Fourth International Scientific Conference on Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture

ITEMA 2020

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SELECTED PAPERS

Association of Economists and Managers of the Balkans

UdEkoM Balkan

FOURTH INTERNATIONAL SCIENTIFIC CONFERENCE
ITEMA 2020

Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture

SELECTED PAPERS

Online-Virtual
October 8, 2020

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PREFACE

Association of Economists and Managers of the Balkans headquartered in Belgrade – Serbia organized the Fourth International Scientific Conference on Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture - ITEMA 2020 online/virtually (due to the COVID-19 pandemic) on October 8, 2020 via Zoom platform.

The aim of the ITEMA 2020 conference was to bring together the academic community (experts, scientists, engineers, researchers, students and others) and publication of their papers with the purpose of popularization of science and their personal and collective affirmation. The unique program combined presentation of the latest scientific developments in Information Technologies, Tourism, Economics, Management and Agriculture, interactive discussions and other forms of interpersonal exchange of experiences.

Within publications from the ITEMA 2020 conference:
- 12 double peer-reviewed papers have been published in the ITEMA 2020 - Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture - **Selected Papers**,
- 34 double peer-reviewed papers have been published in the ITEMA 2020 - Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture – **Conference Proceedings,**
- 63 abstracts have been published in the ITEMA 2020 - Recent Advances in Information Technology, Tourism, Economics, Management and Agriculture - **Book of Abstracts**.

ITEMA 2020 publications have more than 500 pages. All papers have been scanned with the Crosscheck (powered by Turnitin) and have ORCID iD integration. Besides that, some papers have been accepted for publication in the conference partner journals namely:

1. **Balkans Journal of Emerging Trends in Social Sciences (Balkans JETSS)** is an international scientific journal, published by the Association of Economists and Managers of the Balkans. Aims and scope are economics, management, law and tourism. Balkans JETSS has the following indexations: Google Scholar, CEEOL (Central and Eastern European Online Library), Index Copernicus, ProQuest´s Serial Solutions, Summon, Primo Central, Alma, EBSCO´s EDS Discovery Service and Knowledge Base, TDNet and OCLC.
2. **Journal of Innovative Business and Management** is published by the DOBA Faculty, Maribor (Slovenia) and is referred in international scientific journal bases DOAJ, Google Scholar, EconPapers, ResearchGate and RePec. It has been published since 2009 and since then it has been attracting more and more interest among the readers, who predominantly come from academia and business practice.
3. **Journal of Sustainable Development (JSD)** is an international journal published by the Integrated Business Faculty – Skopje, North Macedonia. JSD area includes three pillars of economic, social and environmental development issues. All these aspects are considered relevant for publishing in the JSD. The journal is officially listed in the respected EBSCO database, CEEOL database, as well as the databases of Business Source Complete and Sustainability Reference Center. All articles published in the journal are also indexed in these databases.
4. **JFEAS** is published by the Çukurova University, Faculty of Economics and Administrative Sciences from Turkey twice a year as an open source. This international journal is dedicated to the wide scope of themes of economics, business, public finance,

econometrics, international relations, labor economics and the theoretical, methodological and applications between these disciplines, and others in Turkish and English. The journal is indexed in DOAJ, DRJI and Index Copernicus.

5. **Central European Journal of Geography and Sustainable Development (CEJGSD)** starting with 2018 publishes relevant academic research papers in geography, sustainable development and other related areas. Journal has a reputable international editorial board comprising experts from Italy, Poland, Slovakia, Serbia, Bulgaria, Hungary, Romania, Israel, Russian Federation, and Turkey. CEJGSD has indexation in Ulrich's Periodicals Directory, ELSEVIER Social Science Research Network (SSRN) and Scientific Publishing & Information Online (SCIPIO).

