, and Zarutsky (2021) identified the peculiarities of monetary processes in the crisis period of economic development and directions of monetary policy correction. Khalatur (2015) analyzed the dynamics of the main agricultural development indicators in Ukraine and European countries. Export promotion will incentivize investors to invest in agricultural production, infrastructure and related services. Velychko, Velychko, Butko and Khalatur (2019) considered integrated solutions in the marketing logistics system, which are the main resource for ensuring effective value chain management. Khalatur, Velychko, Pavlenko, Karamushka and Huba (2021) investigated tools for monitoring the impact of VUCA global conditions on the financial stability of banks. Khalatur, Vinichenko and Volovyk (2021) explore the critical features of modern business processes and outsourcing. New forms of cooperation can bring legal relations beyond legal regulation in those countries that do not have time to adapt their legislation to new business strategies. Vasylieva (2019) proposed consistent monitoring and comparison of the dynamics of the development of the agricultural sectors of Ukraine and the USA, which will ensure the desired continuous improvement in the quality and efficiency of management. Velychko, Velychko and Ramanauskas (2016) consider promising ways and conceptual approaches to harmonizing the budget-forming role of agribusiness and the socio-economic role of rural development.

Chen, Lee and Shen (2022) write that a bank with high-income diversification and high liquidity has a high probability of problems in the next period. Corbisiero (2022) shows that liquidity infused into the banks of the affected country can lead to risk financing rather than lending simulation. Igan, Mirzaei, and Moore (2022) argue that the significant reduction in banking risk is primarily due to credit growth limits. Huynh and Dang (2022) analyze how the impact of loan portfolio diversification on a bank's profitability varies depending on the size of the bank and state ownership. Shahhosseini (2022) writes that capital needs are transmitted to the real economy through the bank lending channel. Banks that have passed the stress test are increasing lending, reducing the supply of loans to small and risky borrowers. The research results by Garcia and Meurer (2022) show that an increase in assets negatively affects the profitability of private banks but does not affect the profitability of state-owned banks. Cañón, Cortés and Guerrero (2022) explored the relationship between competition measures at the bank level and the cost of credit for nonfinancial firms. Lee, Wang, and Thinh Xu (2022) note that the relationship between climate risk and the creation of bank liquidity depends on the characteristics of the bank and the country. Minesso, Mehl and Stracca (2022) studied the implications of the central bank's digital currency for an open economy. Fukuyama, Matousek and Tzeremes (2022) learn the production process of banks with problem loans. Empirical data show that the critical factors in the efficiency of banks are the high level of investment and strategic efficiency of decisions. Tian, Park and Cagas (2021) explore how the development of the bond market affects banks' risk-taking. Researchers have found that larger bond markets are associated with lower liquidity and portfolio risk and more excellent overall bank stability.

Pedrono (2022) writes that the amplitude of leverage pro-cyclicality is heterogeneous between banks and countries. Fiordelisi and Scardozzi (2022) analyze banks' financing strategies after offering assistance. Eurozone countries have recently switched to a new centralized exemption system, removing implicit state guarantees. Adeniran, Jada and Mohammed (2020) stress the importance of information technology in the strategic management of banks. This study differs from previous ones in that it lacks a link between sentiment and the real economy and does not consider the effect of the relationship between banking informatization and the real economy arising from information friction. The study also highlights the twofold feedback loop between banking informatization and the real economy; it shows that banking informatization can be a source of endogenous signals that generate self-realized fluctuations.

2. Method

The World Bank's data on macroeconomic and banking informatization indicators were used for the main analysis. The study begins by creating a model for assessing banking informatization and making assumptions about the interaction of banking sector performance and the economic environment. A set of indicators is being selected to be flexible and to explore different scenarios and variations of assumptions that illustrate how results may differ depending on the level of informatization, bank response, policy and economic response (see Fig. 1).

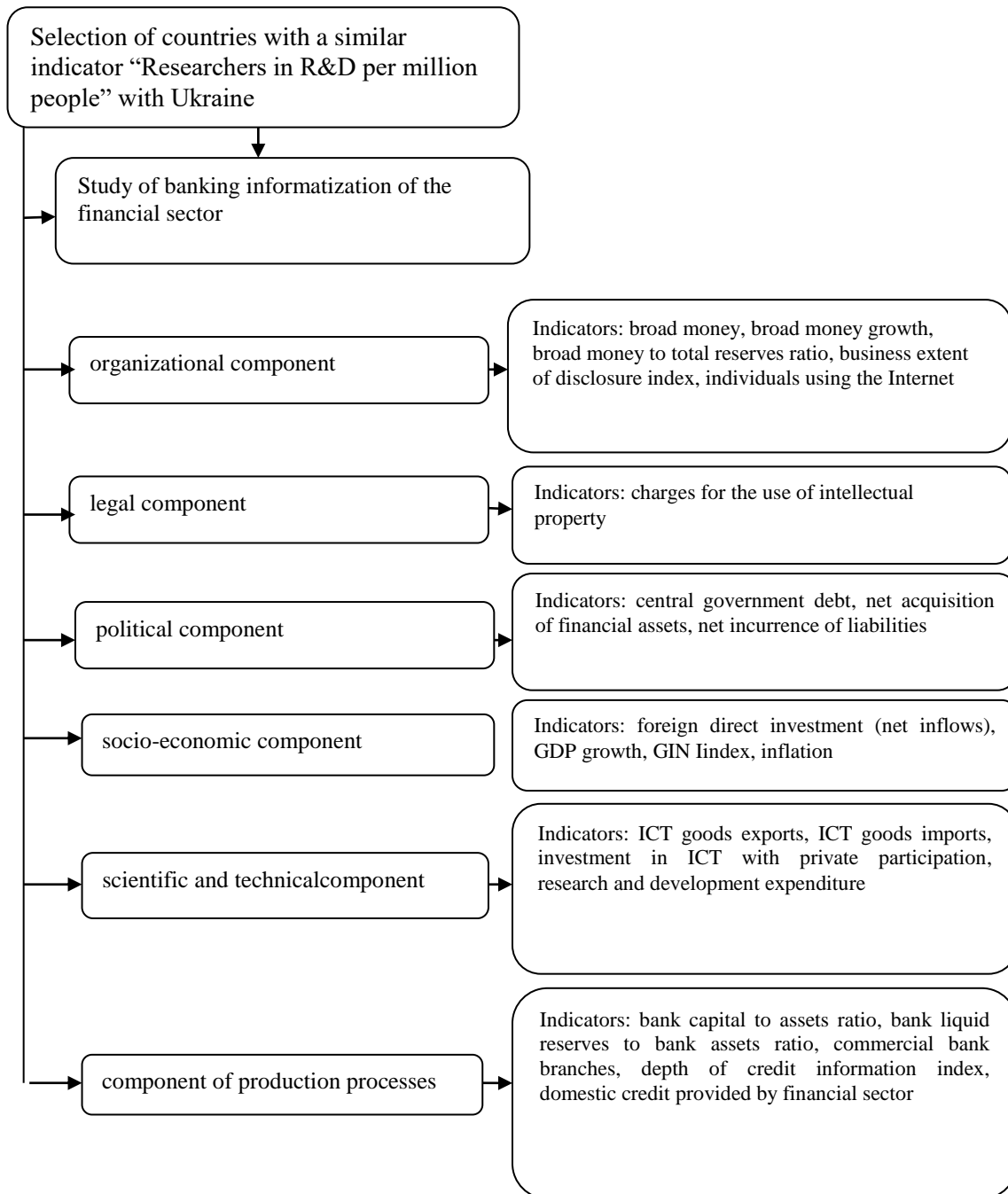


Figure 1. The theoretical framework of the study

For the purposes of this study of banking informatization of the financial sector in selected European countries, the following indicators were taken for analysis: organizational component - broad money, broad money growth, broad money to total reserves ratio, business extent of disclosure index, individuals using the Internet; legal component - charges for the use of intellectual property; political component - central government debt, net acquisition of financial assets, net incurrence of liabilities; socio-economic component - foreign direct investment(net inflows), GDP growth, GINI index, inflation; scientific and technical component - ICT goods exports, ICT goods imports, investment in ICT with private participation, research and development expenditure; component of production processes - bank capital to assets ratio, bank liquid reserves to bank assets ratio, commercial bank branches, depth of credit information index, domestic credit provided by financial sector and some others.

The indicators of the results of the banking sector informatization will also be analyzed, in particular, a mobile-money-service provider with the account of ownership at a financial institution, firms using banks to finance investment, firms using banks to finance working capital and others.

4. Results

Banking in current conditions is significantly diversified and is one of the economy's most dynamic sectors. This makes it challenging to define the concept of "banking digitalization/informatization". There is currently no generally accepted definition of banking informatization, so it isn't easy to provide a complete review of the literature in this rapidly evolving research area.

In the article, banking digitalization/informatization means a set of interrelated organizational, legal, political, socio-economic, scientific and technical production processes aimed at creating conditions to meet information needs, a realization of rights of citizens and society through creation, development, use information systems, networks, resources and information technologies based on the use of modern computer and communication innovation in banking.

The financial system has become much more complex in recent years. Although this complexity is an inevitable consequence of competition and economic growth, it is accompanied by specific outcomes, including much greater informatization.

For a detailed study of banking informatization of the financial sector, countries were selected with a similar indicator to Ukraine's Researchers R&D per million people (see Fig. 2).

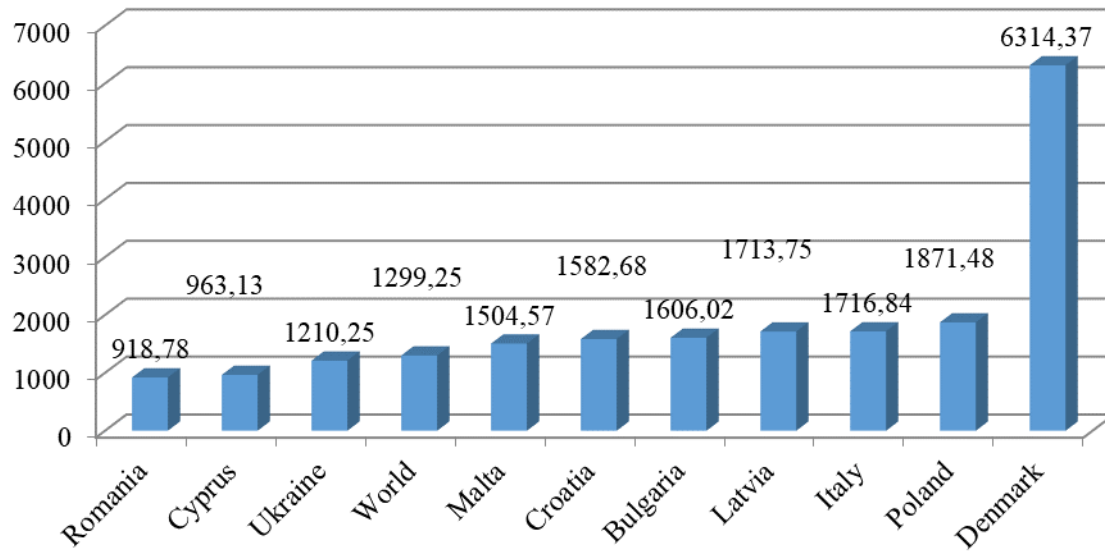


Figure 2. Researchers in R&D by European countries, on average 2001-2020, per million people

Source: compiled by authors based on World Bank data

Thus, Romania, Cyprus, Ukraine, Malta, Croatia, Bulgaria, Latvia, Italy, and Poland were selected for further research. In these countries, the Researchers in R&D indicator is approximately at the level of Ukraine. Denmark is also compared, with the highest rate of this indicator among European countries. Table 1 analyzed the indicators of organizational and legal components of banking informatization on average from 2000-2020.

Table 1. Indicators of the organizational and legal component of banking informatization on average for 2000-2020

Country	Business extent of disclosure index (0=less disclosure to 10=more disclosure)	Individuals using the Internet (% of population)	Charges for the use of intellectual property, payments (BoP, current US\$)
Romania	8,93	38,50	491608114,03
Cyprus	6,53	53,51	71831564,88
Ukraine	4,13	25,07	519052631,58
World	5,21	26,65	264463449834,54
Malta	3,00	57,60	598452067,41
Croatia	3,00	50,84	226844635,02
Bulgaria	10,00	41,03	126965329,35
Latvia	5,00	60,79	43050450,42
Italy	7,00	47,76	5369156274,42
Poland	7,00	54,10	2011578947,37
Denmark	7,00	86,20	1378585695,02

Source: compiled by authors based on World Bank data

Money circulation is an important financial and economic process, the characteristics of both the result and the condition for the functioning of the economic system.

According to World Bank data (2022), Broad money in Romania is 35.77% of GDP, in Ukraine - 45.93% of GDP; in the world - 108.26% of GDP; in Croatia - 66.57% of GDP; in Bulgaria - 67.52% of GDP; in Poland -

54.36% of GDP; in Denmark - 58.70% of GDP. Broad money growth in Romania is 16.38 annual %, in Ukraine - 23.75 annual %; in Croatia - 8.32 annual%; in Bulgaria - 13.29 annual%; in Poland - 9.51 annual%; in Denmark - 4.80% annual. Broad money to total reserves ratio is in Romania - 1.72, in Ukraine - 3.20; in Croatia - 2.68; in Bulgaria - 1.85; in Poland - 3.09; in Denmark - 3.36. In other countries under study, the values of these indicators are missing. According to the peculiarities of the formation of the information and network economy, electronic money is becoming more widespread, particularly in international electronic networks. An intrinsic property of money is dynamism - money is constantly in motion, moving between economic entities of the same and different countries. The dynamism of money ensures its role in shaping the profitability of current financial and economical operations. Therefore the speed of money movement affects the financial stability and balance of the economic system. Table 2 analyzed the indicators of the political component of banking informatization on average from 2000-2020.

Table 2. Indicators of the political component of banking informatization on average for 2000-2020

Country	Net investment in nonfinancial assets (% of GDP)	Net lending (+) / net borrowing (-) (% of GDP)	Government expenditure on education, total (% of GDP)
Romania	2,79	-3,10	3,44
Cyprus	3,51	-3,26	6,29
Ukraine	0,76	-2,38	5,94
World	1,48	-3,00	4,29
Malta	5,12	-4,69	5,88
Croatia	1,76	-3,62	4,10
Bulgaria	2,61	-0,50	3,74
Latvia	3,28	-2,56	5,29
Italy	1,06	-2,82	4,26
Poland	2,05	-3,52	5,03
Denmark	1,69	0,82	8,02

Source: compiled by authors based on World Bank data

According to World Bank data (2022), Central government debt in Ukraine is 41.41% of GDP; net incurrence of liabilities) in Ukraine is 4.39% of GDP; in Malta - 5.82% of GDP. Claims on central government claims in Romania is 0.95 annual growth as% of broad money; in Ukraine - 3.98 annual growth as% of broad money; in Croatia - 1.52 annual growth as% of broad money; in Bulgaria (-0.72) annual growth as% of broad money; in Poland - 1.85 annual growth as% of broad money; Denmark (-0.78) annual growth as% of broad money. So, many problems need to be solved shortly within the limits of modern information technologies to develop the banking system. Currently, among the most urgent problems of informatization of the banking sector are the small amount of equity capital of most banks and its unsatisfactory quality, the imbalance of the structure of assets and liabilities, and low efficiency of management. Table 3 analyzed the indicators of the socio-economic component of banking informatization on average from 2000-2020.

Table 3. Indicators of the socio-economic component of banking informatization on average for 2000-2020

Country	Foreign direct investment, net inflows, % of GDP	GDP growth, annual %	Gini index, World Bank estimate	Inflation, GDP deflator, annual %
Romania	3,74	4,13	36,31	10,40
Cyprus	81,51	2,39	32,56	1,64
Ukraine	3,80	2,43	26,46	15,78
World	2,88	2,84	x	3,85
Malta	97,00	3,88	29,08	2,42
Croatia	3,55	1,98	31,60	2,39
Bulgaria	8,36	3,59	36,93	4,26
Latvia	3,45	3,73	35,83	4,63
Italy	1,22	0,22	34,55	1,74
Poland	3,25	3,79	33,17	2,21
Denmark	0,95	1,34	27,01	1,68

Source: compiled by authors based on World Bank data

The main problems of the financial sector in Ukraine are distrust in the financial system, lack of financial planning and financial literacy of customers, and problems with Internet coverage in the country's regions. To build a strategy for the development of banking informatization of the financial sector, it is necessary to consider the strategy of each bank through the prism of those trends that already exist in the global market. Key internal processes will then be analyzed, strengths and weaknesses identified and compared with leading market practices. It is necessary to assess the opportunities for implementing current trends and be the ones who create trends. Table 4 analyzed the indicators of banking informatization's scientific and technical components on average for 2000-2020.

Table 4. Indicators of the scientific and technical component of banking informatization on average for 2000-2020

Country	ICT goods exports, % of total goods exports	ICT goods imports, % total goods imports	ICT service exports, % of service exports, BoP	Insurance and financial services, % of service exports, BoP	Insurance and financial services, % of service imports, BoP	Research and development expenditure, % of GDP
Romania	4,10	7,24	13,08	2,60	6,28	0,45
Cyprus	6,49	5,18	7,67	20,02	16,54	0,42
Ukraine	0,93	3,39	6,36	1,42	7,47	0,81
World	11,99	12,76	7,99	11,60	8,48	2,05
Malta	32,40	16,92	1,44	28,39	31,18	0,57
Croatia	2,56	5,43	3,78	0,88	8,40	0,85
Bulgaria	2,21	5,39	6,86	3,55	6,85	0,58
Latvia	5,62	7,06	7,25	10,18	7,79	0,55
Italy	2,40	6,01	7,46	6,79	9,99	1,21
Poland	6,44	8,54	5,78	2,42	6,18	0,75
Denmark	4,46	8,73	4,92	1,70	1,81	2,77

Source: compiled by authors based on World Bank data

According to World Bank data (2022), Indicator Investment in ICT with private participation in Romania is 153000000 US \$, in Ukraine - 1320000000 US \$, in Bulgaria - 280000000 US \$, in other countries, there are no data. Further development of FinTech companies is not possible without attracting investments and adapting legislation to new business models. These processes result from large-scale globalization of the economy and the

natural development of technologies. In today's operating conditions, business is increasingly immersed in digital processes, and traditional economic models are taking a back seat.

Rare events, including financial crises and macroeconomic catastrophes, are challenging to analyze. This analysis informs us of our understanding of data transmission mechanisms and assessing vulnerabilities in the financial sector, as well as highlights potential policy responses that would effectively mitigate reinforcements. From a practical point of view, data on macroeconomic indicators provide detailed information on flows between different financial institutions. This detailed information allows managers to model various scenarios using factual data and investigate the result without too many assumptions (see Table 5).

Table 5. Indicators of the component of production processes of banking informatization on average for 2000-2020

Country	Bank capital to assets ratio (%)	Bank liquid reserves to bank assets ratio (%)	Bank nonperforming loans to total gross loans (%)	Borrowers from commercial banks (per 1,000 adults)	Depositors with commercial banks (per 1,000 adults)	Depth of credit information index (0=low to 8=high)
Romania	8,78	35,44	10,16	225,99	-	7,00
Cyprus	7,69	-	23,19	387,79	1189,57	4,71
Ukraine	12,44	10,18	31,74	-	2467,68	7,00
World	x	16,47	x	152,69	485,16	4,60
Malta	7,63	-	6,23	363,92	1356,94	2,57
Croatia	13,45	21,35	10,68	625,45	1440,94	5,86
Bulgaria	11,08	15,44	11,55	448,44	1571,84	5,00
Latvia	10,02	-	7,73	349,03	1249,22	7,14
Italy	5,41	-	11,32	466,12	679,64	7,00
Poland	8,88	12,02	4,31	465,94	1011,95	8,00
Denmark	6,29	4,24	3,53	-	-	6,00

Source: compiled by authors based on World Bank data

According to World Bank data (2022), deposit interest rate in Romania is 7.18%; in Ukraine - 10.02%; in Croatia - 2.04%; in Bulgaria - 2.39%. No data are available for other studied countries. Domestic credit provided by the financial sector in Ukraine is 83.93% of GDP. In Fig. 3, there are analyzed commercial bank branches and banks' domestic credit to the private sector.

Despite digital technologies rapidly gaining ground, there are no generally accepted and harmonized legal definitions of digitalization and informatization. Digitalization is becoming an essential factor in the economic growth of any country's economy and is a modern development trend.

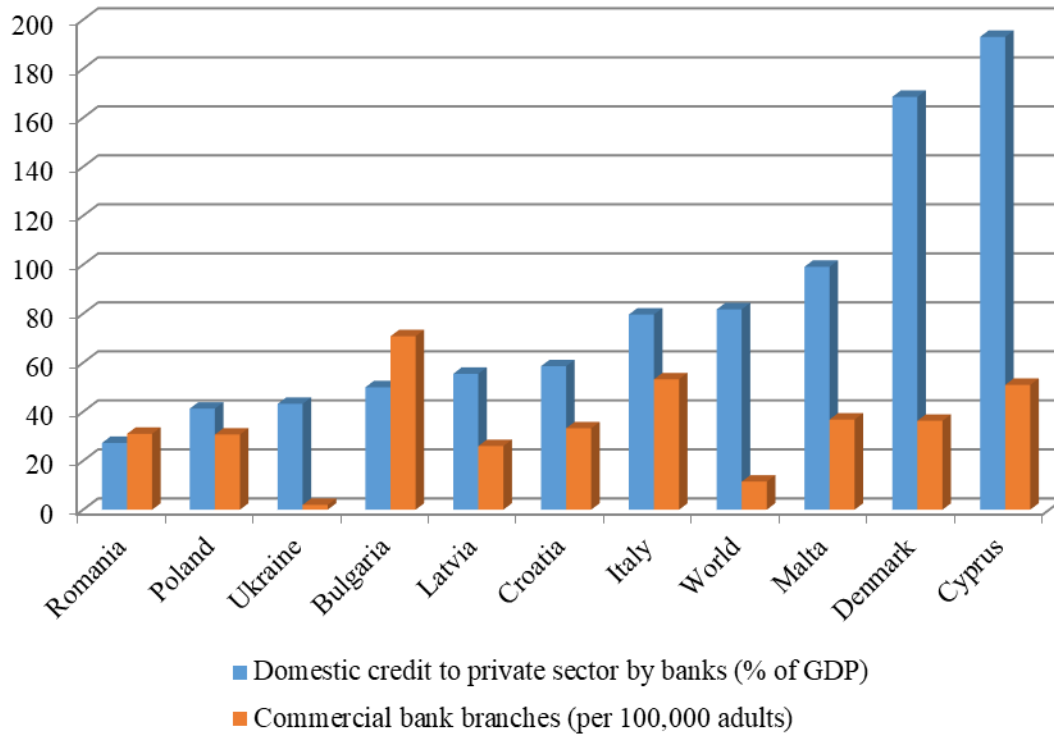


Figure 3. Commercial bank branches (per 100,000 adults) and domestic credit to the private sector by banks (% of GDP), average from 2000-2020.

Source: compiled by authors based on World Bank data

Traditional interconnection research examines the impact on the network of relationships formed by banks through interbank borrowing and other performance indicators. However, banking informatization's opportunities and effects can manifest through connections that are not actively manifested through traditional risk management. Another critical factor is the possibility of feedback and empowerment through economics and politics. Figure 4 analyzed the indicators of the informatization results of the banking sector on average from 2000-2020.

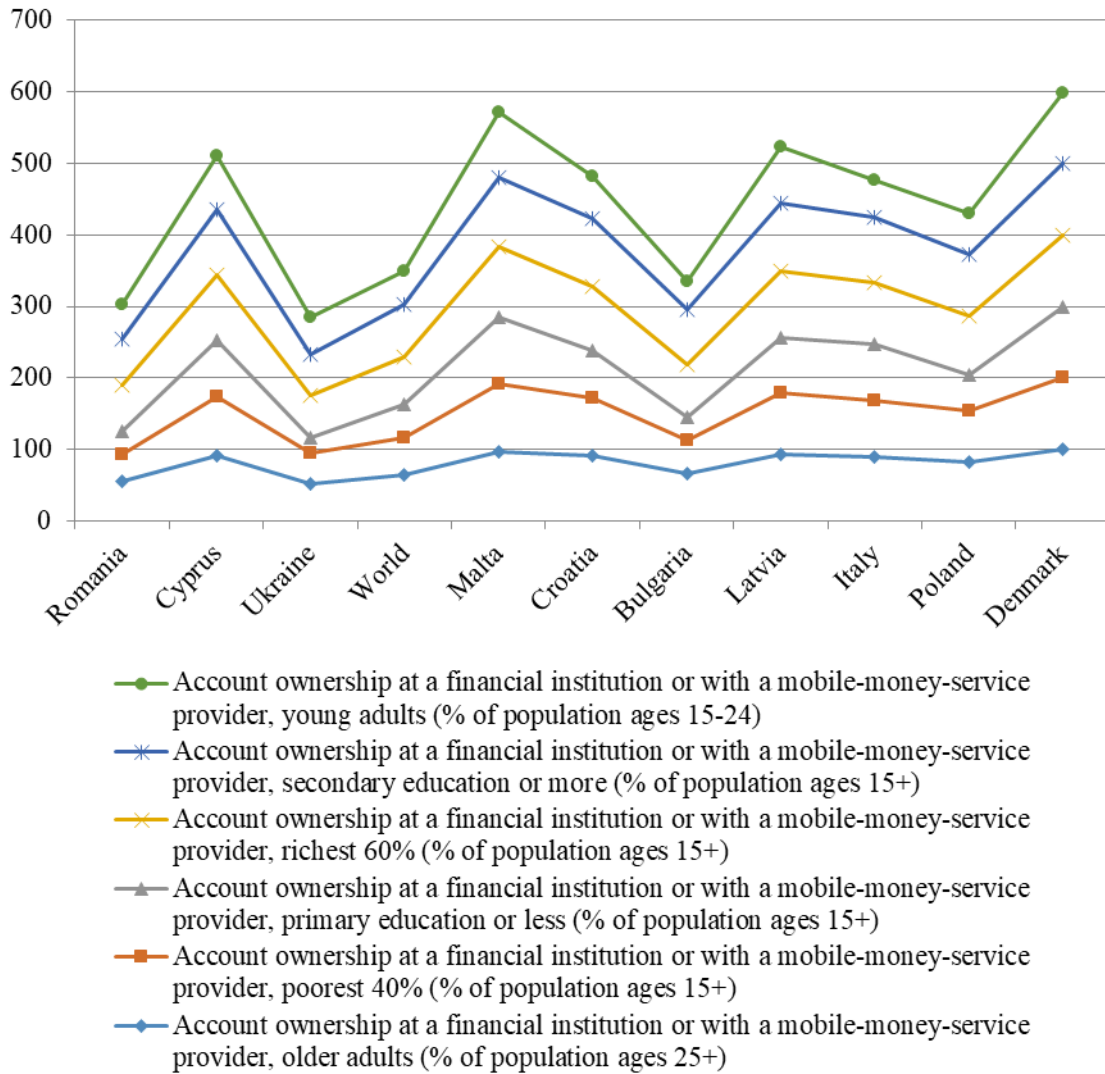


Figure 4. A mobile-money-service provider or account ownership at a financial institution, average from 2000-2020.
 Source: compiled by authors based on World Bank data

Banking informatization of the financial sector is associated with projects to transform the IT landscape of banks, introducing new services and personalizing offers to customers.

Analyzing the results of multivariate analysis, the factors proposed above are also considered in more detail. The banking informatization of the financial sector is indirectly reflected in the growth rate of account ownership at a financial institution or with a mobile-money-service provider (Index Mundi <https://www.indexmundi.com/facts/indicators/FX.OWN.TOTL.ZS>)

However, choosing an indicator that would become a correct indicator of such a process is somewhat problematic. Little attention has been paid to the study of this factor in the scientific literature. Thus, even if it is selected as the correct indicator, the regression analysis based on retrospective data will not provide an adequate assessment of the impact of this indicator on the level of banking informatization of the financial sector in the countries under study. It is not necessary to reject the impact of the country's economic diversification process on Account ownership at a financial institution or with a mobile-money-service provider (Index Mundi

<https://www.indexmundi.com/facts/indicators/FX.OWN.TOTL.ZS>). It is believed that this process can impact a more extended period. It is argued that the impact of such a complex multifactorial process should be considered in separate macroeconomic studies.

Business extent of disclosure index, individuals using the Internet, charges for the use of intellectual property; net investment in nonfinancial assets; net lending/net borrowing; foreign direct investment; GDP growth; Gini index; inflation; ICT goods exports; ICT goods imports; ICT service exports; insurance and financial services; insurance and financial services; government spending on education; research and development expenditure; bank capital to assets ratio; bank liquid reserves to bank assets ratio; nonperforming bank loans to total gross loans; borrowers from commercial banks; commercial bank branches; depositors with commercial banks; depth of credit information index; domestic credit to the private sector by banks are indicators that can become important determinants of a mobile-money-service provider or account ownership at a financial institution. In the factors proposed in this study, this indicator of banking informatization of the financial sector is indirectly taken into account. The data sample refers to the period from 2000 to 2020. This period is justified by the relative macroeconomic stability of countries and the availability of statistical data necessary for analysis. Below is table 7 with correlation coefficients between potential determinants and a mobile-money-service provider or the account ownership at a financial institution due to banking informatization of the financial sector (see Table 7).

Table 7. Results of the correlation analysis of the banking informatization factors of the financial sector (based on the indicator “A mobile-money-service provider or account ownership at a financial institution”)

Correlation coefficients and their statistical significance					
Group of factors of organizational and legal component banking informatization		Group of factors of political component banking informatization		A group of factors of social and economic components banking informatization	
Business extent of disclosure index	0,871	Net investment in nonfinancial assets	0,811	Foreign direct investment, net inflows	0,297
Individuals using the Internet	0,295	Net lending (+) / net borrowing (-)	0,729	GDP growth	0,756
Charges for the use of intellectual property	0,753	Government expenditure on education, total	-0,701	Gini index	-0,744
Group of factors of scientific and technical component of bank informatization		Group of factors component of production processes of banking informatization		Inflation, GDP deflator	0,832
ICT goods exports	0,846	Bank capital to assets ratio	0,461		
ICT goods imports	0,371	Bank liquid reserves to bank assets ratio	0,867		
Insurance and financial services (% of service exports)	0,653	Borrowers from commercial banks	0,471		
Insurance and financial services (% of service imports)	0,689	Commercial bank branches	0,671		
Research and development expenditure	0,383	Depth of credit information index	0,774		
		Domestic credit to the private sector by banks	0,732		

* statistically significant correlation coefficients ($t_{obs} > t_{crit}$ at a significance level $< 5\%$)

The selection of the main factors that have the most substantial influence on the function y is made since the model, which includes many aspects, is unstable: it does not objectively reflect changes in y with corresponding changes in factors. The selection was made based on the analysis of the values of special statistical characteristics.

However, for further regression analysis, the factors with the highest correlation coefficient values are selected. In the course of further study, a regression model of account ownership at a financial institution or with a mobile-money-service provider was built for the selected factors.

Regression analysis is a method of establishing the analytical expression of the stochastic relationship between the studied features. The regression equation shows how y (the dependent variable describing the process to be predicted or understood) changes on average when any of the x_i changes and has the form:

$$y = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \dots + \beta_n * x_n + u$$

A multivariate correlation-regression model was built for a mobile-money-service provider or account ownership at a financial institution. In this methodological development, the limitations were as follows: the selection of the main factors that determine the level of a mobile-money-service provider or account ownership at a financial institution and an assessment of the degree of their impact on this indicator. In this study, a mobile-money-service provider or account ownership at a financial institution is the dependent variable y .

The impact on Account ownership at a financial institution or with a mobile-money-service provider of the following factors is considered:

X_1 - people using the Internet, % of population;

X_2 - direct foreign investment, net inflows, % of GDP;

X_3 - imports of ICT goods, % total goods imports;

X_4 - research and development expenditure, % of GDP;

X_5 - bank capital to assets ratio, %;

X_6 - borrowers from commercial banks, per 1,000 adults;

y - a mobile-money-service provider or account ownership at a financial institution, % of population ages 15+.

In this study, we assume that there is a multiple linear regression; that is, a mobile-money-service provider or account ownership at a financial institution depends linearly on the selected six factors X_1, X_2, \dots, X_6 . The regression equation has the following form: $y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 + a_6 X_6$, where a_1, a_2, \dots, a_6 are the parameters of the regression equation, subject to evaluation. The evaluation of the regression function was performed using the Excel program.

The regression equation looks like this:

$$y = 4,274 + 0,073x_1 + 0,931x_2 + 0,251x_3 + 1,056x_4 + 0,355x_5 + 0,904x_6$$

This regression model and the multiple correlation coefficient $R = 0,768$ indicates a high closeness of the relationship between the selected factors and a mobile-money-service provider or account ownership at a financial institution.

In the course of the correlation-regression analysis, it was revealed that the main factors determining the variation in the level of the indicator Account ownership at a financial institution or with a mobile-money-service provider in the retrospective period are: people using the Internet; foreign direct investment, net inflows; imports of ICT goods; research and development expenditure; bank capital to assets ratio; borrowers from commercial banks.

Thus, when changing the coefficient x_1 (people using the Internet) by 1% a mobile-money-service provider or account ownership at a financial institution increases slightly by 0,073%; when x_2 (foreign direct investment, net

inflows) increases by 1%, a mobile-money-service provider or account ownership at a financial institution increases by 0,931%; when changing the coefficient x_3 (ICT goods imports) by 1% a mobile-money-service provider or account ownership at a financial institution increases by 0,251%; when the coefficient x_4 (research and development expenditure) is changed by 1%, the resulting indicator increases by 1,056%; when the coefficient x_5 (bank capital to assets ratio) is changed by 1%, the resulting indicator increases by 0,355%; when the coefficient x_6 (borrowers from commercial banks) is changed by 1%, the resulting indicator increases by 0,904%. Thus, in current conditions, the resulting indicator selected for the study of banking informatization of the financial sector, a mobile-money-service provider or account ownership at a financial institution is most influenced by the following indicators: foreign direct investment, net inflows; research and development expenditure; borrowers from commercial banks.

To increase a mobile-money-service provider or account ownership at a financial institution, it should first be paid special attention to foreign direct investment, net inflows, research and development expenditure, borrowers from commercial banks.

In the proposed model, agents form expectations and make investments based on information from the financial sector about the overall state of the economy. Thus, a key feature of the proposed model is that information and macroeconomic indicators are correlated through general sentiment about the overall economy and can create a balance of non-fundamental rational expectations. The analyzed indicators, which reflect the perspective views of most experienced investors, are widely considered a barometer of the aggregate economy.

Discussion

Schelling and Towbin (2022) found that banks that suffered more from negative interest rates offered softer lending terms and provided more than other banks. This result is consistent with risk-taking when a lower policy rate encourages the bank to take risks to maintain profits. Garel, Petit-Romec and Vander Vennet (2022) showed that banks with more significant institutional ownership operate with much higher capital ratios. The results of research by Karakaya, Michalsk and Örsç (2022) show that the channel of banking integration helps shape the country's industrial landscape.

Beutler, Gubler, Hauri and Kaufmann (2021) note that the overall negative impact of changes in interest rates on loan growth is partially muted in periods when uncertainty is extremely low or high. The research of Cappelletti, Reghezza, Rodríguez d'Acra and Spaggiari (2022) shows the interaction between macroprudential and monetary policy, as well as the positive effect of combining two different sets of incentives to maintain banking stability and credit for the real economy. Özlem Dursun-de Neef and Schandlbauer (2022) argue that policies which may affect household spending will lead to changes in the volume of deposits in the banking system, which will affect the supply of credit by banks. Igan, Mirzaei and Moore (2022) argue that pre-crisis capital growth in systemically important financial institutions reduces the profitability of bank shares.

Huynh and Dang (2022) write that the bank's profits increase with the diversification of the loan portfolio in state-owned banks, in contrast to the consequences for private banks. The results of studies by Lee, Wang, Thinh and Xu (2022) show that policymakers should be careful when formulating and implementing climate-related strategies, as they may affect the creation of liquidity, which, in turn, may affect macroeconomic stability.

Thus, this article complements the latest literature, which examines the effect of the relationship between the financial sector and the real side of the economy.

Innovative information technologies play an essential role. When creating the bank of the future, information technologies in the banking services field have the strategic effect of increasing the customer base, reducing the cost of banking operations at the optimal level of operational risk and operating costs. The leading global trends in the development of banking informatization are the close relationship of the bank with the client, the integration of the bank into the IT sector, the interaction of banks with social networks and the involvement of new technologies.

The current stage of banking informatization of the financial sector of the economy has identified trends and directions of the development of financial institutions. Coherence of organizational and planned measures for banking informatization will help increase the level of innovation and performance of the banking and financial sector. Further prospects for developing banking informatization in the financial industry aim to improve the legal framework and data protection and find appropriate cooperation between banks and Fintech companies. Thus, the priority areas of banking informatization of the financial sector of the world economy are improvement, the components development of the above processes, means of informatization and information technology, and their integration. The dynamics of global economic growth in banking informatization of the financial sector is essential.

Conclusions

The study aimed to summarize the existing global trends in banking informatization of the financial sector and assess the impact of macroeconomic indicators. Thus, this paper examines how the financial industry can affect the overall real economy through the information channel. Due to the two-way feedback between the financial and real sectors, a slight shock to financial market sentiment could intensify and have a significant impact on the real economy. A multifactor correlation-regression model of account ownership at a financial institution or with a mobile-money-service provider was built. In this methodological development, the limitations were as follows: selection of the main factors determining the level of account ownership at a financial institution or with a mobile-money-service provider and assessment of their impact on this indicator. In this study, a dependent variable is account ownership at a financial institution or with a mobile-money-service provider. Thus, a vital feature of the proposed model is that information and macroeconomic indicators are correlated through general sentiment about the overall economy and can create a balance of non-fundamental rational expectations. The analyzed indicators, which reflect the perspective views of most experienced investors, are widely considered a barometer of the aggregate economy.

Despite the indicated research limitations, to increase “Account ownership at a financial institution or with a mobile-money-service provider”, managers should first pay special attention to foreign direct investment, net inflows, research and development expenditure, and borrowers from commercial banks.

References

- Adeniran, A. O., Jada, H. M., & Mohammed, N. H. (2020). Impact of information technology on strategic management in the banking sector of Iraq. *Insights into Regional Development*, 2(2), 592-601. [https://doi.org/10.9770/IRD.2020.2.2\(7\)](https://doi.org/10.9770/IRD.2020.2.2(7))
- Aldasoro, I., Ehlers, T., & Eren, E. (2022). Global banks, dollar funding, and regulation. *Journal of International Economics*, 137, 103609. <https://doi.org/10.1016/j.jinteco.2022.103609>
- Altunbas, Y., Marques-Ibanez, D., Leuvensteijn, M., & Zhao, T. (2022). Market power and bank systemic risk: Role of securitization and bank capital. *Journal of Banking & Finance*, 138, 106451. <https://doi.org/10.1016/j.jbankfin.2022.106451>
- Ampudia, M., Skander, J., & Van den Heuvel. (2022). Monetary Policy and Bank Equity Values in a Time of Low and Negative Interest Rates. *Journal of Monetary Economics*, In Press, Corrected Proof. <https://doi.org/10.1016/j.jmoneco.2022.05.006>

- Anagnostopoulos, Y., Husa, K.A., & Noikokyris E. (2022). A three-phase comparative efficiency analysis of US and EU banks. *International Review of Economics & Finance*, 81, 113-127. <https://doi.org/10.1016/j.iref.2022.04.009>
- Auer, R., Matyunina, A., & Ongena, S. (2022). The countercyclical capital buffer and the composition of bank lending. *Journal of Financial Intermediation*, In Press, Corrected Proof. <https://doi.org/10.1016/j.jfi.2022.100965>
- Baik, H., Han, S., Joo, S., & Lee, K. (2022). A bank's optimal capital ratio: A time-varying parameter model to the partial adjustment framework. *Journal of Banking & Finance*, 142, 106548. <https://doi.org/10.1016/j.jbankfin.2022.106548>
- Benhabib, J. Liu, X., & Wang, P. (2016). Sentiments financial markets, and macroeconomic fluctuations. *Journal of Financial Economics*, 120(2), 420-443. <https://doi.org/10.1016/j.jfineco.2016.01.008>
- Bessler, W., & Nohel, T. (2000). Asymmetric information, dividend reductions, and contagion effects in bank stock returns. *Journal of Banking & Finance*, 24(11), 1831-1848. [https://doi.org/10.1016/S0378-4266\(99\)00097-7](https://doi.org/10.1016/S0378-4266(99)00097-7)
- Beutler, T., Gubler, M., Hauri, S., & Kaufmann, S. (2021). Bank lending in Switzerland: Driven by business models and exposed to uncertainty. *International Review of Financial Analysis*, 78, 101927. <https://doi.org/10.1016/j.irfa.2021.101927>
- Billio, M., Getmansky, M., Lo, A.W., & Pelizzon, L. (2012). Econometric measures of connectedness and systemic risk in the finance and insurance sectors. *Journal of Financial Economics*, 104(3), 535-559. <https://doi.org/10.1016/j.jfineco.2011.12.010>
- Cañón, C., Cortés, E., & Guerrero, R. (2022). Bank competition and the price of credit: Evidence using Mexican loan-level data. *International Review of Economics & Finance*, 79, 56-74. <https://doi.org/10.1016/j.iref.2021.11.007>
- Cappelletti, G., Reghezza, A., Rodríguez d'Acari, C., & Spaggiari, M. (2022). Compositional effects of bank capital buffers and interactions with monetary policy. *Journal of Banking & Finance*, 140, 106530. <https://doi.org/10.1016/j.jbankfin.2022.106530>
- Chang, C.-C., Yang, H. (2022). The role of cash holdings during financial crises. *Pacific-Basin Finance Journal*, 72, 101733. <https://doi.org/10.1016/j.pacfin.2022.101733>
- Chen, Y. (2022). Bank interconnectedness and financial stability: The role of bank capital, *Journal of Financial Stability*, 61, 101019. <https://doi.org/10.1016/j.jfs.2022.101019>
- Eisenbach, T. M., Kovner, A., Lee, M.J. (2022). Cyber risk and the U.S. financial system: A pre-mortem analysis. *Journal of Financial Economics*, 145(3). <https://doi.org/10.1016/j.jfineco.2021.10.007>
- Fiordelisi, F., & Scardozzi, G. (2022). Bank funding strategy after the bail-in announcement. *Journal of Corporate Finance*, 74, 102215. <https://doi.org/10.1016/j.jcorpfin.2022.102215>
- Fukuyama, H., Matousek, R., & Tzeremes, N.G. (2022). Bank production with nonperforming loans: A minimum distance directional slack inefficiency approach. *Omega*, 113, 102706. <https://doi.org/10.1016/j.omega.2022.102706>
- Garel, A., Petit-Romec, A., & Vander Vennet, R. (2022). Institutional Shareholders and Bank Capital. *Journal of Financial Intermediation*, 50, 100960. <https://doi.org/10.1016/j.jfi.2022.100960>
- Garcia, A. S., & Meurer, R. (2022). Effects of a development bank on the profitability of commercial banks: Evidence for Brazil. *The Quarterly Review of Economics and Finance*, 85, 246-259. <https://doi.org/10.1016/j.qref.2022.03.008>
- Georgescu, M. & Jefleab, V. (2015). The Particularity of the Banking Information System. *Procedia Economics and Finance*, 20, 268-276. [https://doi.org/10.1016/S2212-5671\(15\)00074-X](https://doi.org/10.1016/S2212-5671(15)00074-X)
- Corbisiero, G. (2022). Bank lending, collateral, and credit traps in a monetary union. *European Economic Review*, 144, 104057. <https://doi.org/10.1016/j.eurocorev.2022.104057>
- Özlem Dursun-de Neef, H., & Schandlbauer, A. (2022). COVID-19, bank deposits, and lending. *Journal of Empirical Finance*, 68, 20-33. <https://doi.org/10.1016/j.jempfin.2022.05.003>

Hrabchuk, O., Kachula, S., Lysiak, L., & Zarutskia O. (2021). Monetary processes peculiarities during the crisis in Ukraine and adjustment of monetary policy. *Financial and Credit Activity: Problems of Theory and Practice*, 6(41), 4-16. <https://doi.org/10.18371/fcaptop.v6i41.251378>

Hu, B., Schclarek, A., Xu, J., & Yan, J. (2022). Long-term finance provision: National development banks vs commercial banks. *World Development*, 158, 105973. <https://doi.org/10.1016/j.worlddev.2022.105973>

Huynh, J., & Dang, V. D. (2022). Exploring the asymmetric effects of loan portfolio diversification on bank profitability. *The Journal of Economic Asymmetries*, 26, e00250. <https://doi.org/10.1016/j.jeca.2022.e00250>

Igan, D., Mirzaei, A., & Moore, T. (2022). Does macroprudential policy alleviate the adverse impact of COVID-19 on the resilience of banks? *Journal of Banking & Finance*, 106419. In Press, Corrected Proof <https://doi.org/10.1016/j.jbankfin.2022.106419>

Index Mundi. <https://www.indexmundi.com/facts/indicators/FX.OWN.TOTL.ZS>

Jankovic, M. (2020). Factors of Electronic Marketing Adoption in Commercial Banks in the Countries of South-Eastern Europe. *Transformations in Business & Economics*, Vol. 19, No 3 (51), 261- 273.

Karakaya, N., Michalsk, T.K., & Örsç, E. (2022). Banking integration and growth: Role of banks' previous industry exposure. *Journal of Financial Intermediation*, 49, 100944 <https://doi.org/10.1016/j.jfi.2021.100944>

Khalatur, S.M. (2015). Mekhanizm adaptatsii ahropromyslovoho kompleksu Ukrainy v umovakh hlobalnoi prodovolchoi problemy [Mechanism of adaptation of agroindustrial complex of Ukraine in the conditions of global food problem]. *Visnyk Dnipropetrovskoho aharnoekonomichnoho universytetu – Bulletin of Dnipropetrovsk Agrarian and Economic University*, 1(55), 114-116 (in Ukrainian)

Velychko, O., Velychko, L., Butko, M., & Khalatur, S. (2019). Modelling of strategic managerial decisions in the system of marketing logistics of enterprise. *Innovative Marketing*, 15(2), 58-70. [http://doi.org/10.21511/im.15\(2\).2019.05](http://doi.org/10.21511/im.15(2).2019.05)

Khalatur, S., Velychko, L., Pavlenko, O., Karamushka, O., & Huba, M. (2021). A model for analyzing the financial stability of banks in the VUCA-world conditions. *Banks and Bank Systems*, 16(1), 182-194. [http://doi.org/10.21511/bbs.16\(1\).2021.16](http://doi.org/10.21511/bbs.16(1).2021.16)

Khalatur, S., Vinichenko, I., & Volovyk, D. (2021). Development of modern business processes and outsourcing activities. *Baltic Journal of Economic Studies*, 7(3), 195-202. <https://doi.org/10.30525/2256-0742/2021-7-3-195-202>

Lee, C.-C., & Wang, C.-W. (2021). Firms' cash reserve, financial constraint, and geopolitical risk. *Pacific-Basin Finance Journal*, 65, 101480. <https://doi.org/10.1016/j.pacfin.2020.101480>

Lee, C.-C., Wang, C.-W., Thinh, B.T., & Xu, Z.-T. (2022). Climate risk and bank liquidity creation: International evidence. *International Review of Financial Analysis*, 82, 102198. <https://doi.org/10.1016/j.irfa.2022.102198>

Liao, H., Chen, T., & Lu, C.-W. (2009). Bank credit risk and structural credit models: Agency and information asymmetry perspectives.. *Journal of Banking & Finance*, 33(8), 1520-1530. <https://doi.org/10.1016/j.jbankfin.2009.02.016>

Mazurek, S. (2021). From Crowdsourcing through Sharing Economy to Platform Economy: Changes in the Perception and Definition of Digital Platforms. *Transformations in Business & Economics*, Vol. 20, No 2B (53B), 1005-1023.

Melecky, M., & Podpiera, A.M. (2020). Financial sector strategies and financial sector outcomes: Do the strategies perform? *Economic Systems*, 44(2) <https://doi.org/10.1016/j.ecosys.2020.100757>

Minesso, M. F., Mehl, A., & Stracca L. (2022). Central bank digital currency in an open economy. *Journal of Monetary Economics*, 127, 54-68. <https://doi.org/10.1016/j.jmoneco.2022.02.001>

Nassar, N., Strielkowski, W. (2022). Transition towards green financial sector for gaining newly perceived competitiveness by adopting a green management model. *Insights into Regional Development*, 9(3), 71-88. [http://doi.org/10.9770/IRD.2022.4.1\(5\)](http://doi.org/10.9770/IRD.2022.4.1(5))

Nevrla, M. (2020). Systemic risk in European financial and energy sectors: Dynamic factor copula approach. *Economic Systems*, 44(4) <https://doi.org/10.1016/j.ecosys.2020.100820>

Ornelas, R.J.H., Soaresdade Silva, M., & Nazar Van Doornik, B.F. (2022). Informational switching costs, bank competition, and the cost of finance. *Journal of Banking & Finance*, 138, 106408. <https://doi.org/10.1016/j.jbankfin.2022.106408>

- Pedrono, J. (2022). The currency channel of the global bank leverage cycle. *Journal of International Money and Finance*, 126, 102652 <https://doi.org/10.1016/j.jimonfin.2022.102652>
- Radavičius, T., & Tvaronavičienė, M. (2022). Digitalisation, knowledge management and technology transfer impact on organisations' circularity capabilities. *Insights into Regional Development*, 4(3), 76-95. [http://doi.org/10.9770/IRD.2022.4.3\(5\)](http://doi.org/10.9770/IRD.2022.4.3(5))
- Rizwan, M. S., Ahmad, G., & Ashraf, D. (2022). Systemic risk, Islamic banks, and the COVID-19 pandemic: An empirical investigation. *Emerging Markets Review*, 51, Part B, 100890 <https://doi.org/10.1016/j.ememar.2022.100890>
- Schelling, T., & T. owbin, P. (2022). What lies beneath - Negative interest rates and bank lending. *Journal of Financial Intermediation*, 51, 100969 <https://doi.org/10.1016/j.jfi.2022.100969>
- Shahhosseini, M. (2022). Capital Requirements and Banks' Behavior: Evidence from Bank Stress Tests. *The Quarterly Review of Economics and Finance*, 86, 240-262. <https://doi.org/10.1016/j.qref.2022.04.001>
- Tian, S., Park, D., & Cagas, M. A. (2021). Bond market development and bank stability: Evidence from emerging markets. *Research in International Business and Finance*, 58, 101498. <https://doi.org/10.1016/j.ribaf.2021.101498>
- Chen, T.-H., Lee, C.-C., & Shen, C.-H. (2022). Liquidity Indicators, Early Warning Signals in Banks, and Financial Crises. *The North American Journal of Economics and Finance*, 62, 101732. <https://doi.org/10.1016/j.najef.2022.101732>
- Vasylieva, N. (2019). Improvement of Agricultural Management: Functional Comparative Approach. *Montenegrin Journal of Economics*, 15(1), 227-238. <https://doi.org/10.14254/1800-5845/2019.15-1.17>
- Velychko, O., Velychko, L. & Ramanauskas, J. (2016). Transformation and development of production-logistics enterprises in Ukrainian agrarian economy. *Management Theory and Studies for Rural Business and Infrastructure Development*, 38(1), 70-87. <https://doi.org/10.15544/mts.2016.7>
- World Bank, database 2021, <http://www.worldbank.org> (Accessed 15.04.2022).
- Xiao, H., Zhao, Y., & Zhou, M. (2022). Can financial factors affect corporate debt leverage convergence? *Pacific-Basin Finance Journal*, 72, 101728 <https://doi.org/10.1016/j.pacfin.2022.101728>
- Xu, Y., Saunders, A., Xiao, B., & Li, X. (2020). Bank relationship loss: The moderating effect of information opacity. *Journal of Banking & Finance*, 118. <https://doi.org/10.1016/j.jbankfin.2020.105872>
- Yuan, T.T., Gu, X.A., Yuan, Y.-M., Lu, J.J., & Ni, B.-P. (2022). Research on the impact of bank competition on stability—Empirical evidence from 4631 banks in US. *Heliyon*, 8(4) <https://doi.org/10.1016/j.heliyon.2022.e09273>
- Yun, Y., & Cho, B. (2022). Does monetary policy affect bank lending to households and firms differently? *Economic Modelling*, 109, 105783. <https://doi.org/10.1016/j.econmod.2022.105783>
- Zou, Y., & Wang, X. (2022). Distance, information and bank lending in China. *Pacific-Basin Finance Journal*, 74, 101793. <https://doi.org/10.1016/j.pacfin.2022.101793>

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DIFFERENCES BETWEEN WEBROOMING AND SHOWROOMING IN TERMS OF SELECTED CONSUMER PERCEPTION FACTORS*

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Abstract. In order to find out whether customers perceive (any) differences between the types of shopping channels (webrooming or showrooming) when it comes to buying clothes and footwear (given the selected factors), the study used the theoretical framework of the Technology Acceptance Model, the theory of Exploratory Consumer Behavior, and other factors (perceived risk, need for touch and feel, and price perception). The study is based on answers of 208 Slovak consumers (elicited on the basis of a questionnaire). By applying a non-parametric test of differences - the Wilcoxon test of two independent samples (Mann-Whitney U test), the study arrived at a conclusion that the differences between shopping channels are not significant when it comes to technology acceptance determinants (TAM determinants). From the point of view of exploratory behavior, the exploratory information seeking dimension turned out to be insignificant. However, the research showed that webroomers prefer exploratory acquisition. The differences between the purchasing channels in terms of other analysed factors also proved to be significant. In all cases, higher tendencies were identified for webrooming. The paper upholds the idea of integrating purchase channels and highlights the need to track the purchase journey of customers who interact with businesses through many different channels and touchpoints, both online and offline. The paper will serve marketers, as a better understanding of the purchasing behavior of customers will help businesses set up more relevant marketing and business strategies, and thus improve their market position. Towards the end, the paper presents business recommendations and suggest possibilities for further research.