Participation in the conference took **114 researchers** with the paper representing **20 different countries** from different universities, eminent faculties, scientific institutes, colleges, and various ministries, local governments, public and private enterprises, multinational companies, associations, etc.
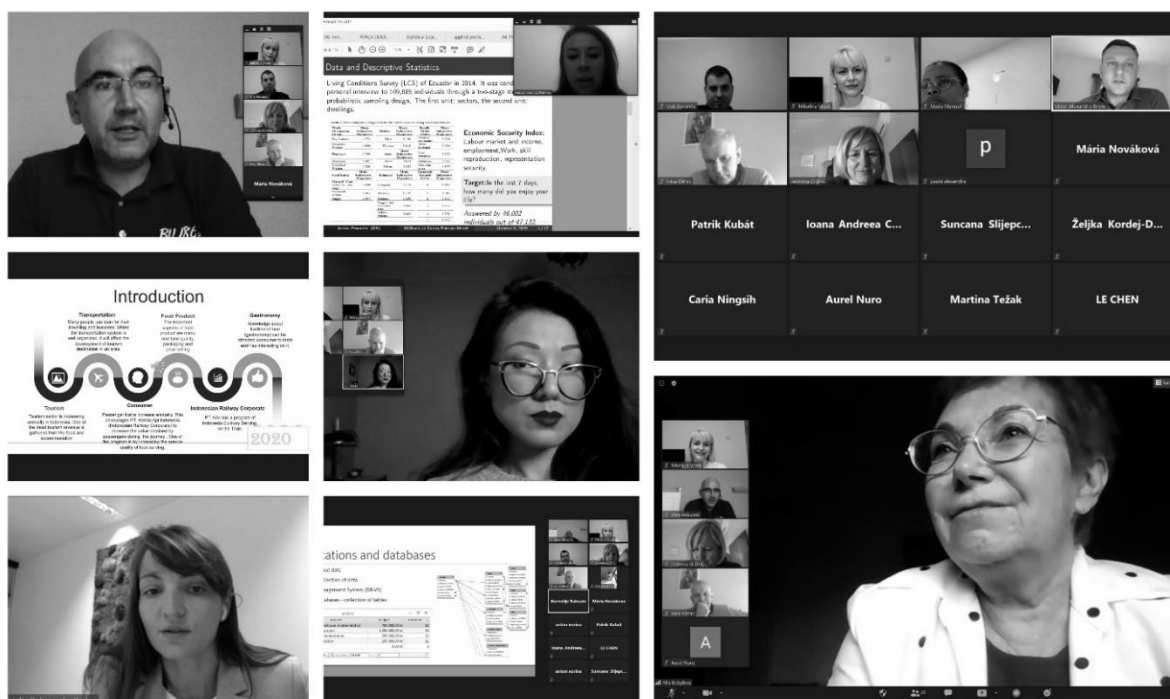
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EXPLORING SMART CITY RESEARCH FROM INFORMATION SYSTEMS AND MANAGEMENT PERSPECTIVES

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Abstract: *Research in the smart city domain is characterised by distinct multidisciplinarity. The reason for this is the broadness of the domain, classified into six key categories: smart governance, smart people, smart living, smart mobility, smart economy, and smart environment, all focal points of research in separate scientific fields. Also, many researchers argue about the best approach and steps in the development of smart cities highlighting different technological, economic, or sociological aspects of research. This paper aims to explore and clarify the differences in smart city research from two different perspectives - information systems and management. Abstracts from almost 5.000 papers from the WoS database and more than 7.000 papers from the Scopus database were downloaded and analysed. Publications categorised into two perspectives were then analysed descriptively, including data about the number of papers, year of publication, and country of publishing. Furthermore, automated text mining procedure was performed for additional interpretation of attributes and occurrences from the two observed perspectives. The use of six smart city categories as keywords within each set was also analysed and visualised. The results indicate clear differences in both research approaches and research subjects between the two perspectives.*