Keywords: webrooming; showrooming; omnichannel consumer behaviour; exploratory behaviour; Technology Acceptance Model (TAM)

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1. Introduction

The current retail environment is going through a change due to the rapid expansion of mobile technologies. Mobile applications have also become one of the basic search tools (Hernández-Garrido et al., 2022) and the dependence of individuals on them has been also increased rapidly since the occurrence of Covid-19 pandemic (Fakunle & Ajani, 2021; Dušek & Sagapova, 2022). These technologies give valuable knowledge that is easy to access by their users (Zamir & Kim, 2022). With the expansion of shopping channels available in the market, the way consumers shop has changed significantly. This is evidenced in changes in the way people search for information, compare products and make purchases (Nam & Kannan, 2020). Understanding the ever-changing consumer shopping journey is therefore an important step in meeting shopping expectations of consumers. Today, the way marketers want to sell their products is no longer important as the way consumers want to shop comes to the forefront. The marketing science is now shifting its focus towards specific determinants decisive in choosing the type of shopping channel (Machova & Vochozka, 2019). In this regard, social media channels and other online-digital marketing platforms are crucial for marketing purposes (Civelek et al., 2020; Antosko et al., 2015) including branding and advertising (Ključnikov et al., 2022; Melnikova et al., 2016) since they provide less costly options for their users (Žufan et al., 2020) developing communication quality, and reducing time that they spend for their operations (Tekin & Turhan, 2020). Firms also use new demand forecasting methods to be competitive in changing environments (Kolková & Ključnikov, 2021; Turisová et al., 2021). Using these methods should be reflected in the level of their profit (Vochozka et al., 2019b). To explain this behavior, previous research made use of various models and theories, including other research variables. For example, Rejon-Guardia & Luna-Nevarez (2017) investigated the adoption of showrooming behavior using the theory of planned behavior. Arora & Sahney (2017) proposed a conceptual model of webrooming acceptance based on the technology acceptance model. Mukherjee & Chatterjee (2021) used consumer purchase decision theories in their research to design a model that identifies showrooming and webrooming as a combination of two decisions, in particular channel selection when searching for information and channel selection during purchase. A study by Aw et al. (2021) proposed a comprehensive research model that includes consumer traits (i.e., need to touch, need for interaction, and price comparison), channel-related factors (i.e., online search convenience, perceived usefulness of online reviews, perceived friendliness of a salesperson, and perceived risk of shopping online) and the perception of smart shopping as precursors to webrooming. A study by Huh & Kim (2021) examined the differences between showrooming and webrooming in terms of exploratory behavior. Based on the epistemic theory of curiosity, this study tested a conceptual model delineating two independent variables (i.e., interest and deprivation–curiosity), two mediating variables (i.e., market mavenism, consumer innovativeness), and two dependent variables (i.e., actual showrooming, actual webrooming).

Although previous researchers have tried to best understand the process of choosing a shopping channel, there are still gaps that need to be filled. No studies have yet been conducted that would investigate the behavior of Slovak consumers with regard to switching between online and offline shopping channels. For this reason, an exploratory study based on two theoretical frameworks, similar to Herrero-Crespo's (2021) research, has been proposed. Technology Acceptance Model (TAM) explains how the user accepts the technology. Some researchers also declare the fact that TAM examines how the perceived trust, security and benefits influence individuals' plan to use new tools that are based on new technological developments (Ključnikov et al., 2020a; Petruf et al., 2015). Exploratory Consumer behavior (ECB), in terms of cognitive and sensory stimulation, explains how shoppers select and evaluate information. In addition to these two frameworks, which are widely used in the scientific literature and accepted by researchers, the study also focuses on other variables that may influence the choice of shopping channel - perceived risk, price perception and need for touch and feel. In contrast to the aforementioned analyses, the aim of this study is to find out whether customers prefer certain types of shopping channels when it comes to purchasing products (any type of clothing and footwear). The sample consisted of Slovak consumers. The paper will serve business entities, as a better understanding of the purchasing behavior of customers will help

them set up more relevant marketing and business strategies, and thus improve their market position, increase customer loyalty, conversion rate and bring more sales opportunities at the same time.

The paper consists of several parts. In its first part, the paper presents the theoretical framework of the research, outlines individual researched variables and research assumptions. In the next part, the paper describes data collection process, characterizes the research sample and describes other research methods. In the third part, the paper presents the results of established hypotheses (on the basis of statistical methods). Subsequently, the paper discusses the results and presents implications and suggestions for future research.

2. Theoretical framework and hypothesis development

In the literature, concepts such as showrooming and webrooming are identified as distinct and independent consumer purchasing behaviors (Ailawadi & Farris, 2017; Wolny & Charoensuksai, 2014). According to Mukherjee & Chatterjee (2021), showrooming and webrooming are seen as the result of two different and sequential channel choice decisions. Therefore, consumers with a higher propensity for showrooming or webrooming may show a different attitude when making their decisions. Flavian et al. (2020), characterizes these behaviors as two-phase decision processes that differ in the channels customers use to collect data, research products, and make the purchase. Webrooming is trend in shopping behaviour where consumers search for product information using online channels, but opt to purchase products in brick-and-mortar stores (Awet et al., 2021). On the other hand, showrooming is behavior where search for information in brick-and-mortar stores and then purchase products online (Fiestas & Tuzoiv, 2021; Ziolo et al., 2020). Based on previous studies and based on the theoretical framework of TAM and ECB, the authors of the paper present their own research assumptions in the next chapter.

Technology Acceptance Model (TAM)

The model tries to explain which factors convince users to accept a new technology, for instance using neural networks (Vochozka et al., 2019a, Vochozka et al., 2020). Two main determinants of technology acceptance are: (1) Perceived Usefulness (PU) and (2) Perceived Ease of Use (PEOU). The former refers to the extent to which an individual believes that using a particular system would enhance their job performance, while the latter is defined as the extent to which the user of the technology expects that its use will not require high effort (Davis et al., 1989). Research by Arora & Sahney (2018) confirmed that perceived usefulness has a positive effect on showrooming intentions, while both perceived usefulness and ease of use have a positive yet indirect effect on webrooming (Arora & Sahney 2019). In their study, Blut & Wang (2020) found that consumers engage in webrooming or showrooming only if they believe that the process of purchasing fashion products meets the criteria of “ease of use”. Chimborazo-Azogue et al. (2021) focused on mobile showroomers and hypothesized that mobile showrooming intention will increase when the shopper perceives that using a smartphone contributes to the achievement of shopping trip goals. Herrero-Crespo et al. (2021) also assumed in their research that the use of webrooming / showrooming is determined by the degree to which consumers perceive that this multi-channel shopping is better than single-channel shopping in terms of usefulness and ease of use. Online channels are identified in the literature as search channels offering convenience, ease of navigation, price comparison and tailor-made offers (Dekimpe et al., 2020). Therefore, webroomers, according to Fernández et al. (2018), search and obtain product information online to facilitate the purchase phase in brick-and-mortar stores. Today's empirical strengthening confirms that security is an important multidimensional factor of the quality of society and the life of citizens, which we must systematically investigate, predict, and ensure (Kelemen et al., 2018). In accordance with the TAM model, Arora & Sahney (2019) identified the convenience of online search as an important factor that affects consumers' attitude towards webrooming. Based on the above, the following hypotheses were formulated:

H1: There are statistically significant differences between webrooming and showrooming in perceived usefulness when consumers shop for clothes and footwear.

H2: There are statistically significant differences between webrooming and showrooming in perceived ease of use when consumers shop for clothes and footwear.

Exploratory Consumer Behaviour (ECB)

The authors of this theory are Baumgartner & Steenkamp (1996), who believe that there may be differences in the way consumers search for, select and evaluate information when shopping. For this reason, they defined two dimensions of consumer behavior: (1) Exploratory acquisition of products (EAP) and (2) Exploratory information seeking (EIS). According to the authors, the first dimension is associated with sensory stimulation, suggesting that individuals search for new, complex, surprising, and challenging experiences. They want to try new products more, change merchants they buy products from, and explore new options to avoid routine purchases (Swati & Sandeep, 2012). Research suggests that online channels offer more comprehensive product categories than brick-and-mortar stores, prompting shoppers to search for products online first before heading to brick-and-mortar stores (Kang, 2018). The second dimension reflects cognitive stimulation through acquiring relevant knowledge. In this case, consumers like to browse and watch displays, are interested in advertisements and other promotional materials that provide marketing information (Viejo-Fernandez et al., 2018). It is likely that both types of exploratory behavior support the development of webrooming and showrooming behavior (Herrero-Crespo et al., 2021). In their work, Huh & Kim (2021) researched the differences between showrooming and webrooming in terms of exploratory behavior based on the epistemic theory of curiosity. The results they arrived at suggested that showroomers and webroomers have different characteristics and are driven by different motivational factors. Likewise, Herrero-Crespo et al. (2021) argue that given the characteristics that define webrooming and showrooming, the exploratory behavior has different impact on each of these shopping channels. The decision-making processes of showroomers are less planned than those of webroomers. Research by Viejo-Fernandez et al. (2018) suggests that both dimensions of ECB are found in showrooming, although their relative importance may slightly differ. According to the authors, it is possible that from the point of view of cognitive stimulation, showroomers do not always provide accurate information about the properties of the product, and therefore they project a less consolidated attitude than webroomers. Moreover, the decision-making processes of showroomers are less planned than those of webroomers. It is likely that showroomers will be more intensely attracted by the sensory stimulation of the surroundings when visiting a brick-and-mortar store (Bezès, 2015). Based on the above, the following hypotheses were formulated:

H3: There are statistically significant differences between webrooming and showrooming in exploratory information search when consumers shop for clothes and footwear.

H4: There are statistically significant differences between webrooming and showrooming in exploratory acquisition when consumers shop for clothes and footwear.

Price Perception (PP)

According to Heitz-Spahn (2013), price perception is defined as a consumer's tendency to acquire knowledge about product prices and compare them. Thus, the choice of media and channels in a multi-channel environment is often driven by customers' price expectations (Balakrishnan et al., 2014). Total product cost plays an important factor in channel selection (Trenz, 2015). Research shows that online price comparison sites provide rich market information and influence shoppers' subsequent offline price evaluations, fuelling the growth of web-to-store shopping strategy (Bodur et al., 2015). Other researchers also agree that consumers who are highly price-comparison-oriented will search for information online before purchasing in brick-and-mortar stores, because the Internet makes price comparison easier, faster, and the information obtained facilitates subsequent offline purchase decisions (Flavián et al., 2016; Santos & Goncalves 2019). There is research that confirms that students with a high level of price perception are likely to prefer online shopping (Heitz-Spahn, 2013; Arora et al., 2017). On the other hand, other researchers (Rapp et al., 2015; Rejón-Guardia & Luna-Nevarez, 2017) found that finding

cheaper products online is the main reason why people prefer showrooming. Based on the above, the following hypotheses were formulated:

H5: There are statistically significant differences between webrooming and showrooming in price perception when consumers shop for clothes and footwear. *Need for touch and feel (NTF)*

The need for touch refers to consumers' propensity to evaluate product information through the haptic sensory system (Peck & Childers, 2003). Thus, the need to touch and see the product is a variable that influences channel choice and represents the desire for physical interaction with the product (Jin & Phua, 2015). In the research conducted by Orth et al. (2013), it has been found that many purchase decisions require a higher need for touch and feel when evaluating products (this is impossible when using online channels). In such scenarios, consumers prefer to search for products offline, but these needs do not significantly influence the purchase process itself. Earlier studies suggested that the difficulty of physically evaluating product quality affects online product search and online purchase intention (Frasquet et al., 2015; Chocarro et al., 2013). Therefore, consumers with a high need for touch are likely to switch from online to offline channels during their shopping journey. Researchers explain this by the fact that the purchase goal is more pronounced in the purchase phase (Lester et al., 2006) and therefore the need for physical examination and evaluation of products is dominant in webroomers. Some authors argue that the need for touch is more important when purchasing experiential goods such as clothing, as such goods tend to have characteristics that require more intense or direct inspection (Mukherjee & Chatterjee, 2021; Aw, 2019). Some researchers suggest that customers visit brick-and-mortar stores not only to try products, but also for an emotional and personal shopping experience (Sachdeva & Goel, 2015). While both utilitarian and hedonic aspects are present in various shopping channels, hedonic aspects are increasingly associated with offline shopping and utilitarian with online shopping (Chang et al., 2005). A holistic shopping experience with sensory aspects caused by various sensory stimuli is therefore an advantage offline stores have over online stores (Pookulangara et al., 2011). Based on the above, the following hypotheses were formulated:

H6: There are statistically significant differences between webrooming and showrooming in the need to touch and see the product when consumers shop for clothes and footwear.

Perceived Risk (PR)

Consumers may feel uncertain when purchasing products. Most of the time, consumers perceive financial risk and performance risk (Mohseni et al., 2018). Therefore, overall risk perception determines which shopping channel the consumer will choose (Wang et al., 2016). The concept of perceived risk basically characterizes the expected difference in shopping experiences and goals, as well as potential dissatisfaction with the purchase (Pires et al., 2004). There is a degree of risk involved in online shopping, and this makes it a less attractive shopping channel for risk-averse customers. In general, online shopping has been found to entail a higher risk than offline shopping (Bezès, 2016). Moreover, the perceived risk of online shopping is even more pronounced when shopping for experience goods (Lian & Yen, 2013). If such risk perception is high, consumers tend to intensively search for products online due to the easy availability of information, but are more prone to making the final purchase, due to concerns, offline (Mohseni et al., 2018; Lin et al., 2019). On the other hand, the results of the study by Arora et al. (2017) confirm the role of showrooming as a risk reduction mechanism. The authors explain this by the fact that visiting an offline store helps reduce the uncertainty associated with shopping, because the products can be seen and tried on before making a purchase online. Based on the above, the following hypotheses were formulated:

H7: There are statistically significant differences between webrooming and showrooming in risk perception when consumers shop for clothes and footwear.

3. Methodology

Data collection

The presented research can be characterized as quantitative. The inquiry method was a method of choice for data collection, and a questionnaire was chosen as a research tool. The questionnaire was distributed from February to April 2022 via social networks, by email sent to customers of the selected e-shop, and considering that the research also addresses offline purchases, the data was also collected in person at a shopping center (customers were asked to fill-in a questionnaire, no personal data were collected).

In order to identify factors that motivate consumers to prefer certain types of purchasing process, two types of questionnaires were drawn up. The first questionnaire addressed webrooming while the second addressed showrooming. Table 1 shows an overview of the researched factors and their associated manifest variables, which were modified according to the type of purchasing process. Each questionnaire was divided into two parts. The first part consisted of identification items to better understand the structure of the research sample. The second part of the questionnaire consisted of items focusing on the subjective attitudes of the respondents towards the issue. The questionnaire made use of the 5-point Likert scale (1-strongly disagree, 5-strongly agree).

Table 1. Overview of investigated variables

Factor		Manifest variables	Source
Perceived usefulness (PU)	PU1:	Webrooming/showrooming is very useful when shopping.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PU2:	Webrooming/showrooming makes it easier for me to shop.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PU3:	Webrooming/showrooming makes my shopping process more efficient.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PU4:	Webrooming/showrooming speeds up my shopping process.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
Perceived ease of use (PEOU)	PEOU1:	Webrooming/showrooming is easy for me.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PEOU2:	I can quickly navigate in webrooming/showrooming.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PEOU3:	Webrooming/showrooming does not take much time.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
	PEOU4:	Webrooming/showrooming is not difficult for me.	Herrero-Crespo et al. (2021); Vankatesh et al. (2003)
Exploratory acquisition of products (EAP)	EAP1:	Before shopping in a brick-and-mortar/online store, I search for information about clothing and footwear products online/in a brick-and-mortar store.	Herrero-Crespo et al. (2021); Christodoulides & Michaelidou (2010)
	EAP2:	Before buying clothing and footwear in a brick-and-mortar store/online store, I compare prices in different online/ brick-and-mortar stores.	Herrero-Crespo et al. (2021); Christodoulides & Michaelidou (2010)
Exploratory information seeking (EIS)	EIS1:	I browse clothing and footwear in brick-and-mortar/online stores without having to buy anything.	Herrero-Crespo et al. (2021); Christodoulides & Michaelidou (2010)

	EIS2:	I buy clothing and footwear that I didn't plan to buy before visiting a brick-and-mortar /online store.	Herrero-Crespo et al. (2021) Christodoulides & Michaelidou (2010)
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Perceived risk (PR)	PR1:	When browsing products in a brick-and-mortar/online store, I have difficulty evaluating clothing and footwear (e.g. in terms of the amount of information, product quality, assortment...). That is why I prefer buying products in a brick-and-mortar store/ online.	Mukherjee & Chatterjee (2021)
	PR2:	I prefer to pay in a physical/online store because I have/have no doubts about the safety and feasibility of online payment.	Mukherjee & Chatterjee (2021)
	PR3:	When shopping via the Internet, I feel/do not feel concerned about the security of my personal data and therefore make the final purchase of the product in a brick-and-mortar store/via the Internet.	Mukherjee & Chatterjee (2021)
Price perception (PP)	PP1:	Shopping for clothes and footwear in brick-and-mortar/online stores allows me to save money because I don't have to pay shipping/go anywhere.	Mukherjee & Chatterjee (2021)
	PP2:	Shopping for clothes and shoes in brick-and-mortar/online stores allows me to buy the same or similar products at cheaper prices than shopping in online/brick-and-mortar stores.	Mukherjee & Chatterjee (2021)
	PP3:	I think brick-and-mortar /online stores offer better deals and prices compared to online/ brick-and-mortar stores.	Mukherjee & Chatterjee (2021)
Need for touch and feel (NTF)	NTF1:	When shopping, I like to / I don't need to touch and feel clothes and footwear	Mukherjee & Chatterjee (2021)
	NTF2:	Touching and feeling products before buying clothes and footwear is/isn't important to me.	Mukherjee & Chatterjee (2021)

Source: Personal collection

After the end of the data collection process, data cleansing stage followed (due to the incompleteness or irrelevance of questionnaires). For a more accurate comparison of individual shopping channels, the method of random selection was employed. Thus, each shopping channel is represented by 104 questionnaires. The data were encoded using the MO Excel. Mathematical-statistical methods were processed in STATISTICA 13. The next part of the paper presents the results of descriptive statistics and interprets the results of the analysis of differences. The Shapiro-Wilk test was used to assess the normality of the data distribution. The Mann-Whitney U test was used to assess the differences between the shopping channels in question. Boxplot graphs show the tendencies of the differences.

Research sample

In order to create the research set, the random selection method was used while maintaining a proportional distribution of respondents for each shopping channel. After discarding the incomplete or irrelevant questionnaires, a data set with of n= 104 for each shopping channel, which represents a total research sample of n= 208 respondents, was compiled. In the case of webrooming, the research sample consists of 58% women and 42% men. In the case of showrooming, the research sample consists of 54% women and 46% men. Data on education of the research participants – secondary education (41% webrooming, 50% showrooming) and a university education (59% webrooming, 50% showrooming).

3. Results

The following part of the presented paper assesses the existence of differences between shopping channels (showrooming and webrooming) focusing on the customer perception of the following factors - 1. Technology Acceptance Model, 2. Exploratory Buying Behavior and 3. Selected Purchase Motivations (I. Perceived risk, II. Perceived convenience, III Price perception, IV. Need for touch and feel). The above hypotheses were verified using mathematical and statistical analyzes on a sample of main research data (n=208). The hypotheses were verified in three basic steps. Firstly, the assessment of normality was carried out (the Shapiro-Wilk test). Secondly, the difference test was carried out employing non-parametric tests of differences - the Wilcoxon test of two independent samples (Mann-Whitney U test). Thirdly, the sessions of the investigated variables in which the difference was manifested as statistically significant were identified using box plots and descriptive analysis.

Table 2. The results of the normality test

	Webrooming			Showrooming		
	Statistic	df	Sig.	Statistic	df	Sig.
PU1	0.830368	104	5.87E-10	0.864241	104	2.30E-08
PU2	0.848711	104	2.80E-09	0.872126	104	4.83E-08
PU3	0.871577	104	2.34E-08	0.889557	104	2.76E-07
PU4	0.852547	104	3.94E-09	0.890113	104	2.93E-07
PEOU1	0.843088	104	1.71E09	0.863918	104	2.23E-08
PEOU2	0.828426	104	5.01E-10	0.847204	104	5.04E-09
PEOU3	0.895093	104	2.70E-07	0.892353	104	3.760E-07
PEOU4	0.823750	104	3.43E-10	0.872310	104	4.91E-08
EIS1	0.857251	104	6.03E09	0.777264	104	2.56E-11
EIS2	0.774834	104	9.37E-12	0.804326	104	1.70E-10
EAP1	0.843003	104	1.70E-09	0.747851	104	3.87E-12
EAP2	0.895154	104	2.72E-07	0.821472	104	6.18E-10
PP1	0.879776	104	5.32E-08	0.891077	104	3.24E-07
PP2	0.822562	104	3.12E-10	0.842835	104	3.48E -09
PP3	0.795393	104	3.97E-11	0.858369	104	1.35E -08
NTF1	0.865784	104	1.34E-08	0.873148	104	5.33E-08
NTF2	0.792456	104	3.21E -11	0.757036	104	6.86E -12
PR1	0.858733	104	6.92E-09	0.872269	104	4.90E-08
PR2	0.871290	104	2.28E-08	0.861774	104	1.38E-08
PR3	0.873174	104	2.74E-08	0.881873	104	1.26E-07

Source: Personal collection

Table 2 shows the results of the normality test outputs. In all investigated latent variables, the p-value is less than 0.05, which means that the conditions of normality are not met. Therefore, non-parametric test was carried out for each investigated factor.

Table 3. Results of the test to assess the existence of differences

	Mann-Whitney U	Z	p-value
PU1	551.500	0.838	0.402
PU2	520.000	0.564	0.573
PU3	382.000	0.532	0.595
PU4	276.500	1.694	0.090
PEOU1	267.000	-0.919	0.358
PEOU2	212.000	-1.507	0.132
PEOU3	181.500	1.885	0.059
PEOU4	396.000	-1.462	0.059
EIS1	685.000	-0.512	0.609
EIS2	656.500	0.312	0.755
EAP1	39.500	1.998	0.046
EAP2	71.000	0.439	0.661
PP1	74.500	-2.146	0.032
PP2	304.500	0.417	0.676
PP3	418.000	0.853	0.394
NTF1	124.000	2.648	0.008
NTF2	511.000	-2.479	0.013
PR1	218.500	1.991	0.046
PR2	200.000	0.685	0.493
PR3	131.500	0.907	0.364

Source: Personal collection

Table 3 shows the results of the difference test. If the p-value takes on a value lower than the significance level of 0.05, it is possible to speak of a statistically significant difference. On the basis of the above, it can be concluded that the significant difference between webrooming and showrooming in the latent variable Perceived usefulness (PU) was not manifested in any item. Therefore, H1 is rejected. The same results were observed in the case of Perceived ease of use (PEOU), where in all investigated manifest variables the p-value is > 0.05. Therefore, H2 is rejected. Thus, it could be stated that there is no statistically significant difference between webrooming and showrooming in the perception of ease of use when shopping for clothes and footwear.

The test did not show any statistically significant difference in the Exploratory information seeking (EIS) factor, because the p-value is higher than the level of significance in both variables. Therefore, H3 is rejected. Looking at the XY table, it can be seen that the item EAP_1 acquires the p-value (0.046) lower than the significance level, which indicates that H4 could be accepted. Thus, it could be stated that there is a statistically significant difference between webrooming and showrooming in Exploratory acquisition of products (EAP). Based on the

descriptive analysis and the boxplot graph, it is obvious that the measured value of the median of this item is significantly higher for webrooming.

The results of the difference test showed that the p-value for item PP1 (0.032) takes on a value lower than the significance level of 0.05. Thus, H5 is accepted - there is a statistically significant difference between webrooming and showrooming in Price perception when shopping for clothes and footwear. The median values are the same for both shopping channels, however, the trends indicate that the upper quartile is significantly higher on the side of webrooming.

Differences were also manifested when examining the manifest variables NTF1 (0.008), NTF2 (0.013). Therefore, H7 is accepted, as there is a statistically significant difference in Need for touch and feel. The values of the median as well as the upper and lower quartile in both items indicate a higher need tendency in webroomers than in showroomers.

Differences were also evident when examining the Perceived risk factor. Based on the results of the difference test (the p-value lower than the level of significance for item PR1 (0.046)) H8 is accepted. Differences were shown also for the Perceived risk factor in the PR1 item (0.046), where the median value for webrooming is higher than in the case of showrooming. With regard to the results of the tests, it can be concluded that showroomers have a higher tendency to feel a sense of risk when shopping.

3. Discussion

The results of the analyzes showed that the factors forming the TAM model do not play an important role in the choice of shopping channel in the omnichannel shopping behavior of consumers. Nowadays, consumers seem to be fully integrated with online shopping platforms and have embraced the technology to make better purchasing decisions. Consumers are likely to experience the same purchase benefits when they first search online and then complete the purchase offline, and also when they first go to a brick-and-mortar store to try on a product and then complete the purchase online (for various reasons). In relation to perceived ease of use, the results of the study can be explained by the fact that young people, who made up the majority of the research sample, have no problems working with new technologies (Ključnikov et al., 2020b), because they are not only digitally savvy and motivated to develop their digital capabilities (Civelek & Krajčák, 2022) but also are considered the driving force of online business (Hall et al., 2017; Ladhari et al., 2019) and innovation (Civelek et al., 2021; Ključnikov et al., 2021). With regard to ease of purchase, younger generations do not perceive much difference between shopping online (mobile applications, social networks, etc.). This idea is also supported by the research of Chimborazo-Azogue et al. (2021), in which the authors researched the behaviour of mobile showroomers based on the UTAUT2 model. The results they arrived at showed that variables such as expected performance (as well as perceived usefulness from the TAM model) and expected effort (as well as perceived ease of use from the TAM model) do not lead to showrooming preference. According to the authors, this is probably because it is natural for users to use the technology.

From the point of view of exploratory behavior, it was shown that in the search for information (EIS) the differences in the preferences of individual shopping channels are not significant, which may be caused by the fact that in both types of shopping channels (online and offline), consumers perceive certain (although different) advantages. However, when it comes to sensory stimulation (a variable related to exploratory acquisition), the results indicate that the tendencies are higher on the side of webroomers. Thus, it appears that consumers who like to search for products they are not yet familiar with, those that are willing to try new products, those appreciative of variety in product selection, and those willing to change their shopping behavior in order to achieve stimulating consumer experiences will search for products online but, quite surprisingly, will make the actual purchase in offline stores. For this type of consumers, retailer advice and consumer services play a significant role (Bezes,

2015). Research by Herrero-Crespo et al. (2021), however, demonstrated important differences between webrooming and showrooming shopping behavior in both dimensions of exploratory consumer behavior. The results of their study also showed that consumers were more prone to search for product information while webrooming

The research showed that consumers reporting a higher level of perceived risk when shopping tend to prefer webrooming. Such consumers probably feel more confident when they use online platforms to search for product information, but make the actual purchase offline. Also, previous research has found that consumers who fear the misuse of their personal and financial information when shopping online tend to exhibit more webrooming behavior (Frasquet et al., 2015). In addition, consumers reporting a high level of risk perception develop a distrust of online merchants and therefore tend to purchase products from brick-and-mortar stores (Ahmad & Sun, 2018; Hassan & Lee, 2021) or transport services (Stehel & Vochozka, 2016). This phenomenon can also be explained by the fact that consumers shopping offline prefer touching goods before the purchase as well as the sense of immediate ownership, socialization and assistance from sales staff (thus reducing uncertainty and eventual dissatisfaction with the purchase).

Further results of our study indicate that the need for touch and feel also plays a significant role in choosing a shopping channel, with higher tendencies measured for webrooming. Research by Mukherjee & Chatterjee (2021) found that people with a higher need for touch and feel tend to search for products more offline (in the showrooming mode). However, results of their study did not prove any significant effect on channel choice (not even when making the actual purchase). Therefore, understanding at which stage of the purchase journey a consumer feels the need to touch a product seems key - whether it is in the phase product information gathering phase or in the phase where the consumer has already decided to buy the product but wants to make sure that his choice is right. Some research, contrary to the results presented hereunder, suggests that consumers verify product characteristics using touch and feel in showrooming because it is difficult to do “product diagnosis” offline (Balakrishnan et al., 2014; Arora et al., 2017).

The differences between webrooming and showrooming were also shown in relation to price perception. In this case, it has been found that the higher tendencies were found for webrooming, mainly due to the fact that if the consumer searches for the product online but buys it offline, he saves the shipping costs. However, the results of previous studies are contradictory. Flavián et al. (2020) found that when consumers are motivated to save money, they prefer showrooming. It is also generally known that prices in brick-and-mortar stores are higher than prices in online stores. Therefore, consumers are expected to be reluctant to webroom and instead complete their shopping journey online, i.e. in showrooming mode (Aw, 2019; Manss et al., 2019).

Conclusions and Implications

Theoretical implications

The phenomenon of webrooming and showrooming, as part of omnichannel shopping behavior, are currently gaining popularity among consumers. The presence and availability of multiple contact points throughout the customer's shopping journey enables the customer to enjoy a simpler, smoother and more attractive product search process, as well as the actual purchase. The results of the research hereunder showed that the differences between purchase channels (webrooming vs. showrooming) are not significant in terms of the determinants of Technology Acceptance Model. From the perspective of the theory of Exploratory Consumer Behavior, the exploratory information seeking dimension also appears to be insignificant. However, in the case of exploratory acquisition, it was found that webroomers showed higher preferences. With regard to the factors “perceived risk, need for touch and feel, and price perception”, the differences between the purchase channels proved to be significant, while in all cases they proved to be more pronounced in webrooming.

These results may also be affected by the ongoing COVID-19 pandemics – at the time of data collection, COVID-19-related restrictions were being gradually lifted and people were returning to brick-and-mortar stores to browse clothing and footwear. During the periods of strict lockdowns, consumers got used to the fact that the only way to buy clothing and footwear is to shop online. We believe that as a result of the pandemic, the trend of searching for products on the Internet will continue. However, after anti-pandemic measures and restrictions were lifted, people wanted to satisfy their need to touch and feel products and took brick-and-mortar stores by storm. For that reason, webrooming prevailed in terms of omnichannel behavior. Thanks to the employment of TAM model and the ECB theory, this research offers information that will be helpful in the field of omnichannel shopping behavior of Slovak consumers. The results research hereunder arrived at support the findings of previous research in the field.

Managerial implications

Several managerial implications also emerge from the research results. It is generally known that consumers today are not limited to online or offline channels, but obtain information and purchase products using both sources, which means that the shopping process is becoming increasingly fragmented, blurring the lines between online and offline channels. Merchants should therefore offer their customers a holistic, or "phygital" (i.e. physical and digital) shopping experience. In order to attract customers to brick-and-mortar stores, merchants should make benefits of the online stores available directly in brick-and-mortar stores. Implementation of new technologies, such as interactive panels, tablets, free Wi-Fi connection, etc., might be key to ensuring this. The same applies to online merchants. Online merchants should make more use of technologies based on artificial intelligence to eliminate the lack of physical contact with the product. Haptic technologies such as 3D product photos, videos, virtual or augmented reality are great tools that can improve the interactive shopping experience, reduce the perceived risk of online shopping, and thus influence the behavior of webroomers.

Limitations and future research

The research presented hereunder has several limitations that must be taken into account when interpreting the results. As has already been stated, the research is of cross-sectional nature. The initial euphoria associated with lifting anti-pandemic restrictions has already passed, and consumers are slowly getting back to the so-called new normal, that is online shopping. Another limitation of the research is the statistical methods used, as these only assessed the existence of differences between two shopping channels, but may not sufficiently reflect the actual behavior of consumers in connection with switching between online and offline shopping channels. Due to the lower number of observations and the non-representative research sample, it is not possible to generalize the research results to the entire population of Slovakia. The results can only be applied to research participants and the so-called experience products (fashion).

These limitations indicate the need to deepen scientific knowledge in this field. In future, the research will focus on examining the preferences of purchase channels and touchpoints in the post-pandemic period. The aim of the research is to explore and find out whether trends that were popular during the pandemic period remain valid or whether the purchase journey has changed once more. In an effort to better explain consumer purchasing behavior and switching between purchasing channels, future research will investigate at which stage of the purchasing journey the consumer feels the need to touch the product - whether it is in the phase product information gathering phase or in the phase where the consumer has already decided to buy the product but wants to make sure that his choice is right.

References

- Ahmad, W., & Sun, J. (2018). Modeling consumer distrust of online hotel reviews. *International Journal of Hospitality Management*, 71, 77-90. <https://doi.org/10.1016/j.ijhm.2017.12.005>
- Ailawadi, K. L., & Farris, P. W. (2017). Managing multi-and omni-channel distribution metrics and research directions. *Journal of Retailing*, 93(1), 120-135. <https://doi.org/10.1016/j.jretai.2016.12.003>
- Antosko, M., Korba, P., & Sabo, J. (2015). One runway airport separations. Informatics, geoinformatics and remote sensing, SGEM 2015. International Multidisciplinary Scientific GeoConference-SGEM, pp. 241-248.
- Arora, S., Singha, K., & Sahney, S. (2017). Understanding consumer's showrooming behaviour: extending the theory of planned behavior. *Asia Pacific Journal of Marketing and Logistics*, 29(2), 409-431. <https://doi.org/10.1108/APJML-06-2016-0111>
- Arora, S., & Shaney, S. (2018). Antecedents to consumers showrooming behaviour: an integrated TAM-TPB framework. *Journal of Consumer Marketing*, 35(4), 438-450. <https://doi.org/10.1108/JCM-07-2016-1885>
- Arora, S., & Sahney, S. (2019). Examining consumers' webrooming behavior: an integrated Approach. *Marketing Intelligence and Planning*, 37(3), 339-354. <https://doi.org/10.1108/MIP-05-2018-0152>
- Aw, E.C. (2019). Understanding the webrooming phenomenon: Shopping motivation, channel-related benefits and costs. *International Journal of Retail & Distribution Management*, 42(12), 65-83. <https://doi.org/10.1108/IJRDM-01-2019-0026>
- Aw, E.C.X., Basha, N.K., Ng, S.I., & Ho, J.A. (2021). Searching online and buying offline: understanding the role of channel-, consumer-, and product-related factors in determining webrooming intention. *Journal of Retailing and Consumer Services*, 58, 102328. <https://doi.org/10.1016/j.jretconser.2020.102328>
- Balakrishnan, A., Sundaresan, S., & Zhang, B. (2014). Browse-and-switch: retail-online competition under value uncertainty. *Production and Operations Management*, 23(7), 1129-1145. <https://doi.org/10.1111/poms.12165>
- Baumgartner, H., & Steenkamp, J.B.E.M. (1996). Exploratory consumer buying behavior: conceptualization and measurement. *International Journal of Research in Marketing*, 13(2), 121-137. [https://doi.org/10.1016/0167-8116\(95\)00037-2](https://doi.org/10.1016/0167-8116(95)00037-2)
- Bezes, C. (2015). Identifying central and peripheral dimensions of store and website image: applying the elaboration likelihood model to multichannel retailing. *Journal of Applied Business Research*, 31(4), 14-53. <https://doi.org/10.19030/jabr.v31i4.9362>
- Bodur, H.O., Klein, N.M., & Arora, N. (2015). Online price search: impact of price comparison sites on offline price evaluations. *Journal of Retailing*, 91(1), 125-139. <https://doi.org/10.1016/j.jretai.2014.09.003>
- Blut, M., & Wang, C. (2020). Technology readiness: a meta-analysis of conceptualizations of the construct and its impact on technology usage. *Journal of the Academy of Marketing Science*, 48, 649-669. <https://doi.org/10.1007/s11747-019-00680-8>
- Chang, M.K., Cheung, W., & Lai, V.S. (2005). Literature derived reference models for the adoption of online shopping. *Information & Management*, 42, 543-559. <http://dx.doi.org/10.1016/j.im.2004.02.006>
- Chimborazo-Azogue, L.E., Frasset, M., Molla-Descals, A., & Miquel-Romero, M.J. (2021). Understanding Mobile Showrooming Based on a Technology Acceptance and Use Model. *Sustainability*, 13(13), 7288. <https://doi.org/10.3390/su13137288>
- Chocarro, R., Cortiñas, M., & Villanueva, M. L. (2013). Situational variables in online versus offline channel choice. *Electronic Commerce Research and Applications*, 12(5), 347-361. <https://doi.org/10.1016/j.elerap.2013.03.004>
- Christodoulides, G., Michaelidou, N. (2010). Shopping motives as antecedents of e-satisfaction and e-loyalty. *Journal of Marketing Management*, 27(1-2), 181-197. <https://doi.org/10.1080/0267257X.2010.489815>
- Civelek, M., Gajdka, K., Světlík, J., & Vavrečka, V. (2020). Differences in the usage of online marketing and social media tools: evidence from Czech, Slovakian and Hungarian SMEs. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(3), 537-563. <https://doi.org/10.24136/eq.2020.024>

- Civelek, M., Ključnikov, A., Fialova, V., Folvarčnà, A., & Stoch, M. (2021). How innovativeness of family-owned SMEs differ depending on their characteristics? *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(2), 413-428. <https://doi.org/10.24136/eq.2021.015>
- Civelek, M., & Krajčík, V. (2022). How do SMEs from different countries perceive export impediments depending on their firm-level characteristics? System approach. *Oeconomia Copernicana*, 13(1), 55-78. <https://doi.org/10.24136/oc.2022.002>
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-339. <https://doi.org/10.2307/249008>
- Dekimpe, M. G., Geyskens, I., & Gielens, K. (2020). Using technology to bring online convenience to offline shopping. *Marketing Letters*, 31, 25-29. <https://doi.org/10.1007/s11002-019-09508-5>
- Dušek, R. & Sagapova, N. (2022). Instagram Use among Czech Young Generation during COVID-19 Lockdown Period with Restricted Travel and Services. *Journal of Tourism and Services*, 24(13), 150-163. <https://doi.org/10.29036/jots.v13i24.350>
- Fernández, N. V., Pérez, M. J. S., & Vázquez-Casielles, R. (2018). Webroomers versus showroomers: Are they the same? *Journal of Business Research*, 92, 300-320. <https://doi.org/10.1016/j.jbusres.2018.08.004>
- Fiestas, J.C., & Tuzovic, S. (2021). Mobile-assisted showroomers: understanding their purchase journey and personalities. *Journal of Retailing and Consumer Services*, 58, 102280. <https://doi.org/10.1016/j.jretconser.2020.102280>
- Flavian, C., Gurrea, R., & Orus, C. (2020). Combining channels to make smart purchases: the role of webrooming and showrooming. *Journal of Retailing and Consumer Services*, 52, 101923. <https://doi.org/10.1016/j.jretconser.2019.101923>
- Flavián, C., Gurrea, R., & Orús, C. (2016). Choice confidence in the webrooming purchase process: The impact of online positive reviews and the motivation to touch. *Journal of Consumer Behaviour*, 15(5), 459-476. <https://doi.org/10.1002/cb.1585>
- Frasquet, M., Ruiz-Molina, M. E., & Molla-Descals, A. (2015). The role of the brand in driving online loyalty for multichannel retailers. *International Review of Retail, Distribution and Consumer Research*, 25(5), 490-502. <https://doi.org/10.1080/09593969.2015.1081100>
- Fakunle, S. O., & Ajani, B. K. (2021). Peculiarities of ICT adoption in Nigeria. *Insights into Regional Development*, 3(4), 51-61. [http://doi.org/10.9770/IRD.2021.3.4\(4\)](http://doi.org/10.9770/IRD.2021.3.4(4))
- Hall, A., Towers, N., & Shaw, D.R. (2017). Understanding how millennial shoppers decide what to buy: digitally connected unseen journeys. *International Journal of Retail & Distribution Management*, 45(5), 498-517. <https://doi.org/10.1108/IJRDM-11-2016-0206>
- Hassan, M., & Lee, G. (2021). Online payment options and consumer trust: determinants of e-commerce in Africa. *International Journal of Entrepreneurial Knowledge*, 9(2), 1-13. <https://doi.org/10.37335/ijek.v9i2.121>
- Heitz-Spahn, S. (2013). Cross-channel free-riding consumer behavior in a multichannel environment: an investigation of shopping motives, sociodemographics and product categories. *Journal of Retailing and Consumer Services*, 20(6), 570-578. <https://doi.org/10.1016/j.jretconser.2013.07.006>
- Hernández-Garrido, R., Perea, D. & Pérez-Calañas, C. (2022). The vision of the main mobile apps related to caravanning: an analysis of the reviews focusing on users and developers. *Journal of Tourism and Services*, 24(13), 1-25. <https://doi.org/10.29036/jots.v13i24.360>
- Herrero-Crespo, A., Viejo-Fernández, N., Collado-Agudo, J., & Sanzo Pérez, M.J. (2022). Webrooming or showrooming, that is the question: explaining omnichannel behavioural intention through the technology acceptance model and exploratory behaviour. *Journal of Fashion Marketing and Management*, 26(3), 401-419. <https://doi.org/10.1108/JFMM-05-2020-0091>
- Huh, J., & Kim, H. Y. (2021). Showrooming versus webrooming: Examining motivational differences in omnichannel exploratory behaviors. *International Review of Retail, Distribution and Consumer Research*. In press. <https://doi.org/10.1080/09593969.2022.2048413>
- Jin, S. V., & Phua, J. (2015). The moderating effect of computer users' autotelic need for touch on brand trust, perceived brand excitement, and brand placement awareness in haptic games and in-game advertising (IGA). *Computers in Human Behavior*, 43, 58-67. <https://doi.org/10.1016/j.chb.2014.10.035>
- Kang, J.Y.M. (2018). Showrooming, webrooming, and user-generated content creation in the omnichannel era. *Journal of Internet Commerce*, 17(2), 145-169. <https://doi.org/10.1080/15332861.2018.1433907>

Kelemen, M., & Jevčák, (2018). Security Management Education and Training of Critical Infrastructure Sectors' Experts, 2018 XIII International Scientific Conference - New Trends in Aviation Development (NTAD), 2018, pp. 68-71. <https://doi.org/10.1109/NTAD.2018.8551687>

Ključnikov, A., Civelek, M., Polách, J., Mikoláš, Z., & Banot, M. (2020a). How do security and benefits instill trustworthiness of a digital local currency? *Oeconomia Copernicana*, 11(3), 433-465. <https://doi.org/10.24136/oc.2020.018>

Ključnikov, A., Civelek, M., Vozňáková, I., & Krajčík, V. (2020b). Can discounts expand local and digital currency awareness of individuals depending on their characteristics? *Oeconomia Copernicana*, 11(2), 239-266. <https://doi.org/10.24136/oc.2020.010>

Ključnikov, A., Civelek, M., Fialova, V., & Folvarčnā, A. (2021). Organizational, local, and global innovativeness of family-owned SMEs depending on firm-individual level characteristics: evidence from the Czech Republic. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(1), 169-184. <https://doi.org/10.24136/eq.2021.006>

Ključnikov, A., Civelek, M., Klimeš, C., & Farana, R. (2022). Export risk perceptions of SMEs in selected Visegrad countries. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 17(1), 173-190. <https://doi.org/10.24136/eq.2022.007>

Kolková, A., & Ključnikov, A. (2021). Demand forecasting: an alternative approach based on technical indicator Pbands. *Oeconomia Copernicana*, 12(4), 863-894. <https://doi.org/10.24136/oc.2021.028>

Ladhari, R., Gonthier, J., & Lajante, M. (2019). Generation Y and online fashion shopping: Orientations and profiles. *Journal of Retailing and Consumer Services*, 48, 113-121. <https://doi.org/10.1016/j.jretconser.2019.02.003>

Lester, D. H., Forman, A. M., & Loyd, D. (2006). Internet shopping and buying behavior of college students. *Services Marketing Quarterly*, 27(2), 123-138. https://doi.org/10.1300/J396v27n02_08

Lian, J. W., & Yen, D. C. (2013). To buy or not to buy experience goods online: Perspective of innovation adoption barriers. *Computers in Human Behavior*, 29(3), 665-672. <https://doi.org/10.1016/j.chb.2012.10.009>

Lin, X., Featherman, M., Brooks, S. L., & Hajli, N. (2019). Exploring gender differences in online consumer purchase decision making: An online product presentation perspective. *Information Systems Frontiers*, 21 (5), 1187-1201. <https://doi.org/10.1007/s10796-018-9831-1>

Machova, V., & Vochozka, M. (2019). Analysis of business companies based on artificial neural networks. In J. Horak (Ed.), *Innovative economic symposium 2018 – Milestones and trends of world economy (IES2018)* (61). VSTE. <https://doi.org/10.1051/shsconf/20196101013>

Manss, R., Kurze, K., & Bornschein, R. (2019). What drives competitive webrooming? The roles of channel and retailer aspects. *The International Review of Retail, Distribution and Consumer Research*, 53(3), 1-33. <https://doi.org/10.1080/09593969.2019.1687104>

Melnikova, L., Cibereova, J., & Korba, P. (2016). Building a training airport for pilots. Informatics, geoinformatics and remote sensing conference proceedings, SGEM 2016. 16th International Multidisciplinary Scientific Geoconference (SGEM 2016), 109-116.

Mohseni, S., Jayashree, S., Rezaei, S., Kasim, A., & Okumus, F. (2018). Attracting tourists to travel companies' websites: the structural relationship between website brand, personal value, shopping experience, perceived risk and purchase intention. *Current Issues Tourism*, 21(6), 616-645. <https://doi.org/10.1080/13683500.2016.1200539>

Mukherjee, S., & Chatterjee, S. (2021). Webrooming and showrooming: a multi-stage consumer decision process. *Marketing Intelligence & Planning*, 39(5), 649-669. <https://doi.org/10.1108/MIP-08-2020-0351>

Nam, H., & Kannan, P.K. (2020). Digital Environment in Global Markets: Cross-Cultural Implications for Evolving Customer Journeys. *Journal of International Marketing*, 28(1), 28-47. <https://doi.org/10.1177/1069031X19898767>.

Orth, U. R., Bouzdine-Chameeva, T., & Brand, K. (2013). Trust during retail encounters: A touchy proposition. *Journal of Retailing*, 89(3), 301-314. <https://doi.org/10.1016/j.jretai.2013.02.002>

Peck, J., & Childers, T. L. (2003). Individual differences in haptic information processing: the need for touch scale. *Journal of Consumer Research*, 30(3), 430-442. <https://doi.org/10.1086/378619>

Petruf, M., Korba, P., & Kolesár, J. (2015). Roles of logistics in air transportation. *NAŠE MORE: znanstveni časopis za more i pomorstvo*, 62(3), 215-218. <https://doi.org/10.17818/NM/2015/SI23>

- Pires, G., Stanton, J., & Eckford, A. (2004). Influences on the perceived risk of purchasing online. *Journal of Consumer Behaviour*, 4(2), 118-131. <https://doi.org/10.1002/cb.163>
- Pookulangara, S., Hawley, J., & Xiao, G. (2011). Explaining multi-channel consumers' channel migration intention using theory of reasoned action. *International Journal of Retail & Distribution Management*, 39(3), 183-202. <https://doi.org/10.1108/09590551111115024>
- Rapp, A., Baker, T.L., Bachrach, D.G., Ogilvie, J., & Beitelspacher, L.S. (2015). Perceived Consumer Showrooming Behavior and the Effect on Retail Salesperson Self-efficacy and Performance. *Journal of Retailing*, 91(2), 358-369. <https://doi.org/10.1016/j.jretai.2014.12.007>
- Rejon-Guardia, F., & Luna-Nevarez, C. (2017). Showrooming" in consumer electronics retailing: an empirical study. *Journal of Internet Commerce*, 16(2), 174-201. <https://doi.org/10.1080/15332861.2017.1305812>
- Sachdeva, I., & Goel, S., 2015. Retail store environment and customer experience: a Paradigm. *Journal of Fashion Marketing and Management*, 19(3), 290-298. <https://doi.org/10.1108/JFMM-03-2015-0021>
- Santos, S., & Gonçalves, H.M. (2019). Multichannel consumer behaviors in the mobile environment: using fsQCA and discriminant analysis to understand webrooming motivations. *Journal of Business Research*, 101, 757-766. <https://doi.org/10.1016/j.jbusres.2018.12.069>
- Swati, K., & Sandeep, S. (2012). Study on the three-way influence of self-concept, ethnocentrism and impulsiveness on consumer's exploratory tendencies. *Asian Journal of Management Research*, 3(1), 139-152.
- Stehel, V., & Vochozka, M. (2016). The Analysis of the Economical Value Added in Transport. *Nase more*, 63(3), 185-188. <https://doi.org/10.17818/NM/2016/SI20>
- Tekin, Ö. A., & Turhan, A. A. (2020). Does Social Media Addiction Differ by Personality Traits? A Study on Undergraduate Tourism Students. *Journal of Tourism and Services*, 22(12), 23-41. <https://doi.org/10.29036/jots.v12i22.220>
- Trenz, M. (2015). *Multichannel Commerce: A consumer perspective on the integration of physical and electronic channels*. Switzerland: Springer.
- Turisová, R., Pačaiová, H., Kotianová, Z., Nagyová, A., Hovanec, M., & Korba, P. (2021). Evaluation of eMaintenance Application Based on the New Version of the EFQM Model. *Sustainability*, 13, 3682. <https://doi.org/10.3390/su13073682>
- Venkatesh, V., Morris, M.G., Davis, G.B., & Davis, F.D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27(3), 425-478. <https://doi.org/10.2307/30036540>
- Vochozka, M., Horak, J., & Suler, P. (2019a). Equalizing Seasonal Time Series Using Artificial Neural Networks in Predicting the Euro-Yuan Exchange Rate. *Journal of Risk and Financial Management*, 12(2). <https://doi.org/10.3390/jrfm12020076>
- Vochozka, M., Rowland, Z., & Suler, P. (2019b). The specifics of valuating a business with a limited lifespan. *Ad Alta – Journal of Interdisciplinary Research*, 9(2), 339-345.
- Vochozka, M., Vrbka, J., & Suler, P. (2020). Bankruptcy or Success? The Effective Prediction of a Company's Financial Development Using LSTM. *Sustainability*, 12(18). <https://doi.org/10.3390/su12187529>
- Viejo-Fernandez, N., Sanzo-Perez, M.J., & Vazquez-Casielles, R. (2018). Webroomers versus showroomers: are they the same?. *Journal of Business Research*, 92, 300-320. <https://doi.org/10.1016/j.jbusres.2018.08.004>
- Wang, Y. M., Lin, H. H., Tai, W. C., & Fan, Y. L. (2016). Understanding multi-channel research shoppers: an analysis of Internet and physical channels. *Information Systems and e-Business Management*, 14(2), 389-413. <https://doi.org/10.1007/s10257-015-0288-1>
- Wolny, J., & Charoensuksai, N. (2014) Mapping customer journeys in multichannel decision-making. *Journal of Direct, Data and Digital Marketing Practice*, 15(4), 317-326. <https://doi.org/10.1057/dddmp.2014.24>
- Zamir, Z., Kim, D. (2022). The Effect of Quality Dimensions of Information Systems on Knowledge Sharing and User Satisfaction. *International Journal of Entrepreneurial Knowledge*, 10(1), 1-19. <https://doi.org/10.37335/ijek.v10i1.153>
- Zioło, M., Kluza, K., Kozuba, J., Kelemen, M., Niedzielski, P., & Zinczak, P. (2020). Patterns of Interdependence between Financial Development, Fiscal Instruments, and Environmental Degradation in Developed and Converging EU Countries. *Int. J. Environ. Res. Public Health*, 17, 4425. <https://doi.org/10.3390/ijerph17124425>

Žufan, J., Civelek, M., Hamarneh, I., Kmeco, L. (2020). The Impacts of Firm Characteristics on Social Media Usage of SMEs: Evidence from the Czech Republic. *International Journal of Entrepreneurial Knowledge*, 8(1), 102-113. <https://doi.org/10.37335/ijek.v8i1.111>

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UNEMPLOYMENT IN THE CONTEXT OF MINIMUM WAGE CONCEPT IN SLOVAKIA^{*}

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Abstract. The aim of study is to identify an impact of the minimum wage concept on the unemployment rate in Slovakia from 1993 to 2020. Linear regression tests an impact of the Kaitz index, minimum wage and living wage rate, GDP, unemployment rate of people with basic education and progressive taxation. In case the minimum wage increase is less profound than the average wage increase, and a difference between the minimum wage and the living wage is being continually deepened, then the unemployment rate may be decreased. The Slovak unemployment rate may decrease by the GDP growth and by decreasing the number of citizens with basic education.

Keywords: minimum wage; unemployment rate; the Kaitz index; linear regression

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JEL Classifications: A13, C32, C51, E24, J38, J64

1. Introduction

The minimum wage has been a topic of numerous economic studies, which led to contradictory results since the 19th century. Even at present, opinions of many economists differ when considering to what extent the minimum wage impacts unemployment, efficiency of labour market and/or social security of workers (Chytilová & Frejlich, 2020). Innovative approaches have also been implemented by business (Kolková & Ključnikov, 2021; Ključnikava, 2022) and by governments to minimize unemployment issues in various markets (Ključnikov et al.,

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2020a; Ključnikov et al., 2020b). Standard economic theory describes the minimum wage as a certain form of rigidity in labour market (Mankiw, 2010; Bartókova & Gontkovičová, 2014; Přívara, 2019a,b; Přívara & Rievajová, 2021). There exist many studies about minimum wage and its impact on employment. Various authors show that the minimum wage has a negative impact on employment, especially in terms of young employees without any practice and low-qualified employees (Currie & Fallick, 1996; Neumark & Wascher, 2007; Herr et al, 2009; Neumark et al; 2009; Gontkovičová et al., 2015; Štefančík et al. 2021; Ighoshemu, & Ogidiagba, 2022). However, an effect may be statistically significant in certain sectors with a higher rate of low-qualified job positions (for example, fast-food restaurants in Neumark & Wascher, 2000), while it may differ depending on how mature is economy of a particular region (for example, construction sector in West and East Germany in König & Möller, 2007). Possible wage reduction due to the inflow of cheap labour force.

On the other hand, Card and Krueger (1994) find a positive relation between minimum wage increase and employability. Similar opinion presents also Novak et al. (2016). However, inflow of cheap labour such as migration of foreign people causes decreases in wages (Přívarová et al., 2022). Since there is an increasing trend in a rising official migrant population in Slovakia (Přívara & Kiner, 2020), this fact might also affect unemployment rate of this country. Schmitt (2013) states that the minimum wage may also have a positive impact on employment due to higher rate of work motivation on labour supply side. High work motivation also increases commitment of employees to their firms where they work (Cizreliogullari & Babayiğit, 2022). In general, Schmitt (2013) believes that a slight increase of the minimum wage has none or only a small impact on a total employment. Many studies determined insignificant and/or no effects on employment after the minimum wages increase (Card, 1992; Card & Krueger, 1995; Card & Krueger, 1998; Card & Krueger, 2000; Dickens & Draca, 2005). Other studies are focused on the minimum wages in specific sectors (Machova & Vochozka, 2019, Bartos et al., 2021, Vochozka, Rowland & Vrbka, 2016, Rowland et al. 2021). Stehel, Horak and Vochozka (2019) describe situation in agricultural sector, where the motivation is based mainly on family heritage. Very special situation is in mining industry. It is combination of higher minimum wages, early retirement and others (Vochozka et al. 2021, Vochozka et al. 2020a). Minor effect of the minimum wage on employment may be explained by the fact that many employers search for various channels how to compensate increased labour costs. Solution would be for example, reduced working-time, limitation of non-monetary benefits, reduction of their profits, or reduction in remuneration of those employees with higher wages (Schmitt, 2013). However, Vochozka et al. (2020b) identified correlation between minimum wage and company profitability. Reducing of staff turnover would represent one of many other channels. Consequently, it may lead to a slowdown in job creation in some specific sectors, especially for young people. However, there will not be an immediate negative effect on a total employment (Meer and West, 2013; Grumstrup et al., 2021; Kabir, 2021; Galstyan, Grabowska & Bačiulienė, 2021). Employers may reflect the minimum wage increase into higher prices for consumers (see minimum wage increase in Hungary according to Harasztosi and Lindner, 2019). It is evident that there does not exist any clear and quantitatively relevant relationship between minimum wage development and employment. Many empirical studies conclude that higher minimum wages compress wage structure and change income distribution. Low-paid and less-qualified workers make profit from a higher minimum wage and the minimum wage increase reduces poverty to a certain extent (Card & Krueger, 1995; Dolado et al., 2000; König & Moller, 2007; Sahoo & Pradhan, 2021; Vorobeve & Dana, 2021, Kliuchnikava, 2022).

The study aims at identifying an impact of the minimum wage concept on the unemployment rate in Slovakia from 1993 – 2020. However, the authors do not deny different situation abroad, for example different minimum wage, different unemployment ratio or different exchange rate (Vochozka, Horak & Suler, 2019). Present research indicates that there does not exist any unequivocal agreement with regard to minimum wage impact on labour supply for the unemployed in the labour market. Conclusions of numerous studies differ across the countries as a consequence of differences in the labour market and institutional differences. This study aims at researching the minimum wage impact on the unemployment rate in the context of significant variables, such as average wage and living minimum wage that influence the Slovak labour market. Similarly, it examines the GDP level, the

unemployed rate with basic education and the application of tax policy by means of progressive taxation. The use of the Kaitz index, that is frequently used in many foreign studies on this topic, is considered as very beneficial. Econometric analysis of linear regression model is used to examine an impact of the above-mentioned exogenic factors. For these reasons, this study also differs from other studies that emphasize the positive contributions of SMEs in the reduction of unemployment rate in Slovakia (Civelek et al., 2020; Ključnikov et al., 2022; Civelek & Krajčík, 2022) and other markets (Amoah et al., 2021).

2. Literature Overview

Currently published studies have determined that minimum wage impact on employment differs depending on the country observed. Broecke, Forti and Vandeweyer (2015) found out that there is a minimum or no impact on employment if the minimum wage changes. On the contrary, Neumark and Corella (2019) concluded that the effects of the minimum wage on employment are predominantly negative, once the MW is higher and binding within the formal sector and for vulnerable workers. Harasztosi and Lindner (2019) confirmed this fact on the case of Hungary and the study by Vodopivec (2015) confirmed this fact on the case of Slovenia. In these countries, there is a relatively high ratio of the minimum wage on average wage, which is also in accordance with the study by Neumark and Corella (2019).

Inconsistent results of the minimum wage impact on unemployment are evident in case of those countries which have low level of this variable. Hinnosar and Rõõm (2003) identified negative impact in the nineties in Estonia. Ferraro, Hännilane, & Staehr (2018), who examined the period from 2013 to 2016 in Estonia, determined no statistically significant impact.

Melnyk (1996) examined an impact of the minimum wage increase on employment and unemployment rate during the period 1991 – 1995 in Poland. The results demonstrated significant negative impact of the minimum wage increase on the unemployment rate. Majchrowska and Zolkiewski (2012) confirmed this conclusion on a sample of young employees during the period 2005 – 2010.

Steward (2004) estimated an effect of the minimum wage implementation on employment in low-wage workers during the period 1999 – 2001 in the Great Britain. Neumar and Wascher (2007) estimated, by means of regression, the minimum wage impact on unemployment and long-term unemployment. The results showed that the minimum wage increase leads to long-term unemployment increase, especially in the group of young men. Fialová and Mysíková (2009) confirmed negative impact of the minimum wage on regional unemployment in the Czech Republic in their analysis of regional panel data from 1995 to 2004.

Pícl et al. (2014) examined the minimum wage impact in the Czech Republic from 2000 to 2012. The regression model was used to determine that the minimum wage impact on total unemployment is statistically insignificant. However, the impact of the GDP, education of population in the Czech Republic and presence of progressive taxation are considered as statistically significant.

Similarly, Pavelka et al. (2014) did not prove any statistically significant impact of the minimum wage on unemployment rate in the Czech Republic. On the contrary, the team of authors confirmed an impact of the GDP growth rate. Soukup et al. (2018) concluded in the study that the minimum wage increase by 1% leads to a higher number of unemployed workers in full-time jobs in the entire economy of the Czech Republic by 0.2%. Chytilová and Frejlich (2020) monitored period from 2006 to 2018. The authors examined an impact of the following variables: the GDP growth rate, inflation rate, unemployment benefit and social security benefits and the Kaitz index. In the Czech Republic, an impact of the minimum wage increase on unemployment was proved as statistically insignificant. Similarly, both, hypothesis of a negative impact of the GDP growth rate on unemployment and hypothesis of a positive impact of unemployment benefit on this variable were not rejected. The minimum wage increase during the period 2011 – 2018 had a positive impact on the unemployment rate of

women in the labour market. On the other hand, some researchers declare the importance of other players such as Czech SMEs in the creation of job opportunities for unemployed people (Ključnikov et al., 2021; Civelek et al., 2021; Žufan et al., 2020).

Brezová and Pániková (2011) monitored the quarterly data from 1994 to 2010 in the Slovak labour market. The authors confirmed a negative impact of the minimum wage on employment, while size and effect of this impact differed depending on employment type. Hidas and Žúdel, (2016), the Institute of Financial Policy, confirmed that even the minimum wage increase has a statistical meaning, it has a low year-on-year impact on employment based on the intersectional analysis of year-on-year data from 2008 to 2014. Also, these authors concluded that the minimum wage may have a higher impact on young workers as opposed to older ones, and in poorer regions as opposed to Bratislava. Ondruš et al. (2017) assumed that the minimum wage and its reasonable increase does not have a negative impact on economic growth and on employment. The team of authors came to this conclusion based on the analysis of empirical studies of various countries in the world. On the contrary, both of these areas showed many examples when the minimum wage had and may have a positive impact. The authors believe that even in Slovakia, the minimum wage increase leads, in a combination with tax credits, to a reduction of social disparities and the government should approach it in ‘good’ times and when labour productivity grows. Zeman (2018) analysed unemployment in Slovakia during the period 1998 – 2016. The author concluded that in those regions, where the rate between minimum wage and average wage is higher, the minimum wage considerably limits a creation of new working opportunities rather than in economically more developed regions. Also, author suggests the following as the main problems of unemployment in Slovakia: low level of skills, decreasing tendency in demand for manual workers, high level of legislation and bureaucracy, low mobility of workforce and also a negative impact of the minimum wage increase in the labour market (Přivara et al., 2018; Přivara, 2019, 2021).

3. Data and Methods

The study is based on the analysis of already existing studies, such as Hinnosar and Rõõm (2003); Melnyk (1996); Fialová and Mysíková (2009); Pícl and Richter (2014); Chytilová and Frejlich (2020); Zeman (2018). It monitors annual data for the period 1993 – 2020 in Slovakia. These data were obtained by a combination of numerous sources, specifically the Statistical Office of the Slovak Republic, Eurostat and the Ministry of Labour, Social Affairs and Family of the Slovak Republic. The group of economic indicators, such as unemployment rate (%), minimum wage (EUR), average wage (EUR), GDP (EUR billion current prices), living minimum (EUR), unemployment rate of people with basic education (%), presence of progressive taxation (dummy variable Yes/No in a particular year) was selected on the basis of empirical studies.

The principal subject of the study is to quantify an impact of these explanatory variables on a response variable, the unemployment rate difference **UNEMPL_TOT**. The response variables are selected based on the analysed empirical studies. The most significant variable is **Kaitz index (KAITZ)** that is defined as a rate of nominal minimum wage and average gross salary (Kaitz, 1970). The paper uses annual variation of this rate. The Kaitz index may explain a willingness of people to work for such a minimum wage. As Weber (1912) and many other socially oriented types of economists suggest the index growth should decrease an unemployment. On the other hand, unemployment would increase in case neoclassical approach to the minimum wage is used, which was represented by Stigler (1946), and/or even by more recent studies, such as Aaronson and French (2007). This assumption is even used in the presented study. Stewart (2004) indicated that given index does not necessarily influence unemployment. The presented study assumes that the closer minimum wage is to average wage, the lower unemployment, which results in a lower social disparity rate in a society. Consequently, once this ratio is used, it excludes a research of the minimum wage impact itself due to a high correlation coefficient value (0.884) of a variable in relation to the Kaitz index. Also, a high correlation value was achieved in the year-on-year changes of variables (0.775).

Figure 1 displays the year-on-year change development of the minimum wage, the average wage and the Kaitz index in the year-on-year changes.

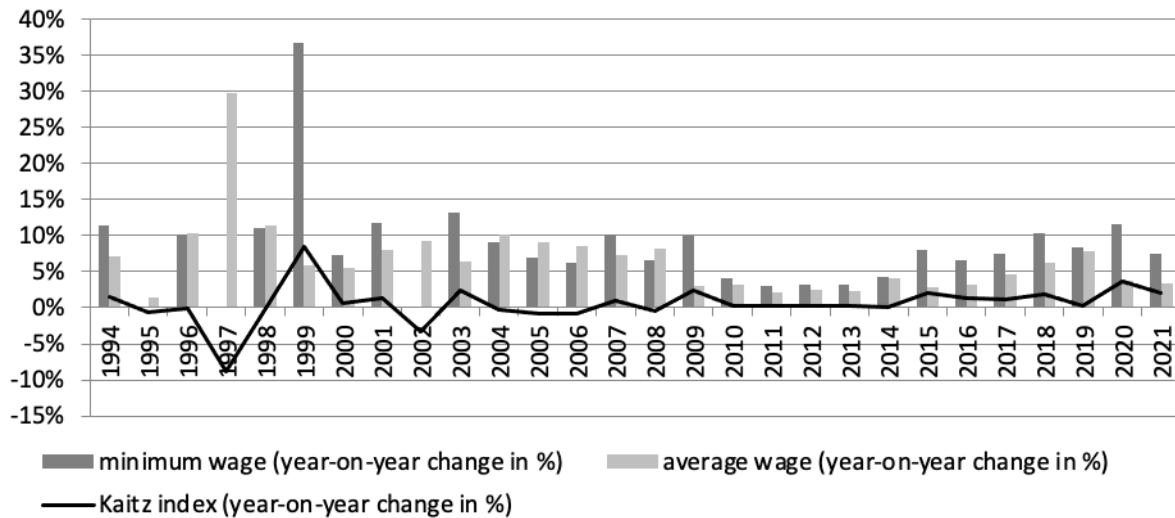


Figure 1. Development of the year-on-year change of the minimum wage, the average wage and the Kaitz index

Source: own calculation

Share of the minimum wage of the living minimum (MW/LM) represents a minimum level of income to provide food and other basic personal needs. Model uses the year-on-year change of this ratio. In general, setting the minimum wage above the level of the living minimum increases workers' productivity (Webb, 1912). People prefer social benefits to job search when the minimum wage is closer to the living minimum. On the other hand, people are more motivated to work if value of the minimum wage is farther from the living minimum, in a positive direction (Pollin, 2007). Model presumes that unemployment decreases if a share of the minimum wage of the living minimum increases.

In case of the **GDP growth rate (GDP_G)**, it is supposed that an economic expansion leads to a growth of consumption and investments, which subsequently impacts an unemployment decrease. It means that a negative correlation between the unemployment rate and the GDP growth rate is present and expressed by the Okun's Law. Also, results of the following studies confirm this fact: Pavelka et al. (2014), Pícl and Richter (2014) and Chytilová and Frejchl (2020). Model assumes that an unemployment decreases with the GDP growth rate.

The unemployed rate with basic education (UNEMPL_BE) was already determined as a significant variable in the studies by Currie and Fallick (1996), Neumark and Wascher (2007), Herr, Kazandziska and Mahnkopf-Praprotnik (2009), Neumark et al. (2009). Studies' results conclude that the more individuals with basic education, the harder their employability and thus, unemployment problem is more deepened. Model uses the year-on-year change of variable.

Progressive taxation (PT) is also included in the study by Pícl and Richter (2014) who led similar research in the Czech Republic. The research resulted in the fact that progressive taxation has a negative impact on a development of unemployment. Progressive taxation is depicted by a dummy variable that has value 1 in those years when progressive taxation of personal income in Slovakia was present (1993-2003, 2013-2020), and value 0 in those years when flat tax was present in Slovakia (2004-2012).

Regression model is applied to estimate the explanatory variables impact on the unemployment rate, while all of the tests and estimates are done at 10% significance level.

Econometric model has a following pattern:

$$\text{UNEMPL_TOT} = \beta_0 + \beta_1 \text{KAITZ} + \beta_2 \text{MW/AW} + \beta_3 \text{GDP} + \beta_4 \text{UNEMPL_BE} + \beta_5 \text{PT} + \varepsilon \quad (1)$$

Table 1 presents an expected impact of selected variables on the unemployment rate on theoretical basis.

Table 1. Overview of response variables and their expected impact on the unemployment rate

Abbreviation	Type of variable	Presumption of effect
KAITZ	quantitative	+
MW/LM	quantitative	-
GDP	quantitative	-
UNEMPL_BE	quantitative	+
PT	dummy	-

Source: own elaboration based on the studies by Aaronson and French (2007), Pollin, (2007), Neumark et al. (2009), Pícl, Richter (2014), Chytilová and Frejlich (2020)

Assumptions of linear regression use are tested before the model's interpretation. The Jarque-Bera test is used to test the assumption of the model's normality of residuals. The second assumption is homoscedasticity (uniform scattering) of residuals, where the Breusch-Pagan test is applied. The third assumption, that is being very frequently interrupted, especially in modelling of time rows, is that a random component of the model is not auto-correlated. The Durbin-Watson test is used to test this assumption. The last assumption is, that there is no multi-linearity in the model, that is, a relation between explanatory variables. Thus, variance inflation factor (VIF) is used to assess this last assumption.

Results

Modelling was performed in a software environment of R programming language, while using linear regression via the method of least squares. Table 2 provides the results.

Table 2. Results in R program according to the method of least squares

Variable	Coefficient	Estimate Error	T ratio	P-value
const	12.71264	5.10379	2.491	0.023383 *
KAITZ	0.42234	0.23913	1.766	0.095320 .
MW/LM	-0.14128	0.03046	-4.637	0.000235 ***
GDP_G	-0.32216	0.11475	-2.808	0.012111 *
UNEMPL_BE	0.13543	0.09108	1.487	0.155344
PT	3.19294	1.11769	2.857	0.010918 *

Source: own elaboration

Assumptions of linear regression use are tested before the model's interpretation. The normality of residuals assumption was fulfilled on the basis of asymptotic p-value of the Jarque-Bera test (0.407). Also, the assumption of uniform scattering of residuals (value of tested criterium is 8.5209) was fulfilled based on the testing of the Breusch-Pagan test p-value (0.1298). Results of the Breusch-Pagan test did not prove any heteroscedasticity of error member as p-value is higher than 0.10. The Durbin-Watson test determined that the test's P-value is close to zero, that is, the model has a positive auto-correlation (value of tested characteristics is 0.90643). The variance inflation factor (VIF) was used to test multicollinearity. Table 3 presents its results.

Table 3. Values of variance inflation factor

Coefficient	Estimate Error
12.71264	5.10379
0.42234	0.23913
-0.14128	0.03046
-0.32216	0.11475
0.13543	0.09108

Source: own elaboration

In all of the explanatory variables, values of variance inflation factor are lower than or equal to 5 that represents a sufficient level to assume that the model is not burdened by a mutual relationship of individual explanatory variables (there is no multicollinearity). Auto-correlation problem was solved via transformation, while using weighted variance-covariance matrix. Consequently, there was created a new model whose regression coefficients are the same as in the previous case, but based on this new model, it is also possible to determine a statistical significance of regression coefficients and their explanatory variables (Table 4).

Table 4. Model's results

Variable	Coefficient	Estimate Error	T ratio	P-value
const	12.71264	1.723741	7.3750	1.085e-06 ***
KAITZ	0.42234	0.212961	1.9832	0.0637418
MW/LM	-0.141281	0.034368	-4.1109	0.0007293 ***
GDP_G	-0.322156	0.067534	-4.7703	0.0001777 ***
UNEMPL_BE	0.135431	0.074523	1.8173	0.0868390
PT	3.19294	1.551868	2.0575	0.0553145

Source: own elaboration

Final model of selected variables' impact on the unemployment rate in Slovakia has the following pattern:

$$\text{UNEMPL_TOT} = 12.71 + 0.42\text{KAITZ} - 0.14\text{MW/AW} - 0.32\text{GDP} + 0.14\text{UNEMPL_BE} + 3.19\text{PT} + \varepsilon \quad (2)$$

All explanatory variables at 10% significance level are statistically significant. Both variables, KAITZ and MW/LM, that explain a relationship of the minimum wage to average wage and living minimum are statistically significant. Also, these variables confirmed the minimum wage impact on the unemployment rate in Slovakia.

In case of the Kaitz index, neoclassical approach to the minimum wage, that was represented by Stigler (1946), and/or more recent studies by Aaronson and Frencha (2007), was confirmed. Thus, in Slovakia, the unemployment rate increases when the minimum wage share of the average wage increases. Zeman (2018) confirms this fact at the regional level. Poorer regions, where a difference between minimum wage and average wage is low, which causes a decrease of job decline, may experience many problems due to this relation. Consequently, the higher minimum wage, the higher unemployment rate. However, there is a difference in the relationship between the minimum wage and the living wage to response variable. The assumption, Polina (2007), that if the minimum wage share increases of the living minimum income, then unemployment decreases, was confirmed. Once this share increases, there is also evident a willingness of people to work and to prefer work to receiving social security benefits. Also, model confirmed that once the GDP grows, then unemployment decreases. Similarly, the year-on-year difference of the unemployed with basic education rate is considered as statistically significant variable. Growth of this variable has a positive impact on the unemployment rate increase. The last monitored variable was a presence of progressive taxation. Pícl (2014) assumed a negative impact of this variable on the unemployment rate in the labour market in the Czech Republic. It may be concluded, based on the model's results in the Slovak labour market that a presence of progressive taxation causes the unemployment rate increase and it is considered as a demotivation factor as opposed to that period, when flat tax was launched.

Conclusions

The main subject of this study is to identify an impact of the minimum wage concept on the unemployment rate in Slovakia from 1993 to 2020. Econometric model examined an impact of ratios, especially the Kaitz index, according to modern foreign studies, and it did not examine only an impact of the minimum wage on the unemployment rate. Both, the minimum wage amount and a relation to such variables as average wage and living minimum value are very important in the labour market. Econometric model confirmed that both ratios and the minimum wage have a statistically significant impact on the unemployment rate in Slovakia. However, this impact is different depending on a selected ratio. In case of a relation to the average wage, there is a positive dependency, that is, ratio increase influences the unemployment rate increase. It is inevitable to ensure that the average wage would grow faster than the minimum wage in order to achieve a positive development in the labour market. Also, present economic development, that has impact on a development of the average wage, shows that the minimum wage in Slovakia increases very fast and it influences the unemployment rate increase. It is possible to confirm this fact by analysis of the monitored period from 1993 to 2020, when the average wage increase was of 7%, and the minimum wage increase was of 8%. New calculations of the minimum wage for the next period should consider the average wage increase rate. However, the period of a negative economic development poses a question of how the minimum wage level should be set correctly? The job positions, which were evaluated by the minimum wage, may be lost due to the economic recession impact. Subsequently, the average wage would artificially increase that could put pressure on the minimum wage increase. Such conclusion would be destructive for the labour market, as it would limit the possibilities to employ for young people and low-qualified workers, especially in the least developed regions. In practice, it is necessary to take into consideration the Kaitz index in order to develop the unemployment rate more complexly, at least via development of other macro-economic indicators. In case of the GDP, model's results confirm this statement, that is, the higher GDP, the lower unemployment. Modified version of the Kaitz index could be suggested. It would be possible to compare minimum net pay and net average wage, and/or minimum wage costs and average wage costs.

Ratio of the minimum wage and the living minimum income is considered as a statistically significant variable in the model. There has been a significant widening of disparities between the living minimum income and the minimum wage since 1993 in Slovakia, which should motivate people to job search in a positive way. Model's results confirmed that the year-on-year growth of a change of ratio in the minimum wage and the living minimum influences the unemployment rate decrease. It means, that in case of this variable, Slovakia set a correct policy of the labour market. However, the living minimum problem is more complex. Generally, the living wage recipients are those families, where none of its members work and they have many dependent children. In 2021, such Slovak family with three dependent children has the living wage in the amount of 668 Euro. In case, one of the parents would decide to work, at least for the minimum wage, the entire family financial situation would only slightly improve (it would be necessary to add the family allowance per three dependent children and consider tax bonus to the minimum wage in the amount of 623 Euro). The question therefore arises whether the minimum wage fulfils its social and protective function. Consequently, there is a demotivation to work for the minimum wage, and there appears a space for illegal work. However, the group of people who receives the social benefits has a great problem with education level that disqualifies them in the selection procedures. Almost 19% of people who receives the minimum wage has the basic education. The analysis of this study confirmed this fact. It proves that the more individuals with basic education, the deeper unemployment problem.

The article aims at identifying an impact of the minimum wage concept on the unemployment rate in Slovakia from 1993 to 2020. Model's results confirmed that the minimum wage has a statistically significant impact on the unemployment rate during the monitored period in Slovakia. However, it requires deeper interpretation whether this impact is positive or negative. It is necessary to set the minimum wage growth in a way it is not faster than the year-on-year increase of the minimum wage in order to achieve the unemployment rate decrease. Also, it is ideal to perform the minimum wage freeze during the economic recession. Unemployment may also be decreased

by increasing the difference between the minimum wage and the living minimum, and by increasing the educational level of a population. Model proved that positive impacts of the GDP on unemployment. Changes that would occur in case of progressive taxation may be interpreted only in case of its existence. Similarly, model proved that unemployment was higher in case of progressive taxation rather than in case of alternate form, that is flat tax. It would be inevitable to perform more detailed analyses in case of this variable. Also, it would be very beneficial to monitor progressive taxation impact on, for example, a group of the unemployed with basic education as this group belongs to the group of the minimum wage jobs.

References

- Amoah, J., Jibril, A.B., Luki, B.N., Odei, M.A., & Yawson, C. (2021). Barriers of SMEs' sustainability in sub-saharan Africa: a pls-sem approach. *International Journal of Entrepreneurial Knowledge*, 9(1), 10-24. <http://dx.doi.org/10.37335/ijek.v9i1.129>
- Bartóková, L., & Gontkovičová, B. (2014). *Labour Markets of EMU Countries in the Context of OCA*. International Conference on Emerging Markets Queries in Finance and Business. *Procedia Economics and Finance*, 15, 146-153. [https://doi.org/10.1016/S2212-5671\(14\)00464-X](https://doi.org/10.1016/S2212-5671(14)00464-X)
- Bartos, V., Vochozka, M., & Janikova, J. (2021). Fair value in squeeze-out of large mining companies. *Acta Montanistica Slovaca*, 26(4), 712-731. <https://doi.org/10.46544/AMS.v26i4.10>
- Brezová, M., & Pániková, L. (2009). *Influence of minimum wage on labour market – case of Slovak Republic*. Ecomod, Faculty of Social Sciences of the University of Ottawa.
- Broecke, S., Forti, A., & Vandeweyer, M. (2015). The effect of minimum wages on employment in emerging economies: a survey and meta-analysis. *Oxford Development Studies*, 45(3), 366-391. <https://doi.org/10.1080/13600818.2017.1279134>
- Card, D. (1992). Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage. *Industrial and Labor Relations Review*, 46(1), 38-54. <https://doi.org/10.3386/w4058>
- Card, D., & Krueger, A. B. (1995). Time-Series Minimum-Wage Studies: A Meta-analysis. *The American Economic Review*, 85(2), 238–43.
- Card, D., & Krueger, A. B. (1998). *A Reanalysis of the Effect of the New Jersey Minimum Wage Increase on the Fast-Food Industry with Representative Payroll Data*, Princeton University Working Paper, 293. <https://doi.org/10.3386/w6386>
- Card, D., & Krueger, A. B. (2000). Minimum Wages and Employment: A Case Study of the Fastfood Industry in New Jersey and Pennsylvania –Reply, *American Economic Review*, 90(5), 1397-1420. <https://doi.org/10.1257/aer.90.5.1397>
- Chytilová, H., & Frejlich, P. (2020). Kontroverze konceptu minimální mzdy, aplikace na Českou republiku. *Politická Ekonomie*, 68(4), 423–442. <https://doi.org/10.18267/j.polek.1285>
- Civelek, M., Gajdka, K., Světlík, J., & Vavrečka, V. (2020). Differences In The Usage Of Online Marketing And Social Media Tools: Evidence From Czech, Slovakian and Hungarian SMEs. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(3), 537–563. <http://dx.doi.org/10.24136/eq.2020.024>
- Civelek, M., Ključnikov, A., Fialova, V., Folvarčnà, A., & Stoch, M. (2021). How Innovativeness Of Family-Owned SMEs Differ Depending On Their Characteristics? *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(2), 413-428. <https://doi.org/10.24136/eq.2021.015>
- Civelek, M., & Krajčík, V. (2022). How Do SMEs From Different Countries Perceive Export Impediments Depending On Their Firm-Level Characteristics? System approach. *Oeconomia Copernicana*, 13(1), 55–78. <http://dx.doi.org/10.24136/oc.2022.002>
- Cizrelioğulları, M.N., & Babayigit, M.V. (2022). Effects of High-Performance Work System on Job Satisfaction: The Mediating Role of Psychological Capital in the Hotel Employees of North Cyprus. *Journal of Tourism and Services*, 24(13), 43-70. <http://dx.doi.org/10.29036/jots.v13i24.284>

- Currie, J., & Fallick, B.C. (1996). The Minimum Wage and the Employment of Youth Evidence from the NLSY. *The Journal of Human Resources*, 31(2), 404-428. <https://doi.org/10.2307/146069>
- Dickens, R., & Draca, M. (2005). *The Employment Effects of the October 2003 Increase in the National Minimum Wage*. Discussion Paper No. 693, Centre for Economic Performance.
- Dolado, J. J., Felgueroso, F., & Jimeno, J. F. (2000). *The Role of the Minimum Wage in the Welfare State: An Appraisal*, Discussion Paper No. 152, IZA. <https://doi.org/10.2139/ssrn.233903>
- Ferraro, S., Hännilane, B., & Staehr, K. (2018). Minimum wages and employment retention: A microeconomic study for Estonia. *Baltic Journal of Economics*, 18(1), 51–67. <https://doi.org/10.1080/1406099X.2018.1485422>
- Fialová, K., & Mysíková, M., (2021). Do low minimum wages disserve workers? A case study of the Czech and Slovak Republics. *Baltic Journal of Economics*, 21(1), 43-59. <https://doi.org/10.1080/1406099X.2021.1917844>
- Galstyan, A., Grabowska, M., & Bačiulienė, V. (2021). Economic Development and Migration After EU Accession: The Case of Baltic States. *Pressburg Economic Review*, 1(1), 47-55.
- Gontkovičová, B., Mihalčová, B., & Pružinský, M. (2015). Youth Unemployment – Current Trend in the Labour Market? *Procedia Economics and Finance*, 23, 1680-1685. [https://doi.org/10.1016/S2212-5671\(15\)00554-7](https://doi.org/10.1016/S2212-5671(15)00554-7)
- Grumstrup, E., Sørensen, T., Misiuna, J., & Pachocka, M. (2021). Immigration and Voting Patterns in the European Union: Evidence from Five Case Studies and Cross-Country Analysis. *Migration Letters*, 18(5), 573-589. <https://doi.org/10.33182/ml.v18i5.943>
- Harasztosi, P., & Lindner, A. (2019). Who pays for the minimum wage? *American Economic Review*, 109(8), 2693–2727. <https://doi.org/10.1257/aer.20171445>
- Herr, H., & Kazandziska, M., Mahnkopf-Praprotnik, S. (2009). *The Theoretical Debate about Minimum Wages*. Global Labour University Working Paper No. 6, Berlin.
- Hidas, S., & Žúdel, B. (2016). *Malý vplyv zvyšovania minimálnej mzdy na nezamestnanosť*. Inštitút finančnej politiky, Ekonomická analýza 34. Bratislava.
- Hinnosar, M., & Rõõm, T. (2003). *The impact of minimum wage on the labour market in Estonia: An empirical analysis*. WP8 of Eesti Bank. Eesti Bank.
- Ighoshemu, B. O., & Ogidiagba, U. B. (2022). Poor governance and massive unemployment in Nigeria: as causes of brain drain in the Buhari administration (2015-2020). *Insights into Regional Development*, 4(2), 73-84. [https://doi.org/10.9770/IRD.2022.4.2\(6\)](https://doi.org/10.9770/IRD.2022.4.2(6))
- Kabir, H. (2021). Notion of Belonging in the Nation-State: Gendered Construction of International Migration Aspirations among University Students in Bangladesh. *Migration Letters*, 18(4), 463-476. <https://doi.org/10.33182/ml.v18i4.1158>
- Kaitz, H. (1970). Experience of the Past: The National Minimum. Youth Unemployment and Minimum Wages. *U.S. Department of Labor*, 30–54.
- Kliuchnikava, Y. (2022). The Impact of the Pandemic on Attitude to Innovations of SMEs in the Czech Republic. *International Journal of Entrepreneurial Knowledge*, 10(1), 34-45. <https://doi.org/10.37335/ijek.v10i1.131>
- Ključníkov, A., Civelek, M., Vozňáková, I., & Krajčík, V. (2020a). Can Discounts Expand Local And Digital Currency Awareness Of Individuals Depending On Their Characteristics? *Oeconomia Copernicana*, 11(2), 239–266. <https://doi.org/10.24136/oc.2020.010>
- Ključníkov, A., Civelek, M., Polách, J., Mikoláš, Z., & Banot, M. (2020b). How Do Security And Benefits Instill Trustworthiness Of A Digital Local Currency? *Oeconomia Copernicana*, 11(3), 433–465. <https://doi.org/10.24136/oc.2020.018>
- Ključníkov, A., Civelek, M., Fialova, V., & Folvarčn, A. (2021). Organizational, Local, And Global Innovativeness Of Family-Owned SMEs Depending On Firm-Individual Level Characteristics: Evidence From The Czech Republic. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 16(1), 169–184. <https://doi.org/10.24136/eq.2021.006>
- Ključníkov, A., Civelek, M., Klimeš, C., & Farana, R. (2022). Export Risk Perceptions Of SMEs in Selected Visegrad Countries. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 17(1), 173–190. <https://doi.org/10.24136/eq.2022.007>

- Kolková, A., & Ključnikov, A. (2021). Demand Forecasting: An Alternative Approach Based On Technical Indicator Pbands. *Oeconomia Copernicana*, 12(4), 863–894. <https://doi.org/10.24136/oc.2021.028>
- König, M., & Möller, J. (2007). *Mindestlohnneffekte des Entsendegesetzes?* Eine Mikrodatenanalyse für die deutsche Bauwirtschaft, Discussion Paper No. 30. IAB. Institut für Arbeitsmarkt-und Berufsforschung, Nürnberg.
- Machova, V., & Vochozka, M. (2019). Analysis of business companies based on artificial neural networks. In J. Horak (Ed.), *Innovative Economic Symposium 2018—Milestones and Trends of World Economy (IES2018)* (61). VSTE. <https://doi.org/10.1051/shsconf/20196101013>
- Majchrowska, A., & Żółkiewski, Z. (2012). The impact of minimum wages on employment in Poland. *Investigaciones Regionales*, 24, 211–239.
- Mankiw, G.N. (2010). *Macroeconomics*. 7th edition. Worth Publishers, New York.
- Meer, J. & West, J. (2013). Effects of the Minimum Wage on Employment Dynamics. NBER Working Paper No. 19262 <https://doi.org/10.3386/w19262>
- Melnik, A. M. (1996). The Minimum Wage and Unemployment in Poland: Lessons for Cuba's Transitions. *ASCE - Cuba in Transition*, 6(126).
- Neumar, D. & Wascher, W. (2007). Minimum Wages and Employment. IZA Discussion Paper No. 2570, Institute for the Study of Labor, Bonn
- Neumark, D. & Wascher, W. (2000): Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review*. 90 (5), 1362-1396. <https://doi.org/10.1257/aer.90.5.1362>
- Neumark, D., & Corella, L. F. M. (2019). Do minimum wages reduce employment in developing countries? A survey and exploration of conflicting evidence. NBER Working Paper Series, no. 26462. <https://doi.org/10.3386/w26462>
- Neumark, D., Ian Salas, J.M. & Wascher, W. (2009). Revisiting the Minimum Wage Employment Debate: Throwing out the Baby with the Bathwater. NBER Working Paper No. 18681, Cambridge.
- Novak, V., Vokoun, M., Stellner, F., & Vochozka, M. (2016). institutional analysis of the contemporary regional labour market in the Czech Republic. *E & M Ekonomie A Management*, 19(3), 4–19. <https://doi.org/10.15240/tul/001/2016-3-001>
- Ondruš, B., Štefánková, I., Liška, P., & Kramer, T. (2017). Minimálna mzda – empirické zistenia kontra ideologické mýty. Národný projekt Centrum sociálneho dialógu II. ITMS projektu: 312031B970
- Pícl, M., Brhlík, I., & Ondroušek, M. (2014). *Vliv minimální mzdy na nezaměstnanost v ČR*. Úřad vlády České republiky, Odbor analýz a informací.
- Pícl, M., & Richter, P. (2014). Minimální mzda a její vliv na nezaměstnanost v ČR. *Acta Oeconomica Pragensia*, 22(6), 51-65. <https://doi.org/10.18267/j.aop.458>
- Pollin, R. (2007). Economic Prospects: Marking the Federal Minimum Wage s Living Wagw. *New Labor Forum*, 16(2), 103-107. <https://doi.org/10.1080/10957960701279306>
- Privara, A. (2022). Economic growth and labour market in the European Union: lessons from COVID-19. *Oeconomia Copernicana*, 13(2), 355-377. <https://doi.org/10.24136/oc.2022.011>
- Privara, A., Rievajová, E., & Dziura, B. (2018). Unemployment Aspects of Regional Development (The Cases of the Czech and Slovak Republics). *Advanced Science Letters*, 24(9), 6320-6322. <https://doi.org/10.1166/asl.2018.13042>
- Privara, A. (2019). Citizenship-for-Sale Schemes in Bulgaria, Cyprus, and Malta. *Migration Letters*, 16(2), 245-254. <https://doi.org/10.33182/ml.v16i2.735>
- Privara, A. (2019). Explaining Emigration Patterns in Estonia, Lithuania, Slovenia and Slovakia. *Geographical Journal*, 71(2), 161-180. <https://doi.org/10.31577/geogrcas.2019.71.2.09>
- Privara, A. (2021). Labour market efficiency and emigration in Slovakia and EU neighbouring countries. *Economic Research-Ekonomska Istraživanja*, 34(1), 1850-1869. <https://doi.org/10.1080/1331677X.2020.1858131>

- Prívar, A., & Kiner, A. (2020). Immigrant Employment in the Slovak Hospitality Industry: Profiles, Experience, and Education. *Journal of Tourism and Services*, 20(11), 167-182. <https://doi.org/10.29036/jots.v11i21.223>
- Prívar, A., & Rievajová, E. (2021). Migration governance in Slovakia during the COVID-19 crisis. *Migration Letters*, 18(3), 331-338. <https://doi.org/10.1080/1331677X.2020.1858131>
- Prívarová, M., Martincová, M., Trnovský, K., & Hačár, D. (2022). Labour Migration and Tourism Flows: the Case of the EU. *Journal of Tourism and Services*, 24(13), 271-289. <https://doi.org/10.29036/jots.v13i24.374>
- Rowland, Z., Blahova, A., & Gao, P. (2021). Silver as a value keeper and wealth distributor during an economic recession. *Acta Montanistica Slovaca*, 26(4), 796-809. <https://doi.org/10.46544/AMS.v26i4.16>
- Sahoo, M., & Pradhan, J. (2021). Adaptation and Acculturation: Resettling displaced tribal communities from wildlife sanctuaries in India. *Migration Letters*, 18(3), 237-259. <https://doi.org/10.33182/ml.v18i3.877>
- Schmitt, J. (2013). Why does the minimum wage have no discernible effect on employment? Working paper, Centre for Economic and Policy Research
- Soukup, J., Čadil, J., Macáková, J., & Pavelka, T. (2018). Odhad dopadů změny minimální mzdy na jednotlivá odvětví. Praha: ČMKOS.
- Stehel, V., Horak, J., & Vochozka, M. (2019). Prediction of institutional sector development and analysis of enterprises active in agriculture. *E & M Ekonomie A Management*, 22(4), 103-118. <https://doi.org/10.15240/tul/001/2019-4-007>
- Stewart, M. B. (2004). The Employment Effect of the National Minimum Wage. *The Economic Journal*, 114(494), 110-116. <https://doi.org/10.1111/j.0013-0133.2003.00200.x>
- Stigler, G. J. (1946). The Economics of Minimum Wage Legislation. *The American Economic Review*, 36(3), 358-365.
- Vochozka, M., Horak, J., Krulicky, T., & Pardal, P. (2020a). Predicting future Brent oil price on global markets. *Acta Montanistica Slovaca*, 25(3), 375-392. <https://doi.org/10.46544/AMS.v25i3.10>
- Vochozka, M., Horak, J., & Suler, P. (2019). Equalizing Seasonal Time Series Using Artificial Neural Networks in Predicting the Euro-Yuan Exchange Rate. *Journal of Risk And Financial Management*, 12(2). <https://doi.org/10.3390/jrfm12020076>
- Vochozka, M., Kalinova, E., Gao, P., & Smolikova, L. (2021). Development of copper price from July 1959 and predicted development till the end of year 2022. *Acta Montanistica Slovaca*, 26(2), 262-280. <https://doi.org/10.46544/AMS.v26i2.07>
- Vochozka, M., Rowland, Z., & Vrbka, J. (2016). Financial Analysis of an Average Transport Company in the Czech Republic. *NASE MORE*, 63(3, SI), 227-236. <https://doi.org/10.17818/NM/2016/SI28>
- Vochozka, M., Vrbka, J., & Suler, P. (2020b). Bankruptcy or Success? The Effective Prediction of a Company's Financial Development Using LSTM. *Sustainability*, 12(18). <https://doi.org/10.3390/su12187529>
- Vodopivec, M. (2015). The employment and wage spillover effects of Slovenia's 2010 minimum wage increase. *European Scientific Journal*, Special edition, 11(10), 82-109.
- Vorobeve, E., & Dana, L. P. (2021). The COVID-19 pandemic and migrant entrepreneurship: Responses to the market shock. *Migration Letters*, 18(4), 477-485. <https://doi.org/10.33182/ml.v18i4.1400>
- Webb, S. (1912). The Economic Theory of a Legal Minimum Wage. *Journal of Political Economy*, 20(10), 973-998.
- Zeman, M. (2018). Unemployment in Slovakia Between 1998 and 2016 – One of the Systematic problems of the national economy. *Ecoforum*, 7(1), 1-8. <https://doi.org/10.1086/252125>
- Žufan, J., Civelek, M., Hamarneh, I., & Kmeco, Ľ. (2020). The Impacts of Firm Characteristics on Social Media Usage Of SMEs: Evidence from the Czech Republic. *International Journal of Entrepreneurial Knowledge*, 8(1), 102-113. <https://doi.org/10.37335/ijek.v8i1.111>

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ACTUAL PAID COST OF EQUITY IN CONSTRUCTION*

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Abstract. The value of the cost of equity capital is very important, both for all businesses and for investors, as it expresses the return on invested funds and is one of the most important factors in decision-making. The aim of the article is to determine the value of the actual paid costs of equity capital in the construction industry in 2016-2019. The used data from the Cribis / Albertina databases were processed using changes in the undistributed economic result of previous years and the economic result of the current accounting period. The results found show that the average cost of equity in the years 2016 - 2019 ranges from 29.35 % - 37.81 % and the median values range from 16.43 % - 24.24 %. The benefit of the presented results is primarily seen in their possibility of subsequent prediction of future costs of equity capital. A limitation of the research may be in the data used, for which it is appropriate when it is the most recent.

Keywords: economics result; costs on own capital; share on profit; average; median

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1. Introduction

Not only in the Czech Republic, construction is one of the most important industries that have a significant impact on the economy of the entire country. The construction industry is one of the leading sectors in direct and indirect job creation and can respond very quickly and flexibly to various changes in the behavior of investors and others (Busina and Sikyr, 2014).

The construction industry is therefore the main developer of various buildings, which are among the essential components of investments or the creation of gross fixed capital in the entire economy (Vochozka et al., 2015).

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Vochozka (2018) further states that the construction industry has an optimal amount of assets, an acceptable financing structure and an adequate economic result.

The topic of the cost of equity capital applies to every business, as the cost of equity capital refers to the returns that are required by the owner for a given investment or project. It is therefore necessary information needed to make the right decision, and this is one of the most important activities that owners or managers do (Váchal et al., 2013; Valášková et al. 2020). The importance of monitoring business processes in terms of their production value has been pointed out by many authors such as Straková (2020, 2021c), Gavurova (2012) and Tkacova et al. (2017). A properly organized decision-making process is the basis of success. Managers or owners are aware of the seriousness of the consequences of their decisions. (Vrbka and Stehel, 2019). Therefore, investors primarily monitor the level of risk and returns on invested capital (Vochozka, 2012). The invested capital, i.e. the funds provided, is also affected by the time factor, which reduces the purchasing power of the invested funds and it is therefore necessary to include it in the calculation of expected returns (Vochozka and Hašková, 2019). These invested funds, from which their owner requires a certain return, can serve, for example, as an investment in a project that will expand the company's production capacity, improve its competitiveness or provide a material basis for long-term development (Vochozka et al., 2021).

The article thus responds to the social demand for the determination of adequate required revenues from an investment, in this case in the construction industry, and how to determine these required returns. The cost of equity capital is mostly only predicted to the future and just little authors deals with their historical value, which can be more beneficial for future prediction than commonly used methods, and this is exactly what the present article will deal with.

The objective of the article is to determine the value of the actual paid-up cost of equity capital in the construction industry in 2016-2019. To this end, several research questions are set:

1. How high is the cost of equity in each year?
2. How much was actually paid out in profit shares in each year?

2. Literature research

An important decision of the company is the determination of the dividend policy, which can affect the value of the company. Above all, the variability of the dividend policy is very important in determining the future development of the company, while the owners expect that the management of the company's finances will be performed well and will be able to adapt to environmental influences (Sari and Patrisia, 2019; Straková et al., 2018).

The creation of profit is one of the fundamental motivational stimuli of every business, as it is financial resources that, after being withdrawn from the business, do not threaten its further activity and can therefore be considered as income for the owner (Vochozka et. al., 2012; Sinicakova et al. 2017). Profit is one of the main factors of economic growth (Dementyev and Scherbakov, 2017). Profit therefore represents the prevailing economic quantity used by external and internal users in the decision-making process (Ermacora, 2018; Gavurova et al. 2017a,b). Vochozka and Machová (2017) identified the company's profit or loss as one of the most important generators of business value in the construction industry in the Czech Republic. The same conclusion was also reached by Machová and Vrbka (2018), who investigated value generators in enterprises in the agricultural sector in the Czech Republic. Identifying value generators is very important for businesses, because these are business-economic variables that contribute the most to the creation of business value (Vochozka et. al., 2017).

According to Chen, Leung and Goergen (2017), the gender of the company's highest-ranking employees also has an effect on the payment of dividends. Women pay a larger dividend than men, with the increase being significant

for firms with weak governance. Thus, this finding suggests that women use dividend payment as a management tool. The same result was reached by Almeida, de Moraes and Coelho (2020), who found that the presence of women in the management bodies of a company contributes to a higher probability of higher dividends. The opposite result was reached by Sanan (2019), who shows that women in company management have a negative effect on dividend payouts. Furthermore, the organization of the company's management has a great influence on the payment of dividends, as a well-organized management has a positive effect on the dividend payment policy (Tahir, Masri and Rahman, 2020; Kocisova et al. 2018).

Kovalev and Drachevskiy (2020) looked at the dividend policy of oil and gas companies in emerging markets and identified two main problems in calculating dividends, namely determining the correct discount rate and establishing meaningful predicted dividend payout data. They chose the CAPM model as the most suitable method for calculating the discount rate. A Monte Carlo simulation model was chosen for the dividend forecast. Dividend policy is influenced by profitability, company size, growth, debt and macroeconomic variables (Nur and Karnen, 2014). Ranajee, Pathak, and Saxena (2018) add to these effects that higher dividends are paid by group firms compared to sole proprietorships.

The macroeconomic environment in which the company is located has a significant influence on the functioning of construction companies and their financial results (Baltgailis, 2019; Pavelko et al., 2021). The indisputable importance of the macro environment within the integrated model of the corporate environment is highlighted in the studies of Straková et al. (2021b) and Gavurova et al. (2020). The integrated concept of the environment undeniably contributes to the sustainable development of the enterprise (Straková et al., 2021a; Chehabeddine, Grabowska and Adekola, 2022).

Appropriate profit should always be included in the prices of individual construction works in order to ensure their competitiveness, as profit is important for the survival of the company (Majer, Ellingerová and Gašparík, 2020). The efficiency of construction works has a great influence on the profit of construction companies. Every construction work carried out (e.g. building a house) must be well calculated and subsequently evaluated using suitable methods during the execution of these works. The resulting information is very important for guiding the company to future decisions (Anysz, 2017).