Keywords*: Smart city, Information systems, Management, Text mining.*

INTRODUCTION

Smart cities are getting smarter due to the wide range of increasingly available digital technologies. For example, the cities are becoming equipped with various electronic devices for different applications and use, such as street cameras, transport system sensors, smart lighting, parking, and similar. There are also initiatives to provide value-added services within the applications, such as Google street view, global positioning systems, and more, where a large proportion of the population using mobile devices positively contributes to the development of smart cities (Rathore et al., 2016). The "smartness" of a city is a measure of convergence of different devices and systems into a unified framework for city-wide data management throughout their life cycle. Ultimately, the goal is to improve the quality of citizens' life, reduce the cost of living, and achieve a sustainable environment (Gharaibeh et al., 2017). For that reason, the development of smart services in different areas requires the incorporation of advanced technologies into urban activities in various areas (Kumar et al., 2018). According to Manville et al. (2014), a Smart City is a city that implements at least one initiative in one out of six key areas: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy, and Smart Environment.

While some researchers criticise first-generation smart cities for failing to engage citizens and meet their needs, many demand a shift beyond the narrow framework of meeting environmental

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and economic goals and opening up to social issues important for smart city development (Trencher, 2018). On that note, Mora et al. (2018) highlight a deep-rooted divergence in smart city research and divergent hypotheses about what principles should be considered when implementing smart city strategies.

To explore and bring light to stated differences in the smart city domain, this study is designed around and based on literature review and text mining. The following research questions were posited: (1) Is there a difference in terms of the geographical distribution of smart city studies?, (2) Is there a specific trend that can be recognised related to the time of publishing of the relevant papers?, (3) What has been the focus of recent studies in the field of smart cities?, (4) Is there a difference in smart city research from information systems and management perspectives?, (5) Is there a difference in occurrences of smart city key categories from information systems and management perspectives? The paper follows the standard structure: Section 2 contains a detailed explanation of the used methodology with the procedure of data retrieval and text mining technique. Section 3 presents the results, followed by Section 4 that includes the elaboration of the results based on the analysis of WoS top-cited papers in the field. Section 5 presents future research directions, and section 6 concludes the paper by providing a short overview of the overall contribution of the paper.

METHODOLOGY

With the repositories of scientific papers containing textual and complete data sources, together with the increase in the volume and diversity of these sources, conducting a systematic review of the literature has become increasingly complex (Jadric et al., 2020). For a researcher, a domain of interest can contain thousands of titles and abstracts. For that purpose, text mining as an approach can be used to optimise the process. This data mining technique where the input data is in the form of unstructured text has enabled an automated review of a large number of published papers. The technique has become essential in support of knowledge discovery in texts (Justicia De La Torre et al., 2018) and it is commonly used to extract useful hidden information and patterns in a text (Kaur & Chopra, 2016). In this particular case, an insight into the occurrences of certain keywords related to the domain of a smart city was investigated from research perspectives of information systems and management. Standard phases of text mining – data retrieval, data extraction, and knowledge discovery were followed for that purpose.

Data

WoS and Scopus databases were chosen as a source for the analysis to analyse the diversity of perspectives in the domain of smart cities using text mining techniques. Although in this way the papers published in some other databases that distribute research studies from the smart city domain were excluded from the analysis, the focus on all journals at this stage of the analysis would introduce additional complexity. Also, this would affect the interpretability of the results as the impact of papers published in low-citation journals would be equal to those that are highly-cited. For text mining, abstracts of papers were downloaded, in line with previous studies (Daenekindt and Huisman 2020; Jadric et al., 2020) and because of the four criteria the abstracts meet: (1) availability for download from WoS and Scopus databases, (2) abstracts are available free of charge, (3) the abstracts represent a summary of the papers, and (4) the abstracts are similar in terms of scope and style in different journals. This approach reduces the impact of paper size on the representation of a particular topic in the results of the analysis.