The cost of equity represents the expected rate of return required by the market to obtain the required funds for the investment, with the most complex component of the cost of equity calculation being the capital component (Valaskova and Bakes, 2018). The going concern principle can also be related to the cost of equity capital. This connection was positively confirmed and it was found that the cost of equity capital increased in the range of 3.3-5.7% for companies where the going concern principle was confirmed for the first time (Amin, Krishnan and Yang, 2014). Customers also have an impact on the cost of equity capital, especially for businesses that are more likely to lose key customers or are more prone to lose more when they lose key customers, so the cost of equity capital is higher. While businesses that have more government customers in their customer base have a lower cost of equity capital. Overall, therefore, the customer base affects the cost of financing (Dhaliwal, Judd, and Serfling, 2016).

The cost of equity capital is also affected by social capital because in countries with lower social capital the cost of equity capital is higher and in countries with higher social capital the cost of equity capital falls. However, this relationship is significant only for firms with a relatively low level of competition on the market and also for firms with a good reputation (Gupta et al., 2017). Political corruption also affects the cost of equity capital, as firms operating in states with higher levels of corruption have higher costs of equity capital (Hossain and Kryzanowski, 2021). Corporate social responsibility performance has an impact on the cost of equity capital, as corporate social responsibility performance is significantly negatively correlated with the cost of equity capital (Chen and Zhang, 2021).

The CAPM model, which Laghi and Marcantonio (2016), extended by premiums for certain idiosyncratic risks, can be used to value the cost of equity capital. These risks are company size, value factor, operational risks, financial structure and stock market price volatility. With these modifications, it was found that the CAPM model systematically underestimates the cost of equity capital, while with the proposed modifications, the correct estimate of its expected value already occurs. Glova (2015) investigated the CAPM in its dynamically time-varying form. The prediction of future cost of equity capital was also investigated by Momcilovic, Begovic and Živkov, 2015, who investigated the cost of equity capital of the food industry using the CAPM and Downside CAPM models. Ogiugo, Adesuyi and Ogbeide (2020) devoted their study to empirical test of capital asset pricing model on securities return of listed firms in Nigeria.

The relationship between the level of liquidity and risks on the implied cost of equity capital was investigated by Saad and Samet, 2017, who found that the implied cost of equity capital increases with the level of illiquidity and in the covariance between firm-level illiquidity and market illiquidity, but decreases in both the covariance between returns at the firm level and market illiquidity, as well as in the covariation between firms. Furthermore, it was observed that the level of liquidity and risk affect the implied cost of stocks during crisis and non-crisis periods, but this relationship is more pronounced during crisis periods for the most illiquid stocks.

An important role in corporate finance is played by the CEO, who has a great influence on the cost of equity capital, and this influence is affected by his confidence, because there is a non-linear relationship between the overconfidence of the CEO and the cost of equity capital (Aghazadeh et. al., 2018). Executive compensation also affects the cost of equity capital (Chen, Truong, & Veeraraghavan, 2015). Information risk is another variable that has a significant impact on the cost of equity capital (Abdollahi et al., 2021). Saleem and Usman, 2021, conducted similar research and reached the same conclusion. Bae, An, and Kim (2020) show that about 42% of the total effect of information quality on the cost of equity capital is due to indirect effects, namely information asymmetry, market risk, and liquidity risk.

Other factors affecting the cost of equity capital include company reputation, as companies with higher reputation scores have lower cost of equity capital and this effect increases with the degree of information asymmetry (Cao et al., 2015). Furthermore, the annual reports that large companies have to publish can also affect the cost of equity capital, as greater text complexity is associated with higher costs of equity capital (Rjiba et al., 2021).

3. Materials and methods

The data used for this article is taken from the Albertina database, which provides information on businesses and individuals. The downloaded data is in an excel data file. It includes companies operating in the construction industry, and for each of them, data from financial statements for the period 2016 - 2020 is presented.

CAPM model or the modular model is most commonly used to calculate the cost of equity capital. These models are suitable for calculating the cost of equity capital, but their calculation determines the future value of the cost of equity capital, which is inappropriate for the purposes of determining the actual paid-in cost of equity capital.

The following methodological procedure will therefore be chosen to answer the research questions:

In order to determine the profit shares paid out in a given year for one company, the economic result of the current accounting period will be added together with the undistributed profit of previous years/undistributed profit or unreimbursed loss of previous years, and subsequently the undistributed profit of previous years/undistributed profit or unreimbursed loss of previous years will be deducted from this value.

For the item undistributed profit of previous years/retained profit or unreimbursed loss of previous years, the data that is available in the given period is selected.

After performing these calculations, it is necessary to filter the data to only relevant ones, which means that minus items and percentage items exceeding the value of 100 must be deleted. Subsequently, the resulting value will be divided by the equity of the given year and converted into percentages.

Statistical functions mean, median, variance, standard deviation will be used for the final evaluation.

4. The results and discussion

Table 1. Resulting values of equity costs for the period 2016 - 2019

Year	Average cost of equity	Median cost of equity capital	Paid in total
2016	29,35 %	16,43 %	19 656 223 745,00
2017	36,40 %	23,07 %	49 966 461 785,00
2018	31,64 %	17,84 %	24 212 135 900,00
2019	37,81 %	24,24 %	34 758 034 067,00
Total	135,20 %	81,57 %	128 592 855 497,00

Source: Database Albertina

Table 1 presents the resulting values of the cost of equity capital for the period 2016 – 2019, where the average, median values and overall paid profit shares are listed. The results show that the mean and median values differ by almost half in each observed year. The highest values in the case of the average and median were achieved in 2019 and in the case of the overall paid profit shares in 2017.

Table 2. Selected statistical indicators from the resulting values of equity costs for the period 2016 - 2019

Quantity	From the average cost of equity capital	From equity medians	From the total shares paid out
Diameter	33,80 %	20,39 %	32 148 213 874,25
Median	34,02 %	20,45 %	29 485 084 983,50
Dispersion	11,81	11,06	1,36
Standard deviation	3,44	3,32	11 654 744 431,45

Source: Database Albertina

Table 2 presents selected statistical indicators from the resulting average and median values of the cost of equity for the period 2016 – 2019, where the average, median, dispersion and standard deviation are given. The results show that the average and median values for the cost of equity capital do not differ much and for the total profit shares paid out, the difference is only 8.2 %.

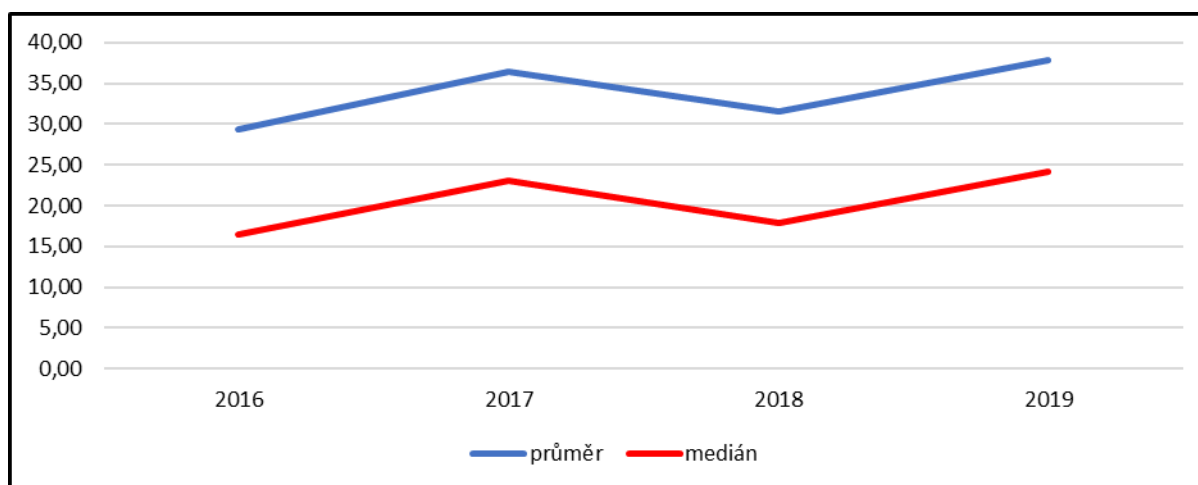


Figure 1. Development of average and median values of the cost of equity capital for the period 2016 - 2019

Source: Own processing

Figure 1 presents the development of the average and median values of the cost of equity capital for the period 2016 – 2019, which clearly shows the development of these values in individual years. It can be seen from the graph that the development of the average and median values in individual years is fluctuating, when in 2017 there is an increase in both values. The following year there was a slight decrease compared to the previous period, when, however, the resulting values are higher than in 2016. In the last monitored year, the average and median value of the cost of equity increased again.

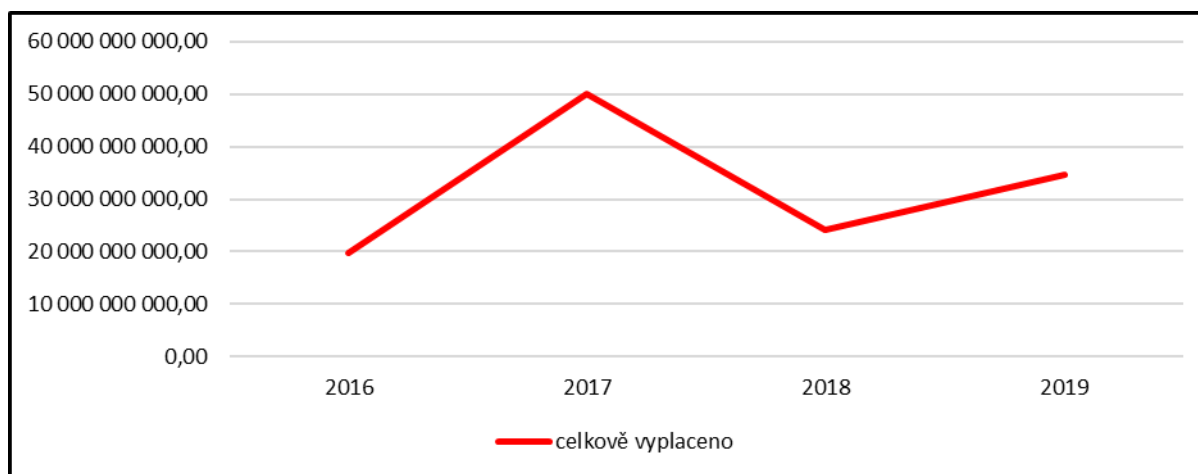


Figure 2. Development of total paid shares of profit for the period 2016 – 2019

Source: Own processing

Figure 2 presents the overall paid-out profit shares for the period 2016 – 2019, which clearly shows the progress of paid-out profit shares in individual years. The course of paid profit shares in individual years copies the development of the average and median values of the cost of equity capital, i.e. it increases in 2017, the following year there was a decrease and the last year it increased again.

Discussion

1. How high is the cost of equity in each year?

In the individual years, the cost of equity in the case of average values is 29.35%, 36.40%, 31.64% and 37.81%. For the median values, the cost of equity was 16.43%, 23.07%, 17.84% and 24.24%. The results show that the difference between the average and median values of the cost of equity capital is almost double. It is therefore very important for the calculation to choose the appropriate indicators, because the resulting values can subsequently differ greatly. Most research on the cost of equity capital calculates the future value of the cost of equity capital, most often using the CAPM method. This article presents a calculation methodology that arrives at actual cost of equity values and thus gives better feedback for calculating the future value of the cost of equity capital.

2. How much was actually paid out in profit shares in each year?

In individual years, CZK 19,656,223,745, CZK 49,966,461,785, CZK 24,212,135,900 and CZK 34,758,034,067 were paid out in profit shares. The results show that their values fluctuate a lot, with the lowest value at the level of CZK 19 billion and the highest value at the level of CZK 49 billion. As already mentioned in the literature review, profit is one of the main generators of the value of enterprises in the construction industry, and it is therefore desirable that its values increase every year and thus the cost of equity capital of investors or owners. And the results show that this trend is not in the construction industry.

5. Conclusion

The objective of the article was to determine the value of the actual cost of equity paid in the construction industry in 2016-2019. The objective of the article was met by creating a methodology for calculating the cost of equity from financial statements from the entire construction industry.

The results found are very different, especially in the case of the average and median values of the cost of equity capital in individual years. The average values of the cost of equity are in the range of 29.35% - 37.81% and the median values are in the range of 16.43% - 24.24%. It is therefore very important to choose appropriately a statistical indicator that will express the value of the cost of equity capital, as large differences between average and median values can cause inaccuracies or misleading results in subsequent calculations.

The conducted research has limits in outdated data, in which data from financial statements for subsequent years is missing. Despite this fact, the usability of the calculated results for practical purposes is high, especially the methodology presented in the article, which describes the procedure for calculating the actual paid out costs of equity capital. The results can be used to predict future costs of equity capital, when this prediction can be more reliable than commonly used methods, as it is based on historical values that can better predict future development, especially in the case of stable market development.

The scope for further research is very wide, as the methodology developed in the presented article is usable for any company or entire industry, as in the presented article.

References

- Abdollahi, A., Gerayli, ČS., Pitenoei, YR., Hassanpour, D. & Riahi, F. (2021). Information risk, cost of equity and stock returns: evidence from Iranian firms. *Journal of financial Reporting And Accounting*. <https://doi.org/10.1108/JFRA-01-2021-0025>
- Aghazadeh, S., Sun, L., Wang, Q. & Yang, R. (2018). Investors perception of CEO overconfidence: evidence from the cost of equity capital. *Review of Quantitative Finance And Accounting*, 51(4), 1129-1150. <https://doi.org/10.1007/s11156-017-0699-9>

- Almeida, TA. & De Morais, CRF. (2020). Gender diversity, governance and dividend policy in Brazil. *Rege-revista de Gestao*, 27(2), 189-205. <https://doi.org/10.1108/REGE-03-2019-0041>
- Amin, K., Krishhan, J. & Yang, JS. (2014). Going concern opinion and cost of equity. *Auditing-a journal of practice and theory*, 33(4), 1-39. <https://doi.org/10.2308/ajpt-50827>
- Anysz, H. (2017). The profit as in-company evaluation of the construction site effectiveness, *RSP 2017 – XXVI R-S-P Seminar 2017 theoretical foundation of civil engineering*, 117(9). <https://doi.org/10.1051/mateconf/201711700009>
- Baltgailis, J. (2019). The issues of increasing the effectiveness of teaching comparative economics. *Insights into Regional Development*, 1(3), 190-199. [https://doi.org/10.9770/ird.2019.1.3\(1\)](https://doi.org/10.9770/ird.2019.1.3(1))
- Bar, SM., An, HT. & Kim, JD. (2020). Mediators linking information quality and the cost of equity capital. *Asia-pacific Journal of Financial Studies*, 49(3), 410-437. <https://doi.org/10.1111/ajfs.12299>
- Cao, Y., Myers, JN., Myers, LA. & Omer, TC. (2015). Company reputation and the cost of equity capital. *Review of Accounting Studies*, 20(1), 42-81. <https://doi.org/10.1007/s11142-014-9292-9>
- Dementyev, VV. & Scherbakov, AP. (2017). Profit and economic growth, *Terra economicus*, 15(3), 75-91.
- Dhaliwal, D., Scott Judd, J., Serfling, M. & Shaikh, S. (2016). Customer concentration risk and the cost of equity capital. *Journal of Accounting and Economics*, 61(1), 23-48. <https://doi.org/10.1016/j.jacceco.2015.03.005>.
- Ermacora, R. (2018). Accounting approach versus economic approach in determining profit of small family dairy company, *7th international scientific symposium economy of eastern croatia – vision and growth*, 996-1004.
- Gavurova, B. (2012). Source Identification of Potential Malfunction of Balanced Scorecard System and its influence on system function. *E & M Ekonomie a Management*, 15(3), 76-90.
- Gavurova, B., Janke, F., Packova, M., & Pridavok, M. (2017). Analysis of Impact of Using the Trend Variables on Bankruptcy Prediction Models Performance. *Ekonomicky Casopis*, 65(4), 370-383.
- Gavurova, B., Packova, M., Misankova, M., & Smrcka, L. (2017). Predictive Potential and Risks of Selected Bankruptcy Prediction Models in the Slovak Business Environment. *Journal of Business Economics and Management*, 18(6), 1156-1173. <https://doi.org/10.3846/16111699.2017.1400461>
- Gavurova, B., Belas, J., Bilan, Y., & Horak, J. (2020). Study of legislative and administrative obstacles to SMEs business in the Czech Republic and Slovakia. *Oeconomia Copernicana*, 11(4), 689–719. <https://doi.org/10.24136/oc.2020.028>
- Glova, J. (2015). Time-varying CAPM and its applicability in cost of equity determination. *Procedia Economics and Finance*, 32, 60-67. [https://doi.org/10.1016/S2212-5671\(15\)01365-9](https://doi.org/10.1016/S2212-5671(15)01365-9)
- Gupta, A., Raman, K. & Shang, CG. (2018). Social capital and the cost of equity. *Journal of Bankong and Finance*, 87, 102-117. <https://doi.org/10.1016/j.jbankfin.2017.10.002>
- Hašková, S., & Vochozka, M. (2019). Finance podniku I. Ústav znaleství a oceňování. Vysoká škola technická a ekonomická v Českých Budějovicích.
- Hossain, AT. & Kryzanowski, L. (2021). Political corruption and cost of equity, *Business and Society*, 60(8), 2060-2098. <https://doi.org/10.1177/0007650320928502>
- Chehabeddine, M. R., Grabowska, S., & Adekola, A. F. (2022). Building a model for securing regional development from ecological threats. *Insights into Regional Development*, 4(2), 22-40. [https://doi.org/10.9770/IRD.2022.4.2\(2\)](https://doi.org/10.9770/IRD.2022.4.2(2))
- Chen, B. & Zhang, AJ. (2021). How does corporate social responsibility affect the cost of equity capital through operating risk. *Borsa Istanbul Review*, 21, 38-45. <https://doi.org/10.1016/j.bir.2021.01.005>
- Chen, J., Leung, WS. & Goergen, M. (2017). The impact of board gender composition on dividend payouts, *Journal of Corporate Finance*, 43, 86-105. <https://doi.org/10.1016/j.jcorpfin.2017.01.001>

- Chen, YY., Truong, C. & Veeraraghavan, M. (2015). CEO risk-taking incentives and the cost of equity capital, *Journal of Business Finance and Accounting*, 42(7-8), 915-946. <https://doi.org/10.1111/jbfa.12126>
- Kovalev, VV. & Drachevskiy, IS. (2020). Dividend policy as a factor for managing company value: comparing trends in emerging markets, *Vestnik Sankt-Peterburgskogo Universiteta – Ekonomika – St Petersburg University Journal Of Economic Studies*, 36(1), 95-116. <https://doi.org/10.21638/spbu05.2020.105>
- Kocisova, K., Gavurova, B. & Behun, M. (2018). The evaluation of stability of Czech and Slovak banks. *Oeconomia Copernicana*, 9(2), 205-223. <https://doi.org/10.24136/10.24136/oc.2018.011>
- Laghi, E. & Di Marcantonio, M. (2016). Beyond CAPM: estimating the cost of equity considering idiosyncratic risks, *Quantitative finance*, 16(8), 1273-1296. <https://doi.org/10.1080/14697688.2015.1124136>
- Machová, V. & Vrbka, J. (2018). Value generators for businesses in agriculture, *The 12 International Days of Statistics and Economics, Prague, September 6-8, 2018*, 11, 1123-1132.
- Majer, R., Ellingerova, H. & Gasparik, J. (2020). Methods for the calculation of the lost profit in construction contracts, *Buildings*, 10(4). <https://doi.org/10.3390/buildings10040074>
- Momcilovic, M., Begovic, SV., & Živkov, D. (2015). Cost of equity: the case of serbian food industry. *Custos e agronegocio on line*, 11(1), 184-197.
- Nur, T. & Karnen, K. A. (2014). Searching for determinants of pay or not to pay cash dividend in indonesia, *Indonesian Capital Market Review*, 6 (1), 19-37. <https://doi.org/10.21002/icmr.v6i1.2984>
- Ogiugo, H. U., Adesuyi, I. O., & Ogebeide, S. O. (2020). Empirical test of capital asset pricing model on securities return of listed firms in Nigeria. *Insights into Regional Development*, 2(4), 825-836. [https://doi.org/10.9770/IRD.2020.2.4\(8\)](https://doi.org/10.9770/IRD.2020.2.4(8))
- Pavelko, O., Lazaryshyna, I., Dukhnovska, L., Sharova, S., Oliinyk, T. & Donenko, I. (2021). Construction development and its impact on the construction enterprises financial results. *Estudios de Economia Aplicada*, 39(3). <https://doi.org/10.25115/eea.v39i3.4719>
- Ranjee, R., Pathak, R. & Saxen, A. (2018). To pay or not to pay: what matters the most for dividend payments?, *International journal of Maanagerial Finance*, 14(2), 230-244. <https://doi.org/10.1108/IJMF-07-2017-0144>
- Rjiba, H., Saadi, S., Boubaker, S. & Ding, X. (2021). Annual report readability and the cost of equity capital. *Journal of Corporate Finance*, 67. <https://doi.org/10.1016/j.jcorpfin.2021.101902>
- Saad, M. & Samet, A. (2017). Liquidity and the implied cost of equity capital. *Journal of International Financial Markets Institutions and Money*, 51, 15-38. <https://doi.org/10.1016/j.intfin.2017.08.007>
- Saleem, S. & Usman, M. (2021). Information risk and cost of equity: the role of stock price crash risk. *Journal of asian finance economics and business*, 8(1), 623-635. <https://doi.org/10.1108/APJBA-04-2021-0154>
- Sanan, K. (2019). Impact of board characteristics on firm dividends: evidence from India. *Corporate Governance-The International Journal of Business in Society*, 19(6), 1204-1215.
- Sari, RM., & Patrisia, D. (2019). The effect of institutional ownership, capital structure, dividend policy, and company's growth on firm value (study of property real estate and building construction companies), *Proceedings of the third padang international conference on economics education, economics, business and management, accounting and entrepreneurship*, 97, 637-645. <https://doi.org/10.2991/piceeba-19.2019.69>
- Sikyr, M. & Busina, F. (2014). Human resource management in the Czech and Slovak building industry. *8th International Days of Statistics and Economics. Prague, Czech Republic*, 8, 1477-1486.
- Sinicakova, M., Sulikova, V., & Gavurova, B. (2017). Twin Deficits Threat in the European Union. *E & M Ekonomie a Management*, 20(1), 144-156. <https://doi.org/10.15240/tul/001/2017-1-010>
- Straková, J., Pártlová, P., Dobrovič, J., & Váchal, J. (2018). Situational analysis and its role in the process of strategic business management. *Polish Journal of Management Studies*, 18(1), 353-364. <https://doi.org/10.17512/pjms.2018.18.1.26>

- Straková, J., Rajjani, I., Pártlová, P., Váchal, J., & Dobrovič, J. (2020). Use of the Value Chain in the Process of Generating a Sustainable Business Strategy on the Example of Manufacturing and Industrial Enterprises in the Czech Republic. *Sustainability*, 12(4), 1520. <https://doi.org/10.3390/su12041520>
- Straková, J., Koraus, A., Váchal, J., Pollák F., Cernak, F., Talíř, M. & Kollmann, J. (2021a). Sustainable Development Economics of Enterprises in the Services Sector Based on Effective Management of Value Streams. *Sustainability*, 13 (16). <https://doi.org/10.3390/su13168978>
- Straková, J., Talíř M., Kollmann, J., Pártlová, P. & Váchal, J. (2021b). An integrated model of corporate environment, including value chain, as a competitiveness tool for small and medium enterprises. *Polish Journal of Management Studies*, 23(1), 370-384. <https://doi.org/10.17512/pjms.2021.23.1.23>
- Straková, J., Šimberová, I., Pártová, P., Váchal, J. Váchal & Zich, R. (2021c). The Value Chain as the Basis of Business Model Design. *Journal of Competitiveness*, 13(2), 135-151. <https://doi.org/10.7441/joc.2021.02.08>.
- Tahir, H., Masri, R., & Rahman, MM. (2020). Impact of board attributes on the firm dividend payout policy: evidence from Malaysia. *Journal Information*, 20(5), 919-937. <https://doi.org/10.1108/CG-03-2020-0091>
- Tkacova, A., Gavurova, B., Danko, J., & Cepel, M. (2017). The importance of evaluation of economic determinants in public procurement processes in Slovakia in 2010-2016. *Oeconomia Copernicana*, 8(3), 367-382. <https://doi.org/10.24136/oc.v8i3.23>
- Váchal, J., Vochozka, M., Doležalová, H., Drábková, Z., Faltová Leitmanová, I., Hron, J., Hrušková, L., Kallista, P., Konigová, M., Krninská, R., Macák, T., Opekarová, L., Oubrechtová, M., Rolínek, L., Sedlák, J., Slabá, M., Sehel, V., Straková, J., Škodová Parmová, D., Pártlová, P., Tichá, I., Vaněček, D., Vrchota, J. & Zeman, R. (2013). *Podnikové řízení. 1. vyd.* Praha: Grada Publishing.
- Valaskova, K., & Bakes, V. (2018). International perception of the costs of equity estimation, *Globalization and its Socio-Economic Consequences*, 1887-1894.
- Valášková, K., Gavurová, B., Ďurana, P., & Kováčová, M. (2020). alter ego only Four times? the Case study of business profits in the visegrad group. *E a M: Ekonomie a Management. E+M Ekonomie a Management*, 23(3), 101-119. <https://doi.org/10.15240/tul/001/2020-3-007>
- Vochozka, M. (2018). Analysis of Enterprise Operating in the Construction Industry Based on Kohonen Networks, *The 12 International Days of Statistics and Economics, Prague, September 6-8, 2018*, 10, 1874-1883.
- Vochozka, M., & Machová, V. (2017). Enterprise value generators in the building industry. *SHS Web of Conferences*, 39, p.8. <https://doi.org/10.1051/shsconf/20173901029>.
- Vochozka, M., Mulač, P., Ezrová, H., Kafka, T., Mulačová, V., Opekarová, L., Pártlová, P., Tuček, J. & Váchal, J. (2012). *Podniková ekonomika. 1. vyd.* Praha: Grada Publishing.
- Vochozka, M., Rowland, Z., & Vrbka, J. (2015). Evaluation of credibility of civil construction companies in South bohemia. *Innovative Economic Symposium 2015*. 17, 145-161.
- Vochozka, M., Vrbka, J., Hašková, S., Rowland, Z. & Machová, V. (2017). *Přehled metod komplexního hodnocení podniků. 1. vyd.* Vysoká škola technická a ekonomická v Českých Budějovicích.
- Vochozka, M., Vrbka, J., Stehel, V., Šuleř, P., Rowland, Z., Machová, V., Horák, J. & Krulický, T. (2021). *Finance podniku: Komplexní pojetí. 1. vyd.* Praha, Česká republika: Grada publishing.
- Vrbka, J. & Stehel, V. (2019). The issue of multicriteria decision-making: Model example of business partner risk assessment. In Popa, I; Dobrin, C; Ciocoiu, C.N. *Proceedings of the 13th International Management Conference: Management Strategies for High Performance (IMC 2019): International Management Conference*. 13, 738-749.

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PROFITABILITY OF CURRENT INVESTMENTS IN STOCK INDEXES

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Abstract. Investing in stock indexes has become an integral part of financial portfolios. Fearing the loss of savings value, households move their financial reserves into stocks, bonds and stock indexes; the latest concerns the subject of this article. The article focuses on determining the best method of forecasting the prices of stock indexes, S&P 500 and NASDAQ Composite, comparing the Simple moving average (SMA) technique with the Autoregressive integrated moving average (ARIMA) model based on free software RStudio. We formulated two plausible hypotheses: Which of these two methods - SMA or ARIMA - is more accurate for predicting the prices of selected stock indexes in the last thirty years? How will the price of the selected stock indexes develop according to the better of the suggested method through 2022? The ARIMA model indicated better results, proving great ability to forecast both indexes through 2022. The method determined the NASDAQ Composite stock index value to be 16,115.75 USD per stock through 31.12.2022, whereas S&P 500 index saw the value of 5,025.86 USD per stock through the same date. The follow-up research should deal with forecasting different stock indexes and comparing other conventional techniques for predicting time series. The subsequent study may also compare methods' forecasting accuracy between stock indexes and independent companies, whose stock volatility could favour different forecasting approaches.

Keywords: forecasting; the ARIMA model; moving averages; stock indexes; return on investments

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JEL Classifications: G22, G11, G17

Additional disciplines: mathematics

1. Introduction

Developed global economies have recently fostered a close interrelationship, jointly facing galloping inflation (Straková et al., 2021a). This nominal macro-economic variable made markets of multiple countries suffer from extreme price variations, e.g. caused by soaring or slumping commodity prices in global markets (Masood et al., 2019; Fernandes, 2020). The rise in inflation is more significant than in the years before the onset of the Covid-19 pandemic. Upon witnessing the price increase, households seriously reconsider their investment decisions (Abildgren and Kuchler, 2021). Fearing the loss of savings value, they move their financial reserves into stocks, bonds and stock indexes (Straková et al., 2020); the latest concerns the subject of this article. Choosing a good investment portfolio requires careful consideration of potential risks, involving keeping the balance between the stock and bond investments (Sinicakova et al. 2017; Gavurova et al. 2020). This harmony is changeable, depending on the situation in the market. Careful diversification of portfolios helps minimize the risk of substantial losses (Xiao and Tao, 2021; Bilan et al. 2017; Fedorko et al. 2018), making stock indexes an ideal investment. Forecasting the prices of stock indexes is an indispensable tool for reducing the risk and boosting the returns. Yet, it can be a high-stake venture due to multiple impactful hard-to-predict factors, which, for example, triggered the Great Recession in 2008 (Straková et al., 2021b; Gavurova et al. 2017, 2018). Today's world would have been much different if we had foreseen, mitigated, or even avoided this financial meltdown (Tang et al., 2015).

The article aims at forecasting the price movement of selected stock indexes. We formulated two plausible hypotheses:

- 1) Which of these two methods - Simple moving average (SMA) or Autoregressive integrated moving average (ARIMA) - is more accurate for predicting the prices of selected stock indexes in the last thirty years?
- 2) How will the price of the selected stock indexes develop according to the better of the suggested method through 2022?

2. Theoretical background

The return on stock indexes has recently been a widely discussed issue, drawing the attention of investors (Suler et al., 2020). From the very beginning of the existence of the stock market, various people have tried to predict its future development, or the future development of share prices. Nowadays, according to Machová et al., price forecasting in the stock markets is becoming (2020) an increasingly interesting topic. Fatal losses can occur in the event of a wrong estimate of the market's development tendency or in the event of a wrong decision. Klieštík and Majerová (2015) also agree with this opinion, who state that the prediction of stock prices is a very important task for all people paying attention to the stock market. The authors further add that stock price forecasting is always a hot issue for shareholders, dealers and stock brokers. According to Etemadi et al (2015), managers, investors and financial analysts consider earnings per share as one of the most important financial indicators. Precisely for this reason, it is very useful to predict the stock price with high accuracy (Kučera and Andelík, 2021).

Koutroumanidis et al. (2011) state that the ability to predict stock price developments is a key task for investors in order to maximize their profits. Investors are able to make big profit using these quality tools with high accuracy. Stock price prediction is currently a very important financial topic and has huge potential for the market economy and investors in the future. Vochozka et al. (2020) state that the effort to forecast stock prices is becoming increasingly complex due to the increasing amount of historical data. The development of stock prices over time is very dynamic, complex and non-linear and can be predicted through many methods, one of which is the ARIMA model (Shi et al., 2012). For prediction, it is advisable to use the ARIMA model, because it uses and manages to calculate with time series data (Jiang and Subramanian, 2019). Using the ARIMA model on historical data to estimate returns and volatility of S&P BSE Essex and S&P BSE IT indexes in the Bombay Stock Exchange market showed a strong correlation between actual values and the estimates. The results indicate

increasing returns, yet they gradually approach zero (Challa et al., 2020). The ARIMA method supplemented with the AdaBoost algorithm demonstrated the best results when determining the price movement of the Standard&Poor's 500 index (S&P 500).

Pulungan et al., 2018 used the ARIMA model in the Indonesian stock market on daily data of the SRI-KEHATI index from 8th June 2009 to 17th July 2017, acquiring only unreliable non-stationary data. Upon extensive data processing, the authors transformed the seasonal differences into applicable stationary information, using the ARIMA model as the ideal method for data handling (3,1,1). The technique also proved practical for predicting stock prices in the Indonesian stock market (Pulungan et al., 2018). Gaspareniene et al. 2018 used the ARIMA method to forecast the price volatility of gold - an essential commodity in the financial sector, revealing that the technique is suitable only for short-term predictions (max. one year). Oil presents another primary asset, ensuring the smooth running of major economic ventures. To forecast the prices of this vital resource, the authors (Haque and Shaik, 2021) applied the ARIMA and GARCH models. Of all the categories, the ARIMA (4,1,4) and GARCH (1,1) showed the best accuracy, the former indicating higher accuracy in forecasting extreme and almost unpredictable situations, e.g. the Covid-19 pandemic.

Creating and forecasting the price movement in the stock market is a complicated issue. There have been many statistic models struggling to make almost impossible predictions (Tkacova et al. 2017; Gavurova et al. 2020; Kocisova et al. 2018). Islam and Nguyen, 2020 compared forecasts of a method of autoregressive integrated average, artificial neural network and stochastic process of Brownian motion with reality, revealing that the conventional statistic model and the stochastic technique yield more accurate results than artificial neural structures. Zakamulin and Giner 2020 contrasted a method of moments (MOM) and moving average (MA) to forecast time series, unveiling considerable similarities. Yet, MA made better forecasts regarding the future trends. The use of the MA method to predict stock prices within 50 days made investors receive higher returns (Almujamed, 2018). However, a survey from 1972 to 2015 proved a dramatic slump in the accuracy of moving averages (Strobel and Auer, 2018). Since financial trends are imperative in making sensible investment decisions, forecasting time series is subject to continuous improvement. Hybrid models also provide accurate forecasts, making better predictions than the ARIMA model or moving averages (Khashei and Hajirahimi, 2017). Kučera and Andelik (2021) say that although the ARIMA model and moving average method rank among less complex approaches to forecasting time series, they still find wide use in making accurate investment decisions. Using both techniques, investors significantly reduce the risk of loss, mainly in the event of ARIMA, which can handle unpredictable scenarios.

3. Data and Methodology

We used data from the S&P 500 and NASDAQ Composite Index for the calculation. The prediction of stock indexes through 2022 encompasses data from Yahoo Finance website from the last thirty years, from 31st March 1992 to 31st March 2022. The paper introduces the figures in American Dollars (USD), reflecting the closing prices of the indexes. We replaced the missing data with the information from the previous day, rounding the results to two decimal places (see Table 1 and Table 2).

Table 1. A basic data characteristic from NASDAQ Composite Index

Average price per stock	3578.63073 USD
Price median	2380.405 USD
Modus	2470.52 USD
Maximum stock price	16057.44 USD
Minimum stock price	547.84 USD
Max-min difference	15509.6 USD
Amount of data	10958

Source: Own

Table 2. A basic data characteristic from S&P 500 Index

Average price per stock	1526.801 USD
Price median	1277.89 USD
Modus	1092.54 USD
Maximum stock price	4796.56 USD
Minimum stock price	394.5 USD
Max-min difference	4402.06 USD
Amount of data	10958

Source: Own

Figure 1 and 2 depict data used as input sources for the research.

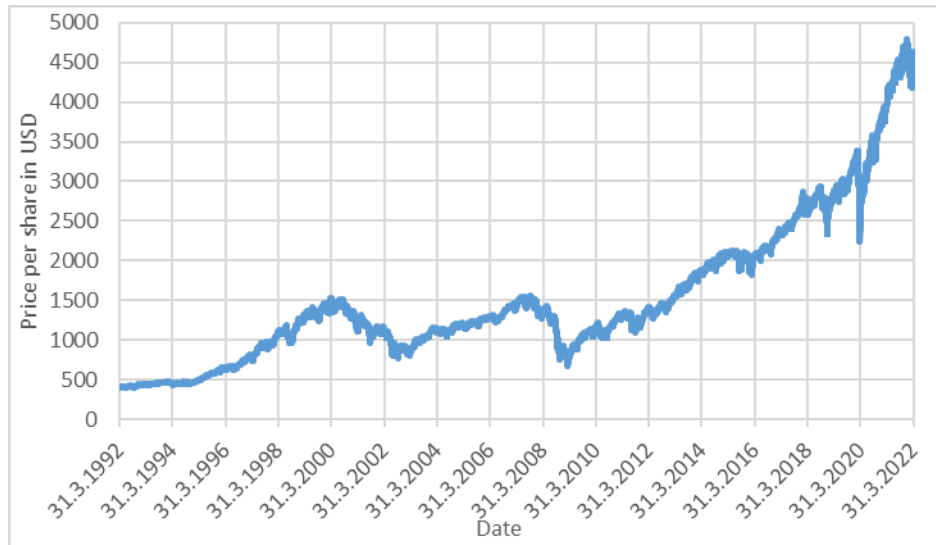


Figure 1. Price movement of the S&P 500 Index from 31.3.1992 to 31.3.2022

Source: Authors' elaboration reflecting processed data from Yahoo Finance

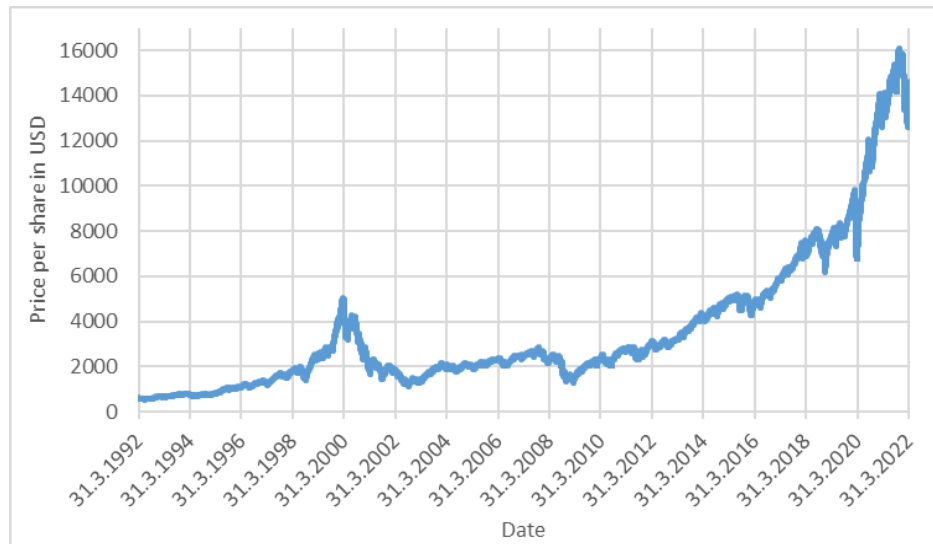


Figure 2. Price movement of NASDAQ Composite Index from 31.3.1992 to 31.3.2022

Source: Authors' elaboration reflecting processed data from Yahoo Finance

In the first part, we used the SMA method to forecast stock index prices, deliberately disregarding the trend and seasonality of the data. Firstly, the calculation of the future values involved known data, followed by previously predicted figures. Individual categories of the SMA comprised 50, 100 and 300 days. The research tested the data regarding their abilities to forecast stock indexes, verifying this capacity on the already known data from 31st March to 31st March 2021 to preserve similarities of the predicted periods. A close comparison of the resulting forecast with reality allowed selecting the most accurate category to predict prices through 2022.

The ARIMA model is the second chosen method, involving RStudio statistic software for selecting the most relevant model parameters. The used commands were as follows:

- `Class(File_name)`
- `File_name_time=ts(File_name$Price,start=min(File_name$Date),end=max(File_name$Date))`
- `Class(File_name_time)`
- `Library(Forecast)`
- `Library(tseries)`
- `Plot(File_name_time)`
- `Acf(File_name_time)`
- `Pacf(File_name_time)`
- `Adf.test(File_name_time)`
- `File_name_MODEL=auto.arima(File_name_time, ic='aic',trace=true)`

R program tested and chose the best ARIMA parameters. Upon uploading the criteria to Microsoft Excel, XLSTAT software predicted year 2022, setting the confidence interval to 95%.

4. Results

The blue curve of Figures 3 and 4 illustrates the actual stock index value from 1.4.2021 through 31.12.2021, contrasting with the red line values provided by a 50-day SMA. The green line depicts a forecast made by a 100-day SMA, and the purple trend tracks the estimated price using a 300-day SMA. The figures suggest that the 100-day SMA draws nearest to the actual value in the NASDAQ Composite, whereas the 50-day SMA is the closest to the real value of the S&P 500 index.

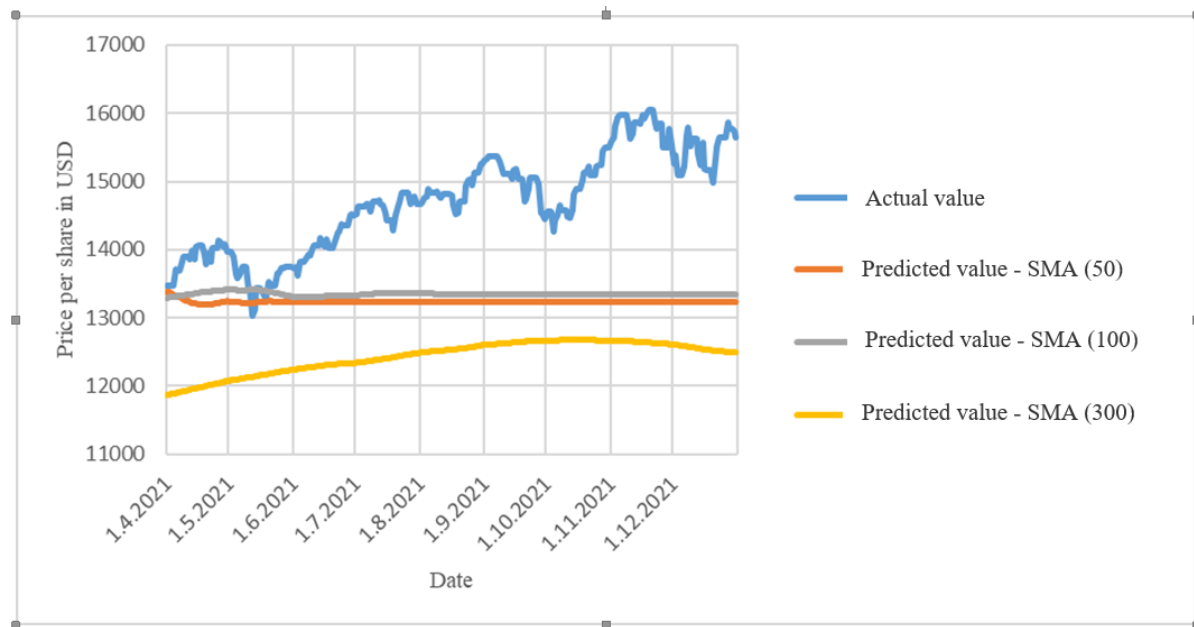


Figure 3. Comparing individual forecasts with real values of the NASDAQ Composite

Source: Own

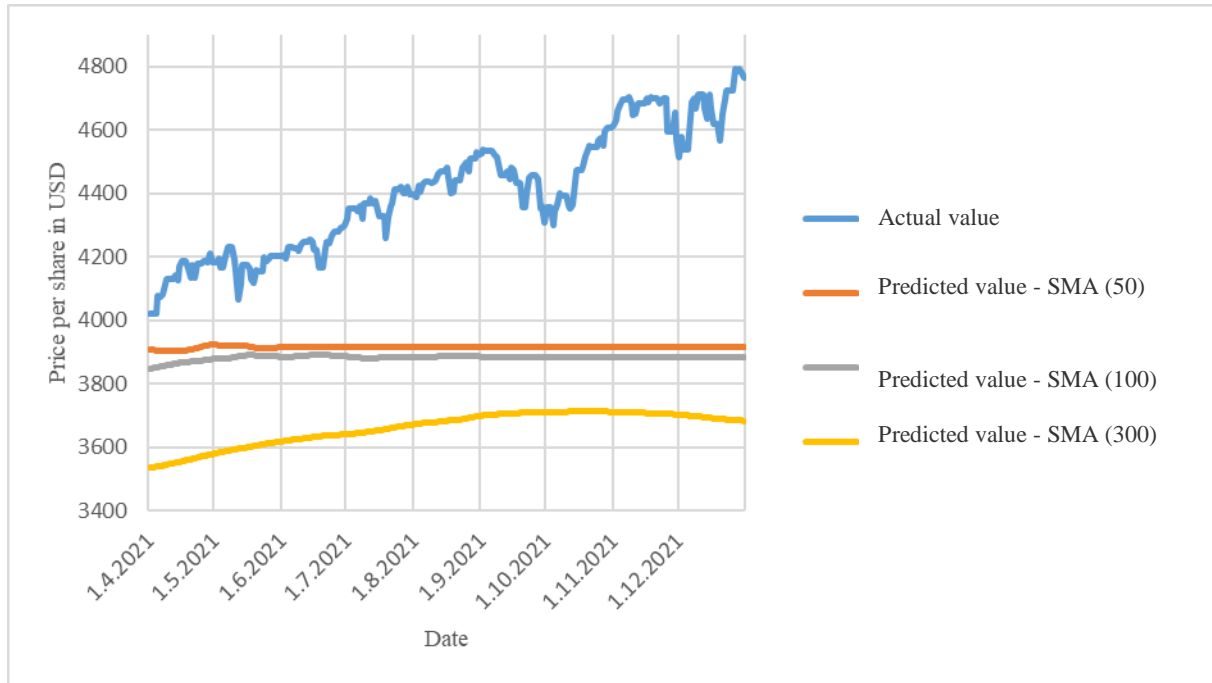


Figure 4. Comparing individual forecasts with real values of S&P 500

Source: Own

Tables 3 and 4 suggest other essential data for comparing the accuracy of separate forecasts. Each prediction contrasts with the average actual stock value for a defined period. The first indicator compares the average price of one predicted stock and the average real price per stock. The second indicator involves the mean absolute error (MAE), while the third indicator refers to the mean absolute percentage error (MAPE). The figures acquired from the experiment comply with the data suggested in Figures 3 and 4. The NASDAQ Composite index saw the average price per stock at 13,231.43\$ using a 100-day SMA, which is the closest to the average actual value of 14,697.95 USD. The MAE amounts to 1,356.00 USD, and the MAPE equals 9%, indicating the lowest value of all the forecasts. The S&P 500 index was the closest to the average actual price per stock using a 50-day SMA amounting to 3,914.79 USD, while the real price was 4,403.14 USD. The average MAE in this prediction was 488.36 USD, whereas the MAPE equalled 10.92 %. The 300-day SMA made the worst prediction, varying by about 6% from the most accurate forecast in both cases.

Table 3. Comparing predicted values with real values of the NASDAQ Composite index

	Real value	SMA(50)	SMA(100)	SMA(300)
Average price per stock (USD)	14,697.95	13,231.43	13,348.59	12,430.28
Average MAE (USD)	X	1,468.58	1,356.00	2,267.67
Average MAPE	X	9.77 %	9.00 %	15.28 %

Source: Own

Table 4. Comparing predicted values with real values of the S&P 500 index

	Real value	SMA(50)	SMA(100)	SMA(300)
Average price per stock (USD)	4,403.14	3,914.79	3,882.61	3,659.95
Average MAE (USD)	X	488.36	520.53	743.19
Average MAPE	X	10.92 %	11.66 %	16.76 %

Source: Own

Based on the findings, we chose the 100-day SMA for the NASDAQ Composite index and the 50-day SMA for the S&P 500. Figures 5 and 6 depict the predicted values of the discussed stock indexes through the end of the year. To make the charts less complex, we included figures as of 1.1.2002. The stock price of the NASDAQ Composite index should reach 13,846.26 USD, whereas the value S&P 500 index should hit 4,408.48 USD per stock.

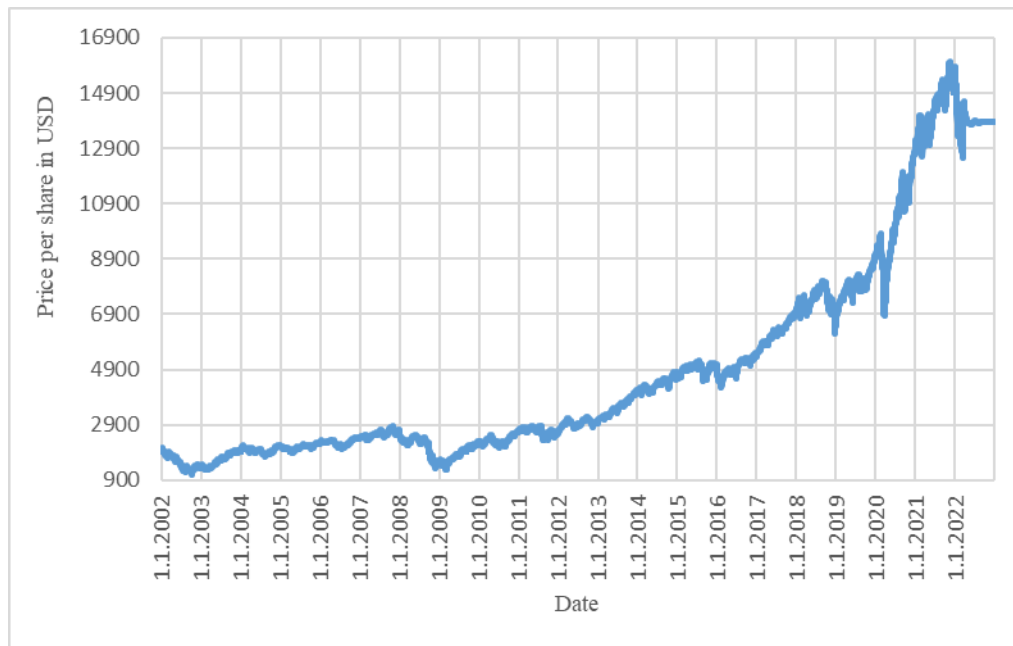


Figure 5. The predicted price movement of the NASDAQ Composite index as of 1.1.2002 through 31.12.2022

Source: Own

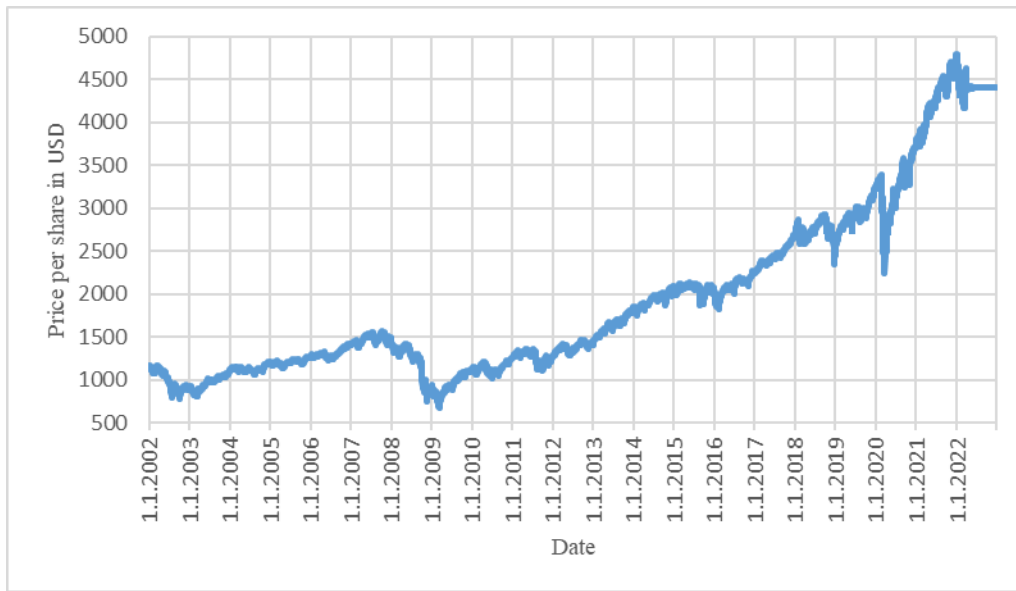


Figure 6. The predicted price movement of the S&P 500 index as of 1.1.2002 through 31.12.2022
Source: Own

To test the accuracy of the ARIMA model (5,1,0) based on the results from the RStudio statistic program, we chose the period from 1.4.2021 to 31.1.2021. The blue curve of Figures 7 and 8 illustrates the actual value of one stock of the selected index contrasted with the red central line; the green line represents the lower prediction boundary, whereas the purple curve tracks the outer limit of the estimate. The figures suggest that the purple line is the closest to the actual index value.

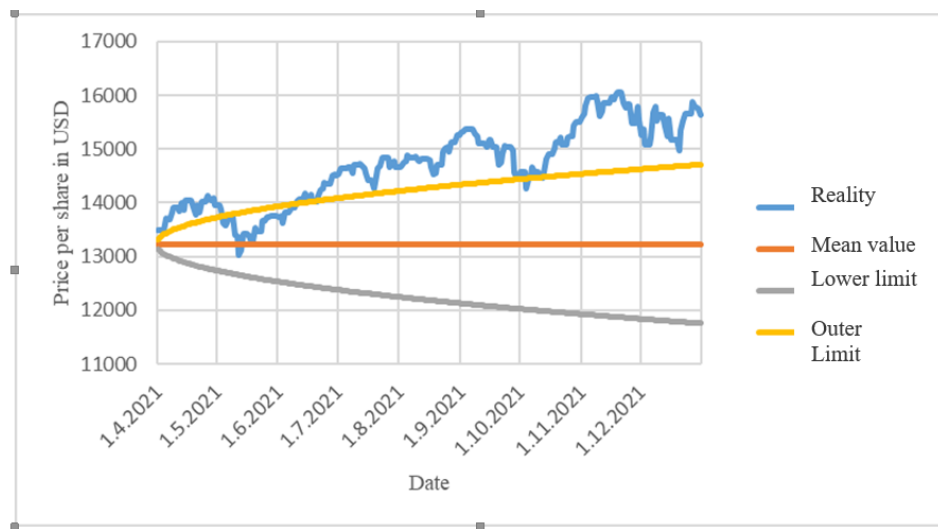


Figure 7. Comparing the forecasts of the ARIMA model with the actual value of the stock index NASDAQ Composite
Source: Own

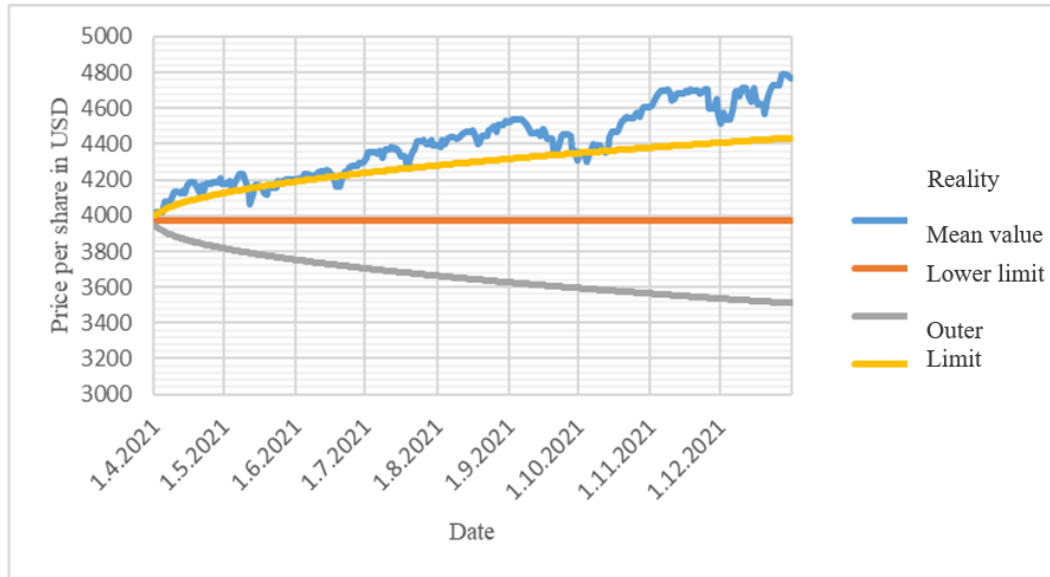


Figure 8. Comparing the forecasts of the ARIMA model with the actual value of the stock index S&P 500
Source: Own

Tables 5 and 6 propose essential parameters to determine the accuracy of the forecasts. The figures comply with Figures 7 and 8. A close comparison of the limits shows a similar MAPE average in both indexes.

Table 5. A tabular comparison of a forecast of ARIMA model with the actual value of the NASDAQ Composite stock index

	Actual value	Central limit	Lower limit	Outer limit
Average price per stock (USD)	14,697.95	13,233.3	12,245.12	14,221.47
MAE average (USD)	X	1,4466.91	2,452.83	550.72
MAPE average	X	9.73 %	16.38 %	3.66 %

Source: Own

Table 6. A tabular comparison of a forecast of ARIMA model with the actual value of the S&P 500 stock index

	Actual value	Central limit	Lower limit	Outer limit
Average price per stock (USD)	4,403.14	3,971.43	3,662.52	4,280.34
MAE average (USD)	X	431.72	740.63	126.93
MAPE average	X	9.63 %	16.56 %	2.8 %

Source: Own

We applied the ARIMA model (5,1,0) to the up-to-date information of the S&P 500 index and NASDAQ Composite, forecasting a time series through 31.12.2022 depicted in Figures 9 and 10.

The NASDAQ Composite index hit the mean value per stock at 14,439.44 USD, the lower limit of 13,348.19 USD and the outer boundary of 15,560.69 USD in the predicted period. The 31st December 2022 saw the highest foreseen price per stock at 16,115.71 USD, with a trough of 12,763.14 USD. The S&P 500 index hit the forecast mean value of 4,535.05 USD, the lower limit of 4,206.75 USD and the outer value of 4,863.36 USD. The index hit the lowest estimated stock price at 4,044.24 USD and the highest at 5,025.86 USD on 31.12.2022.

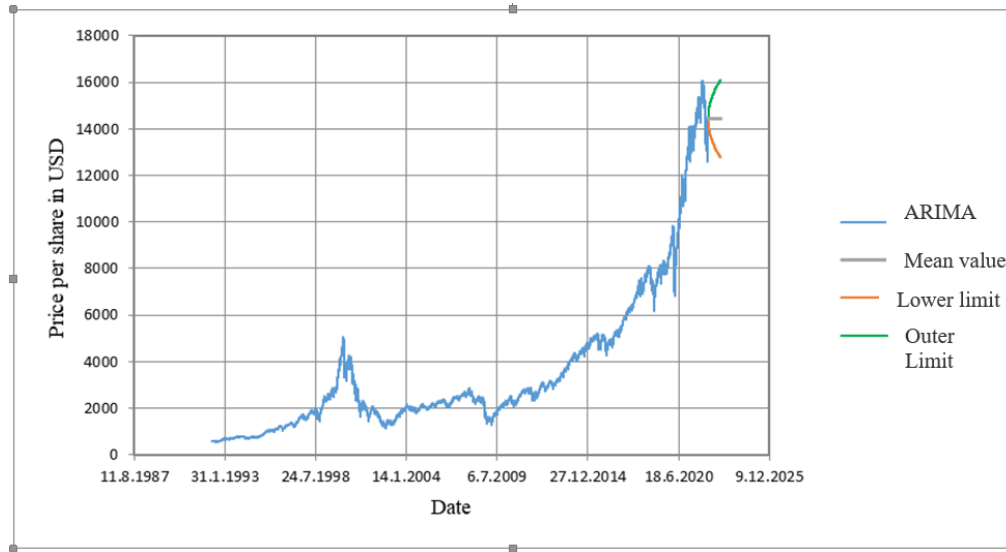


Figure 9. Graphical depiction of the movement of the NASDAQ Composite index by the ARIMA model
Source: Own

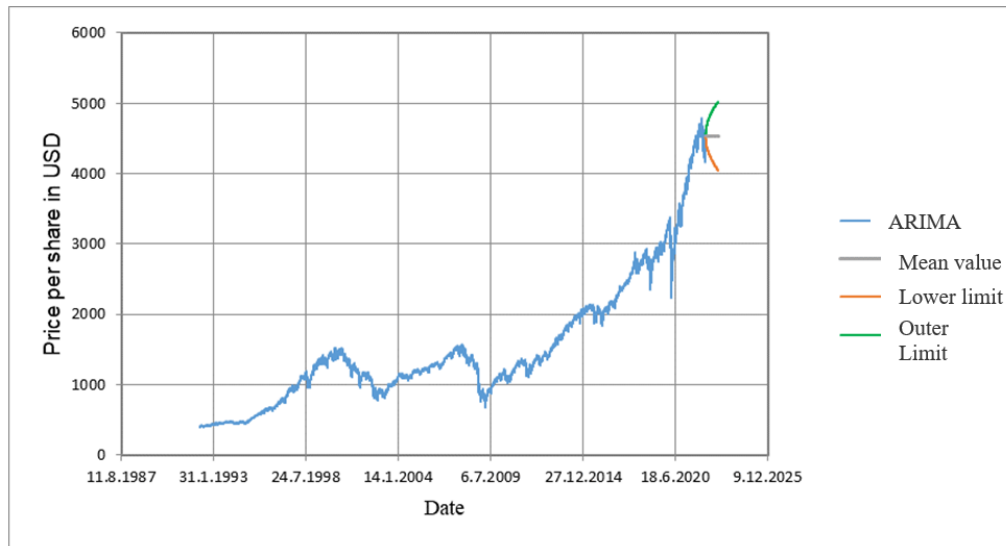


Figure 10. Graphical depiction of the movement of the S&P 500 index by the ARIMA model
Source: Own

5. Discussion

The research revealed that the 100-day SMA best reflects the NASDAQ Composite index, whereas the 50-day SMA closely corresponds to S&P 500. The indexes showed different SMAs as the most accurate technique because the NASDAQ Composite had suffered an unexpected, short-term decline upsetting the resulting predicted price per stock. The 100-day SMA did better in forecasting the constantly upward trend of the index, smoothing the downturn by the previous values. The S&P 500 index did not witness any striking variations, retaining its steadily increasing trend. That is why this index best correlates with the 50-day moving average. The testing forecasts further proved that moving averages are not a wise choice for a long-term prediction of the price movement of stock indexes. Both experimental scenarios showed the MAPE at around 10%, indicating an unacceptably high percentage. The short-term SMA cannot readily respond to the index volatility, and the long-term SMA displays strong bias given the past low index prices. Despite their inaccuracies, the methods may help investors roughly estimate the future market trend. Almujaed (2018) stated that investors' incomes dramatically increased using a 50-day SMA.

Upon verifying the accuracy of the ARIMA model (5,1,0), the highest forecast estimate proved the most realistic, indicating a constant upward trend in both stock indexes. The average MAPE ranged around 3%. Pulungan et al. (2018) arrived at similar results, using ARIMA (3,1,1) for predicting SRI-KEHATI stock index prices.

Thanks to these findings, we found the answer to the first hypothesis: 1) Which of these two methods - Simple moving average (SMA) or Autoregressive integrated moving average (ARIMA) - is more accurate for predicting the prices of selected stock indexes in the last thirty years? The results indicate that the ARIMA model (5,1,0) greatly outplays the SMA in both index scenarios. Gaspareniene et al. (2018) arrived at the same conclusions, revealing that the ARIMA model is instrumental in short-term forecasts for up to one year. A close comparison between the most accurate test prediction of the NASDAQ Composite index using the ARIMA model and the SMA revealed that the latter method was worse than the ARIMA model by 6.11% in making the most accurate forecast at the average MAPE. The S&P 500 index indicated an even sharper difference of 8.12%, favouring the ARIMA model.

The second hypothesis relates to the first one: 2) How will the price of the selected stock indexes develop according to the better of the suggested method through 2022? Both approaches (the ARIMA model and SMA) have foreseen a further steady rise in the stock indexes. To satisfactorily answer the hypothesis, we chose the ARIMA model (5,1,0) and its highest limit as the most accurate method. The technique estimates the value of the NASDAQ Composite index to be 16,115.71 USD per stock to 31.12.2022, expecting the S&P 500 index to hit 5,025.86 USD per stock. Jiang and Subramanian (2018) share the same opinion, proving the ARIMA model's great utility in forecasting time series.

Conclusions

The article sought to estimate stock index prices through 2022. We fulfilled this objective by suggesting the most accurate method. Although forecasts are never fully authentic (stock markets are unpredictable), they provide at least a rough estimate of the price movement. Using the MAPE technique, we compared the testing predictions based on the SMA and ARIMA models (5,1,0), obtaining better results from the ARIMA model. The method suggests that the S&P 500 index price should soar to 5,025.86 USD per stock, and the NASDAQ Composite index should hit 16,115.71 USD per stock through 2022. Yet, the ARIMA model does not apply to other stock indexes with the same accuracy, which constitutes a pitfall of our analysis. Further research would have to involve a different ARIMA model to estimate the movement of other stock indexes. Follow-up studies should focus on forecasting various stock indexes and comparing different methods not included in our research to predict time

series. The scientists may also compare the accuracies of the forecasting methods between stock indexes and corporate stocks, which are more volatile and require different forecasting approaches.

References

- Abildgren, K., & Kuchler, A. (2021). Revisiting the inflation perception conundrum. *Journal of Macroeconomics*, 67, 0164-0704. <https://doi.org/10.1016/j.jmacro.2020.103264>
- Almujamed, H. I. (2018). Predictable returns in an emergin stock market: Evidence from Qatar. *Cogent Business & Management*, 5(1), UNSP 1497573. <https://doi.org/10.1080/23311975.2018.1497573>
- Bilan, Y., Gavurova, B., Stanislaw, G., & Tkacova, A. (2017). The Composite Coincident Indicator (CCI) for Business Cycles. *Acta Polytechnica Hungarica*, 14(7), 71-90. <https://doi.org/10.12700/aph.14.7.2017.7.5>
- Challa, M. L., Malepati, V., & Kolusu, S. N. R. (2020). S&P BSE Sensex and S&P BSE IT return forecasting using ARIMA. *Financial Innovation*, 6, 47. <https://doi.org/10.1186/s40854-020-00201-5>
- Etemadi, H., Ahmadpour, A., & Moshashaei, S. M. (2015). Earnings Per Share Forecast Using Extracted Rules from Trained Neural Network by Genetic Algorithm. *Computational Economics*, 46(1), 55-63. <https://doi.org/10.1007/s10614-014-9455-6>
- Fedorko, I., Bacik, R., & Gavurova, B. (2018). Technology acceptance model in e-commerce segment. *Management & Marketing Challenges for the Knowledge Society*, 13(4), 1242-1256. <https://doi.org/10.2478/mmcks-2018-0034>
- Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. *IESE Business School Working Paper No. WP-1240-E*, 33. <http://dx.doi.org/10.2139/ssrn.3557504>
- Gavurova, B., Dujcak, M., Kovac, V., & Kotaskova, A. (2018). Determinants of successful loan application of peer-to-peer lending market. *Economics & Sociology*, 11(1), 85-99. <https://doi.org/10.14254/2071-789x.2018/11-1/6>
- Gavurova, B., Packova, M., Misankova, M., & Smrcka, L. (2017). Predictive Potential and Risks of Selected Bankruptcy Prediction Models in the Slovak Business Environment. *Journal of Business Economics and Management*, 18(6), 1156-1173. <https://doi.org/10.3846/16111699.2017.1400461>
- Gavurova, B., Belas, J., Bilan, Y., & Horak, J. (2020). Study of legislative and administrative obstacles to SMEs business in the Czech Republic and Slovakia. *Oeconomia Copernicana*, 11(4), 689-719. <https://doi.org/10.24136/oc.2020.028>
- Gaspreniene, L., Remeikiene, R., Sadeckas, A., & Ginevicius, R. (2018). The main gold price determinants and the forecast of gold price future trends. *Economics and Sociology*, 11(3), 248-264. <http://dx.doi.org/10.14254/2071-789X.2018/11-3/15>
- Haque, M. I., & Shaik, A. R. (2021). Predicting crude oil prices during a pandemic comparison of arima and garch models. *Montenegrin Journal of Economics*, 17(1), 197-207. <http://dx.doi.org/10.14254/1800-5845/2021.17-1.15>
- Islam, M. R., & Nguyen, N. (2020). Comparison of Financial Models for Stock Price Prediction. *Journal of Risk and Financial Management*, 13(8). <https://doi.org/10.3390/jrfm13080181>
- Jiang, L. C., & Subramanian, P. (2019). Forecasting of stock price using autoregressive integrated moving average model. *Journal of Computational and Theoretical Nanoscience*, 16(8), 3518-3524. <https://doi.org/10.1166/jctn.2019.8317>
- Khashei, M., & Hajirahimi, Z. (2017). Performance evaluation of series and parallel strategies for financial time series forecasting. *Financial Innovation*, 3(1), 24. <https://doi.org/10.1186/s40854-017-0074-9>
- Klieštík T., & Majerova, J. (2015). Selected issues of selection of significant variables in the prediction models. *Proceedings of the 10th International Scientific Conference Financial management of Firms and Financial Institutions*, pp. 537-543, Ostrava, Czech Republic, 2015. ISBN 978-80-248-3865-6.
- Kocisova, K., Gavurova, B. & Behun, M. (2018). The evaluation of stability of Czech and Slovak banks. *Oeconomia Copernicana*, 9(2), 205-223. <https://doi.org/10.24136/10.24136/oc.2018.011>

- Koutroumanidis, T., Ioannou, K., Zafeiriou, E. (2011). Forecasting Bank Stock Market Prices with a Hybrid Method: The Case of Alpha Bank. *Journal of Business Economics and Management*, 12(1), 144-163. <https://doi.org/10.3846/16111699.2011.555388>
- Kučera, J., & Andelík, T. (2021). A historical excursion through the development of cryptocurrencies in the world. *Littera Scripta*, 14, (1) https://littera-scripta.com/wp-content/uploads/2021/09/1_2021%2007%20Kucera%20Andelik.pdf
- Machová, V., Krulický, T., & Horak, J. (2020). Comparison of neural networks and regression time series in estimating the development of the afternoon price of gold on the New York stock exchange. *Social and Economic Revue*, 1 61-72. <https://doi.org/10.13164/trends.2017.30.73>
- Masood, O., Tvaronavičienė, M., & Javaria, K. (2019). Impact of oil prices on stock return: evidence from G7 countries. *Insights into Regional Development*, 1(2), 129-137. [https://doi.org/10.9770/ird.2019.1.2\(4\)](https://doi.org/10.9770/ird.2019.1.2(4))
- Park, M., Lee, M. L., & Lee, J. (2019). Predicting stock market indices using classification tools. *Aslan Economic and Financial Review*, 9(2), 243-256. <https://doi.org/10.18488/journal.aefr.2019.92.243.256>
- Pulungan, D. P., Wahyundi, S., Suharnomo, S., & Muharam, H., (2018). Technical analysis testing in forecasting socially responsible investment index in Indonesia stock exchange. *Investment Management and Financial Innovations*, 15(4), 135-143. [http://dx.doi.org/10.21511/imfi.15\(4\).2018.11](http://dx.doi.org/10.21511/imfi.15(4).2018.11)
- Shi, S., Liu, W., & Jin, M. (2012). Stock Price Forecasting Using A Hybrid ARMA and BP Neural Network and Markov Model. *Proceedings of 2012 IEEE 14th International Conference on Communication Technology*, Chengdu, China, 2012, pp. 981-985. <https://doi.org/10.1109/ICCT.2012.6511341>
- Sinicakova, M., Sulikova, V., & Gavurova, B. (2017). Twin Deficits Threat in the European Union. *E & M Ekonomie a Management*, 20(1), 144-156. <https://doi.org/10.15240/tul/001/2017-1-010>
- Straková, J., Koraus, A., Váchal, J., Pollák F., Cernak, F., Talíř, M., & Kollmann, J. (2021a). Sustainable Development Economics of Enterprises in the Services Sector Based on Effective Management of Value Streams. *Sustainability*, 13 (16). <https://doi.org/10.3390/su13168978>
- Straková, J., Rajjani, I., Pártlová, P., Váchal, J., & Dobrovič, J. (2020). Use of the Value Chain in the Process of Generating a Sustainable Business Strategy on the Example of Manufacturing and Industrial Enterprises in the Czech Republic. *Sustainability*, 12(4), 1520. <https://doi.org/10.3390/su12041520>
- Straková, J., Talíř M., Kollmann, J., Pártlová, P., & Váchal, J. (2021b). An integrated model of corporate environment, including value chain, as a competitiveness tool for small and medium enterprises. *Polish Journal of Management Studies*, 23(1), 370-384. <https://doi.org/10.17512/pjms.2021.23.1.23>
- Strobel, M., & Auer, B. R., (2018). Does the predictive power of variable moving average rules vanish over time and can we explain such tendencies? *International Review of Economics & Finance*, 53, 168-184. <https://doi.org/10.1016/j.iref.2017.10.012>
- Suler, P., Horak, J., & Krulicky, T. (2020). Validation of the prediction of ČEZ stock prices. *Littera Scripta*, 13(1), 194-210. ISSN 1805-9112. https://doi.org/10.36708/Littera_Scripta2020/1/13
- Tang, D., Pan, Z., & Bethel, B. (2021). Prediction of stock index of two-scale long short-term memory model based on multiscale nonlinear integration. *Studies in Nonlinear Dynamics & Econometrics*, Early Access. <https://doi.org/10.1515/snde-2021-0032>
- Vochozka, M., Horak, J., & Krulicky, T. (2020). Innovations in management forecast: Time development of stock prices with neural networks. *Marketing and Management of Innovations*, 2020 (2), 324-339. <https://doi.org/10.21272/mmi.2020.2-24>
- Xiao, J. J., & Tao, C.S. (2021). Consumer finance / household finance: The definition and scope. *China Finance Review International*, 11(1), 1-25. <https://doi.org/10.1108/CFRI-04-2020-0032>
- Zakamulin, V., & Giner, J. (2020). Trend following with momentum versus moving averages: A tale of differences. *Quantitative Finance*, 20(6), 985-1007. <https://doi.org/10.1080/14697688.2020.1716057>

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RETAILER OR THE THIRD-PARTY REMANUFACTURER: WHICH IS THE GREENER CONTRACTOR FOR OUTSOURCING REMANUFACTURING?*

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Abstract. The aim of this paper is to understand how outsourcing remanufacturing operations to different OEMs agents (i.e., the retailer or third-party remanufacturer) affected a supply chain's sustainable issues. Although outsourcing strategies have been well studied in the remanufacturing literature, existing research has focused primarily on operational options between original equipment manufacturers (OEMs) and third-party remanufacturers (3PRs). In practice, however, many brand name retailers have recently created business models in which product remanufacturing is an integral part. The question showed the retailer or the third-party, which was the right remanufacturer for OEM's remanufacturing outsourcing? To answer this question, we developed two models for an OEM that had two options for remanufacturing outsourcing: (1) outsourcing remanufacturing to a 3PR (Model T) or (2) to its retailer (Model R). Using these two models, we addressed the questions: from the profit-maximizing perspective, how does outsourcing remanufacturing operations to retailers create strategic issues that are different from those with 3PRs? Which is more profitable for the OEM, 3PR, retailer, and the total supply chain? From an environmental impact perspective, how does outsourcing remanufacturing operations to retailers create strategic issues different from those with 3PRs? Which is more beneficial for our environment? Our analysis revealed that if the OEMs cared about economic performance, outsourcing the remanufacturing operations to the 3PR was a practical strategy. Conversely, if they cared about environmental sustainability, outsourcing the remanufacturing to the retailer was the preferred strategy. Numerical studies further validated our conclusions

Keywords: outsourcing; third-party remanufacturer; original equipment manufacturer; greener contractor

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1. Introduction

Besides the fact that remanufacturing creates benefits for the economy and the environment, it also poses several questions for original equipment manufacturers (OEMs) when they intend to undertake remanufacturing operations themselves. The greatest concern for the OEM is the risk of cannibalization problems between remanufactured and new products. The consumers' willingness to pay for the remanufactured consumer product was usually 15.3% lower than that for the new one (Guide and Li, 2010). The loss of profits from new product sales is not the only concern for OEMs when undertaking remanufacturing operations. In practice, many customers associate the lower quality of a remanufactured product with the OEM's brand, making it even more difficult for OEMs to maintain a high-quality branding image when adopting remanufacturing as part of its extended business (Ferguson, 2010; Fedorko et al. 2018).

As a result, many OEMs prefer to outsource remanufacturing operations (Karakayali et al., 2007). For example, in developed countries, such as the U.S. and European nations, many brand name OEMs, such as IBM, Texas Instruments, Hitachi, and Dow, have outsourced their remanufacturing operations to other agents, which earned millions of dollars in licensing revenues (Arora et al., 2013). According to a survey from the U.S. remanufacturing industry, OEMs only accounted for a small fraction (about 6%) of the total firms with integrated remanufacturing operations (Hauser and Lund, 2003). Similar cases also appeared in developing countries. For example, in 2008, the pilot program for automobile parts remanufacturing entered into force in the China market. In this pilot program and several OEMs, many third-party remanufacturers (3PRs) supported by the China National Development and Reform Commission selected to engage in remanufacturing for auto parts (National Development and Reform Commission, 2022).

Besides, it noted that many brand name retailers had created business models in which product remanufacturing was an integral part (Fedorko et al. 2018; Radavičius et al., 2021; Horvath et al. 2021). For example, Argos repositioned itself by offering affordable leasing of all its products by requiring recycling or remanufacturing when those products reached their end-of-life stage (The Brands of the Future Must Be Sustainable, 2021). Similarly, TigerDirect offers remanufactured products (TigerDirect Refurnished), such as printers, laptops, cameras, Led monitors, and more. For example, in the Chinese market, Sevlao, the largest distributor for excavators in China, has established its production-batch process of disassembly, cleaning, refurbishment, and replacement for excavators. From a research perspective, the discussion above raises the fundamental question addressed in this paper. Are the effects on profits or sustainability different if the OEM outsources remanufacturing operations to its retailers but not to 3PRs?

Profits or sustainability issues are perhaps the two important components that affect the selection of an OEM's remanufacturers (Ferguson, 2010; Mezulanik et al., 2020; Dvorsky et al., 2020). Indeed, outsourcing remanufacturing operations to 3PRs not only allows OEMs to focus on the production of new products, sales, and marketing, but it also outsources the "extended producer responsibility" of the end-of-life products to 3PRs. However, we should note that such an outsourcing strategy creates a secondary remanufactured market that is not under the OEM's direct control but is a niche for 3PRs. In the I.T. industry, "third-party companies built over \$100 million per year businesses in buying used computer equipment, remanufacturing it, and selling or leasing it out to someone else" (Big players emerge in fragmented brokerage market, 2021). Of course, such large numbers of remanufactured products from 3PRs can have serious consequences for OEMs' new product prices and profitability. Conversely, outsourcing remanufacturing operations to retailers is a potential option that mitigates the competition from the remanufactured product's market because both parties, including retailers, were concerned about the cannibalization problems of remanufactured products. However, such outsourcing may

induce considerable challenges for the OEM's profitability from new products and their branding image (Yan et al., 2015).

Our goal in this paper was to understand how outsourcing remanufacturing operations to different OEMs agents (i.e., the retailer or third-party remanufacturer) affected a supply chain's sustainable issues. More specifically, we developed two models for an OEM that have two options for remanufacturing outsourcing: (1) outsourcing it to a 3PR (Model T) or (2) outsourcing it to its retailer (Model R). Using these two models, we addressed the following questions.

1. From the profit-maximizing perspective, how does outsourcing remanufacturing operations to retailers create strategic issues that are different from those with 3PRs? Which is more profitable for the OEM, 3PR, retailer, and the total supply chain?
2. From an environmental impact perspective, how does outsourcing remanufacturing operations to retailers create strategic issues different from those with 3PRs? Which is more beneficial for our environment?

The overall contribution of this paper is threefold. First, instead of highlighting the interactions between the OEM and the 3PRs related to outsourcing remanufacturing, we allowed the OEM to have the potential flexibility to outsource remanufacturing to its retailers. Second, our work investigated the OEM's decisions that involved choosing the "right" remanufacturer and demonstrated how it affected the supply chain's economic outcomes and how environmental sustainability was affected by this flexibility. Finally, our paper sheds new light on the remanufacturing outsourcing model, which revealed that outsourcing remanufacturing operations to the 3PR were advantageous if the OEMs cared about economic performance. On the other hand, if they cared more about environmental sustainability, outsourcing remanufacturing operations to the retailer was the preferred strategy.

This paper proceeds as follows. In section 2, we reviewed related literature on remanufacturing outsourcing and on closed-loop supply chains. In section 3, we introduced our basic assumptions. In section 4, we presented and solved our two models. In section 5, we examined the effects of OEM outsourcing of its remanufacturing to different agents and explored the main results related to sustainable issues. Furthermore, in §6, we discussed the results and provided several possible directions for future research.

2. Literature Review

This paper complements the literature on remanufacturing, where we observed the remanufacturing outsourcing strategy between the OEM and the 3PRs. For example, Majumder et al. (2001) showed that, under a certain condition, the 3PR had incentives to reduce the OEM's remanufacturing cost. Debo et al. (2005) found OEM's optimal level of remanufacturing was lower than the monopoly model and decreased as the number of competing remanufacturers increased. Subsequently, Ferrer et al. (2006) found that, as the threat of competition increased, the OEM was more likely to utilize all available cores completely. Recently, Wu et al. (2006) presented an argument that competing OEMs without remanufacturing capacity sometimes benefited from the entry of 3PRs. Meanwhile, Zou et al. (2016) showed that it was in society's interest if the OEMs outsourced remanufacturing to 3PRs. Although most of the above research analyzed the remanufacturing outsourcing relationships between the OEM and the 3PRs, they ignored the OEM's potential flexibility to choose other remanufacturers, such as retailers. In contrast, we developed two models that allowed the OEM to have the flexibility to outsource remanufacturing to its retailers or 3PRs. Thus, we complement the above literature on remanufacturing outsourcing strategy between the OEM and the 3PRs by addressing how the flexibility of the OEM to outsource remanufacturing to a TPR or its retailers affected the issue of environmental performance in a supply chain.

This paper also relates to the literature that highlights the retailer's role in the closed-loop supply chain. Savaskan et al. (2004) addressed choosing the appropriate reverse channel structure to collect used products from customers. Recently, Shulman et al. (2010) examined how the return penalty was affected when returns were

either salvaged by the OEM or by the retailer. They found that the return penalty was more severe when returns were salvaged by a channel member who derived greater value from a returned unit. Subsequently, Lee et al. (2011) presented a model that integrated operations decisions with the retailer's collection and showed that the retailer retained the same form of decision-making by identifying an analogous closed-loop production efficiency. Although the above research highlighted the role of retailers in the reverse channels for collecting the end-of-life products, they ignored the fact that, in recent years, many retailers have created business models in which product remanufacturing was an integral part. Shi and Min (2014) discussed the possibilities of remanufacturing products. Fees for remanufacturing or disposal of goods are in some cases paid for by the government. This economic government instrument can also have a major impact on the environment. Golinska (2014) also notes that remanufacturing is a step towards resource efficiency and can lead to the sustainability of the whole business. According to Kasych et al. (2019) it is important that society and the economy of the whole country are sustainable in terms of economic, environmental and social components. According to Li et al. (2013) the remanufacturing of goods and their subsequent sale is very risky for companies, because they never know in what condition the merchandise will arrive and what the profit will be from a particular remanufactured item after deducting all the costs of remanufacturing. The remanufacturing process itself can also be a marketing strategy that deprives producers' market share of price discrimination (2008). Remanufacturing older products at the end of their service life may prevent new products from entering the competition. However, within a company, remanufacturing poses a risk of preventing the entry of new products, such as newer technologies used and offered for sale at higher margins (Atasu et al., 2006; Bacik et al. 2018). However, in most cases, companies face management barriers, preventing them from initiating remanufacturing services (Gavurova et al. 2018). However, this problem could be eliminated if management activities were left to the model of artificial neural networks. According to Vrbka and Rowland (2020) it is possible to leave the decision of the managerial character of the company to a computer system. According to Geyer et al. (2007) it is important to carefully coordinate the structure of production costs of a new product in order to save on the costs of its subsequent remanufacturing. Zikopoulos and Tagaras (2007) also emphasize that when remanufacturing a product, transporting it to a third-party remanufacturing is one of the most costly expenditures in the entire remanufacturing process. According to Agrawal et al. (2015). The offering of remanufactured products that have been remanufactured by the manufacturer may reduce the perceived value of the new product offered by up to 8%. Conversely, offering remanufactured products that have been remanufactured by a third party may increase the perceived value of the new products offered by up to 7%. Fang et al. (2019) states that a manufacturer should leave the remanufacturing of its products to a third party if this would mean a reduction in the manufacturer's profits. According to Shu et al. (2016), for the optimization of the supply chain in which both new products and remanufactured products figure, there is an important difference in the distribution costs of individual product types (new/refurbished). Suppliers should also focus on products with lower manufacturing/remanufacturing costs. According to Ovchinnikov (2011), the behavior of consumers when buying remanufactured products is very different from the standard behavior when buying new products, and therefore standard predictive sales methodologies for new products cannot be used to predict the sales of remanufactured products.

The whole issue of new products vs. remanufactured products is also greatly affected by consumers' willingness to pay. According to Chen et al. (2019) consumers' willingness to pay for remanufactured products varies depending on age, education, occupation, consumer income and other individual preferences (interest in the environment, antiquarian preferences, trust in a particular brand). Another important parameter is also the perception of the product itself (risk of buying a remanufactured product, goodwill of the brand). Michaud and Llerena (2011) consider remanufactured products to be green products. However, consumers are not willing to pay more for a so-called green product than for a conventional product. If the seller informs the consumer that by purchasing a remanufactured product, the consumer can make a positive contribution to the environment, consumers' willingness to pay increases. Dai et al. (2020) addressed the differentiation of consumers' willingness to pay depending on the offering of remanufactured products. Consumers' willingness to pay varies depending on Corporate Social Responsibility. In setting the right price for remanufactured products, consumers' willingness to

pay is within reasonable limits and there is no surplus or shortage, which helps to sustain the development of the economy. The perceived value of remanufactured products to consumers is very important, as high consumers' willingness to pay can be detrimental to producers (Fang et al., 2019). The willingness to buy a remanufactured product is also given by the so-called "green image" of the company (Georgiandis, 2004).

Raz et al. (2017) used an analytical model and a behavioral study to determine the degree of cannibalization of demand between individual companies that offer remanufactured products and that do not. remanufactured products create a surplus for consumers that offset the cost of environmental impact. According to Esenduran et al. (2016) legislation in the framework of forced end-of-life product buybacks may not be as environmentally beneficial as it may seem at first sight. Remanufacturing large quantities of products can thus be very burdensome for the environment. Chen et al. (2020) point out that legislation assesses a company's environmental performance on the basis of the amount of carbon emitted into the atmosphere. However, the amount of carbon emitted during the disposal process must also be taken into account when remanufacturing products. In relation to the environment, Cerda (2011) examined consumers' willingness to pay in the analysis of contributions to the rescue of an ecologically endangered area from its visitors. It can also be used to determine the economic value of this otherwise ecologically important area. According to Pimonenko et al. (2020), in line with the new trend, companies should transform their overconsumption into green consumption. With this marketing strategy, companies can also increase the value of their products and become more attractive to consumers and investors.

Based on observations from current practice, we developed two theoretical models in which the retailer actively engaged in remanufacturing operations. Therefore, our work contributes to the prior literature by allowing the retailer the flexibility to undertake the remanufacturing operations, which is consistent with earlier observations from current practice.

3. Model Notations and Assumptions

In this study, we considered two different supply chain models with two options for the OEM's remanufacturing outsourcing: (i) Model T (Figure 1(a)), where the OEM outsources the remanufacturing to the 3PR, and (ii) Model R (Figure 1(b)), where the OEM outsources the remanufacturing to the retailer. We discuss and layout our key assumptions below.

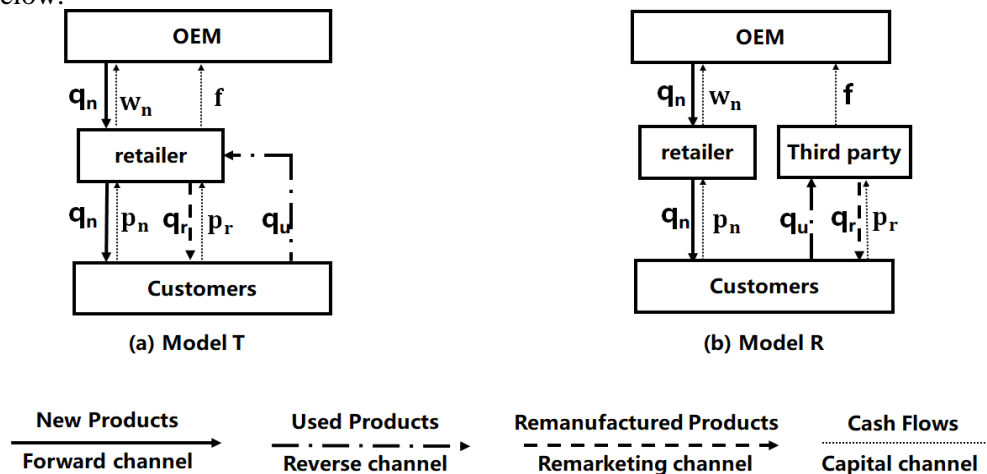


Figure 1. The two basic scenarios of remanufacturing outsourcing.

Source: Authors.

Assumption 1. The unit cost of remanufacturing a used core (c_r) is lower than that of producing a new product (c_n) (i.e., $c_r < c_n$).

This assumption is quite common in the literature on remanufacturing (Yan et al., 2015; Zou et al., 2016, Savaskan et al., 2004). This assumption was supported by Giutini and Gaudette (2003), who confirmed that the costs of remanufacturing accounted for 40-65% of traditional manufacturing.

Assumption 2. Consumers are heterogeneous in their willingness to pay (v) for the new product, uniformly distributed in $[0, Q]$.

The assumption that the consumer's willingness-to-pay for the new product is heterogeneous and uniformly distributed in $[0, Q]$ is widely-accepted in modeling the consumers' heterogeneity (see Ferrer et al., 2010).

Assumption 3. The willingness to pay for each consumer is measured by the ratio of a remanufactured product to the new product is γ ($0 \leq \gamma \leq 1$).

The vertical heterogeneous acceptance of new and remanufactured products in Assumption 3 is consistent because consumers' willingness to pay for the remanufactured consumer product is 15.3% lower than that for the new product (Guide and Li, 2010). Based on the consumer utility functions in Assumptions 2 and 3, the demand functions for new and remanufactured products can be derived. We provide the detailed derivations of them in the Appendix A-I.

$$q_n = \frac{(1 - \gamma)Q - p_n + p_r}{\frac{(1 - \gamma)}{\gamma p_n - p_r}}, \quad (1)$$

$$q_r = \frac{\gamma p_n - p_r}{\gamma(1 - \gamma)}.$$

This linear demand function is quite common in the remanufacturing literature (Savaskan et al., 2004), Ferguson and Toktay (2006)). It should be noted that the consumer value discount for the manufactured products reflects the potential for reducing problems between both products.

Assumption 4. In a steady-state period, the sequential-move games in both models are as follows: the OEM first announces the wholesale price/patent license fee (w_n/f), and the retailer third-party determines the optimal units of new or remanufactured products (q_n or q_r).

A relicensing fee has been widely employed by the OEM when it outsources the remanufacturing to other third party establishments (Zou et al., 2016; Oraopoulos et al., 2012). One can think of f as the unit technical fees charged based on the OEM licenses for remanufacturing technology to others. Finally, like Yan et al. (2015) and Xiong et al. (2013), we assumed that all players had access to the same information. All related notations are presented in Table 1.

Table 1. Parameters and definitions related to this paper

Notation	Definition
w_n / f	The unit wholesale price/ patent license fee charged for a new and remanufactured product
c_n / c_r	The average unit cost of manufacturing new/remanufactured products
p_n / p_r	The unit retail price for a new/remanufactured product
q_n / q_r	The total sales of new/remanufactured products
π_i	Profits of the player i

Source: Authors.

4. Model Formulation and Solution

This section introduces our two models—Model T, in which remanufacturing is outsourced to a 3PR, and Model R, where the retailer undertakes the OEM's remanufacturing. In the following analysis, subscript $i \in \{m, r, 3p, t\}$ refers to the OEM, retailer, 3PR, and the total supply chain, respectively; superscript $j \in \{T, R\}$ denotes Model T and Model R, respectively.

In Model T, the remanufacturing is undertaken by the 3PR, but the OEM produces all new products. Thus, the OEM's problem is

$$\max_{w_n, f} \pi_m^T(w_n, f, p_n^*, p_r^*) = (w_n - c_n)q_n + f q_r \quad (2)$$

Given the wholesale prices w_n and the patent license fees f the retailer's and the 3PR's problem is

$$\begin{aligned} \max_{p_n} \pi_r^T(w_n, f, p_n, p_r) &= (p_n - w_n)q_n \\ \max_{p_r} \pi_{3p}^T(w_n, f, p_n, p_r) &= (p_r - c_r - f)q_r \end{aligned} \quad (3)$$

The above interaction can be analyzed using backward induction: the retailer/remanufacturer maximizes its profit by choosing p_n^{T*}/p_r^{T*} , but the OEM can choose w_n^{T*} and f^{T*} (Table 2). All technical details and proofs appear in the Appendix.

In Model R, the OEM's remanufacturing is outsourced to the retailer. As a result, in addition to selling new products, the retailer should determine the number of remanufactured products according to the OEM's relicensing fee. As a result, the OEM's and the retailer's profit can be written as

$$\begin{aligned} \max_{w_n, f} \pi_m^R(w_n, f, p_n^*, p_r^*) &= (w_n - c_n)q_n + f q_r \\ \max_{p_n, p_r} \pi_r^R(w_n, f, p_n, p_r) &= (p_n - w_n)q_n + (p_r - c_r - f)q_r \end{aligned} \quad (4)$$

Solving the FOCs of the retailer's profits and then substituting them into the OEM's profit in the equation (4) provides the equilibrium outcomes in Model R (Table 2).

Table 2. Equilibrium decisions and profits

The Third-party engages in remanufacturing (Model T)	
$w_n^{T*} = \frac{Q + c_n}{2}$	
$f^{T*} = \frac{\gamma Q - c_r}{2}$	
$q_n^{T*} = \frac{c_n \gamma^2 - 2c_n - 2Q\gamma + 2Q + c_r}{2\gamma^2 - 10\gamma + 8}$	
$q_r^{T*} = \frac{(Q + c_n + c_r)\gamma - Q\gamma^2 - 2c_r}{2\gamma(\gamma^2 - 5\gamma + 4)}$	
$p_n^{T*} = \frac{6Q + 2c_n + c_r - 3Q\gamma}{2Q\gamma^2 - 2c_r - 5Q\gamma - c_n\gamma}$	
$p_r^{T*} = \frac{2(4 - \gamma)}{2c_r^2 - c_r^2\gamma - c_n^2\gamma^2 + 2c_n^2\gamma - 2c_n c_r \gamma - Q^2\gamma^3 - Q^2\gamma^2 + 2Q^2\gamma + 4c_n Q\gamma^2 - 4c_n Q\gamma + 2Q c_r \gamma^2 - 2Q c_r \gamma}$	
$\pi_m^{T*} = \frac{4\gamma(4 - \gamma)(1 - \gamma)}{(2Q - 2c_n + c_r - 2Q\gamma + c_n\gamma)^2}$	
$\pi_r^{T*} = \frac{4(4 - \gamma)^2(1 - \gamma)}{(Q\gamma - 2c_r + c_n\gamma + c_r\gamma - Q\gamma^2)^2}$	
$\pi_{3p}^{T*} = \frac{(Q\gamma - 2c_r + c_n\gamma + c_r\gamma - Q\gamma^2)^2}{4\gamma(4 - \gamma)^2(1 - \gamma)}$	
The retailer engages in remanufacturing (Model R)	
$w_n^{R*} = \frac{Q + c_n}{2}$	
$f^{R*} = \frac{\gamma Q - c_r}{2}$	
$q_n^{R*} = \frac{Q - 2Q\gamma - c_n + c_r}{4(1 - \gamma)}$	
$q_r^{R*} = \frac{c_n\gamma - c_r}{4\gamma(1 - \gamma)}$	
$p_n^{R*} = \frac{3Q + c_n}{c_r + 3Q\gamma}$	
$p_r^{R*} = \frac{4}{c_r + 3Q\gamma}$	
$\pi_m^{R*} = \frac{\gamma Q^2 - Q^2\gamma^2 + 2\gamma^2 Q c_n - 2\gamma Q c_n + \gamma c_n^2 - 2\gamma c_n c_r + c_r^2}{8\gamma(1 - \gamma)}$	
$\pi_r^{R*} = \frac{Q^2\gamma - Q^2\gamma^2 + 2Q c_n\gamma^2 - 2Q c_n\gamma + \gamma c_n^2 - 2c_n c_r \gamma + c_r^2}{16\gamma(1 - \gamma)}$	

Source: Authors.

To ensure accurate comparison of the interior point solutions for both models(i.e., $0 < q_r < q_n$, as seen in Yan et al. (2015) and Xiong et al. (2013), we derived the following assumption (see Lemma 1 and its proof in the Appendix).

Assumption 5. In both of our models, the cost of remanufacturing a core was not sufficiently small or large; that is, $\frac{\gamma(Q\gamma + 3c_n - Q - c_n\gamma)}{2} < c_r < \gamma c_n$.

5. Results - Analysis

This section addressed the question posed at the beginning of this paper: Retailer vs. third-party, who is the right remanufacturer for OEM's remanufacturing outsourcing? To do so, we analyzed the difference in equilibrium decisions between both models. Subsequently, we enriched our analysis to capture the difference in sustainability between both models based on economic and environmental outcomes.

5.1 Comparison of Optimal Outcomes

Based on the equilibrium outcomes of both models, we first derived some key insights into the difference in optimal decisions between the models, which is summarized in the following proposition:

Proposition 1. Compared to Model R, there was a larger quantity of both products in Model T; that is, $q_n^{T*} > q_n^{R*}$ ($q_r^{T*} > q_r^{R*}$).

In Model T, we mentioned earlier that the 3PR was an independent player whose total profits were derived from remanufacturing. As a result, the 3PR independently sought to maximize its profit by remanufacturing and cared nothing about the potential to reduce sales of new products by selling remanufactured products. However, in Model R, both new and remanufactured products were available from the retailer. As a result, the retailer should care greatly about the profits from remanufactured products and be concerned about the cannibalization of new product sales. As Proposition 1 showed, compared with Model R, the availability of remanufactured products in Model T increased, which resulted in significant cannibalization problems for new product sales and reduced the price of new products. Confronting such fierce competition from the remanufactured market, the retailer has to offer more new products under such a scenario to offset each new product's loss of price. That is, confronting a decrease in wholesale price, the retailer would provide higher sales volumes of remanufactured products to offset each new unit's loss.

5.2 Comparison of Profitability

In this section, we examined the OEMs' flexibility regarding how outsourcing affected all parties' profitability. That is, from the profit-maximizing angle, how did outsourcing remanufacturing operations to retailers create strategic issues that were different from those with 3PRs? Which was more profitable for the OEM, 3PR, retailer, and the total supply chain? To do so, we compared the profitability of the OEM, 3PR, retailer, and the total supply chain of Model T with those of Model R. We first turned our attention to the difference in OEM's profitability between both models.

Proposition 2. The OEM benefited more in Model T than in Model R; that is, $\pi_m^{T*} > \pi_m^{R*}$.

The availability of remanufactured products in the market impacted the OEM's profits in two opposing ways. On the one hand, the more that remanufactured products were available in the market, the larger the OEM profits obtained due to the cost savings. On the other hand, as the number of remanufactured products increased, there was the potential to reduce new product sales as remanufactured products' sales intensified. Then, it led the OEM to derive less from new product sales. As a result, the underlying intuition behind Proposition 2 is as follows. If the OEM outsourced the remanufacturing operations to the 3PR, the first component dominated because the increasing availability of remanufactured products not only increased the profitability from remanufactured products, but it also made the competition between both downstream agents (i.e., the retailer and the 3PR) intensify, which mitigated the double marginalization problems in both distribution channels.

Note that, compared with Model R, the competition from the remanufactured products became fiercer in Model T. As such, Proposition 2 revealed that the OEM benefited from the entry of 3PRs, which was an argument supported by Mitra and Webster (2008), who demonstrated that competition from 3PRs usually generated higher

profits for the OEM. It should be noted that they focused on the scenario where an OEM made and sold a new product and a 3PR who competed with the OEM. In contrast, we assumed that the relationship between the OEM and the 3PR was a paradoxical phenomenon of co-opetition: on the one hand, they needed to work together in the remanufacturing market; on the other hand, they defended each other in two different (new and remanufactured products) markets.

We are now able to address how different outsourcing strategies for remanufacturing operations affected the retailer's profitability. Based on the outcomes in Table 2, we summarized our findings in the following proposition.

Proposition 3. Outsourcing the remanufacturing operations to the 3PR was always detrimental to the retailer; that is, $\pi_r^{T*} < \pi_r^{R*}$.

The underlying intuition behind Proposition 3 is as follows. In Model R, the remanufacturing operations were undertaken by the retailer. As a result, in this setting, its profits came from two sources: selling new products and providing remanufactured products. However, in Model T, the remanufacturing was undertaken by the 3PR. As a result, the latter revenue was transferred to the 3PR. Nevertheless, as shown in Proposition 1, the retailer's sales volume of new products was lower than that in Model T because it was a monopolist provider in Model R; in Model T, the retailer had to manage competition from the 3PR.

To analyze the effects of the OEM outsourcing the remanufacturing to different agents, it is of interest to compare the results in Propositions 2 and 3 with the results from Mitra and Webster (2008) where an OEM made a new product, and a 3PR competed with the OEM by remanufacturing used cores. There were two ways in which to make this comparison. The first was to compare the relationship between the OEM and the 3PR. From this perspective, we concluded that, although the competition from 3PRs was detrimental to new products' sales (see Proposition 1), such competition usually generated higher total profits for the OEM (see Proposition 2). From the OEM's perspective, outsourcing the remanufacturing in the Mitra and Webster model to the 3PR confirmed that remanufacturing from 3PRs led to an increase in both parties' profits.

Alternatively, we compared the relationship between the retailer and the 3PR to both firms' relationship in the Mitra and Webster model. From this perspective, we concluded that the competition from the 3PR was not only detrimental to the sales of new products (see Proposition 1), but it also generated lower profits for the retailer (see Proposition 3). From the retailer's perspective, outsourcing the remanufacturing in the Mitra and Webster model to the 3PR reversed that the remanufacturing from 3PRs led to an increase in both parties' profits. The reason for the reversal was analyzed in Proposition 3 and is not repeated here.

We provide the following proposition regarding the variations in total supply chain profits and how different outsourcing strategies for remanufacturing operations affected the total supply chain performance.

Proposition 4. Outsourcing the remanufacturing operations to the 3PR was always beneficial for the total supply chain; that is, $\pi_t^{T*} > \pi_t^{R*}$.