WoS Core Collection database was first searched for the topic "smart cit *" resulting in 12.889 records. The search was then narrowed to focus the research on the papers in which smart city is the primary topic of interest, using the following criteria: (TITLE: ("smart cit *") Refined by DOCUMENT TYPES: (PROCEEDINGS PAPER OR ARTICLE OR BOOK CHAPTER) AND LANGUAGES: (ENGLISH) Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A & HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.); this resulting in 4.994 records from Web of Science Core Collection. The search was further reduced to WEB OF SCIENCE CATEGORIES to collect abstracts of papers from the Information systems perspective: (COMPUTER SCIENCE INFORMATION SYSTEMS), resulting in 1.038 records marked as Computer Science Information Systems (100%), Telecommunications (42.7%), Engineering Electrical Electronic (35.5%), Computer Science Theory Methods (28.9%), Computer Science Artificial Intelligence (12.4%), and Computer Science Hardware Architecture (12.1%) and so on. The initial set of 4,994 papers was also reduced to contain abstracts from the Management perspective to 342 papers based on WEB OF SCIENCE CATEGORIES: (MANAGEMENT OR BUSINESS OR ECONOMICS). There were 158 papers marked with the category Management (46.2%), Business (41.2%), Economics (35.4), Regional Urban Planning (19.9%), Urban Studies (10.5%), Business Finance (4.1%), and so on.

Similarly, the SCOPUS database was searched first for the topic "smart cit *" which resulted in 24.962 document results. The search was then reduced to focus on the papers in which smart city is the primary topic of interest using criteria TITLE ("Smart cit *") AND (LIMIT-TO) (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar ") OR LIMIT-TO (DOCTYPE," ch ")) AND (LIMIT-TO (LANGUAGE," English "))) resulting in 7.099 records. To collect abstracts of papers from the Information systems perspective in Scopus databases, given the different categorisation comparing to WoS, only a search by subject area "Computer science" was possible. From the initial set of 7.099 papers, the search was reduced to 4.631 document results based on the following query: TITLE ("Smart cit *") AND (LIMIT-TO) (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "ch")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SUBJAREA, "COMP")). There were 100% papers marked as Computer Science, Engineering (35.39%), Mathematics (17.67%), Social Sciences (15.12%), Decision Sciences (11.33%), and Energy (5.72). Further, to collect abstracts from the Management perspective, the search was reduced using criteria TITLE ("Smart cit *") AND (LIMIT-TO) (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO DOCTYPE, ("ch")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SUBJAREA, "BUSI")). Business, Management, and Accounting subject area contain 650 records, 100% from Business, Management, and Accounting area, Social Sciences (37.56%), Computer Science (32.21%), Engineering (28.55%), Decision Sciences (26.72%), and Economics, Econometrics, and Finance (17.10%).

Procedure

The tool used for conducting text mining was RapidMiner Studio, accessible as a stand-alone open-source application that provides a powerful platform for data mining. Text mining was done following the standard procedure (Figure 1) and using operators (RapidMiner, 2020): (1) Tokenize, (2) Extract information, (3) Filter Stopwords, (4) Stem (Porter), and (5) Transform Cases. Tokenize operator splits the text of a document into a sequence of tokens (Hrcka et al., 2017) which resulted in tokens consisting of one single word. Generated words from 2 documents (WoS and Scopus paper abstracts) were thus transferred to attributes through tokenisation. Extract information operator extracts information from the structured content of

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a document that might be added as an attribute in this process later. Filter Stopwords (English) filters English stopwords based on a built-in stopword list. Stopword mainly refers to conjunctions and papers that contribute to the readability of texts written in English but do not contribute to the analysis.

After this, words were stemmed using Porter's words stemming algorithm applying an iterative, rule-based replacement of word suffixes intending to reduce the length of the words until a minimum length is reached (for example economics, economia, economico to econom). After that, the Transform Cases operator was used to transform cases of characters to lower cases, and finally, to process documents, word vector was created using the Term Frequency method.