We proved in Proposition 4 that the total supply chain benefited more in Model T than in Model R. Compared with Model R, the increase in total supply chain profitability under the scenario of outsourcing remanufacturing operations to the 3PR was caused by the increase in competition between both downstream agents and the reduction in the double marginalization problems in both channels. Although outsourcing the remanufacturing to the third-party was detrimental to the retailer (see Proposition 3), this outsourcing strategy was beneficial for both

the OEM and the 3PR. Furthermore, both parties' benefits were large enough that it sufficiently compensated for the loss in the retailer's profitability.

5.3 Discussion and Comparison of Environmental Impacts

In this subsection, we address the last question posed at the beginning of the paper: From an environmental impact perspective, how do outsourcing remanufacturing operations to retailers create strategic issues different from those with 3PRS? Which is more beneficial for our environment?

According to ISO14040 (2006) and ISO14044 (2006), Life Cycle Assessment (LCA) is the "compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle." LCA is a quantitative method to calculate the environmental impact of a strategy by summing over all the life cycle phases from raw materials' procurement to end of life (White et al., 1999). LCA methodology can be used to evaluate the environmental performance of materials, products, and industries. A detailed literature review on LCA techniques in the remanufacturing industry is available (Suhariyanto et al., 2017; Atasu et al., 2013).

Consistent with previous work (Atasu et al., 2013; Liu et al., 2017), we measured the total environmental impacts per product by considering the four life cycle phases of production, use, remanufacturing, and disposal. Accordingly, we used i_n , i_u , i_r , and i_d to represent the per-unit impact of production, use, remanufacturing, and disposal, respectively. It should be noted that the remanufacturing operations can extend the life cycle of the new products, which resulted in the total environmental impact of use by consumers as $e_u = i_u(q_n + q_r)$. Also, because all products are disposed of in landfills after the usage without remanufacturing or after usage with remanufacturing, then the total environmental impacts of disposal should be $e_d = i_d q_n$. As a result, we obtained the total environmental impact as $e = i_n q_n + i_u(q_n + q_r) + i_r q_r + i_d q_n$.

Let E^T/E^R represent the environmental impact under the strategy of outsourcing remanufacturing to the 3PR/retailer (Model T/R), respectively. Then, we summarized our main results on environmental outcomes in the following proposition.

Proposition 5. Outsourcing the remanufacturing to the retailer was a greener strategy than outsourcing it to the 3PR; that is, $E^T > E^R$.

Note that there are two components behind Proposition 5: On the one hand, there is a larger quantity of new products in Model T; that is, $q_n^{T*} > q_n^{R*}$ (see Proposition 1), which means that the environmental impact of the life cycle phases of production (of new products), use (of new products), and disposal (of end of life products) in Model T were larger than that in Model R. On the other hand, Proposition 1 further revealed that compared with Model R, there was a larger quantity of remanufactured products in Model T, which meant that the remanufacturing level in Model T was higher than that in Model R. Moreover, the environmental impact of the life cycle phases of use (of remanufactured products) and remanufacturing in Model T was higher than that in Model R.

Conclusions

In recent decades, environmentally-friendly solutions and green operations have emerged as a growing topic. One of the lasting effects of the movement is that remanufacturing is generally perceived as a profitable and environmentally-friendly, end-of-use management option for many products. Although outsourcing has been well studied in the remanufacturing literature (Zou et al., 2016, Abdulrahman et al., 2017, Zhu, 2016, Strakova et al., 2020), existing research focuses primarily on the outsourcing strategy between the OEM and the 3PRs. However, it ignores that the retailer has the flexibility to engage in remanufacturing. However, in recent years,

many brand name retailers have created business models in which product remanufacturing is an integral part. Moreover, the effects on sustainability or profits are different if the OEM outsources remanufacturing operations to its retailers but not to 3PRs. Resource sustainability and business development is key to the future and the businesses themselves (Strakova et al., 2021a). However, to achieve this goal is important synthesis models based on the business environment. This fact is strongly essential (Strakova et al., 2021b; Strakova et al., 2018).

To answer the initial question, we developed two models for the OEM's remanufacturing outsourcing operations: (1) outsourcing remanufacturing to a 3PR (Model T) or (2) outsourcing the remanufacturing to its retailer (Model R). Several key findings related to these models are summarized as the following. (1) Compared with Model R, there was a higher quantity of both products in Model T. (2) Compared with Model R, outsourcing the remanufacturing operations to the 3PR was usually beneficial for the OEM and the entire supply chain but always detrimental to the retailer. (3) Compared with Model R, outsourcing the remanufacturing to the TPR was always detrimental to our environment than the strategy of outsourcing it to the retailer.

Based on the above results, we concluded that if the OEMs cared about economic performance, outsourcing the remanufacturing operations to the 3PR was a practical strategy. On the other hand, if they cared about environmental performance, outsourcing the retailer's remanufacturing operations was a preferred strategy.

This research could be extended in the following directions. First, we assumed that the OEM was limited to a linear wholesale price. Although this is standard in the literature, it is also important to understand encroachment implications when an OEM uses a more complex pricing mechanism. Second, we assumed that the costs, emissions, and consumer preferences related to remanufacturing were the same for retailers and third parties so that future research can generalize the model to different costs and emissions for third parties and retailers. Consumers may exhibit different preferences over the remanufactured products provided by different remanufacturers. We hope this research will open other potentially interesting avenues of research. Finally, given our focus on sustainability issues, we removed other factors, which included the strategic choice of leasing and selling, which can potentially play an important role in remanufacturing with durables.

Appendix A

We get $\frac{\theta(2\theta+3c_n-2-\theta c_n)}{\theta+1} < c_r < \theta c_n$ by solving $q_n^{C*} > q_r^{C*} > 0$ and $\frac{\theta^2 c_n - \theta c_n + 2\theta^2 - 2c_n - 4\theta + 2}{3\theta - 5} < c < \theta c_n$ by solving $q_n^{N*} > q_r^{N*} > 0$. Setting $c_{r1} = \frac{\theta(2\theta+3c_n-2-\theta c_n)}{\theta+1}$ and $c_{r2} = \frac{\theta^2 c_n - \theta c_n + 2\theta^2 - 2c_n - 4\theta + 2}{3\theta - 5}$, we obtain $c_{r2} < c_{r1}$ if $0 < \theta < 593/2705$, and $c_{r1} < c_{r2}$ if $593/2705 < \theta < 1$.

Appendix B

Based on the Stackelberg game, the manufacturer, as a leader, first determined the optimal price w^* and p_n^* anticipated how the remanufacturer would respond after it has observed the OEM decisions. As a follower, the remanufacturer observed this and chose the optimal wholesale price as a response. The model was solved by backward induction.

In the first stage, for the given prices of the OEM, the remanufacturer solved the following problem:

$\pi_R = (p_r - w - c_r)q_r = \frac{(p_r - w - c_r)(\theta p_n - p_r)}{\theta}$. The first derivative $\frac{\partial \pi_R}{\partial p_r} = \frac{\theta p_n - 2p_r + w + c_r}{\theta}$ and solving it yielded $p_r^{N*}(w, p_n) = \frac{\theta p_n + w + c_r}{2}$. Substituting p_r^{N*} into demand functions yielded $q_n^{C*}(w, p_n) = \frac{2(1-\theta)(2-\theta)p_n + w + c_r}{\theta}$ and $q_r^{N*}(w, p_n) = \frac{\theta p_n - w - c_r}{\theta}$. Substituting q_n^{C*} and q_r^{N*} into OEM's profit function yielded $\pi_M^{N*} = \frac{w(\theta p_n - w - c_r)}{\theta} + (p_n - c_n)\left(1 - \frac{(2-\theta)p_n - w - c_r}{\theta}\right)$. Then, we obtained $\frac{\partial \pi_M}{\partial w} = \frac{2\theta p_n - 2w - c_r - \theta c_n}{\theta}$ and

$\frac{\partial \pi_M}{\partial p_n} = \frac{2W + 2(1-\theta) - (4-2\theta)p_n + (2-\theta)c_n + c_r}{2(1-\theta)}$. Jointly solving these two equations yielded $p_n^{C*} = (1 + c_n)/2$ and $w^* = (\theta - c_r)/2$.

Appendix C

Based on the Stackelberg game, the OEM, as a leader, first determined the optimal price p_n in anticipating how the remanufacturer would respond after observing the OEM decisions. The remanufacturer, as a follower, observed this and chose the optimal wholesale price as a response. The model was solved by backward induction.

In the first stage, for the given prices of the OEM, the remanufacturer solved the following problem:

$\frac{\partial \pi_R}{\partial p_r} = \frac{\theta p_n - 2p_r + c_r}{\theta(1-\theta)}$. Solving this equation yielded $p_r^{N*}(w, p_n) = \frac{\theta p_n + c_r}{2}$. Substituting p_r^{N*} into demand functions of Model N respectively yielded $q_n^{N*}(p_n) = (2(1-\theta) - (2-\theta)p_n + c_r)/(2(1-\theta))$ and $q_r^{N*}(p_n) = (\theta p_n - c_r)/(\theta(1-\theta))$. Substituting q_n^{N*} and q_r^{N*} into manufacturer's profit function yielded $\pi_M = (p_n - c_n) \left(1 - \frac{(2-\theta)p_n - c_r}{2(1-\theta)}\right)$. The partial derivative to p_n is $\frac{\partial \pi_M}{\partial p_n} = \frac{2(1-\theta) + (2-\theta)c_n + c_r}{2(1-\theta)}$. Solving it yielded $p_n^{N*} = \frac{2(1-\theta) + (2-\theta)c_n + c_r}{2(1-\theta)}$. Substituting p_n^{N*} into the demand function yielded $p_r^{N*} = \frac{2\theta(1-\theta) + \theta c_n + \theta(2-\theta)c_n + (4-\theta)c_r}{4(1-\theta)}$.

Appendix D

Because $p_n^{N*} = \frac{(1+c_n)}{2}$, $p_n^{N*} = (2(1-\theta) + (2-\theta)c_n + c_r)/(\theta(2-\theta))$, then $p_n^{C*} - p_n^{N*} = \frac{(1-\theta-c_r)}{2(1-\theta)}$. Because of $c_r < \theta c_n$, $c_n < 1$, so $c_r < \theta$. Thus, we obtained $p_n^{C*} > p_n^{N*}$.

Appendix E

We obtained this proposition from $\pi_M^{C*} - \pi_M^{N*} = \frac{(1-\theta-c_r)^2}{4(1-\theta)}$, and it was obviously positive because $0 < \theta < 1$, i.e. $\pi_M^{C*} > \pi_M^{N*}$.

Appendix F

We obtained that the remanufacturer's optimal profit in Model C was $\frac{(\theta c_n - c_r)^2}{16\theta(1-\theta)}$; the optimal profit of the remanufacturer in the competitive model was $\frac{(2\theta - 2\theta^2 + 3\theta c_r + 2\theta c_n - c_n\theta^2 - 4c_r)^2}{16\theta(1-\theta)(2-\theta)^2}$. Comparing the former with the latter, we found that $\pi_R^{C*} - \pi_R^{N*} = c_n\theta^3 + \theta^3 - \theta^2 - 2\theta^2 c_n - 3c_r\theta^2 - c_r c_n\theta^2 + 2c_r c_n\theta + \frac{2\theta c_r^2 + 4\theta c_r - 3c_r^2}{(4\theta(2-\theta)^2)}$.

Setting $c_{r3} = (\theta(\theta c_n - 2c_n + \theta - 1))/(2\theta - 3)$, we observed that if $\max(c_{r1}, c_{r2}) < c_r < c_{r3}$, $\pi_R^{C*} < \pi_R^{N*}$, then $c_{r3} < c_r < \theta c_n$, $\pi_R^{C*} > \pi_R^{N*}$.

Appendix G

We only analyzed the disposal impact of the per-unit product, and we defined it as $e_n = i_n(q_n - q_r)$ because the clearance impact was removed by remanufacturing. Similarly, the clearance impact of a remanufactured product was $e_r = i_r q_r$. Then, the disposal impact in Model C and Model N were $E^C = i_n(q_n^{C*} - q_r^{C*}) + i_u q_r^{C*} = i_n q_n^{C*} + (i_n - i_u)q_r^{C*}$ and $E^N = i_n(q_n^{N*} - q_r^{N*}) + i_u q_r^{N*} = i_n q_n^{N*} + (i_n - i_u)q_r^{N*}$, respectively.

We can get $E^C - E^N = \frac{1}{2(\theta - c_r)(\theta - 2)\theta}$. The c_r is smaller than θ because $c_r < \theta c_n$ and θ is within $[0, 1]$. So, it is easy to know $E^C - E^N$ is always negative.

Appendix H

The optimal total profit in Model C was $\pi_T^C = \pi_M^C + \pi_R^C$; the optimal total profit in Model N was $\pi_T^N = \pi_M^N + \pi_R^N$. Substituting the optimal profit solutions of the manufacturer and the remanufacturer into these equations, we obtained $\pi_T^C = \frac{c_n^2}{16} - \frac{c_n}{2} - \frac{3(c_n - c_r)^2}{(16(\theta - 1))} + \frac{3c_r^2}{16\theta} + \frac{1}{4}$.

$\pi_T^N = \frac{c_r - 2c_n - 2\theta + \theta c_n + 2}{8(\theta - 1)(\theta - 2)} - (4c_r - 2\theta - 2\theta c_n - 3\theta c_r + \theta 2c_n + \frac{2\theta^2}{(16\theta(\theta - 1)(\theta - 2)^2)})$. Comparing the former with the latter, we have $\pi_T^C - \pi_T^N = \frac{(\theta - c_r)(c_r + \theta - 2\theta c_n - \theta c_r + \theta^2 c_n)}{4\theta(2 - \theta)^2}$. We found $\pi_T^C - \pi_T^N > 0$ in $\max(c_{r1}, c_{r2}) < c_r < \theta c_n$.

Appendix I

That is, $\pi_R^N < \pi_R^C + \rho_1(\pi_M^C - \pi_M^N)$. Solving this equation after substituting the profits' equilibrium outcomes into this equation, we found that only when the paying ratio was not smaller than $\phi_1 = \frac{2\theta c_r - 2c_r - c_n\theta^2 - \theta^2 + 2\theta c_n + \theta}{(\theta - c_r)(2 - \theta)}$, the profits of the manufacturer and the remanufacturer in Model C were higher than those in Model N.

References

- Abbey, J. D., Meloy, M. G., Blackburn, J., & Guide, V. D. R. (2015). Consumer markets for remanufactured and refurbished products. *California Management Review*, 57 (4), 26-42. <https://doi.org/10.1525/cmr.2015.57.4.26>
- Abdulrahman, M. D. A., Subramanian, N., Liu, C., & Shu, C. Viability of remanufacturing practice: A strategic decision making framework for Chinese auto-parts companies. *Journal of Cleaner Production*, 105, 311-323. <https://doi.org/10.1016/j.jclepro.2014.02.065>
- Agrawal, V. V., Atasu, A., & Van Ittersum, K. (2015). Remanufacturing, third-party competition, and consumers' perceived value of new products. *Management Science*, 61 (1), 60-72. <https://doi.org/10.1287/mnsc.2014.2099>
- Arora, A., Fosfuri, A., & Rønde, T. (2013). Managing licensing in a market for technology. *Management Science*, 59 (5), 1092-1106. <https://doi.org/10.1287/mnsc.1120.1628>
- Atasu, A., Sarvary, M., & Van Wassenhove, L. N. (2008). Remanufacturing as a marketing strategy. *Management Science*, 54 (10), 1731-1746. <https://doi.org/10.1287/mnsc.1080.0893>
- Atasu, A., Toktay, L. B., & Van Wassenhove, L. N. (2013). How collection cost structure drives a manufacturer's reverse channel choice. *Production & Operations Management*, 22 (5), 1089-1102. <https://doi.org/10.1111/j.1937-5956.2012.01426.x>
- Bacik, R., Fedorko, R., Nastisin, L., & Gavurova, B. (2018). Factors of communication mix on social media and their role in forming customer experience and brand image. *Management & Marketing*, 13(3), 1108-1118. <https://doi.org/10.2478/mmcks-2018-0026>
- Big players emerge in fragmented brokerage market. (2021, January 8) https://www.cbronline.com/news/big_players_emerge_in_fragmented_brokerage_market/
- Cerda, C. (2011). Willingness to pay to protect environmental services: a case study with use and non use values in central Chile. *Interciencia*, 36 (11), 796-802. <https://doi.org/10.3390/su12030891>
- Chen, Y., Li, B., Zhang, G., & Bai, Q. (2020). Quantity and collection decisions of the remanufacturing enterprise under both the take-back and carbon emission capacity regulations. *Transportation Research Part E-logistics and Transportation Review*, 141. <https://doi.org/10.1016/j.tre.2020.102032>

- Chen, Y., Wang, J., Yu, Y. (2019). A Study on consumers' willingness to pay for remanufactured products: A study based on hierarchical regression method. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02044>
- Dai, L., Shu, T., Chen, S., Wang, S., & Lai, K. K. (2020). CSR remanufacturing supply chains under WTP differentiation. *Sustainability*, 12 (6). <https://doi.org/10.3390/su12062197>
- Debo, L. G., Toktay, L. B., & Van Wassenhove, L. N. (2005). Market segmentation and product technology selection for remanufacturable products. *Management Science*, 51 (8), 1193-1205. <https://doi.org/10.1287/mnsc.1050.0369>
- Dvorsky, J., Petrakova, Z., Khan, K. A., Formanek, I., & Mikolas, Z. (2020). Selected aspects of strategic management in the service sector. *Journal of Tourism and Services*, 11 (20), 109-123. <https://doi.org/10.29036/jots.v11i20.146>
- Esenduran, G., Kemahlioglu-Ziya, E., & Swaminathan, J. M. (2016). Take-back legislation: Consequences for remanufacturing and environment. *Decision Sciences*, 47 (2), 219-256. <https://doi.org/10.1111/deci.12174>
- Fang, C., You, Z., Yang, Y., Chen, D., & Mukhopadhyay, S. (2019). Is third-party remanufacturing necessarily harmful to the original equipment manufacturer? *Annals of Operations Research*, 291 (1-2), 317-338. <https://doi.org/10.1007/s10479-019-03445-2>
- Fedorko, I., Bacik, R., & Gavurova, B. (2018). Technology acceptance model in e-commerce segment. *Management & Marketing Challenges for the Knowledge Society*, 13(4), 1242-1256. <https://doi.org/10.2478/mmcks-2018-0034>
- Ferguson, M. (2010). Strategic issues in closed-loop supply chains with remanufacturing. In Ferguson, M., Souza, G. C. (Eds.), *Closed-Loop Supply Chains: New Developments to Improve the Sustainability of Business Practices* (pp. 9-21). Taylor and Francis.
- Ferguson, M. E., & Toktay, L. B. (2006). The effect of competition on recovery strategies. *Production and Operations Management*, 15 (3), 351-368. <https://doi.org/10.1111/j.1937-5956.2006.tb00250.x>
- Ferguson, M. E., & Toktay, L. B. (2006). The effect of competition on recovery strategies. *Production & Operations Management*, 15 (3), 351-368. <https://doi.org/10.1111/j.1937-5956.2006.tb00250.x>
- Ferrer, G., & Swaminathan, J. M. (2006). Managing new and remanufactured products. *Management Science*, 52 (1), 15-26. <https://doi.org/10.1287/mnsc.1050.0465>
- Ferrer, G., & Swaminathan, J. M. (2010). Managing new and differentiated remanufactured products. *European Journal of Operational Research*, 203 (2), 370-379. <https://doi.org/10.1016/j.ejor.2009.08.007>
- Gavurova, B., Bacik, R., Fedorko, R., & Rigelsky, M. (2018). Analytical view of online marketing tools in the dimension of marketing campaigns' personalization in Slovakia. *Маркетинг і менеджмент інновацій*, (2), 186-200. <https://doi.org/10.21272/mmi.2018.2-15>
- Georgiandis, P., & Vlachos, D. (2004). The effect of environmental parameters on product recovery. *European Journal of Operational Research*, 157 (2), 449-464. [https://doi.org/10.1016/S0377-2217\(03\)00203-0](https://doi.org/10.1016/S0377-2217(03)00203-0)
- Geyer, R., Van Wassenhove, L. N., & Atasu, A. (2007). The economics of remanufacturing under limited component durability and finite product life cycles. *Management Science*, 53 (1), 88-100. <https://doi.org/10.1287/mnsc.1060.0600>
- Giutini, R., & Gaudette, K. (2003). Remanufacturing: The next great opportunity for boosting U.S. productivity. *Business Horizons*, 46 (6), 41-48. [https://doi.org/10.1016/S0007-6813\(03\)00087-9](https://doi.org/10.1016/S0007-6813(03)00087-9)
- Golinska, P. (2014). The lean approach for improvement of the sustainability of a remanufacturing process. *Logforum*, 10 (3), 285-293.
- Guide, V. D. R. Jr., & Li, J. (2010). The potential for cannibalization of new products sales by remanufactured products. *Decision Sciences*, 41 (3), 547-572. <https://doi.org/10.1111/j.1540-5915.2010.00280.x>
- Hauser, W. M., & Lund, R. T. (2003) *The Remanufacturing Industry: Anatomy of a Giant: a View of Remanufacturing in America Based on a Comprehensive Survey across the Industry*. Dept. of Manufacturing Engineering, Boston University.
- Horvath, J., Gavurova, B., Bacik, R. & Fedorko, R. (2021). Identification of Uncertainty Factors in the Consumer Behaviour of the New Generation of Customers at the E-commerce Level. *Journal of Tourism and Services*, 22(12), 168-183. <https://doi.org/10.29036/jots.v12i22.263>
- ISO 14040. Environmental management - life cycle assessment - principles and framework. *International Standard Organization (ISO) 2006*, Geneva, Switzerland.

ISO 14044. Environmental management - life cycle assessment - requirement and guidelines. *International Standard Organization (ISO) 2006*, Geneva, Switzerland.

Karakayali, I., Emir-Farinas, H., & Akcali, E. (2007). An analysis of decentralized collection and processing of end-of-life products. *Journal of Operations Management*, 25 (6), 1161-1183. <https://doi.org/10.1016/j.jom.2007.01.017>

Kasych, A. O., Vochozka, M., & Yakovenko, Y. (2019). Diagnostics of the stability states of enterprises and the limits of their tolerance. *Quality - Access to Success*, 20 (172), 3-12.

Lee, C., Realf, M., & Ammons, J. (2011). Integration of channel decisions in a decentralized reverse production system with retailer collection under deterministic non-stationary demands. *Advanced Engineering Informatics*, 25 (1), 88-102. <https://doi.org/10.1016/j.aei.2010.04.001>

Li, X., Li, Y., & Saghaian, S. (2013). A Hybrid manufacturing/remanufacturing system with random remanufacturing yield and market-driven product acquisition. *IEEE Transactions on Engineering Management*, 60 (2), 424-437. <https://doi.org/10.1109/TEM.2012.2215873>

Liu, Z., Tang, J., Li, B. Y., Wang, Z. (2017). Trade-off between remanufacturing and recycling of WEEE and the environmental implication under the Chinese Fund Policy. *Journal of Cleaner Production*, 167, 97-109. <https://doi.org/10.1016/j.jclepro.2017.08.137>

Majumder, P., & Groenevelt, H. (2001). Competition in remanufacturing. *Production and Operations Management*, 10 (2), 125-141. <https://doi.org/10.1111/j.1937-5956.2001.tb00074.x>

Mezulanik, J., Durda, L., Civelek, M., & Malec, L. (2020). Ride-hailing vs. taxi services: A survey-based comparison. *Journal of Tourism and Services*, 11 (20), 170-186. <https://doi.org/10.29036/jots.v11i20.155>

Michaud, C., & Llerena, D. (2011). Green consumer behaviour: an experimental analysis of willingness to pay for remanufactured products. *Business Strategy and the Environment*, 20 (6), 408-420. <https://doi.org/10.1002/bse.703>

Mitra, S., & Webster, S. (2008). Competition in remanufacturing and the effects of government subsidies. *International Journal of Production Economics*, 111 (2), 287-298. <https://doi.org/10.1016/j.ijpe.2007.02.042>

National Development and Reform Commission. (2022, August 31). *The administrative measures for pilot remanufacturing of automobile parts & accessories (in Chinese)*, Development and Reform Office Huanzi [2008] No. 523 March 2, 2008. <https://en.ndrc.gov.cn/>

Oraiopoulos, N., Ferguson, M. E., & Toktay, L. B. (2012). Relicensing as a secondary market strategy. *Management Science*, 58 (5), 1022-1037. <https://doi.org/10.1287/mnsc.1110.1456>

Ovchinnikov, A. (2011). Revenue and cost management for remanufactured products. *Production and Operations management*, 20 (6), 824-840. <https://doi.org/10.1111/j.1937-5956.2010.01214.x>

Petit-Boix, A., Llorach-Massana, P., Sanjuan-Delmás, D., Sierra-Pérez, J., Vinyes, E., Gabarrell, X., Rieradevall, J., & Sanyé-Mengual, E. (2017). Application of life cycle thinking towards sustainable cities: A review. *Journal of Cleaner Production*, 166, 939-951. <https://doi.org/10.1016/j.jclepro.2017.08.030>

Pimonenko, T., Bilan, Y., Horak, J., Starchenko, L., & Gajda, W. (2020). Green brand of companies and greenwashing under sustainable development goals. *Sustainability*, 12 (4). <https://doi.org/10.3390/su12041679>

Radavičius, T., van der Heide, A., Palitzsch, W., Rommens, T., Denafas, J., & Tvaronavičienė, M. (2021). Circular solar industry supply chain through product technological design changes. *Insights into Regional Development*, 3(3), 10-30. [https://doi.org/10.9770/IRD.2021.3.3\(1\)](https://doi.org/10.9770/IRD.2021.3.3(1))

Razu, G., Ovchinnikov, A., & Blass, V. (2017). Economic, environmental, and social impact of remanufacturing in a competitive setting. *IEEE Transactions on Engineering Management*, 64 (4), 476-490. <https://doi.org/10.1109/TEM.2017.2714698>

Savaskan, R. C., Bhattacharya, S., & Van Wassenhove, L. N. (2004). Closed-loop supply chain models with product remanufacturing. *Management Science*, 50 (2), 239-252. <https://doi.org/10.1287/mnsc.1030.0186>

Shi, W., & Min, K. J. (2014). Product remanufacturing: A real options approach. *IEEE Transactions on Engineering Management*, 61 (2), 237-250. <https://doi.org/10.1109/TEM.2013.2278533>

Shu, T., Liao, H., Chen, S., Wang, S., Lai, K. K., & Gan, L. (2016). Analysing remanufacturing decisions of supply chain members in uncertainty of consumer preferences. *Applied Economics*, 48 (34), 3208-3227. <https://doi.org/10.1080/00036846.2015.1136400>

- Shulman, J. D., Coughlan, A. T., & Savaskan, R. C. (2010). Optimal reverse channel structure for consumer product returns. *Marketing Science*, 29 (6), 1071-1085. <https://doi.org/10.1287/mksc.1100.0578>
- Strakova, J., Koraus, A., Vachal, J., Pollak F., Cernak, F., Talir, M. & Kollmann, J. (2021a). Sustainable Development Economics of Enterprises in the Services Sector Based on Effective Management of Value Streams. *Sustainability*, 13 (16). <https://doi.org/10.3390/su13168978>
- Strakova, J., Partlova, P., Dobrovic, J. & Vachal, J. (2018). Situational analysis and its role in the process of strategic business management. *Polish Journal of Management Studies*, 18 (1), 353-364. <https://doi.org/10.17512/pjms.2018.18.1.26>
- Strakova, J., Rajiani, I., Partlova, P., Vachal, J., & Dobrovic, J. (2020). Use of the Value Chain in the Process of Generating a Sustainable Business Strategy on the Example of Manufacturing and Industrial Enterprises in the Czech Republic. *Sustainability*, 12 (4), 1520. <https://doi.org/10.3390/su12041520>
- Strakova, J., Talir, M., Kollmann, J., Partlova, P. & Vachal, J. (2021b). An integrated model of corporate environment, including value chain, as a competitiveness tool for small and medium enterprises. *Polish Journal of Management Studies*, 23 (1), 370-384. <https://doi.org/10.17512/pjms.2021.23.1.23>
- Suhariyanto, T. T., Wahab, D. A., & Rahman, M. N. A. (2017). Multi-life cycle assessment for sustainable products: A systematic review. *Journal of Cleaner Production*, 165, 677-696. <https://doi.org/10.1016/j.jclepro.2017.07.123>
- The Brands of the Future Must Be Sustainable. (2021, January 8). <https://popsop.com/2012/12/the-brands-of-the-future-must-be-sustainable/>
- Vrbka, J., & Rowland, Z. (2020). *Using artificial intelligence in company management*. In Kacprzyk, J. (Ed.), *Lecture Notes in Networks and Systems*, (pp. 422-429), Switzerland. Springer Nature. https://doi.org/10.1007/978-3-030-27015-5_51
- White, A. L., Stoughton, M., & Feng, L. (1999). *Servicizing: The quiet transition to extended producer responsibility*. U.S. Environmental Protection Agency, Office of Solid Waste. <https://www.epa.gov/environmental-topics/land-waste-and-cleanup-topics>
- Wu, X., & Zhou, Y. (2016). Does the entry of third-party remanufacturers always hurt original equipment manufacturers? *Decision Sciences*, 47 (4), 762-780. <https://doi.org/10.1111/deci.12194>
- Xiong, Y., Zhou, Y., Li, G., Chan, H. K., & Xiong, Z. (2013). Don't forget your supplier when remanufacturing. *European Journal of Operational Research*, 230 (1), 15-25. <https://doi.org/10.1016/j.ejor.2013.03.034>
- Yan, W., Xiong, Y., Xiong, Z., & Guo, N. (2015). Bricks vs. clicks: Which is better for marketing remanufactured products? *European Journal of Operational Research*, 242 (2), 434-444. <https://doi.org/10.1016/j.ejor.2014.10.023>
- Zhu, X. (2016). Managing the risks of outsourcing: Time, quality and correlated costs. *Transportation Research Part E: Logistics and Transportation Review*, 90, 121-133. <https://doi.org/10.1016/j.tre.2015.06.005>
- Zikopoulos, C., & Tagaras, G. (2007). Impact of uncertainty in the quality of returns on the profitability of a single-period refurbishing operation. *European Journal of Operational Research*, 182 (1), 205-225. <https://doi.org/10.1016/j.ejor.2006.10.025>
- Zou, Z. B., Wang, J. J., Deng, G. S., & Chen, H. (2016). Third-party remanufacturing mode selection: Outsourcing or authorization? *Transportation Research Part E: Logistics and Transportation Review*, 87, 1–19. <https://doi.org/10.1016/j.tre.2015.12.008>

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PRODUCTION FUNCTION IN AGRICULTURE IN THE CZECH REPUBLIC

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Abstract. Correct setting of value drivers of agricultural companies plays an important role, as every company strives for maximizing its profit. The goal of the paper was to determine the dependence of profit on production factors and to identify important production factors. Variables verified as value drivers were land, material, personnel costs, and depreciation of fixed tangible and intangible assets. The selected method of data processing is multiple regression analysis. The data were represented using a normal probability plot of residuals and a distribution histogram. The results show that 51.44 % of significant variables are material, personnel costs and depreciation of fixed tangible and intangible assets. The findings also imply that multiple regression analysis is a suitable statistical method. In conclusion, it can be stated that material, personnel costs, and depreciation of fixed tangible and intangible assets are important value drivers.

Keywords: agricultural companies; value drivers; profit; multiple regression analysis; production function

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JEL Classifications: D24, Q12

1. Introduction

According to Wicki (2018), the global population is constantly growing, as is the demand for food. Agriculture thus plays a key role. An increase in agricultural production can be achieved mainly by the proper use of production factors. Production factors include land, labor, and capital. Agricultural land is a finite natural resource with a growing economic value (Takac et al., 2020). Soil fertility is paramount in determining the type of plant production (El-Ramady et al., 2019). Correct setting of production factors increases labor productivity and thus leads to capital return (Vochozka et al., 2021; Potapov 2020; Holmen, 2022). Technical development and sufficient human capital enable achieving higher profitability and improving the competitiveness of agricultural products (Vochozka et al., 2020, Anand, Husain& Prakash, 2022; Ganush & Tsetsiarynets, 2022).

Earnings are not determined by production factors only. According to Parolini (2022), agricultural production is also influenced by weather and climatic factors. Agricultural companies are thus at risk of being unprofitable under adverse climatic conditions (Priyanka et al., 2019; Gavurova et al. 2017a). There are soil erosion and

nutrient losses. Extreme weather is a result of climate changes caused by increasingly intensive human activity (Qiao et al., 2018). Climatic changes thus become a global problem (Nyangena, Kinyuru & Imathiu, 2021). Low yields of crops gradually lead to growing food prices (Lambert et al., 2021). By selecting the proper types of crops, agriculture can contribute to soil protection and mitigate climatic changes (Parolini, 2022).

Production inputs and their combination influence the result of agricultural production. The relationship between production inputs and the final product is determined by the production function (Simtion, 2020, Vochozka et al., 2020). Production function remains a current method in economy. Based on the results, it is possible to examine the economic growth (Bartoš et al., 2021, Cheng & Liu, 2021). Production function is an important tool for the analysis, evaluation and prediction of production processes (Kučera et al., 2021, Gadzhieva et al., 2019). The issue of production functions in general and in the industrial sector is also addressed by Straková et al. (2020, 2021).

Agricultural companies differ from each other in the volume of their production considering their size, different yields, technologies, or weather conditions (Gavurova et al. 2017b, 2020; Tkacova et al. 2017). Therefore, it is necessary to determine a suitable model for using the production function that would consider this heterogeneity and find the main determinants of agricultural production (Pechrová Simpachová & Simpach, 2019; Belas et al. 2020).

2. Literature review

As already mentioned, the correct setting of production factors may positively influence the earnings of agricultural companies. This issue has been addressed by several authors.

Vasyl'yeva (2021) used a modified Cobb-Douglas production function describing the effect of human capital on gross added value and gross output. The parameters of production function were determined and verified using correlation and regression analysis; equations of balance and construction of isoquants were used to predict the optimal combinations of production function factors (Kocisova et al. 2018). Chabatul et al. (2019) evaluated the effect of production factors on the revenues from agricultural product sales on the basis of regression analysis. The results were used for scheduling of production and selection of production factors.

Nasir, Ribij and Al-Wassity (2020) estimated the Cobb-Douglas production function using the regression method to determine the functional relationship between the volume of wheat production and the quantity of seed, fertilizers, pesticides, and the number of hours worked using human labor without any mechanization and using mechanization. The results suggest that mechanization significantly increases the return to scale. Muhajan et al. (2018) proposed a quantile regression model using the Cobb-Douglas production function for the analysis of data on the production of foodgrain with respect to net area sown, net cultivated area, and net irrigated area, consumption of fertilizers, pesticides, and electricity. They concluded that net sown and cultivated area plays an important role in increasing the production volume.

The study by Elita et al. (2019) analyses the relationship of the selected inputs in the form of the production area and the quantity of labor, seed, and fertilizers and the output in the form of rice and corn production using the Cobb-Douglas production function. The authors also compared the minimum costs, where the costs of rice growing were lower than the costs of corn growing, but corn profit was higher than rice profit. Shkuratov et al. (2020) used correlation and regression analysis to estimate the volume of gross agricultural production in relation to the area of agricultural land used. Kukushina & Okomina (2019) evaluated the impact of used production factors on the agricultural activity outputs on the basis of regression equation. As stated by Mengthen et al. (2018), capital is the most important factor in the agricultural sector, despite the high dependence of agriculture on land. This finding was achieved using time series regression analysis, whose results indicate that capital

contributes about 76.86 % to the growth of agricultural economy, while the contribution of land, energy, water, and technological progress is lower. By using the Cobb-Douglas production function, Tiammee et al. (2019) found that the size of inputs (agricultural land, labor, and capital) influences the return to scale. Pechrová Simpachová & Simpach (2020) argue that production approximated by sales is directly dependent on the consumption of material, energy, fixed assets, the number of employees, and the acreage of agricultural land, which resulted from the results of the Cobb-Douglas production function.

According to Suseela & Chandrasekaran (2018), the use of technology increases the yield of agricultural crops and profit, as indicated by the results of the Cobb-Douglas production function. On the basis of Stochastic frontier production function fitted by Cobb-Douglas function, Ahmed et al. (2018) confirmed that maize production depends on the acreage, fertilizers used, and the quantity of seed. Pechrová Simpachová & Simpach (2019) used the Cobb-Douglas production function to analyze agricultural output in the form of sales depending on the consumption of material, capital, the number of employees, and acreage of agricultural land. They concluded that the consumption of material had the highest impact, while the effect of the number of employees and acreage of agricultural land was lower. Using the Cobb-Douglas function, Zhang, Chen and Li (2021) found that the yield of agricultural crops grows with the acreage of agricultural land.

Onofri et al. (2019) used the production function to estimate the marginal product of key production inputs (labor and land) and to determine the future performance of the agricultural sector with regard to climatic changes (Onofri et al., 2019). The basis for setting up effective production functions can be, for example, a strategic situational analysis, including an analysis of value streams or corporate production processes (Vochozka et al., 2016; Straková et al., 2018). In the current turbulent to chaotic corporate environment, one of the pro-growth production parameters is targeted investments in other production processes, especially in infrastructure (Straková et al., 2016; Bilan et al. 2017; Gavurova et al. 2019).

The goal of the paper is to determine the production function of production factors of companies operating in the agricultural sector of the CR.

Agricultural activities cannot be carried out without agricultural land. Land (A) is used for plant production – food and feed for animal production. Land is thus the basic production factor in this sector. Other production factors include labor (L), i.e. a human activity appraised with a wage. Another equally important production factor is capital (K), which can be divided into two categories by its nature – tangible (agricultural machinery, buildings, structures, livestock) and monetary.

The profitability of agricultural companies depends on the quantity of the production factors used. A larger area of agricultural land enables the production of a higher volume of agricultural products. The proper setting of production factors (the number of employees, use of agricultural technology) results in higher earnings and generation of profit. The relationship between value drivers and profit generators is expressed by the production function. Production function determines the relationship between the production factors – inputs (labor, land, capital) and outputs.

3. Data and methods

Based on the analysis of the main goal of the paper, two research questions were formulated:

RQ1: What are the value drivers in agricultural companies?

RQ2: What is the relationship of value drivers and profit generators in agricultural companies?

Within the first research questions, value drivers of agricultural companies will be determined. Within the second research question, multiple regression analysis will be used to determine the relationship of these value drivers to the value of profit (earnings).

The data source will be the dataset Extrakt_VSCB_NACE_A_2022_Agriculture, which contains 42,641 rows. The data from the profit and loss account will be processed in Excel, Microsoft. From this dataset, only the columns Company identification number, Tax identification number, Name, Active, Land (p1220), Material (p1243), Earnings for current accounting period (+/-) (p1331), Personnel costs (p1518), Depreciation of fixed intangible assets and fixed tangible asset (p1525).

From these columns, only the rows that will contain the required values will be used. The data will be processed using the Statistica software by TIBCO Software Inc. This software will be used for determining the multiple regression analysis.

A given dataset is opened in the Statistica software, the selected list is imported into the table. Next, the option “1st row as the names of variables is selected, since the dataset contains names in the first row. In the basic menu, in the “Statistics” tab, multiple regression is selected. Furthermore, we will select variables, entering the dependent variable on the left side, which is *Earnings for current accounting period (+/-) (p1331)* in this case. On the right side, there will be a list of independent variables, i.e. *Land (p1220)*, *Material (p1243)*, *Personel Costs (p1518)*, *Depreciation of fixed intangible assets and fixed tangible assets (p1525)*. Then we will continue with calculating the results of the regression; in the tab, we will select “adding to the log”. In the log, a table with given values will be created. The mathematical model of multiple regression expressed as a formula is as follows:

$$y = ax_1 + bx_2 + cx_3 + dx_4$$

where y is profit,
 x_1 land,
 x_2 material,
 x_3 personnel costs,
 x_4 depreciation.

Next, a simplified model of regression analysis without the independent variable Land (p1220) will be created. The process is the same but when choosing variables for multiple regression, Land (p1220) is not included in the list of independent variables. Other items will be the same as above. The process is then the same until the calculation of the regression results and the creation of a log with a table containing the necessary values.

For overall testing of the model (F test), the following hypotheses were formulated:

H0: the model as a whole is insignificant, and H1: the model as a whole is significant.

When testing the significance of the explanatory variable x_1 = Land, the formulated hypotheses are as follows:

H0: the explanatory variable “Land” is insignificant, and H1: the explanatory variable “Land” is significant.

For the variable x_2 = material, the following hypotheses were tested: H0: the explanatory variable “Material” is insignificant, and H2: the explanatory variable “Material” is significant.

For the variable x_3 = personnel costs, the hypotheses tested were as follows: H0: the explanatory variable “personnel costs” is insignificant, and H3: the explanatory variable “personnel costs” is statistically significant

When testing the significance of the explanatory variable x_4 = depreciation, the following hypotheses were formulated:

H0: the explanatory variable “depreciation” is insignificant, and H4: the explanatory variable “depreciation” is significant.

3. Results

Value drivers

Based on the content analysis (research) of the available materials, the selected value drivers are:

x_1 land, x_2 material, x_3 personnel costs, and x_4 depreciation of fixed tangible and intangible assets. Earnings are marked as y .

Relationship of value drivers and profit generators of agricultural companies

The existence of these relationships was verified by multiple regression analysis.

Table 1 suggests that the correlation coefficient R indicating the intensity (tightness) of dependence equals 0.718. This indicates a stronger dependence of earnings on the acreage of land and at the same time, on material, personnel costs, and depreciation. The determination coefficient R^2 equals 0.515, the value of the modified determination coefficient (modified R^2), which is used for comparing models with a different number of variables (here, specifically, 4 explanatory variables) is 0.468. The model with the higher modified R^2 appears to be better. The column b^* (sometimes also referred to as beta coefficient) is used to determine the relative strength of the impact of individual variables on the dependent variable. This way it is possible to determine which variables have the biggest and the smallest impact on the variance of the dependent variable. Since x_1 (land), x_2 (material), x_3 (personnel costs), and x_4 (depreciation) have different units, their impact on y is difficult to compare but possible using b^* . Here, the highest absolute value of b^* is recorded in the case of depreciation. This implies that depreciation has the biggest effect on revenues (earnings). As can be seen, the value of depreciation is -1.318, which means an inverse ratio – depreciation decreases with the growing revenues. The column Standard deviation of b is a standard error of the estimate of the b parameter. The column t is the test criterion for the individual test of parameters, or test of significance of individual variables calculated as follows:

$$t = \frac{b}{st. error}$$

This should be compared with the critical value of the Student's t -distribution, but in this case, the comparison of p -value and α was used. Column b is used for the compilation of the model's equation. This means that the following expression of the model can be found in this column:

$$y' = -494084.871367 - 0.015124x_1 + 1.335417x_2 + 1.003646x_3 - 1.468423x_4$$

The value of F is 10.889. This is the value of the test criterion, which can be compared with the critical value, that is, the quantile of F -distribution. However, in this case, the p -value and α were compared.

Using the overall model test (F test), the following hypothesis was tested:

H0: the model as a whole is insignificant

Since $p < 0.05$ (α), H0 is rejected, which means that the model as a whole is statistically significant. To determine the quality of the model, determination coefficient R^2 was used, whose value is 0.515. The changes in

earnings are 51.51% explained by the change in land, and at the same time, the change in material, personnel costs, and depreciation.

Furthermore, a test of significance of individual explanatory variables (x_1 : land, x_2 : material, x_3 : personnel costs, x_4 : depreciation).

For land x_1 , the following hypothesis was tested:

H_0 : the explanatory variable "land" is insignificant

H_1 : the explanatory variable "land" is significant

Since the p-value 0.811 > 0.05, H_0 is not rejected, which means that land is a statistically insignificant explanatory variable and the conclusion is that it needs to be removed from the model.

For material x_2 , the following hypothesis was tested:

H_0 : the explanatory variable "material" is insignificant

H_2 : the explanatory variable "material" is statistically significant

Since the p-value 0.026 < 0.05, H_0 is rejected, which means that material is a statistically significant explanatory variable and needs to be included in the model.

For personnel costs x_3 , the following hypothesis was tested:

H_0 : the explanatory variable "personnel costs" is insignificant

H_3 : the explanatory variable "personnel costs" is significant

Since the p-value 0.000 < 0.05, H_0 is rejected, which means that "personnel costs" is a significant variable and needs to be included in the model.

For depreciation x_4 , the following hypothesis was tested:

H_0 : the explanatory variable "depreciation" is insignificant

H_4 : the explanatory variable "depreciation" is significant

Since the p-value 0.000 < 0.05, H_0 is rejected, which means that depreciation is a significant explanatory variable and needs to be included in the model (for more details, see Table 1).

Table 1. Regression Summary for dependent variable (Model 1)

N= 46	Regression Summary for dependent variable: Profit/(loss) for the current accounting period					
	R=,71770834 R2= ,51510526, adjusted R2= ,46779845					
	F(4,41)=10,889 p<,00000 Standard error of estimate: 4630E3					
	b*	Standard error of b*	b	Standard error of b	t(41)	p-value
intersection			-494084,871367	940753,6	-0,52520	0,602272
land	-0,04265	0,177499	-0,015124	0,1	-0,24029	0,811304
materials	0,34572	0,149666	1,335417	0,6	2,30994	0,026002
personnel costs	1,25404	0,205800	1,003646	0,2	6,09351	0,000000
depreciation of tangible fixed assets and intangible fixed assets	-1,31796	0,219700	-1,468423	0,2	-5,99891	0,000000

Source: Authors

Figure 1 shows a normal probability plot of residuals, which is used to check whether the distribution of residuals is normal.

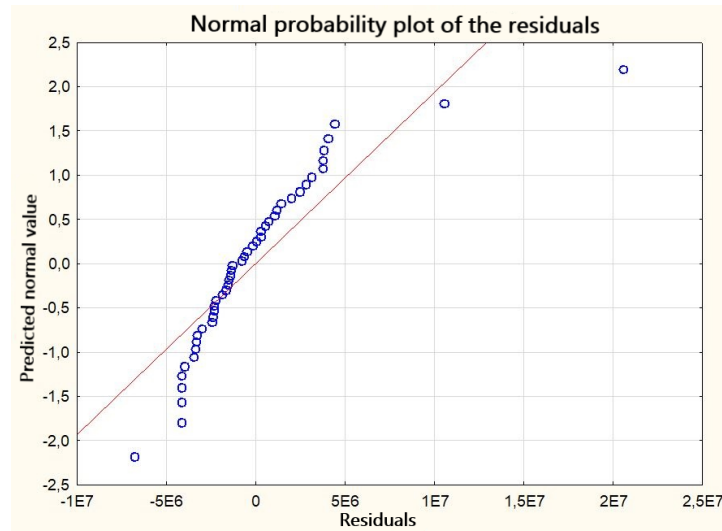


Figure 1. Normal probability plot of the residuals (Model 1)

Source: Authors

The points should be located as close to the red line as possible, which was achieved in this case.

Figure 2 shows the distribution histogram. The shape of the histogram should be similar to the Gaussian curve as much as possible (red curve = normal distribution).

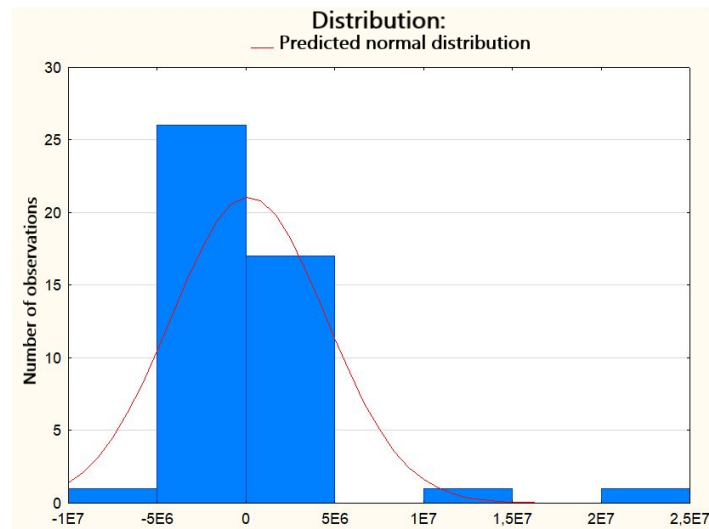


Figure 2. Normal distribution histogram (Model 1)

Source: Authors

Simplified model

It can be seen from Table 2 that the value of the correlation coefficient R is 0.717. In this case, it again indicates a stronger dependence of earnings on material, and at the same time, on personnel costs and depreciation. The value of the R^2 determination coefficient is 0.514, the value of the modified determination coefficient (modified R^2) is 0.479. In this case, there are 3 explanatory variables. The model with a higher modified R^2 appears to be better; now it can be seen that the simplification of the model was suitable, as this model shows a higher modified R^2 . In the b^* column, it can be seen that the highest absolute value of beta is achieved in the case of depreciation, which means that depreciation has the biggest effect on revenues. It is a negative value (-1.326), that is, the inverse ratio, which means that the revenues (earnings) grow with decreasing depreciation. Column b shows the shape of the model:

$$y' = -452401.263612 + 1.268884x_2 + 0.992108x_3 - 1.477922x_4$$

Using the overall model test (F test), the following hypothesis was tested:

H0: the model as a whole is insignificant

Since $p < 0.0 < 0.05$ (alpha), H_0 is rejected, which means that the model as a whole is statistically significant. To determine the quality of the model, the determination coefficient R^2 was used, whose value is 0.514. The changes in earnings are 51.44 % determined by the change in the material, and at the same time by the change in personnel costs and depreciation.

Furthermore, the tests of significance of individual explanatory variables (x_2 : material, x_3 : personnel costs, x_4 : depreciation) were performed.

For material x_2 , the following hypothesis was tested:

H0: the explanatory variable "material" is insignificant

H1: the explanatory variable "material" is significant

Since the p-value $0.015 < 0.05$, H_0 is rejected, which means that material is a significant explanatory variable and needs to be included in the model.

For personnel costs x_3 , the following hypothesis was tested:

H0: the explanatory variable "personnel costs" is insignificant

H2: the explanatory variable "personnel costs" is significant

Since the p-value $0.000 < 0.05$, H_0 is rejected, which means that "personnel costs" is a significant variable and shall be included in the model.

For depreciation x_4 , the following hypothesis was tested:

H0: the explanatory variable "depreciation" is insignificant

H3: the explanatory variable "depreciation" is significant

Since the p-value $0.000 < 0.05$, H_0 is rejected, which means that depreciation is a statistically significant explanatory variable and needs to be included in the model (see Table 2).

Table 2. Regression Summary for dependent variable (Model 2)

N= 46	Regression Summary for dependent variable: Profit/(loss) for the current accounting period					
	R=,71723246 R2= ,51442240, adjusted R2= ,47973829					
	F(3,42)=14,832 p<,00000 Standard error of estimate: 4578E3					
	b*	Standard error of b*	b	Standard error of b	t(41)	p-value
intersection			-452401,2636	914190	-0,4948	0,62327
materials	0,3285	0,12990	1,26888	0,5	2,5288	0,01529
personnel costs	1,2396	0,19463	0,99210	0,2	6,3688	0,00000
depreciation of tangible fixed assets and intangible fixed assets	-1,3264	0,21437	-1,47792	0,2	-6,1878	0,00000

Source: Authors

Figure 3 shows the normal probability plot of residuals. This graph serves to verify whether the residuals show normal distribution.

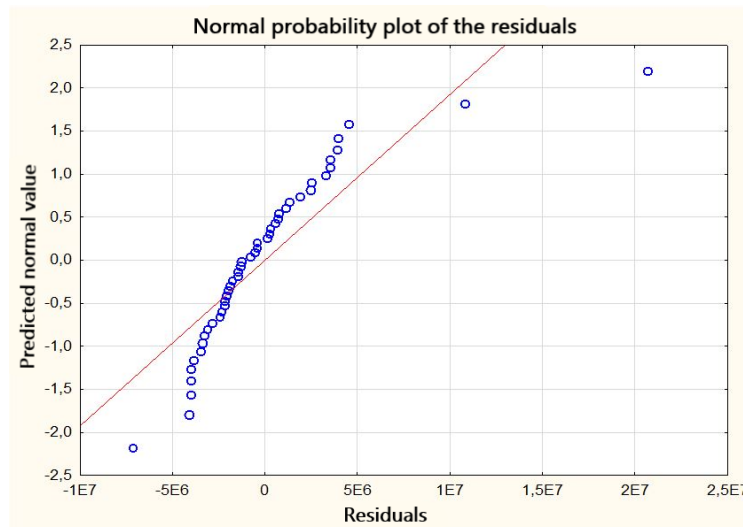


Figure 3. Normal probability plot of the residuals (Model 2)

Source: Authors

The points should be located as close to the red line as possible, which is achieved in this case.

Figure 4 shows a distribution histogram. The shape of the histogram should be similar to the Gaussian curve (red curve = normal distribution).

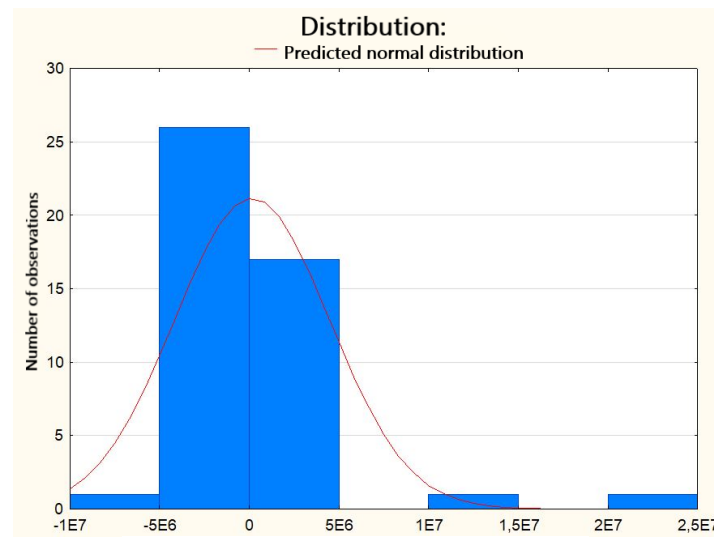


Figure 4. Normal distribution histogram (Model 2)

Source: Authors

Discussion – Evaluation, research questions

RQ1: What are the value drivers of agricultural companies?

Within the first research question, the selected value drivers of agricultural companies were *land*, *material*, *personnel costs* and *depreciation of fixed tangible and intangible assets*. These value drivers were verified on the basis of multiple regression analysis. It was concluded that *land* should be removed (for more details, see RQ2).

When using the Cobb-Douglas production function, Elita et al. (2019) selected the acreage of agricultural land, the quantity of work, seed and fertilizers as value drivers. They determined the relationship between these inputs and outputs in the form of rice and corn production. Shkuratov et al (2020) used correlation and regression analysis and selected the acreage of used agricultural land as a value driver, estimating the volume of gross agricultural output in relation to this value driver. Tiamme et al. (2019) selected agricultural land, labor, and capital as value drivers. They were used for the Cobb-Douglas production function, where the authors found that the size of these inputs influences the return to scale. Pechrová Simpachová and Simpach (2019) selected material, capital, number of employees and acreage of agricultural land as value drivers when using the Cobb-Douglas production function. The authors concluded that sales are directly dependent on these value drivers. According to Pechrová Simpachová & Simpacha (2020), value drivers include material, energy, fixed asset, the number of employees, and the acreage of agricultural land. Land and labor were selected as value drivers by Onofri et al. (2019).

RQ2: What is the relationship of value drivers and profit generators in agricultural companies?

When dealing with the second research question, value drivers (*land*, *material*, *personnel costs* and *depreciation of fixed tangible and intangible asset*) were compared and their relation to *profit – earnings* were analyzed using multiple regression analysis. In the first model, it was found that the changes in *earnings* are 51.51 % influenced by *land*, *material*, *personnel costs* and *depreciation*. However, further analysis showed that *land* is an insignificant variable and needs to be removed from the model due to the zero values of *land* of companies listed in Annex 5. In the second model, the *land* variable was not considered. It was concluded that the changes in *earnings* are 51.44 % determined by *material*, *personnel costs* and *depreciation*.

For comparison, it can be stated that Pechrová Simpachová & Simpach (2019) monitored the agricultural production in the form of sales in dependence on the consumption of material, capital, the number of employees, and the acreage of agricultural land. Instead of regression analysis, the authors used the Cobb-Douglas function and concluded that sales were most influenced by the consumption of material; the number of employees and the acreage of agricultural land had a smaller effect. Vasylyeva (2021) used a modified Cobb-Douglas production function describing how human capital acts on gross value added and gross production. The parameters of the production function were verified by means of correlation and regression analysis. The author concluded that by using higher labor potential and higher capital investments, it is possible to achieve better, yet unspecified agricultural outputs. Therefore, our data cannot be compared with the findings of this author.

Conclusions

The goal of the paper was to derive the production function of production factors of companies operating in the agricultural sector of the CR, to determine the value drivers and their relationship to the profit generators. The selected method was multiple regression analysis, while the determined variables were land, material, personnel costs, depreciation of fixed intangible and tangible asset, and earnings for the current accounting period.

The authors used multiple regression analysis to assess the relationship of the variables and profit. In the first model, it was concluded that earnings are 51.52 % determined by land, material, personnel costs and depreciation of fixed tangible and intangible assets. Since 17 companies out of 46 showed zero values of land, it was considered an insignificant variable and was removed from the model. In the simplified model, it was found that the changes in earnings are 51.44 % determined by material, personnel costs and depreciation. The results indicate that correct setting of production factors positively affects the profit of agricultural companies. In our case, material, personnel costs, and depreciation of fixed tangible and intangible assets contribute 51.44 % to the generation of profit.

Agricultural companies are thus recommended to focus their attention primarily on three out of the four production factors when striving for streamlining their activities. The main benefit of this study is the finding that land as such has probably the same value when held by any company. This can be explained by the fact that agricultural companies quite correctly choose suitable types of plans for all types of soil and soil quality. Therefore, this production factor practically does not play any role in a possible success or failure of an agricultural company. In contrast, the other three assessed production factors play an important role in corporate decision-making. Specifically, these are material, labor, and fixed assets. This is confirmed by the results of regression analysis. However, the truth is that simply increasing the volume of these production factors is not sufficient. What is essential is to maintain an effective ratio of these three production factors' combination. This combination is determined by the parameters (weights) of the regression curve of the second model. Agricultural companies should thus continue to care for land but at the same time, they must be aware of the fact that success depends on the aforementioned combination of material, human labor, and fixed assets. This will allow agricultural companies to set the ratio of these production factors so that they could succeed in the market and generate profit, which will then be used to achieve the main goal of the company – the growth of the value for the owners.

The goal of the paper was thus achieved. However, potential limitations of the research shall be pointed out. The limitation is definitely the dataset. The research was conducted on a limited number of agricultural companies. Furthermore, it can be stated that the ratio of controlled production factors will be different for a micro-enterprise or a large enterprise. The question also is whether the research included all production factors decisively participating in profit generation. The research considered properly the countable value drivers; however, there is a question of whether unquantifiable value generators should have been considered as well. This of course suggests a possible future direction of the research. It is not necessary to examine the level of the influence but

just the existence and the nature of the value driver should be dealt with. This is naturally given by the fact that agriculture is a very specific sector. On the one hand, it is a strategic industry of each state and as such, it receives great support. On the other hand, it is highly dependent on exogenous factors, such as the weather.

References

- Ahmed, M. H., Tazeze, A., Mezgebo, A., & Andualem, E. (2018). Measuring maize production efficiency in the eastern Ethiopia: Stochastic frontier approach. *African Journal of Science, Technology, Innovation and Development*, 10(7), 779–786. <https://doi.org/10.1080/20421338.2018.1514757>
- Anand, P., Husain, D., & Prakash, R. (2022). Sustainable integrated system for rural development: a case study. *Insights into Regional Development*, 4(3), 96–109. [https://doi.org/10.9770/IRD.2022.4.3\(6\)](https://doi.org/10.9770/IRD.2022.4.3(6))
- Bartos, V., Vochozka, M., & Janikova, J. (2021). Fair value in squeeze-out of large mining companies. *Acta Montanistica Slovaca*, 26(4), 712–731. <https://doi.org/10.46544/AMS.v26i4.10>
- Belas, J., Gavurova, B., Cepel, M., & Kubak, M. (2020). Evaluation of economic potential of business environment development by comparing sector differences: perspective of SMEs in the Czech Republic and Slovakia. *Oeconomia Copernicana*, 11(1), 135–159. <https://doi.org/10.24136/oc.2020.006>
- Bilan, Y., Gavurova, B., Stanislaw, G., & Tkacova, A. (2017). The Composite Coincident Indicator (CCI) for Business Cycles. *Acta Polytechnica Hungarica*, 14(7), 71–90. <https://doi.org/10.12700/aph.14.7.2017.7.5>
- Chabatul, V. V., Rusakovich, A. N., & Papinava, M. V. (2019). Methodological approaches for optimization of structure of production means of agricultural companies in the Republic of Belarus. *Proceedings of the National Academy of Sciences of Belarus. Agrarian Series*, 57(1), 19–37. <https://doi.org/10.29235/1817-7204-2019-57-1-19-37>
- Cheng, M., & Liu, B. (2021). Application of an extended VES production function model based on improved PSO algorithm. *Soft Computing*, 25(12), 7937–7945. <https://doi.org/10.1007/s00500-021-05676-7>
- Elita, Y., Sentosa, S. U. & Efrizal, S. (2019). Production Analysis, Minimum Cost, and Profit in Sentra Production of Rice and Corn Farming in Padang Pariaman: *Proceedings of the third padang international conference on economics education, economics, business and management, accounting and entrepreneurship (PICEEBA)* [online].
- El-Ramady, H., Alshaal, T., Yousef, S., Elmahdy, S., Faizy, S. E.-D., Amer, M., Shams El-Din, H., El-Ghamry, A. M., Mousa, A. A., Prokisch, J., & Senesi, N. (2019). Soil Fertility and Its Security. In H. El-Ramady, T. Alshaal, N. Bakr, T. Elbana, E. Mohamed, & A.-A. Belal (Ed.), *The Soils of Egypt* (s. 137–157). Springer International Publishing. https://doi.org/10.1007/978-3-319-95516-2_8
- Gadzchiev, E., Bogacheva, O. & Arutyunyan, S. (2019). Application of production function framework for the integral assessment and forecast of industry development in a region: *Proceedings of the 2nd international scientific conference on new industrialization: global, national, regional dimension (SICNI)* [online].
- Ganush, G. I., & Tsetsyrynets, T. A. (2022). Evolution of the theory and practices of human capital management in the agricultural sector. *Proceedings of the National Academy of Sciences of Belarus. Agrarian Series*, 60(1), 35–45. <https://doi.org/10.29235/1817-7204-2022-60-1-35-45>
- Gavurova, B., Janke, F., Packova, M., & Pridavok, M. (2017). Analysis of Impact of Using the Trend Variables on Bankruptcy Prediction Models Performance. *Ekonomicky casopis*, 65(4), 370–383.
- Gavurova, B., Packova, M., Misankova, M., & Smrcka, L. (2017). Predictive Potential and Risks of Selected Bankruptcy Prediction Models in the Slovak Business Environment. *Journal of Business Economics and Management*, 18(6), 1156–1173. <https://doi.org/10.3846/16111699.2017.1400461>
- Gavurova, B., Belas, J., Bilan, Y., & Horak, J. (2020). Study of legislative and administrative obstacles to SMEs business in the Czech Republic and Slovakia. *Oeconomia Copernicana*, 11(4), 689–719. <https://doi.org/10.24136/oc.2020.028>
- Gavurova, B., Kovac, V., Drabik, P., & Gomory, M. (2019). Exploration of Disparities in Environmental Activities of European Countries from Year 2006 to Year 2016. *Acta Montanistica Slovaca*, 24(4), 376–390.
- Holmen, R. B. (2022). Agglomeration decay in rural areas. *Insights into Regional Development*, 4(3), 139–155. [https://doi.org/10.9770/IRD.2022.4.3\(9\)](https://doi.org/10.9770/IRD.2022.4.3(9))
- Kocisova, K., Gavurova, B., & Kotaskova, A. (2018). A slack-based measure of agricultural efficiency in the European Union countries. *Journal of International Studies*, 11(1), 189–200. <https://doi.org/10.14254/2071-8330.2018/11-1/14>
- Kučera, J., Vochozka, M., & Rowland, Z. (2021). The Ideal Debt Ratio of an Agricultural Enterprise. *Sustainability*, 13(9), 4613. <https://doi.org/10.3390/su13094613>
- Kukushina, O. S., & Okomina, E. A. (2019). Assessing The Impact Of Resource Potential On The Results Of Agricultural Activity. 408–415. <https://doi.org/10.15405/epsbs.2019.04.45>
- Lambert, L. H., English, B. C., Clark, C. C., Lambert, D. M., Menard, R. J., Hellwinckel, C. M., Smith, S. A., & Papanicolaou, A. (2021). Local effects of climate change on row crop production and irrigation adoption. *Climate Risk Management*, 32, 100293. <https://doi.org/10.1016/j.crm.2021.100293>

- Muhajan, S., Sharma, M., Rizvi, S. E. H. & Kumar, B. (2018). Quantile regression approach for the analysis of production function of foodgrain in India: *international journal of agricultural and statistical sciences* [online].
- Nasir, S., Ribij, M. and Al-Wassity, R. Determine the Optimal Behavior of Wheat Producers in Reclaimed Irrigated Lands in Iraq for the Season 2018: *International journal of agricultural and statistical sciences* [online]. 2020 [cit. 2022-04-18].
- Nyangena, D. N., Kinyuru, J., & Imathiu, S. (2021). Climate change: A natural streamliner towards entomophagy? *International Journal of Tropical Insect Science*, 41(3), 2133–2147. <https://doi.org/10.1007/s42690-020-00292-8>.
- Onofri, L., Bianchin, F., & Boatto, V. (2019). How to assess future agricultural performance under climate change? A case-study on the Veneto region. *Agricultural and Food Economics*, 7(1), 16. <https://doi.org/10.1186/s40100-019-0131-y>.
- Pechrová Simpachová, M. & Simpach, O. (2019). Analysis of Production Function of Agricultural Holdings: *37th international conference on mathematical methods in economics 2019* [online].
- Pechrová Simpachová, M. & Simpach, O. (2020). Cobb-Douglas or Translog Production Function in Efficiency Analysis? *38th international conference on mathematical methods in economics (MME 2020)* [online].
- Parolini, G. (2022). Weather, climate, and agriculture: Historical contributions and perspectives from agricultural meteorology. *WIREs Climate Change*, 13(3). <https://doi.org/10.1002/wcc.766>.
- Potapov, A. (2020). Modeling the Impact of Resource Factors on Agricultural Output. *Economic and Social Changes: Facts, Trends, Forecast/Экономические и социальные перемены: факты, тенденции, прогноз*, 4 (70). <https://doi.org/10.15838/esc.2020.4.70.9>.
- Priyanka, P. A., Muraligopal, S., & Kumar, E. N. (2019). The Genesis of Pradhan Mantri Fasal Bima Yojana-A Review. *Indian Journal of Economics and Development*, 15(3), 483. <https://doi.org/10.5958/2322-0430.2019.00063.5>.
- Qiao, J., Yu, D., & Wu, J. (2018). How do climatic and management factors affect agricultural ecosystem services? A case study in the agro-pastoral transitional zone of northern China. *Science of the Total Environment*, 613–614, 314–323. <https://doi.org/10.1016/j.scitotenv.2017.08.264>.
- Shkuratov, O., Dorosh, O., Gorodyska, O. & Patiyuk, O. (2020). Assessment of influence of spatial organization of the territory on economic efficiency of agrarian enterprises: *scientific papers-series management economic engineering in agriculture and rural development* [online].
- Simtion, D. (2020). How to use production functions characteristics of economic processes in agriculture. *Physical (technical) functions: scientific papers-series management economic engineering in agriculture and rural development* [online].
- Straková, J., Koraus, A., Váchal, J., Pollák, F., Cernak, F., Talíř, M., & Kollmann, J. (2021). Sustainable Development Economics of Enterprises in the Services Sector Based on Effective Management of Value Streams. *Sustainability*, 13(16). <https://doi.org/10.3390/su13168978>
- Straková, J., Kucharčíková, A., Pártlová, P., & Váchal, J. (2016). Foreign Direct Investment and Transport Serviceability - a Prerequisite for the Development and Stability of National and Regional Economies. *Nase More*, 63(3), 204–210. <https://doi.org/10.17818/NM/2016/SI24>.
- Strakova, J., Partlova, P., Dobrovic, J., & Vachal, J. (2018). Situational analysis and its role in the process of strategic business management. *Polish journal of management studies*, 18(1), 353–364. <https://doi.org/10.17512/pjms.2018.18.1.26>
- Straková, J., Rajiani, I., Pártlová, P., Váchal, J., & Dobrovič, J. (2020). Use of the Value Chain in the Process of Generating a Sustainable Business Strategy on the Example of Manufacturing and Industrial Enterprises in the Czech Republic. *Sustainability*, 12(4), 1520. <https://doi.org/10.3390/su12041520>
- Suseela, K. & Chandrasekaran, M. (2018). Influence of technology adoption on yield and income of farmers in dryland agriculture of andhra pradesh. *International journal of agricultural and statistical sciences* [online].
- Takáč, I., Lazíková, J., Rumanovská, L., Bandlerová, A., & Lazíková, Z. (2020). The Factors Affecting Farmland Rental Prices in Slovakia. *Land*, 9(3), 96. <https://doi.org/10.3390/land9030096>.
- Tkacova, A., Gavurova, B., Danko, J., & Cepel, M. (2017). The importance of evaluation of economic determinants in public procurement processes in Slovakia in 2010-2016. *Oeconomia Copernicana*, 8(3), 367–382. <https://doi.org/10.24136/oc.v8i3.23>
- Vasyl'yeva, O. (2021). Assessment of factors of sustainable development of the agricultural sector using the Cobb-Douglas production function. *Baltic Journal of Economic Studies*, 7(2), 37–49. <https://doi.org/10.30525/2256-0742/2021-7-2-37-49>.
- Vochozka, M., Horak, J., Krulicky, T., & Pardal, P. (2020). Predicting future Brent oil price on global markets. *Acta Montanistica Slovaca*, 25(3), 375–392. <https://doi.org/10.46544/AMS.v25i3.10>.
- Vochozka, M., Kalinova, E., Gao, P., & Smolikova, L. (2021). Development of copper price from July 1959 and predicted development till the end of year 2022. *Acta Montanistica Slovaca*, 26(2), 262–280. <https://doi.org/10.46544/AMS.v26i2.07>.
- Vochozka, M., Maroušková, A., Váchal, J., & Straková, J. (2016). Appraisal of changes in sewage sludge management. *International Journal of Environmental Science and Technology*, 13(6), 1607–1614. <https://doi.org/10.1007/s13762-016-0991-6>.
- Vochozka, M., Maroušková, A., Straková, J., & Váchal, J. (2016). Techno-economic analysis of waste paper energy utilization. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*. Philadelphia: Taylor & Francis Inc, 38(23), 3459–3463. ISSN 1556-7036.
- Wicki, L. (2018). *The role of productivity growth in agricultural production development in Central and Eastern Europe countries after 1991*. 514–523. <https://doi.org/10.22616/ESRD.2018.060>.
- Wongyai, J., Tiammee, S., Wongyai, J., Udomwong, P., Phaphuangwittayakul, A. & Chanaim, S. Smart Farming in Thailand: *2019 13th international conference on software, knowledge, information management and applications (SKIMA)* [online]. 2019 [cit. 2022-04-19].

Zhang, Q., Chen, Z., & Li, F. (2021). Appropriate Management Scale of Farmland and Regional Differences under Different Objectives in Shaanxi Province, China. *Land*, 10(3), 314. <https://doi.org/10.3390/land10030314>.

Zhao, M., Chen, Z., Zhang, H., & Xue, J. (2018). Impact Assessment of Growth Drag and Its Contribution Factors: Evidence from China's Agricultural Economy. *Sustainability*, 10(9), 3262. <https://doi.org/10.3390/su10093262>.

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BUILDING REPUTATION AND SOCIAL MEDIA – HOW EFFECTIVELY DO ATTRACTIVE EUROPEAN TOURIST DESTINATIONS COMMUNICATE ON THEM?*

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Abstract. The paper focuses on evaluation the use of social media Instagram, YouTube and Twitter by 13 attractive European tourist city destinations for online marketing communication concerning building their reputation in the tourism sector. The following data were collected for all individual social media accounts using the online tool Social Blade: number of uploaded posts/media; number of comments, number of likes/views; number of follower/subscribers. According to the results of the analysis of available data, the quantity of the published content does not automatically mean the high degree of interactions of specific social media users. To determine the effectiveness of published posts (images, videos, textual posts) for individual analysed destinations, the index of Social Media Effectiveness (SME) was created and applied.

Keywords: social media; reputation; tourism; destination; marketing communication; index of Social Media Effectiveness

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JEL Classifications: L83, Z32, D83, M37

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1. Introduction

The widespread use of social media enables easy access to user-generated information and can shape travel intentions. Their influential role in tourism and recreation marketing is thus widely recognized (Lim et al., 2020). Social media help build, produce or even shift the narratives of historic places and tourist destinations through visual and textual information as contextualized content promoted there (Pietrobruno, 2021). Social media and storytelling also contribute to the conservation of historic urban landscapes and attributed heritage values through the narratives shared (van der Hoeven, 2019). Their users, who are perceived as storytellers, may influence perception and buying behaviour of other people, and can co-create brands, including tourism destination brands (Lund, Cohen and Scarles, 2018). These storytellers significantly increase engagement of other social media users, destination brand image and visits intentions (Pachucki, Grohs and Scholl-Grissemann, 2021). On the other hand, social media users and their posts can as well harm and co-destruct destinations' reputation (Lund, Scarles and Cohen, 2019). Good destination reputation affects visit intention (Su, Lian and Huang, 2020), and as there is a significant relationship between tourists' prior knowledge and the reputation of the destination, effective marketing strategies focused on providing relevant information about the destination play a crucial role (Yamashita and Takata, 2020). Marketing strategies, especially in the current highly dynamic and competitive corporate environment, are an important part of corporate strategies (Straková et al. 2018, 2021b; Shevyakova, Munsh and Arystan, 2019; Onete, Vargas and Chita, 2020; Gavurova et al. 2022). A trustworthy destination brand is built on the basis of culture involvement, destination brand identification, and good reputation (Molinillo, Japutra and Ekinici, 2022). Given that in the world of social media, online posts of both the destination management organisations and visitors can alter travel and visit intentions, social media can be considered a challenge, as well as a strategic tool for a destination brand building (Iglesias-Sánchez, Correia and Jambrino-Maldonado, 2019).

The goal of the paper is to evaluate the use of social networking sites Instagram, YouTube and Twitter by attractive European urban tourist destinations for marketing communication related to building reputation in tourism by means of their official profiles. Subsequently, such destinations will be identified whose profiles can be evaluated as best managed and administrated on the basis of their activity and user interaction on the above social networking sites.

To achieve the goal set, the following research questions are formulated:

RQ1: What is the activity of individual examined destinations on their official social media profiles (Instagram, YouTube, Twitter) focused on building a given city's reputation as an interesting European tourist destination?

RQ2: Which of the European destinations examined report the highest annual average number of interactions of social network users per one post published on the official profile on Instagram, YouTube and Twitter?

2. Theoretical background

2.1 The use of social media for communication

The dynamic development of the Internet at the end of the 20th century and its gradual transformation into mass media brought modern, previously unknown forms of the communication to mankind. Many early social portals focused on connecting people with each other through virtual chat rooms. User profiles became a major feature of social networking in the late 1990s, allowing users to compile their own list of 'friends' and to search for other socially connected Internet users with the same or similar interests. However, the intention of today's users is no longer just to connect with each other and share personal information and opinions, as it was in the mid-1990s. Today, social networks are an effective tool for sharing media content - both news and journalistic (Rogers, 1986; Buhalis and O'Connor, 2015; Lindgren, 2017; Knoke and Yang, 2007; Aichner et al., 2021; Fakunle and Ajani, 2021).

As stated by Kemp (2022), in January 2022, the world population reached 7.91 billion, of which 4.95 billion (62.5%) are Internet users. The latest data from 2022 shows that there are more than 4.62 billion social media users. The three most popular social media platforms in the global ranking are WhatsApp, Instagram and Facebook. TikTok app saw the most dynamic increase, which made it the most downloaded mobile application in the world. Facebook is still one of the most widely used social media platforms in the world, with 2.91 billion users as of October 2021. Over the past year, Facebook's user base has grown by 6.2 percent (+170 million users) despite still being blocked in China. The fourth place at the global level is occupied by Instagram, which has seen one of the fastest growths of all platforms over the past year. The number of Instagram's users has grown by more than 6 % (+85 million users) in the last 90 days alone, and the rate of growth continues to accelerate. Over the last year, YouTube has narrowed Facebook's lead. The number of this platform's users is growing almost twice as fast as Facebook. The total number of active users of YouTube is 2.56 billion people. YouTube's ads reach over 2.5 billion users. However, it is definitely worth mentioning that in the last 12 months, this number increased by 11.9 percent (+ 271 million users). Social media have contributed greatly to tourism awareness by providing easy access to information and recommendations from experienced travellers and the locals (Buckley et al., 2015). Each platform is slightly different, allowing for various features a user can enjoy and a company can use for its marketing communication. Facebook enables communication in several ways, including private and public messages, using walls, groups, events, posting photos, stories, videos (Pempek, Yemolayeva and Calvert, 2009; Menon, 2022). Similarly, WhatsApp provides a platform for communication, chatting, sharing ideas, and audio-visual content, only a telephone number is required (Jabbar et al., 2020; Kurniawan et al., 2019). Instagram allows for sharing audio-visual content, communication, with the focus on visuals (Guizzo, Canale and Fasoli, 2021). TikTok enables viewing, creating, and commenting on videos (Montag, Yang and Elhai, 2021), while YouTube is a platform focused on videos, providing also incidental learning and commenting (Lange, 2018), while Twitter is a platform enabling sharing short messages, so-called tweets, detects the trending topics globally or in a specific corner of the world (Umakanth and Santhi, 2020; Asgari-Chananghlu, Nikzad-Khasmakhu and Minaee, 2020).

Among other things, social media has become a tool for selling and buying tourism services (Horvath et al. 2021). The growing need for people to socialize, interact and make new contacts has shifted to social media platforms such as Facebook, Twitter and YouTube, and there are other online platforms that have influenced decisions on tourism activities. Today, many consumers appreciate social media for the richness and diversity of the experience. Therefore, potential customers make a purchase decision just after interacting on social media and exchanging different opinions on blogs, forums and recommendation platforms such as TripAdvisor (Manoliu, 2014).

2.2 Social media in context of destinations and their management

In a sequential choice experiment, respondents were asked to choose a preferred European city destination for their next vacation from a given set before and after they were provided some information about the destination image by a social network member. It was found that destination image based on social media extends knowledge and influences the choice behaviour. When tourists do not have a prior destination image, the effect is even stronger (Pan, Rasouli and Timmermans, 2021; Gavurova et al. 2020; Gavurova et al. 2021a,b). Using methods triangulation including a qualitative content analysis of social media posts, it was found that social media can help sharing the narratives and values of a given city, thus changing the common perception of it (van der Hoeven, 2019). Another qualitative content analysis of tweets on Twitter revealed that the destination management organizations (DMOs) and influencers play an important role in the identity formation process. As there is a relationship between tourism products associated with the nature, culture, weather etc. and the destination image, DMOs can project the destination image with fewer resources used for the communication of popular products while managing the potential of specific local aspects and brands (Garay, 2019; Vasanicova et al. 2021a,b).

Based on the sociological concepts of storytelling, performance, performativity as well as mobility, destination brand stories can circulate among users of social media and increase their engagement. DMOs need to be active in both the online and offline world, maintain interaction, cooperate with users, and co-create the stories with them (Lund, Cohen and Scarles, 2018). As stated by Diniati et al. (2022), some destinations cooperate with influencers who emphasise the digital content to attract the attention, build brand awareness and attract interest of potential tourists, as well as to modify their behaviour by providing information as found through the method triangulation, such as in-depth interviews, non-participant observation and reviewing documents including Social Blade statistics and Instagram content of a glamping site in Indonesia during the Covid-19 pandemic. The content themes highlighted mainly activities and views, health, infographics, giveaways, or product-related content Peralta (2019) used a narrative analysis to evaluate the potential and effectiveness of travel blogs and vlogs shared on Facebook for promoting destinations and their image. The results of this analysis applied in the Philippines show that the perception of destination can be changed by a projected destination image (Peralta, 2019).

A link between online reputation of the top 5 tourism destinations, namely Spain, France, Germany, United Kingdom and USA and their competitiveness was studied by Iglesias-Sánchez, Correia and Jambrino-Maldonado (2019) through the implementation of two social media analytic tools – Social Mention and Mention. The analysis included sources, online presence, sentiment, engagement, topics and influence of the destinations based on their Facebook and Twitter profiles. Finally, a combination of quantitative methods was proposed (Iglesias-Sánchez, Correia and Jambrino-Maldonado, 2019). Another analytical tool, Netvizz, was used to collect data on the content published on Facebook to examine three destinations: Hong Kong, Japan and South Korea. Text mining and thematic coding analysis for the content analysis and also statistical methods were used to examine the effects of photo posts. Notably, each destination has its own marketing strategy with different image content, where the interactions between destination and image themes were found statistically significant. The themes were divided into 11 categories including e.g., modern architecture/object, historical architecture/object, town/landscape, nature/landscape, festival/habits/entertainment, food/restaurant (Song, Park and Park, 2021). A sentiment analysis based on reviews on TripAdvisor for the city of Marrakech was conducted to explore the fundamental topics and sentimental polarity of the destination regarding its negative online reputation. The most negative aspect identified was the citizen's behaviour followed by shopping experience. The knowledge of the main reasons for a bad reputation is necessary in order to remedy it and reduce tourists' dissatisfaction (Ali et al., 2021).

3. Data and methods

For the purpose of selecting popular tourist urban destinations in Europe the paper is focused on, we used the methodology of determining the most attractive European destination for the year 2020 according to the number of bed nights. The results released on the portal Statista (2022) include a total of 13 European tourist destinations with the highest number of bed nights for the year 2020 (foreign and domestic tourists). The results for individual destinations, which are further processed within this research, are presented in Table 1.

Table 1. Leading European urban tourist destinations in 2020 according to the number of bed nights

Name of tourist destination	Number of bed nights (in millions)	Percentage share
London	20.77	18.56
Paris	14.13	12.63
Berlin	12.28	10.97
Istanbul	9.89	8.84
Munich	7.03	6.28
Stockholm	6.9	6.17
Hamburg	6.88	6.15
Amsterdam	5.8	5.18
Rome	5.35	4.78
Madrid	5.05	4.51
Vienna	4.93	4.40
Prague	4.9	4.38
Frankfurt	4.09	3.65
Barcelona	3.92	3.50
Total nights	111.92	100.00

Source: Statista (2022)

In the next step, official and active accounts on social media were carefully searched for all 13 European destinations analysed. Social media selected for the analysis include Instagram, YouTube and Twitter. This set of social media combines graphical content, video and textual content, a large number of active users, and are also among the currently popular online marketing communication tools in the tourism sector, which is the reason why they were chosen for the analysis. The names of individual analysed destinations' official profiles on social media are presented in the Results chapter. For all accounts on individual social media, the year when the first post was published was sought.

Next, the following data were collected for individual accounts using the online tool Social Blade (2022):

1. Instagram: *Number of uploaded media/Number of Likes/Number of Comments/Number of Followers*
2. YouTube: *Number of uploaded videos/Total views of uploaded videos/Number of Subscribers*
3. Twitter: *Number of tweets/Number of Followers*

The date to which the above data were collected was 7 April 2022. The data obtained were then tabulated. The initial order of destinations in individual tables is based on Table 1, i.e. the ranking of destinations according to the number of bed nights. The presented values concerning the activity on social media (see Table 2-4) are as of the aforementioned date (7 April).

To determine the effectiveness of published posts (images, videos, textual posts) for individual examined destinations, the index of Social Media Effectiveness (SME) was created. In addition to the number of published posts, the index also considers the period for which the individual destination profiles active on the examined social media (i.e. from their creation to 2022). The results of the index thus indicate the average level of effectiveness of individual profiles of analysed destinations for one year according to the substituted variable. After substituting relevant values (number of likes, views, followers, or subscribers), the result of the index shows the average annual increase in a given variable per 1 published post, e.g. the number of new subscribers, likes, or views (see Table 5).

$$\text{Social Media Effectiveness}_{\text{variable}_{\text{destination}}} = \frac{\text{variable}}{\text{total posts (current year - year of account creation)}} \quad (1)$$

Legend:

Social media: Instagram, YouTube, Twitter

Variable: sum of likes, sum of views, sum of followers

The above process is shown in the example of London and its Instagram profile:

$$\text{Instagram Effectiveness}_{\text{likes}_{\text{London}}} = \frac{\text{sum of likes}}{\text{total Instagram posts (2022 - year of account creation)}} \quad (2)$$

Aggregate online activities of individual destinations on analysed social networks were evaluated using the ranking method, specifically the multicriteria ranking method. For each social media, the ranking of destinations was determined according to several variables on the basis of calculated SME values (Table 5). For Instagram, it is an average annual number of likes and new followers per 1 post, for YouTube, an average annual number of views and new subscribers per 1 post, and for Twitter, an average annual number of new followers per 1 post. The order of the 13 destinations was then determined for all 5 variables. The final ranking of the analysed destinations within their aggregate activities on all monitored social networks was determined on the basis of the average value of all rankings of each destination (see Table 6).

4. Results

4.1 Instagram

The growing popularity of graphic and video content on Instagram (launched in 2010) was an incentive for some of the analysed European destinations to create official profiles in 2012. The first posts to entice potential visitors by means of their official Instagram profiles were published by Paris, Vienna and Stockholm, followed e.g. by London and Berlin in the next year. However, there are also destinations that started to use this social network relatively late compared to other destinations, e.g. Prague, Amsterdam, Istanbul, or Munich (see Table 2).

About half of the official profiles use also the word “visit” together with the name of the given destination. This is supposed to clearly indicate what kind of content Instagram users will find there. From its launching until April 2022, most posts were published on the profiles “Visit Stockholm” and “I amsterdam” (Amsterdam). These profiles thus show some of the most aggregate values of “likes”, which exceeds 21 million in the case of Stockholm. However, the first position in terms of the highest number of “likes” and “followers” is occupied by the profile “Visit London”. Although this profile was the one with the highest number of posts, nearly 3,5 k photos or videos have got more than 31 million likes since 2013. This profile, as the only one of the analysed accounts, has more than 1 million followers. For the Instagram account of Istanbul, the data are available until the end of February 2022, after that, the account was removed for unknown reasons, although on the official tourist website of Istanbul, there is a link to this already not existing profile. Istanbul further communicates its graphic content primarily through Twitter.

Table 2. Official Instagram profiles of destinations and their activity

Destination	Account created	Media uploads	Likes	Comments	Followers	IG account name
London	2013	3 325	31 504 375	206 150	1 092 974	<i>Visit London</i>
Paris	2012	3 315	19 243 575	116 025	662 485	<i>Paris Je t'aime</i>
Berlin	2013	2 103	7 966 164	77 811	302 592	<i>Visit Berlin</i>
Istanbul*	2018	1189	621 847	7 134	7 374	<i>Visit Istanbul*</i>
Munich	2018	1079	665 293	8427	36 783	<i>Simply Munich</i>
Stockholm	2012	4 457	21 010 298	218 393	292 475	<i>Visit Stockholm</i>
Hamburg	2013	1 954	1 905 150	15 632	59 467	<i>Hamburg ahoi</i>
Amsterdam	2016	4 120	15 392 320	144 200	278 665	<i>I amsterdam</i>
Rome	2014	3 782	2 344 840	18 910	70 388	<i>Turismo Roma</i>
Madrid	2012	1 603	4 570 153	33 663	143 044	<i>Visita Madrid</i>
Wien	2012	3 252	16 230 732	334 956	310 767	<i>Vienna Tourist Board</i>
Prague	2016	422	734 280	5 486	64 212	<i>City of Prague</i>
Frankfurt	2015	1 304	1 942 960	15 648	45 336	<i>Visit Frankfurt</i>
Barcelona	2014	2 272	12 461 920	131 776	407 283	<i>Visit Barcelona</i>

* the official profile Visit Istanbul was removed from Instagram at the turn of February - March 2022

Source: Social Blade (2022)

4.2 YouTube

The general increase in the video content published on YouTube was closely related mainly to its takeover by Google at the end of 2006. In the first period, YouTube accounts of Berlin and Stockholm were created (2005, or 2006). Other popular European destinations started to create their profiles mainly in the years 2007 – 2010. The highest number of videos published on YouTube was recorded in the case of Madrid, which has shared more than 750 videos with the users of this platform since 2008. However, the highest effectiveness to the overall number of views was recorded in the case of Vienna's account. Almost three hundred videos have had nearly 48 million views and more than 35 k subscribers since 2007 (see Table 3).

Rather little attention is paid to YouTube as a communication channel for building a reputation of an attractive tourist destination by the destination management of Istanbul, Prague and Frankfurt. The profile of Istanbul was created in 2018; and there is not much content and both the number of views and subscribers is very low. In the case of Prague, almost 160 published videos have only 459 k views, which is highly below-average value compared to the accounts of other destinations. Frankfurt, along with Istanbul, has the lowest number of subscribers to the published videos.

Table 3. Official YouTube profiles of destinations and their activity

Destination	Account created	Total uploads	Total views	Subscribers	YouTube account name
London	2010	186	14 792 643	31 100	<i>Visit London Official</i>
Paris	2011	156	2 343 619	5 950	<i>Paris je t'aime</i>
Berlin	2005	68	1 535 183	4 640	<i>Berlin</i>
Istanbul	2018	14	220 610	116	<i>Visit Istanbul</i>
Munich	2018	130	1 619 290	N/A	<i>Simply Munich</i>
Stockholm	2006	118	7 069 585	2 870	<i>Stockholm</i>
Hamburg	2010	175	2 312 176	1 230	<i>Hamburg ahoi - travel</i>
Amsterdam	2010	435	3 654 837	5 290	<i>I amsterdam</i>
Rome	2008	156	459 003	1 420	<i>Turismo Roma</i>
Madrid	2008	754	8 182 039	12 500	<i>Visit Madrid</i>
Wien	2007	269	47 539 326	35 300	<i>Vienna</i>
Prague	2014	78	16 090 690	6 880	<i>Prague City Tourism</i>
Frankfurt	2009	82	638 892	877	<i>Visit Frankfurt</i>
Barcelona	2013	285	6 356 477	2 030	<i>Visit Barcelona Official</i>

Source: Social Blade (2022)

4.3 Twitter

Twitter was launched in 2006 primarily as a platform for sending short text messages. With its growing popularity mainly in the USA, this communication platform further developed and other features started to be added, including the possibility to use more characters in the published posts and easier sharing of links and multimedia content. These changes increase the use of Twitter in marketing communication of important European tourist destinations. From the analysed destinations, the first official tourist profiles were created for London, Amsterdam and Berlin. Other destinations appeared on Twitter mainly in the years 2010-2011.

The highest activity is recorded on the profiles of London and Paris. Both profiles also have a high number of followers, which is almost 700 k Twitter users in the case of London. In contrast, the profiles of Frankfurt or Hamburg show below-average activity in terms of the posts published and the related number of followers. The official profile of Munich, “Simply Munich”, was created in 2016; however, not a single post has been published there since then (see Table 4).

When comparing the content published by the destinations on Instagram and Twitter, it can be stated that in most cases, the same multimedia content appears on both social networks. However, Twitter posts put more emphasis on the textual part of the post, including the possibility to insert various hypertexts thematically related to a given post.

Table 4. Official Twitter profiles of destinations and their activity

Destination	Account created	Total tweets	Followers	Twitter account name
London	2009	54 306	686 560	<i>Visit London</i>
Paris	2011	27 262	358 252	<i>Paris je t'aime</i>
Berlin	2009	21 307	91 020	<i>Visit Berlin</i>
Istanbul	2013	2 553	7 637	<i>Visit Istanbul</i>
Munich	2016	0	18	<i>Simply Munich</i>
Stockholm	2011	7 479	36 880	<i>Visit Stockholm</i>
Hamburg	2013	2 120	4 459	<i>Hamburg ahoi</i>
Amsterdam	2009	13 994	391 153	<i>I amsterdam</i>
Rome	2012	15 796	109 711	<i>Turismo Roma</i>
Madrid	2011	18 638	80 109	<i>Visita Madrid</i>
Vienna	2010	8 828	10 135	<i>WienTourismus #CelebrateVienna</i>
Prague	2010	4 118	18 542	<i>City of Prague</i>
Frankfurt	2010	441	2 577	<i>Visit Frankfurt</i>
Barcelona	2010	13 717	21 653	<i>Visit Barcelona</i>

Source: Social Blade (2022)

4.4 Effectiveness of marketing communication of destinations on social networks

Table 5 shows the evaluation of effectiveness of individual analyzed destinations' profiles in the form of average values for a specific selected variable for one year on the basis of the calculated SME index. In addition to the number of published posts, likes, views of video content, and followers, also the period was considered for which the individual destination profiles are active (i.e. from their creation until the year 2022, when their profile was analyzed).

Table 5. Effectiveness of content published by destinations in terms of user interaction

Destination	Instagram		YouTube		Twitter
	avg. likes/ 1 post	avg. new followers/ 1 post	avg. new views/ 1 video	avg. new subscribers/ 1 video	avg. new followers/ 1 post
	SME - PER 1 YEAR		SME - PER 1 YEAR		SME - PER 1 YEAR
London	1053	37	6628	13.93	0.97
Paris	581	20	1366	3.47	1.19
Berlin	421	16	1328	4.01	0.33
Istanbul	131	2	3939	2.07	0.33
Munich	159	9	3114	-	1.31
Stockholm	471	7	3744	1.52	0.45
Hamburg	108	3	1101	0.59	0.23
Amsterdam	623	11	700	1.01	2.15
Rome	78	2	210	0.65	0.69
Madrid	285	9	775	1.18	0.39
Vienna	499	10	11782	8.75	0.10
Prague	290	25	25786	11.03	0.38
Frankfurt	213	5	599	0.82	0.49
Barcelona	686	22	2478	0.79	0.13

Source: Own processing

As for Instagram, the highest level of effectiveness was detected for the “Visit London” profile. The annual average numbers per one published post are 1,053 likes and 37 new followers. High values in terms of the annual average number of likes were recorded for the profiles of Barcelona, Amsterdam and Paris; the lowest recorded values were in the case of Rome and Hamburg. Although even on YouTube, London as the most visited destination in 2020, shows above-average values for the published videos in terms of the number of views and new followers, the highest values were recorded in the case of Prague and Vienna. On an annual average, each video published on the profile “City of Prague” gets about 26 k views and 11 new subscribers. Although compared to the currently most popular videos and their millions of views, this is rather a negligible number, in the comparison with the values of other analysed destinations, these are very below-average values. For example, the average values of destinations such as Rome, Madrid, or Paris do not exceed 1,400 views per one video post published on the given profiles. The graphical comparison of values concerning the average values of likes per Instagram post and views of a video on YouTube for all destinations is presented in Figure 1 below.

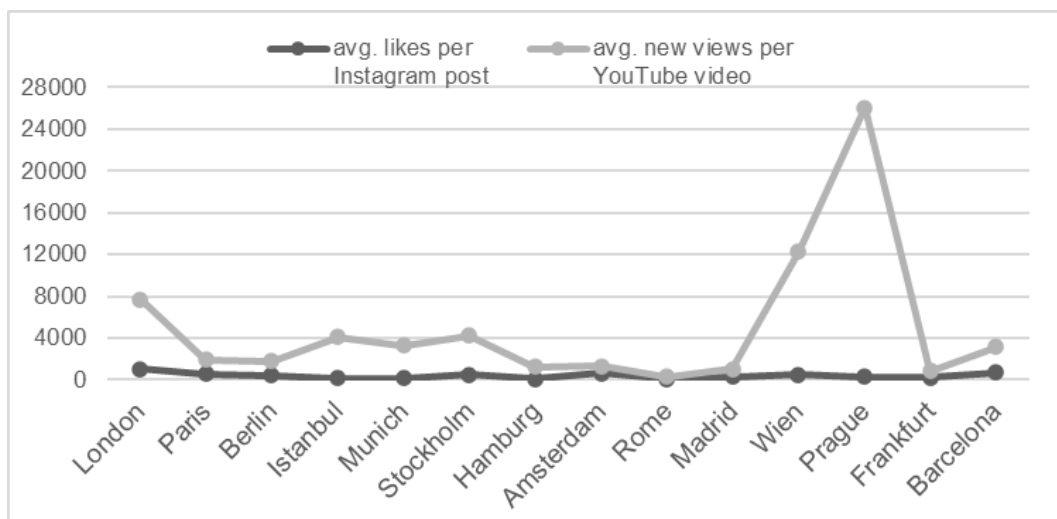


Figure 1. Graphical comparison of interaction on content published by official destination profiles

Source: Own processing

Given that for posts published on Twitter, it was not possible to obtain relevant data on the number of likes, only one indicator was calculated, namely the average annual number of new followers per one published post. Compared to Instagram, the values are significantly lower. Amsterdam, Munich, and Paris manage to gain 1 – 2 new followers per post. The values for other destinations are negligible.

4.5 Destinations ranking in terms of effectiveness when building reputation on social networks

The ranking of all analysed destinations in terms of all examined factors related to building their reputation in the online environment of Instagram, YouTube, and Twitter is clearly specified in Table 6 on the basis of values presented in Table 5. In Table 6, the individual destinations are also primarily ordered by their ranking of leading destinations for the year 2020 according to the number of bed nights.

Table 6. Comparison of individual official profiles of destinations according to the interactions of social network users

Destination	Leading destinations position (<i>bed nights, 2020</i>)	Instagram		YouTube		Twitter	SME: order based method results	
		avg. likes position	avg. new followers position	avg. new views position	avg. new subscribers position	avg. new followers position	avg. of positions	pos.
London	1.	1.	1.	3.	1.	4.	2.0	1.
Paris	2.	4.	4.	8.	5.	3.	4.8	3.
Berlin	3.	7.	5.	9.	4.	11.	7.2	8. – 9.
Istanbul	4.	12.	14.	4.	6.	10.	9.2	11.
Munich	5.	11.	9.	6.	-	2.	7.0	6. – 7.
Stockholm	6.	6.	10.	5.	7.	7.	7.0	6. – 7.
Hamburg	7.	13.	12.	10.	13.	12.	12.0	14.
Amsterdam	8.	3.	6.	12.	9.	1.	6.2	4. – 5.
Rome	9.	14.	13.	14.	12.	5.	11.6	13.
Madrid	10.	9.	8.	11.	8.	8.	8.8	10.
Wien	11.	5.	7.	2.	3.	14.	6.2	4. – 5.
Prague	12.	8.	2.	1.	2.	9.	4.4	2.
Frankfurt	13.	10.	11.	13.	10.	6.	10.0	12.
Barcelona	14.	2.	3.	7.	11.	13.	7.2	8. – 9.

Source: Own processing

In most cases, the order of individual destinations is very different by specific online platforms. One of the few exceptions is represented by official London profiles, where the measured values mean twice the first position on Instagram, the first position on YouTube in terms of the average annual number of new subscribers per one published video and the third position in terms of the average number of views per one video. The high-quality administration of profiles on social media is confirmed by the ranking for individual factors of the popular European destination, Paris. Prague, which occupies the 12th position on Instagram and especially YouTube in terms of the number of bed nights within the analysed destinations, occupies leading positions in the ranking of effective communication for building a reputation as an attractive destination.

Based on the calculated average values for all three social media and subsequent ranking for individual monitored factors (see Table 6), an average value was calculated for all positions of individual destinations. The calculated values enabled the final ranking in terms of using official profiles of tourist destinations on social media to attract their users. The factors considered were thus the number of years of active use of the profile and the ability to get likes for individual posts, views of published videos, and attract new followers. From this perspective, the most successful profiles on Instagram, Twitter, and YouTube were London, Prague, Paris, Vienna, and Amsterdam. The last positions of the ranking were occupied by the official tourist profiles of Hamburg, Rome, Frankfurt, or Istanbul.

5. Discussion

In general, according to the findings presented in this research, the analysed destinations are most active on Twitter in terms of the total number of posts. The total number of tweets published on their profiles is 190,559. The most active destination on this media is London, followed by Paris and Berlin. In contrast, there are destinations that do not use this media at all, such as Munich, which has not published a single post, or use it to a lesser extent, such as Frankfurt. Another analysed social media is Instagram, where the destinations published a total of 34,177 posts. The most active destinations on Instagram include Stockholm, Amsterdam and Rome, the least active one is Prague. An interesting case worth mentioning is Istanbul, which removed its Instagram profile at the beginning of 2022. The least used social media is YouTube, where the analysed destinations uploaded a

total of 2,906 videos. The most active destinations on YouTube are Madrid, Paris and Barcelona; the least active ones include Istanbul, Prague and Frankfurt. Of all the social media analysed, Twitter appears to be the most popular microblog platform very valuable for tourism. In the last decade, its use in this sector has become more popular, with regard to the possibility of using this media in crisis communication and terrorist attacks the destinations might face (Ćurlin, Jaković and Miloloža, 2019). Social media also play an important role in evaluating the attractiveness of tourism destinations in terms of health safety and trust they build by providing information about a given destination (Țuclea, Vrânceanu and Năstase, 2020). On the other hand, social media are also an important tool for promoting destinations and events that take place there (Pino et al, 2018).

However, there shall be mentioned the importance not only of the intensity of using social media by destination management companies but also how they manage to attract and engage followers, subscribers or other users of these platforms. The intensity of using social media has a positive effect on brand awareness, which affects also brand equity and destination image (Stojanovic, Andreu and Curras-Perez, 2018). However, the engagement of social media users, e.g. the number of likes and comments, is also determined by the visual content, which can be subsequently reflected in the effectiveness of marketing in this environment (Song, Park and Park, 2021). Social media are important in enhancing brand image, but they are also a strategic platform for achieving tourist engagement (de las Heras-Pedrosa et al., 2020). For example, the highest average annual number of interactions with Instagram users in terms of the average number of likes per one post is shown by London, Barcelona and Amsterdam, while Rome shows the lowest numbers. The highest average number of new followers per one Instagram post was also recorded in the case of London, while the worst results in this metric are achieved by Rome, Istanbul and Hamburg. Destination management organizations can facilitate the interaction between the destination management, stakeholders and tourists, which may lead to destination value co-creation as well as marketing innovations (Straková et al. 2020, 2021a, 2021c). Social media can be used to evaluate the performance of destination management and the effects of the used destination strategy through audience size, user-generated content, as well as interaction (Trunfio and Della Lucia, 2018). Tourists can consider all content shared on a social media, although some of them might prefer the content created by other tourists. This may even strengthen the effect of using these tools for destination marketing and encourage potential tourists to experience something similar to what other individuals that have shared some posts from given destinations already experienced (Dedeoğlu et al., 2019).

6. Conclusions

The goal of the paper was to evaluate the use of social media Instagram, YouTube and Twitter by attractive European tourist destinations for marketing communication concerning building their reputation in the tourism sector. The research focused on 13 popular European urban destinations with the highest number of bed nights in 2020 and data from official profiles of these destinations on the above social media. In terms of the published content, the results show that while the most active profiles on Instagram are Stockholm and Amsterdam, the highest number of videos on YouTube is posted by Madrid. Twitter is most commonly used for communication by the official profiles of London and Paris.

However, according to the results of the analysis of available data, the quantity of the published content does not automatically mean the high degree of interactions of specific social media users. For example, on the Instagram social media, the highest degree of effectiveness is shown by the Visit London profile, with the annual average number of likes and new followers per post being more than 1,000 likes and almost 40 new followers. On YouTube, the highest average annual number of views was achieved in the case of videos published by Vienna and Prague, although these destinations published a lower total number of videos than other important destinations. In terms of the overall evaluation of building reputation using social media, it can be stated that the official profiles of London, Prague, Paris, Vienna and Amsterdam show the most effective communication. Official tourist profiles of Hamburg, Rome, Frankfurt and Istanbul occupy the last positions of the ranking.

References

- Aichner, T., Grünfelder, M., Maurer, O., & Jegeni, D. (2021). Twenty-Five Years of Social Media: A Review of Social Media Applications and Definitions from 1994 to 2019. *Cyberpsychology, Behavior, and Social Networking*, 24 (4). <http://doi.org/10.1089/cyber.2020.0134>
- Ali, T., Marc, B., Omar, B., Soulaïmane, K., & Larbi, S. (2021). Exploring destination's negative e-reputation using aspect based sentiment analysis approach: Case of Marrakech destination on TripAdvisor. *Tourism Management Perspectives*, 40, 100892. <http://doi.org/10.1016/j.tmp.2021.100892>
- Asgari-Chananghlu, M., Nikzad-Khasmakhu, N., & Minaee, S. (2020). Covid-Transformer: Detecting Trending Topics on Twitter Using Universal Sentence. Retrieved April 9, 2022 from <https://arxiv.org/abs/2009.03947v1>
- Buckley, R. C., Scott, D., Gretzel, U., & Weaver, D. B. (2015). Tourism Megatrends. *Tourism Recreation Research*, 40 (1), 59-67. <http://doi.org/10.1080/02508281.2015.1005942>
- Buhalis, D., & O'Connor, P. (2015). Information Communication Technology Revolutionizing Tourism. *Tourism Recreation Research*, 30(3). <http://doi.org/10.1080/02508281.2005.11081482>
- Ćurlin, T., Jaković, B., & Miloloža, I. (2019). Twitter usage in Tourism: Literature Review. *Information Systems Research Articles*, 10 (1), 102-119. <http://doi.org/10.2478/bsrj-2019-0008>
- de las Heras-Pedrosa, C., Millan-Cellis, E., Iglesias-Sánchez, P. P., & Jambrino-Maldonado, C. (2020). Importance of Social Media in the Image Formation of Tourist Destinations from the Stakeholders' Perspective. *Sustainability*, 12, 4092. <http://doi.org/10.3390/su12104092>
- Dedeoğlu, B. B., Okumus, F., Yi, X., & Jin, W. (2019). Do tourists' personality traits moderate the relationship between social media content sharing and destination involvement? *Journal of Travel & Tourism Marketing*, 36 (5), 612–626. <http://doi.org/10.1080/10548408.2019.1604294>
- Diniati, A., Salma, A. N., Lestari, M. T., Putu, N. L., Devi, F. S., & Tasliman, C. A. (2022). Utilization of Instagram by Glamping Legok Kondang Ciwidey as a Promotion Media during the Pandemic. *Tourism Research Journal*, 6 (1). <http://doi.org/10.30647/trj.v6i1.134>
- Fakunle, S. O., & Ajani, B. K. (2021). Peculiarities of ICT adoption in Nigeria. *Insights into Regional Development*, 3(4), 51-61. [https://doi.org/10.9770/IRD.2021.3.4\(4\)](https://doi.org/10.9770/IRD.2021.3.4(4))
- Gavurova, B., Ivankova, V., Rigelsky, M., & Přívarová, M. (2020). Relations Between Tourism Spending and Global Competitiveness—an Empirical Study in Developed OECD Countries. *Journal of Tourism and Services*, 21 (11), 38-54. <https://doi.org/10.29036/jots.v11i21.175>
- Gavurova, B., Belas, J., Valášková, K., Rigelský, M., & Ivankova, V. (2021a). Relations between infrastructure innovations and tourism spending in developed countries: A macroeconomic perspective. *Technological and Economic Development of Economy*, 27(5), 1072-1094. <https://doi.org/10.3846/tede.2021.15361>
- Gavurova, B., Belas, J., Zvarikova, K., Rigelský, M., & Ivankova, V. (2021b). The effect of education and R&D on tourism spending in OECD countries: An empirical study. *Amfiteatru Economic*, 23(58), 806-806.
- Gavurova, B., Schönfeld, J., Bilan, Y., & Dudáš, T. (2022). Study of the differences in the perception of the use of the principles of corporate social responsibility in micro, small and medium-sized enterprises in the V4 countries. *Journal of Competitiveness*, 14(2), 23-40. <https://doi.org/10.7441/joc.2022.02.02>
- Garay, L. (2019). #Visitspain. Breaking down affective and cognitive attributes in the social media construction of the tourist destination image. *Tourism Management Perspectives*, 32, 100560. <https://doi.org/10.1016/j.tmp.2019.100560>
- Guizzo, F., Canale, N., & Fasoli, F. (2021). Instagram Sexualization: When posts make you feel dissatisfied and wanting to change your body. *Body Image*, 39, 62-67. <https://doi.org/10.1016/j.bodyim.2021.06.005>
- Horvath, J., Gavurova, B., Bacik, R. & Fedorko, R. (2021). Identification of Uncertainty Factors in the Consumer Behaviour of the New Generation of Customers at the E-commerce Level. *Journal of Tourism and Services*, 22(12), 168-183. <https://doi.org/10.29036/jots.v12i22.263>

- Iglesias-Sánchez, P., Correia, P., & Jambrino-Maldonado, C. (2019). Challenges in linking destinations' online reputation with competitiveness. *Tourism & Management Studies*, 15 (1), 2019, 35-43. <https://doi.org/10.18089/tms.2019.150103>
- Jabbar, J., Malik, S. I., Alfarsi, G., & Tawafak, R. M. (2020). The Impact of WhatsApp on Employees in Higher Education. In M. Al Emran, K. Shaalan & A. E. Hassanien (Eds.) *Recent Advances in Intelligent Systems and Smart Applications*. Studies in Systems, Decision and Control, vol. 25 (pp. 639-651). Cham: Springer. https://doi.org/10.1007/978-3-030-47411-9_34
- Kemp, S. (2022). Digital 2022: Global overview report. Retrieved June 26, 2022 from <https://datareportal.com/reports/digital-2022-global-overview-report>
- Knoke, D., & Yang, S. (2007). *Social Network Analysis (Quantitative Applications in the Social Sciences)*. New: York: SAGE Publications Ltd.
- Kurniawan, D. E., Iqbal, M., Friadi, J., Borman, R. I., & Rinaldi, R. (2019). Smart Monitoring Temperature and Humidity of the Room Server Using Raspberry Pi and Whatsapp Notifications. *Journal of Physics: Conference Series*, 1351, 012006. <https://doi.org/10.1088/1742-6596/1351/1/012006>
- Lange, P. G. (2018). Informal Learning on YouTube. In R. Hobbs & P. Mihailidis (Eds.) *The International Encyclopaedia of Media Literacy* (pp. 1-11). New Jersey: Wiley-Blackwell. <https://doi.org/10.1002/9781118978238.ieml0090>
- Lim, W. M., Ahmad, A., Rasul, T., & Parvez, M. O. (2020). Challenging the mainstream assumption of social media influence on destination choice. *Tourism Recreation Research*, 46 (1), 137-140. <https://doi.org/10.1080/02508281.2020.1814521>
- Lindgren, S. (2017). *Digital Media and Society*. New: York: SAGE Publications Ltd.
- Lund, N. F., Cohen, S. A., & Scarles, C. (2018). The power of social media storytelling in destination branding. *Journal of Destination Marketing & Management*, 8, 271-280. <https://doi.org/10.1016/j.jdmm.2017.05.003>
- Lund, N. F., Scarles, C., & Cohen, S. A. (2019). The Brand Value Continuum: Countering Co-destruction of Destination Branding in Social Media through Storytelling. *Journal of Travel Research*, 59 (8), 1506-1521. <https://doi.org/10.1177/0047287519887234>
- Manoliu, A. (2014). The emerging technological trends in the tourism industry. *Annals - Economy Series*, 0, 73-76. Retrieved June 23 from <https://ideas.repec.org/a/cbu/jrnlec/y2014vspecialp73-76.html>
- Menon, D. (2022). Updating 'Stories' on social media and its relationships to contextual age and narcissism: A tale of three platforms – WhatsApp, Instagram and Facebook. *Heliyon*, 8 (5), e09412. <https://doi.org/10.1016/j.heliyon.2022.e09412>
- Molinillo, S., Japutra, A., & Ekinci, Y. (2022). Building brand credibility: The role of involvement, identification, reputation and attachment. *Journal of Retailing and Consumer Services*, 64, 102819. <https://doi.org/10.1016/j.jretconser.2021.102819>
- Montag, C., Yang, H., & Elhai, J. D. (2021). On the Psychology of TikTok Use: A First Glimpse from Empirical Findings. *Frontiers of Public Health*, 9: 641673. <https://doi.org/10.3389/fpubh.2021.641673>
- Onete, C.-B., Vargas, V.M., & Chita, S.D. (2020). Study on the Implications of Personal Data Exposure on the Social Media Platforms. *Transformations in Business & Economics*, Vol. 19, No 2(50), 243-258.
- Pachucki, C., Grohs, R., & Scholl-Grissemann, U. (2021). No Story without a Storyteller: The Impact of the Storyteller as a Narrative Element in Online Destination Marketing. *Journal of Travel Research*. <https://doi.org/10.1177/00472875211046052>
- Pan, X., Rasouli, S., & Timmermans, H. (2021). Investigating tourist destination choice: Effect of destination image from social network members. *Tourism Management*, 83, 104217. <https://doi.org/10.1016/j.tourman.2020.104217>
- Pempek, T. A., Yemolayeva, Y. A., & Calvert, S. L. (2009). College students' social networking experiences on Facebook. *Journal of Applied Developmental Psychology*, 30 (3), 227-238. <https://doi.org/10.1016/j.appdev.2008.12.010>
- Peralta, R. L. (2019). How vlogging promotes a destination image: A narrative analysis of popular travel vlogs about the Philippines. *Place Branding and Public Diplomacy*, 15, 244-256. <https://doi.org/10.1057/s41254-019-00134-6>

- Pietrobruno, S. (2021). Curating Viking objects through customized scrolling: How search engines personalize historical narratives. *Convergence - The International Journal of Research into New Media Technologies*, 27 (5), 1393-1417. <https://doi.org/10.1177/1354856520986268>
- Pino, G., Peluso, A. M., Del Vecchio, P., Ndou, V., Passiante, G., & Guido, G. (2018). A methodological framework to assess social media strategies of event and destination management organizations. *Journal of Hospitality Marketing & Management*, 1–28. <https://doi.org/10.1080/19368623.2018.1516590>
- Rogers, E. M. (1986). *Communication Technology* (Series in Communication Technology and Society). New York: Free Press.
- Shevyakova, A., Munsh, E., & Arystan, M. (2019). Towards diversification of the economy of Kazakhstan via information support for the tourism industry. *Insights into Regional Development*, 1(2), 129-137. [https://doi.org/10.9770/ird.2019.1.2\(5\)](https://doi.org/10.9770/ird.2019.1.2(5))
- Song, S., Park, S., B., & Park, K. (2021). Thematic analysis of destination images for social media engagement marketing. *Industrial Management & Data Systems*, 121 (6), 1375-1397. <https://doi.org/10.1108/imds-12-2019-0667>
- Social Blade (2022). <https://socialblade.com>
- Statista (2022). Leading European city tourism destinations in 2019 and 2020, by number of bed nights. Retrieved May 16, 2022 from <https://www.statista.com/statistics/314340/leading-european-city-tourism-destinations-by-number-of-bednights/>
- Stojanovic, I., Andreu, L., & Curras-Perez, R. (2018). Effects of the intensity of use of social media on brand equity. *European Journal of Management and Business Economics*, 27 (1), 83–100. <https://doi.org/10.1108/ejmbe-11-2017-0049>
- Straková, J., Pártlová, P., Dobrovič, J. & Váchal, J. (2018). Situational analysis and its role in the process of strategic business management. *Polish Journal of Management Studies*, 18(1), 353-364. <https://doi.org/10.17512/pjms.2018.18.1.26>
- Straková, J., Rajiani, I., Pártlová, P., Váchal, J., & Dobrovič, J. (2020). Use of the Value Chain in the Process of Generating a Sustainable Business Strategy on the Example of Manufacturing and Industrial Enterprises in the Czech Republic. *Sustainability*, 12 (4), 1520. <https://doi.org/10.3390/su12041520>
- Straková, J., Koraus, A., Váchal, J., Pollák F., Cernak, F., Talíř, M. & Kollmann, J. (2021a). Sustainable Development Economics of Enterprises in the Services Sector Based on Effective Management of Value Streams. *Sustainability*, 13 (16). <https://doi.org/10.3390/su13168978>
- Straková, J., Talíř M., Kollmann, J., Pártlová, P. & Váchal, J. (2021b). An integrated model of corporate environment, including value chain, as a competitiveness tool for small and medium enterprises. *Polish Journal of Management Studies*, 23(1), 370-384. <https://doi.org/10.17512/pjms.2021.23.1.23>
- Straková, J., Šimberová, I., Pártlová, P., Váchal, Váchal, J., & Zich, R. (2021c). The Value Chain as the Basis of Business Model Design. *Journal of Competitiveness*, 13(2), 135-151. <https://doi.org/10.7441/joc.2021.02.08>
- Su, L., Lian, Q., & Huang, Y. (2020). How do tourists' attribution of destination social responsibility motives impact trust and intention to visit? The moderating role of destination reputation. *Tourism Management*, 77, 103970. <https://doi.org/10.1016/j.tourman.2019.103970>
- Trunfio, M., & Della Lucia, M. (2018). Engaging Destination Stakeholders in the Digital Era: The Best Practice of Italian Regional DMOs. *Journal of Hospitality & Tourism Research*, 109634801880729. <https://doi.org/10.1177/1096348018807293>
- Țuclea, C.-E., Vrânceanu, D.-M., & Năstase, C.-E. (2020). The Role of Social Media in Health Safety Evaluation of a Tourism Destination throughout the Travel Planning Process. *Sustainability*, 12 (16), 6661. <https://doi.org/10.3390/su12166661>
- Umakanth, N., & Santhi, S. (2020). Classification and Ranking of Trending Topics in Twitter Using Tweet Text. *Journal of Critical Reviews*, 7 (4). <https://doi.org/10.31838/jcr.07.04.171>
- Vasanicova, P., Jencova, S., Gavurova, B., & Bacik, R. (2021a). Factors influencing business environment within travel and tourism competitiveness. *Economics & Sociology*, 14(4), 268-282. <https://doi.org/10.14254/2071-789x.2021/14-4/15>
- Vasanicova, P., Jencova, S., Gavurova, B., & Bacik, R. (2021b). Cultural and natural resources as determinants of travel and tourism competitiveness. *Transformations in Business & Economics*, 20(3), 300-316. 17p.

van der Hoeven, A. (2019). Historic urban landscapes on social media: The contributions of online narrative practices to urban heritage conservation. *City, Culture and Society*, 17, 61-68. <https://doi.org/10.1016/j.ccs.2018.12.001>

Yamashita, R., & Takata, K. (2020). Relationship between prior knowledge, destination reputation, and loyalty among sport tourists. *Journal of Sport & Tourism*, 1–11. <https://doi.org/10.1080/14775085.2020.1763192>

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ADVANTAGES OF FUZZY APPROACH COMPARED TO PROBABILISTIC APPROACH IN PROJECT EVALUATION

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Abstract. Uncertainty is often encountered in relation to randomness or fuzziness. In the case of randomness, it can be described by means of a probability distribution; in the case of fuzziness, the fuzzy theory is applied. In the theoretical part, the authors deal with basic tools for describing both types of uncertainty. Probability and fuzzy method are interpreted in the context of their analogies and principal differences. Both techniques are applied in order to quantify the present expected value of a specific development project. The probabilistic solution leads to the point value $E[PV]$, the fuzzy solution establishes the triangular fuzzy number with the subjective $E[PV]$ not burdened with possible exaggerated expectations. The fuzzy approach proved to extend the probabilistic outcome by other additional information useful for decision-makers with different risk propensity.

Keywords: uncertainty; expected value; fuzzy number; risk propensity; evaluation

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1. Introduction

There is no doubt that in the last few years, there has been a massive development of artificial intelligence methods in the world and their implementation directly into practice (Horák et al. 2020; Kelemen et al. 2020; Shevyakova et al., 2021). In connection with this, Vochozka (2016a) tried to find out whether the results obtained using neural networks are better than the results obtained using regression analysis. Horák and Machová (2019) compared both of these approaches on the example of the prediction of PRC exports to the USA. Vrbka et al. (2019) in turn used neural networks to predict the trade balance between the PRC and the USA with regard to seasonal fluctuations. Besides neural networks and genetic algorithms, this area includes approaches or systems that are based on fuzzy logic. A common feature of the above methods is the fact that they are inspired by nature and natural phenomena (Amari, 2013).

The English term “fuzzy” (meaning blurred, vague, unclear) is referred to in Běhounek and Cintula (2006) as a mathematical discipline that works with a well-defined notion of inaccuracy. Kuchta (2000) adds that this refers mainly to the theory of fuzzy logic and fuzzy sets. Zadeh (1965) is the author of the formulation of fuzzy sets in the 1970s. This approach gained popularity at the turn of the 1980s and 1990s thanks to its fascinating applications implemented in Japan and subsequently in other countries. Since then, fuzzy approach has been considered a completely standard method. Dourra and Siy (2002) state that this approach can solve originally unsolvable problems in many areas, as it is simpler than other methods. Project management is area, which requires application of new methods and tools for more efficient decision-making (Ntshangase & Msosa, 2022). Herrera et al (2009) consider the possibility of including inaccuracy and a relatively easy way of working with the meanings of natural language, which is one of the most important parts of human life, to be an essential source of success. Fuzzy approach is applied especially in regulation and control, and can be found more and more often in classification, decision-making, image recognition or in currently increasingly popular area of prediction (Ansari and Abu Bakar, 2014). Wang (2019) also used Fuzzy's approach to predict corporate financial distress. The applicability of this approach was proven and verified on a set of 180 companies, of which 50% were in financial distress and the other 50% were companies that were in no financial need. In contrast, Hašková (2016) used Fuzzy logic to assess the risk to which the investor is exposed. Models based on the correct use of fuzzy logic and a fuzzy set of devices to reveal the uncertainty of experts' reasoning, which ensure the authenticity of scientific results focused on the technology improving the security of crowdfunding platforms, are found in the work of researchers Polishchuk et al. (2019), Kelemen et al. (2019), Gavurova et al. (2020, 2022) etc.

Hašková (2019) states that one of the reasons for the inaccuracy of any prediction may be the lack of information needed to eliminate the uncertainty that can be encountered in any non-deterministic environment. If the uncertainty is based on insufficient knowledge of the relevant values of known factors entering the prediction model, it is the so-called external uncertainty (López-duarte and Vidal-Suárez, 2010). In contrast, according to Bloom (2009), the so-called internal uncertainty is based on the approximate nature of the formal description of the considered relationships between the prediction model's inputs and outputs. In both cases, the uncertainty of two different types can be encountered. Within the research of the issue, we find the application work of researchers Kelemen et al. (2019), and Polishchuk et al. (2019), as fuzzy models, which are embedded in a generalized algorithm and tested in the example of risk assessment, and quantitative evaluation of projects aimed at initiating the environment in the aviation sector, and an innovative hybrid competency assessment model based on fuzzy logic and a network for neuro-fuzzy assessment as in Kelemen et al. (2021).

According to Woju and Balu (2020), uncertainty is usually classified as random and fuzzy. Random uncertainty arises from the inherent randomness of the physical properties and environmental system, while fuzzy uncertainty stems from the lack of relevant knowledge and inaccurate information about the system (Li et al, 2016). Hašková (2019) adds that when talking about uncertainty in the sense of “randomness”, objectively identified basic characteristics are known, while uncertainty in the sense of “lack of knowledge - ignorance” is usually derived from vague terms - a little, approximately, little, simply, etc. The diverse types of uncertainties and ways to deal with them have been addressed in many studies. For example, Marano and Quaranta (2008) state that the problem of estimating random uncertainty is usually performed by probability theory requiring a large number of samples, while fuzzy uncertainty is usually modelled by possibility theories requiring a small sample.

The objective of this paper is to put fuzzy and probabilistic approach into context. The methodological part identifies the main principles, differences, and analogies of both approaches. In the application part, both approaches are compared on the basis of quantifying the internal value (PV) of a development project. The results are discussed and interpreted. The conclusion part summarizes key facts, principles, and benefits of the contribution from the theoretical and application point of view.

2. Methodological approach

The most commonly used criterion in managerial decision-making is the expected present value ($E[PV]$) indicating the value of the expected annual cash flows $E[CF_i]$ in years $i = 1, 2$ to n that are transformed to the moment of decision – see formula (1).

$$E[PV] = \sum_{i=1}^n E[CF_i] / \prod_{j=1}^i (1 + r_j) \quad (1)$$

In (1) CF_i , $i > 0$, symbols of net cash flows generated by the project in i -year of its implementation, r_j is the annual discount rate valid in the j -year of the course of the project.

2.1 Public approach in PV evaluation

Probabilistic approach (see relation (1)) is used if probability distribution of the frequency of possible cash flows outcomes is known. Otherwise, most decision-makers rely on the subjective opinion and expert knowledge when estimating the series of cash flows from the investment under consideration.

The analysis of probabilistic approach within investment evaluation in terms of $E[PV]$ and its alternatives is addressed in professional literature by e. g. Zinn et al (1977), who analysed and justified the formulas of the expected net present value, variance, and semi-variance of net present values of various cash flow profiles at random time. Tufekci and Young (1987) present the method of the moments of the net present value in probabilistic investment alternatives. The publication of Ben Zion and Yagil (1987) compares discount methods for the evaluation of multi-time stochastic income flows that are identical and time-independent.

2.2 Fuzzy approach in PV evaluation

Fuzzy approach is based on the theory of fuzzy sets Zadeh (1983) and represents an alternative in the case of uncertain data, for which it is not possible to construct a probability distribution. In reality, a statistical description is seldom available for creating the probability structure of the CF_i values and the values of the discount rates r_j for long-term projects. The basis of the fuzzy set theory is described in detail in e.g. (Hašková, 2017).

In short, a fuzzy set is a class of ordered pairs in which the first element is an element of the universe in consideration, the second element is a part of the interval $\langle 0,1 \rangle$ that assigns each member a degree of membership in a subset of the universe (i.e., to the support of the fuzzy set). The degree of membership reflects the extent to which the element is compatible with the support of the fuzzy set. More specifically, as Hašková and Fiala (2019) state: the set U is a field of reasoning or discussion (a universe in consideration), $\mu_A: U \rightarrow \langle 0,1 \rangle$ is a membership function, and $A = \{(y, \mu_A(y)) : y \in U\}$ the set of all ordered pairs $(y, \mu_A(y))$, in which $0 \leq \mu_A(y) \leq 1$ indicates the membership degree of the pair $(y, \mu_A(y))$ to the set A on the given $y \in U$. Thus, A is a fuzzy subset of the universe U . An important characteristic of the fuzzy subset A is its support $U_A = \{y : 0 < \mu_A(y) \leq 1, y \in U\} \subset U$. In terms of fuzzy logic, $\mu_A(y) = |y \in U_A|$; herein $|y \in U_A|$ designate the degree of veracity of the statement that y is the element of the support on the fuzzy set A . The element $y \in U$ with the degree of veracity $\mu_A(y) = 0.5$ is called crossover point in A . In the case of veracity degrees greater than 0.5, the element y rather belongs to U_A , while in the case of smaller veracity degrees it rather does not belong to it.

The fuzzy subset A , whose support $U_A \subset U \subset R$, where R is a set of real numbers and its function μ_A is given by normality and convexity, is called the fuzzy number. There are six different shapes of membership functions μ_A

of fuzzy numbers: triangular, trapezoidal, bell-shaped, sinusoidal, cosinusoidal (Kahraman, 2008). The so defined fuzzy numbers can formally represent uncertain variables.

There, the apparent analogy shall be noticed between the function $f(x)$ (the probability density of a random variable x) and the function $\mu_A(x)$ (the degree of the element x membership to the support of the uncertain variable – a fuzzy number A). For instance, a similar meaning that in the case of a random variable x achieves an average or expected value $E[x]$, which corresponds to the horizontal coordinate of the gravity centre of the area under the function $f(x)$ on its definition field, is represented by the horizontal coordinate of the centre of gravity under the course of the function $\mu_A(x)$ above the interval defined by fuzzy support A in the case of the uncertain variable.

This analogy can be useful when solving problems with variables that are beyond descriptive statistics. In such a case, a reliable point estimation can be carried out using the corresponding coordinate of the position of gravity centre of an appropriate fuzzy number with the support matching to the set of all possible results. In practice, this approach is often applied to measure an issue that is difficult to quantify and it is thus changed for a more easily measurable issue (e. g. the value of the quality of life for measuring GDP – see (Ackoff, 1989).

Let us assume that $A = (A_L, A, A_R)$ and $B = (B_L, B, B_R)$ are triangular fuzzy numbers, where the indexes L and R indicate the left and right limits of their supports. Let the middle numbers be the subjectively expected values for which it can be assumed that $\mu_A(A) = \mu_B(B) = 1$ (the subjectively expected values are placed at the centre of the fuzzy number supports; in the case of symmetrical probability density, they coincide with the statistically expected values).

Application of the algebraic operations (+), (−), (·) and (/) of the calculus of triangular fuzzy numbers stated in Zadeh (1965), from which we mention $A (+) B = (A_L+B_L, A+B, A_R+B_R)$, $A (-) B = (A_L-B_R, A-B, A_R-B_L)$, $k (·) A = (k·A_L, k·A, k·A_R)$ and $A (/) B = (A_L/B_R, A/B, A_R/B_L)$, enables the formulation of the fuzzy number PV = (PVL, PV, PVR) in order to describe a model of uncertain cash flows (the fuzzy numbers CF_i) and uncertain discount rates (the fuzzy numbers r_j), as shown in Hašková (2017):

$$\begin{aligned} PV_L &= \sum_{i=1}^n [\max\{CF_{iL}, 0\} / \prod_{j=1}^i (1+r_{jR}) + \min\{CF_{iL}, 0\} / \prod_{j=1}^i (1+r_{jL})], \\ PV &= \sum_{i=1}^n CF_i / \prod_{j=1}^i (1+r_j), \\ PV_R &= \sum_{i=1}^n [\max\{CF_{iR}, 0\} / \prod_{j=1}^i (1+r_{jL}) + \min\{CF_{iR}, 0\} / \prod_{j=1}^i (1+r_{jR})]. \end{aligned} \quad (2)$$

3. Practical application

In order to show the differences, both approaches will be applied and analysed within a hypothetical but a realistic decision-making managerial task. Table 1 below shows the basic input parameters of the task and the focus.

Table 1. The input data of the task

Object of investment	Investment in the construction of a residential building on the outskirts of the capital.
Timetable for completion and possible scenarios	Completion of the construction completion including the inspection of apartments is planned after two years from the start. If there is a one-year delay in the plan, the company decides either to complete the project with annual one-year delay or to sell the project in the third year at an estimated price of EUR 30 million. The possibilities of completing the construction without any delay or with a one-year delay are equal.
Estimate of demand for apartments	In the case of the completion of the construction, the apartments will be sold in the following year. The amount of budgeted revenue from the sale of the apartments (net revenue refers to the difference between the revenues from the sale of the apartments and the operating costs, paid fixed costs associated with the investment and income tax) depends on the development of uncertain demand for apartments. In the case of selling the apartments in the third year, strong demand is estimated with an 80% probability and weak demand with a 20% probability; in the case of postponing the sale, strong demand is estimated with a 60% probability of 60 % and weak demand with a 40% probability.
Project's discount rate	The discount rate of the project r is equal to the average project capital costs of 15 %. As the company does not intend to change the structure of its long-term funding sources, it is considered a constant.
Net revenues scenarios	The prediction of net revenues in the third year N_{31} and N_{32} , and the fourth year N_{41} and N_{42} from the sale of the apartments are shown in the decision tree in Figure 1.
The managers' goal	a) To assess the project within its expected value $E[PV]$. b) To specify the maximum investment if the project is loss-making concerning an adequate project risk rate.

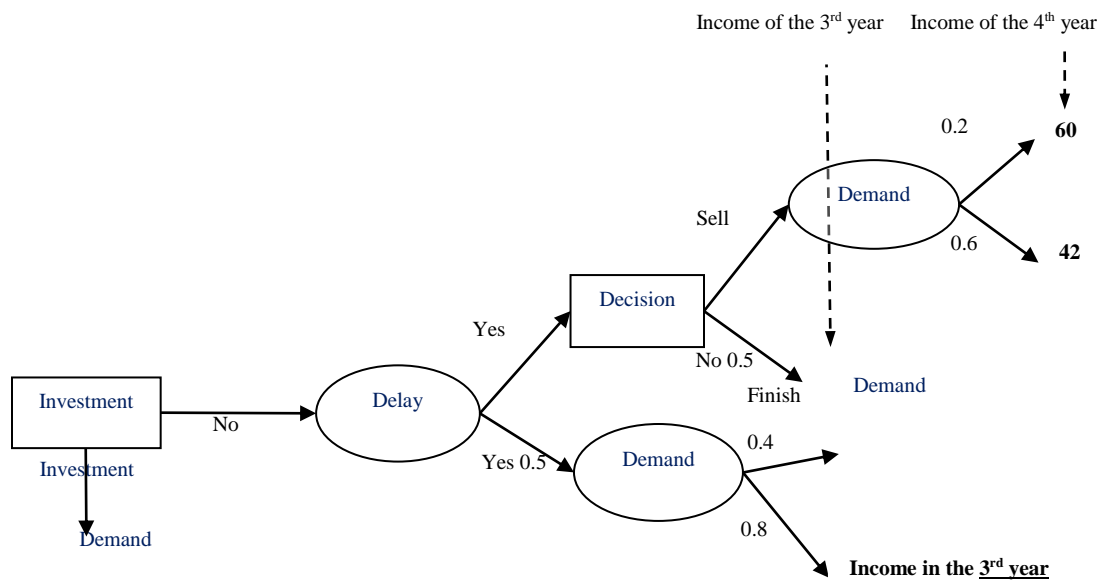


Figure 1. Project decision tree at current prices of the 3rd and 4th year in millions of EUR

Source: Own processing.

Additional analyses performed enable assessing whether the probability criterion $E[PV]$ plays a decisive role in the manager decision-making.

3.1 Probabilistic evaluation of task based on $E[PV]$

The model of the decision tree (see Fig. 1) shows the probabilistic solution to the task. The input parameters are the point estimations of the net revenue random variable. Completion time and estimate of demands are also random variables described by the probabilistic distribution. The positive values of the revenue estimates suggest that $E[PV] > 0$ (see the goal a)). The goal b) focuses on answering the question of “How much to invest ($I = ?$)” – the first decision node.

In the second decision node (Decision), two values are compared: the amount of EUR 30 million from the sale of the project outcome in the 3rd year and the statistically calculated amount of net revenue $(0.6 \cdot 42 + 0.4 \cdot 28) / 1.15 = 31.65$. This amount is higher than 30 million; therefore, the “Decision” node can be cancelled. This enables the simplification of the tree structure in Fig. 1 into the form shown in Fig. 2. Each of the four scenarios is evaluated by its current value $PV_{ij} = N_{ij} / (I + r)^i$ to the time $t = 0$ ($I = ?$), where N_{ij} represent the net revenue in the 3rd and 4th year of the project implementation.

It applies that $E[PV] = 0.3 \cdot PV_{41} + 0.2 \cdot PV_{42} + 0.4 \cdot PV_{31} + 0.1 \cdot PV_{32} = 0.5 \cdot (0.6 \cdot PV_{41} + 0.4 \cdot PV_{42}) + 0.5 \cdot (0.8 \cdot PV_{31} + 0.2 \cdot PV_{32}) = 0.5 \cdot (E[PV_4] + E[PV_3])$. The last derived equality enables further reduction of scenarios, as shown in Fig. 2 below, in which $E[PV_4] = 36.4 / 1.15^4$ and $E[PV_3] = 53.8 / 1.15^3$ have the same probability of occurrence.

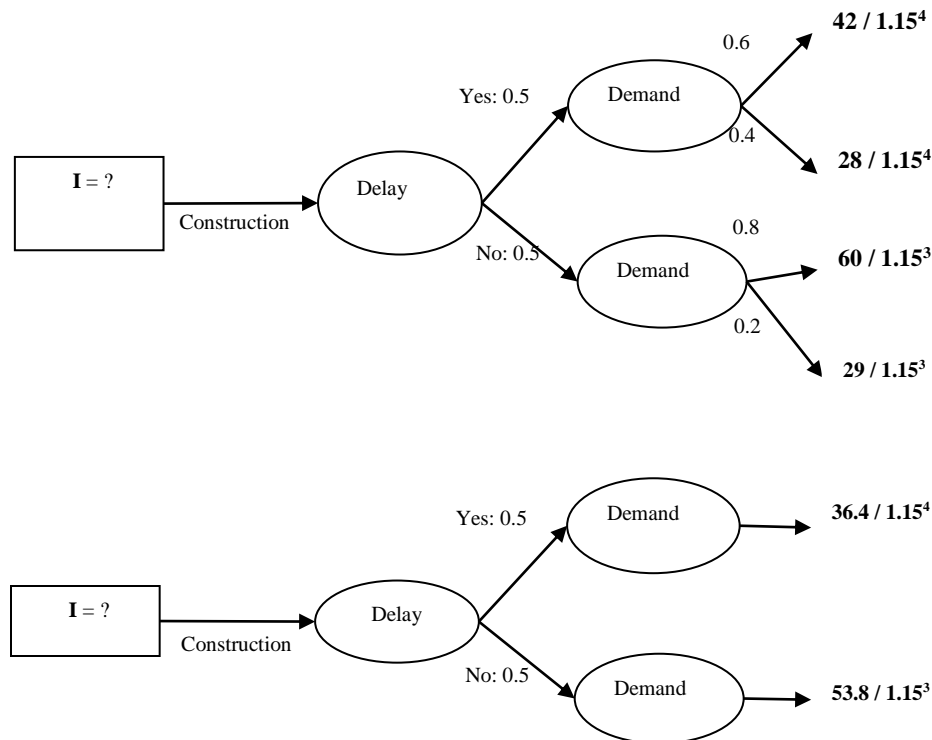


Figure 2. Simplifications of tree structure shown in Fig. 1 based on results of managerial calculations

Source: Own processing.

The sought solution of $E[PV] = 0.5 \cdot (E[PV4] + E[PV3]) = 0.5 \cdot (36.4 / 1.154 + 53.8 / 1.153) \approx 28.1$ million EUR. This also provides information about the maximum possible investment in a project that is not loss-making

3.2 Fuzzy evaluation of task based on interval values

The fuzzy approach deals with uncertainty by replacing the point estimates with triangular fuzzy numbers in the form of (L, S, P); the left edge of the interval (L) indicates the smallest considered value, the right edge (P) indicates the largest estimated value, and the centre (S) represents the middle of the interval. The S value is formed in accordance with the principle of indifference (Pettigrew, 2014). It results from its nature that when multiple alternative outcomes occur with no relevant reason to prefer one over another, they will be assigned the same probability. Therefore, S is the subjectively expected value, which does not converge to any of the interval limits (based on the observation, the statistically expected value is objective). The task in question contains uncertain data on future demand, which makes the resulting net revenue value uncertain as well.

The subjectively expected value of the fuzzy procedure is $35 / 1.15 \approx 30.4$, which is compared with the expected amount for the sale of the project outcome - EUR 30 (see Fig. 1, the upper “Decision” node). As the subjective value is higher than 30, the upper “Decision” node can be ignored and the model can be constructed in a reduced way in analogy to Fig. 2 to get Fig. 3, where the second subjective value is 44.5 (see the “Demand” node in Fig. 1 and Fig. 2, above).

The application of the tools of interval calculus leads to the following solution:

$$E[PV]_L, E[PV], E[PV]_R = (0.5 \cdot 28 / 1.15^4 + 0.5 \cdot 29 / 1.15^3; 0.5 \cdot 30.4 / 1.15^4 + 0.5 \cdot 44.5 / 1.15^3; 0.5 \cdot 42 / 1.15^4 + 0.5 \cdot 60 / 1.15^3) = (16.3; 23.3; 31.7), \quad (3)$$

Where the subjective $E[PV]$ of potential net revenue from the sale of the apartments is written in italics.

The fuzzy $E[PV]$ number (16.3; 23.3; 31.7) can be viewed as an interval of possible present values generated by the project, in which the left number represents a pessimistic scenario, while the right number can be perceived as a result of an optimistic scenario, and the middle number represents the subjectively expected value. It shall be noticed that the interval range also provides information on the maximum investment costs for a project that is not loss making.

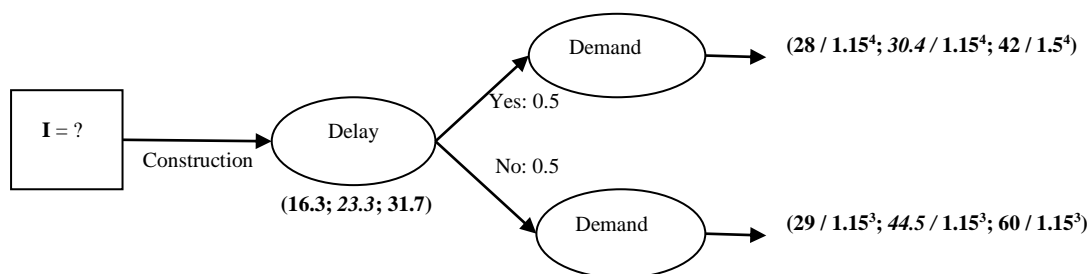


Figure 3. Reduced model of task - fuzzy approach perspective

Source: Own processing.

4. What do the analyses indicate?

Fuzzy analysis extends the standard probabilistic result by other information. These particularly follow from the nature of the fuzzy number $\underline{E[PV]} = (E[PV]_L, E[PV], E[PV]_R)$, whose limit values indicate the smallest and highest possible present values of the project with the middle value representing the *subjectively* expected one. The range $(E[PV]_L, E[PV]_R)$ provides an idea about the span between the pessimistic and optimistic development of the project in terms of its expected outcomes.

The fact that the *subjective* $E[PV] = 23.3$ is lower than the *probabilistic* $E[PV] = 28.1$ confirms the finding (e. g. in Kahneman (1993) that managers tend to exaggerate positive flows and reduce negative flows. This tendency corresponds with the probability distribution of the demand for the sale of the apartments both in the 3rd and the 4th year of the project in question. This tendency can result in late completion of projects and exceeding the planned budget; consequently, in some of them, the expectations of the investors may even never be fulfilled (Vochozka, 2016b).

A manager assuming on the basis of $E[PV] = 28.1$ that the investment of EUR 27 million will provide him with, for instance, a minimal required profit of EUR 0.8 million, is wrong. The fuzzy analysis says that the achievement of this objective is most likely if the initial investment does not exceed EUR 15.5 million (i.e., 0.8 less than the value of pessimistic scenario PV_L). Thus, a question arises whether the project would be feasible under these circumstances. The answer depends, among other things, on the investor's willingness to take risks.

From the above, it is clear that knowing the limits of the possible interval values $\underline{E[PV]}$ provided by the fuzzy approach can be useful; it provides the decision-makers with extra information in terms of possible development project scenarios.

5. Conclusions

In the area of management, uncertainty of different types is encountered. The basic distinction sees uncertainty in the sense of randomness and uncertainty in the sense of fuzziness. The first type mentioned could be described, for instance, by a probability distribution, while in the latter case, the technique of fuzzy approach has been successfully proved.

The most commonly used probability criterion in financial management is the expected present value $E[PV]$. In the fuzzy approach, the decision criterion is performed by the fuzzy number $\underline{E[PV]} = (E[PV]_L, E^*[PV], E[PV]_R)$ of uncertain cash flows (\underline{CF}_i fuzzy numbers) and uncertain discount rates (\underline{r}_i fuzzy numbers). L and R stand for the left and right limits of the support of the fuzzy number.

The analogies and differences of the approaches were described in order to determine the value of the project of constructing and selling apartments by means of $E[PV]$ and $\underline{E[PV]}$. The comparison revealed that the fuzzy approach extends the standard $E[PV]$ result by additional information. More specifically, $E[PV]$ is a weighted average, whose calculation erases all limits given by the project's extreme scenarios. The fuzzy number $\underline{E[PV]} = (E[PV]_L, E^*[PV], E[PV]_R)$ provides decision-makers with an interval of possible values where the centre value is a subjectively expected value not burdened with excessive optimism or scepticism. Taking these limits into consideration provides useful information to decision-makers with a different propensity to risk.

The above stated advantages of fuzzy approach compared to the probability approach are the original benefits of the application. The theoretical superstructure identifies the analogy between the probabilistic and fuzzy approach.

References

- Ackoff, R. L. (1989). From data to wisdom. *Journal of Applied Systems Analysis*, 16 (1), 3-9.
- Amari, S. (2013). Dreaming of mathematical neuroscience for half a century. *Neural Networks*, 37, 48-51. <https://doi.org/10.1016/j.procs.2013.05.092>
- Ansari, A., & Abu Bakar, A. A. (2014). A Comparative study of three artificial intelligence techniques: Genetic algorithm, neural network, and fuzzy logic, on scheduling problem. *Proceedings 2014 4th International Conference on Artificial Intelligence with Applications in engineering and Technology*, 31-36. <https://doi.org/10.1109/ICAJET.2014.15>
- Běhounek, L., & Cintula, P. (2006). From fuzzy logic to fuzzy mathematics: A methodological manifesto. *Fuzzy Sets and Systems*, 157 (5), 642-646. <https://doi.org/10.1016/j.fss.2005.10.011>
- Benzion, U., & Yagil, J. (1987). On the discounting formula for a stream of independent risky cashflows. *The Engineering Economist*, 32 (4), 337-345. <https://doi.org/10.1080/00137918708902972>
- Bloom, N. (2009). The impact of uncertainty shocks. *Econometrica*, 77 (3), 623-685. <https://doi.org/10.3982/ECTA6248>
- Dourra, H., & Siy, P. (2002). Investment using technical analysis and fuzzy logic. *Fuzzy Sets and Systems*, 127 (2), 221-240. [https://doi.org/10.1016/S0165-0114\(01\)00169-5](https://doi.org/10.1016/S0165-0114(01)00169-5)
- Gavurova, B., Kelemen, M., & Polishchuk, V. (2022). Expert model of risk assessment for the selected components of smart city concept: From safe time to pandemics as COVID-19. *Socio-economic Planning Sciences*, 101253. <https://doi.org/10.1016/j.seps.2022.101253>
- Hašková, S. (2019). An alternative approach for estimating GDP growth rate: Fuzzy prediction model. *ACC Journal*, 25 (2), 55-63. <https://doi.org/10.15240/tul/004/2019-2-004>
- Hašková, S. (2017). Contribution to economic efficiency evaluation of projects in terms of uncertainty. *35th International Conference on Mathematical Methods in Economics*, 213-218.
- Hašková, S. (2016). Evaluation of the Quality of the Entrepreneurial Environment on the Basis of Fuzzy Logic. *Littera Scripta*, 9 (3), 10-23. Retrieved October 14, 2021, from <https://www.littera-scripta.com/wp-content/uploads/2019/05/Evaluation-of-the-Quality-of-the-Entrepreneurial-Environment-on-the-Basis-of-Fuzzy-Logic-1.pdf>
- Hašková, S., & Fiala, P. (2019). A fuzzy approach for the estimation of foreign investment risk based on values of rating indices. *Risk Management*, 21, 183-199. <https://doi.org/10.1057/s41283-019-00051-1>
- Herrera, F., Alonso, S., Chiclana, F., & Herrera-Viedma, E. (2009). Computing with words in decision making: foundations, trends and prospects. *Fuzzy Optimization and Decision Making*, 8 (4), 337-364. <https://doi.org/10.1007/s10700-009-9065-2>
- Horák, J., & Machová, V. (2019). Comparison of neural networks and regression time series on forecasting development of US imports from the PRC. *Littera Scripta*, 12 (1), 28-42. Retrieved October 14, 2021, from https://www.littera-scripta.com/wp-content/uploads/2020/03/Horak_Machova-citace-1-form-oprava-%C4%8D%C3%ADsla-str%C3%A1nek.pdf
- Horák, J., Vrbka, J., & Šuleř, P. (2020). Support vector machine methods and artificial neural networks used for the development of bankruptcy prediction models and their comparison. *Journal of Risk and Financial Management*, 13 (3), 15. <https://doi.org/10.3390/jrfm13030060>
- Kahneman, D. (1993). Timid choices and bold forecasts: A cognitive perspective on risk taking. *Lovallo, Management Science*, 39 (1), 17-31. Retrieved October 14, 2021, from <https://www.jstor.org/stable/2661517>
- Kahraman, C. (2008). *Fuzzy multi-criteria decision making: Theory and applications with recent developments*. 16 Springer Science & Business Media, Springer-Verlag US.

- Kelemen, M., Polishchuk, V., Gavurová, B., Szabo, S., Rozenberg, R., Gera, M., Kozuba, J., Andoga, R., Divoková, A., & Blišťan, P. (2019). Fuzzy Model for Quantitative Assessment of Environmental Start-up Projects in Air Transport. *Int. J. Environ. Res. Public Health*, 16, 3585. <https://doi.org/10.3390/ijerph16193585>
- Kelemen, M., Polishchuk, V., Gavurová, B., Rozenberg, R., Bartok, J., Gaál, L., Gera, M., Kelemen, M., Jr. (2021). Model of Evaluation and Selection of Expert Group Members for Smart Cities Green Transportation and Mobility: From Safe Times to Pandemic Times. *Mathematics*, 9, 1287. <https://doi.org/10.3390/math9111287>
- Kelemen, M., Polishchuk, V., Gavurová, B., Andoga, R., Szabo, S., Yang, W., ... & Antoško, M. (2020). Educational model for evaluation of airport NIS security for safe and sustainable air transport. *Sustainability*, 12(16), 6352. <https://doi.org/10.3390/su12166352>
- Kuchta, D. (2000). Fuzzy capital budgeting. *Fuzzy Sets and Systems*, 111 (3), 367-385. [https://doi.org/10.1016/S0165-0114\(98\)00088-8](https://doi.org/10.1016/S0165-0114(98)00088-8)
- Li, G., Lu, Z., Li, L., & Ren, B. (2016). Aleatory and epistemic uncertainties analysis based on non-probabilistic reliability and its Kriging solution. *Applied Mathematical Modelling*, 40 (9/10), 5703-5716. <https://doi.org/10.1016/j.apm.2016.01.017>
- López-duarte, C., & Vidal-Suárez, M. M. (2010). External uncertainty and entry mode choice: Cultural distance, political risk and language diversity. *International Business Review*, 19 (6), 575-588. <https://doi.org/10.1016/j.ibusrev.2010.03.007>
- Marano, G., & Quaranta, G. (2008). Fuzzy-Based robust structural optimization. *International Journal of Solids and Structures*, 45 (11/12), 3544-3557. <https://doi.org/10.1016/j.ijsolstr.2008.02.016>
- Ntshangase, B.A., & Msosa, S.K. (2022). Enhancing service delivery for metropolitan municipalities in South Africa via project management. *Insights into Regional Development*, 4(3), 127-138. [http://doi.org/10.9770/IRD.2022.4.3\(8\)](http://doi.org/10.9770/IRD.2022.4.3(8))
- Pettigrew, R. (2014). Accuracy, risk, and the principle of indifference. *Philosophy and Phenomenological Research*, 92 (1), 35-59. <https://doi.org/10.1111/phpr.12097>
- Polishchuk, V., Kelemen, M., Gavurová, B., Varotsos, C., Andoga, R., Gera, M., Christodoulakis, J., Soušek, R., Kozuba, J., Blišťan, P., & Szabo, S., Jr. (2019). A Fuzzy Model of Risk Assessment for Environmental Start-Up Projects in the Air Transport Sector. *Int. J. Environ. Res. Public Health*, 16, 3573. <https://doi.org/10.3390/ijerph16193573>
- Polishchuk, V., Kelemen, M., & Kozuba, Jarosław. 2019. Technology Improving Safety of Crowdfunding Platforms Functioning in the Context of the Protection of the Start-Up Investors in the Financial and Transport Sectors. *Journal of KONBiN*, 49(1), 313-330. <https://doi.org/10.2478/jok-2019-0016>
- Shevyakova, A., Munsh, E., Arystan, M., & Petrenko, Y. (2021). Competence development for Industry 4.0: Qualification requirements and solutions. *Insights into Regional Development*, 3(1), 124-135. [https://doi.org/10.9770/IRD.2021.3.1\(7\)](https://doi.org/10.9770/IRD.2021.3.1(7))
- Tufekci, S., & Young, D. B. (1987). Moments of the present worth of general probabilistic cash flows under random timing. *The Engineering Economist*, 32 (4), 303-336. <https://doi.org/10.1080/00137918708902971>
- Vochozka, M. (2016a). Practical Comparison of Results of Statistic Regression Analysis and Neural Network Regression Analysis. *Littera Scripta*, 9 (2), 156-168. Retrieved October 14, 2021, from <https://www.littera-scripta.com/wp-content/uploads/2019/05/Practical-Comparison-of-Results-of-Statistic-Regression-Analysis-and-Neural-Network-Regression-Analysis-1.pdf>
- Vochozka, M. (2016b). Using neural networks to determine the financial plan. *Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS)*, 742-755.
- Vrbka, J., Šuleř, P., Machová, V., & Horák, J. (2019). Considering seasonal fluctuations in equalizing time series by means of artificial neural networks for predicting development of USA and People's Republic of China trade balance. *Littera Scripta*, 12 (2), 178-192. Retrieved October 14, 2021, from <https://www.littera-scripta.com/wp-content/uploads/2020/01/Cel%C3%A9-bez-doi-1.pdf>
- Wang, L. (2019). Financial distress prediction for listed enterprises using Fuzzy C-Means. *Littera Scripta*, 12 (1), 169-177. Retrieved October 14, 2021, from https://www.littera-scripta.com/wp-content/uploads/2020/03/Wang_Littera_Scripta-citace-1form-%C4%8D%C3%ADsla-str%C3%A1nek.pdf
- Woju, U. W., & Balu, A. S. (2020). Fuzzy uncertainty and its applications in reinforced concrete structures. *Journal of Engineering Design and Technology*, 18 (5), 1175-1191. <https://doi.org/10.1108/JEDT-10-2019-0281>

Zadeh, L. A. (1965). Fuzzy sets. *Information and Control*, 8 (3), 338-383. [https://doi.org/10.1016/S0019-9958\(65\)90241-X](https://doi.org/10.1016/S0019-9958(65)90241-X)

Zadeh, L. A. (1983). The role of fuzzy logic in the management of uncertainty in expert systems. *Fuzzy Sets and Systems*, 11 (1-3), 199-227. [https://doi.org/10.1016/S0165-0114\(83\)80081-5](https://doi.org/10.1016/S0165-0114(83)80081-5)

Zinn, C. D., Lesso, W. G., & Motazed, B. A. (1977). Probabilistic approach to risk analysis in capital investment projects. *The Engineering Economist*, 22 (4), 239-260. <https://doi.org/10.1080/00137917708965183>

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