Figure 1. Process of text mining in RapidMiner Studio
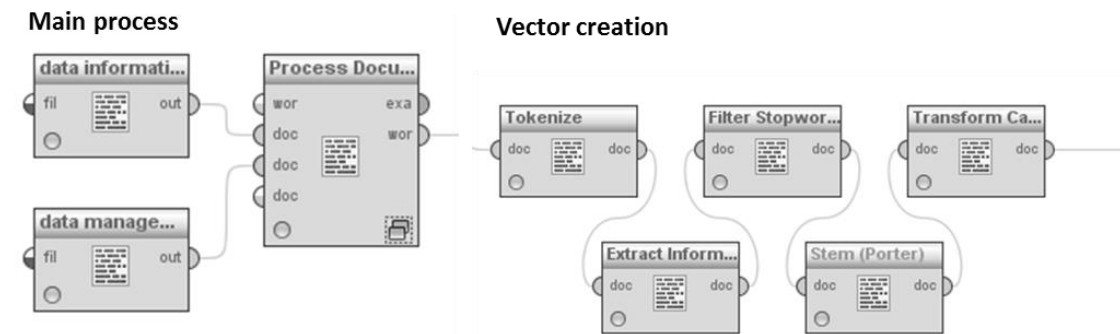
Source: Author

RESULTS

The overall analysis of the smart city research
Looking at the number of total publications from WoS (4.994) in the maximum searchable period from 1955 to 2020, the growth of publications in smart city research in the last decade can be observed. Figure 2 shows the number of total publications for the last decade that has grown since 2010 from 2 papers published per year to over 900 papers in 2017, 2018, and 2019. The reasons for such rapid growth can be found in the marketing attractiveness of the term itself, which overlaps and historically replaces terms such as digital city, electronic city, information city, and similar on the one hand, and on the other, in the growing number of the application of modern ICT in cities. For example, in the period from 1990 to 1999, only 4 papers on smart city research were reported in the WoS database.

Figure 2. Number of publications in WoS database related to smart city research in the last decade
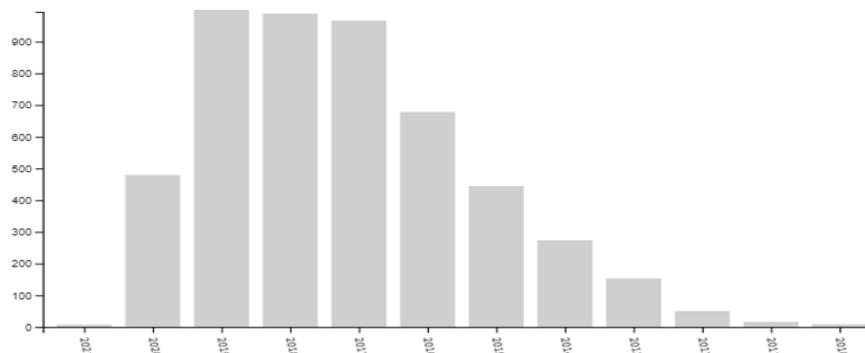
Source: Web of Science platform (https://apps.webofknowledge.com/)

The sum of term frequency was calculated using RapidMiner as well, showing how frequently a word occurs in a document formed by a collection of abstracts from two specific databases (table 1 and table 2) and two perspectives. For readability in the tables below the number of terms shown is either top 10 or top 12. The results of the text mining implemented in RapidMiner Studio for both perspectives (represented by document occurrences) within the smart city domain are presented in table 1. In addition to the two most common terms "citi" and "smart", the terms "univ" (university), scienc" (science), "comput" (computing, computer…), "system", "data", and so on, have a high occurrence in the observed papers.

Table 1. Word occurrences in smart city research published in WoS database

	Attribute name	Total occurrences	Document occurrences
1	citi	5.461	2
2	smart	5.093	2
3	univ	2.808	2
4	scienc	2.521	2
5	comput	2.440	2
6	system	1.858	2
7	data	1.634	2
8	manag	1.578	2
9	inform	1.465	2
10	ieee	1.393	2
11	research	1.393	2
12	technolog	1.321	2

Source: Author

When analysing 7.099 papers published in the Scopus database on the topic, similar to in the WoS database, a sharp increase in the number of published papers from the smart city domain in the last decade can be noticed. In the period from 1990 to 1999, 3 papers, and from 2000 to 2009, only 8 papers were published.

Figure 3. Number of publications in Scopus database related to smart city research in the last decade
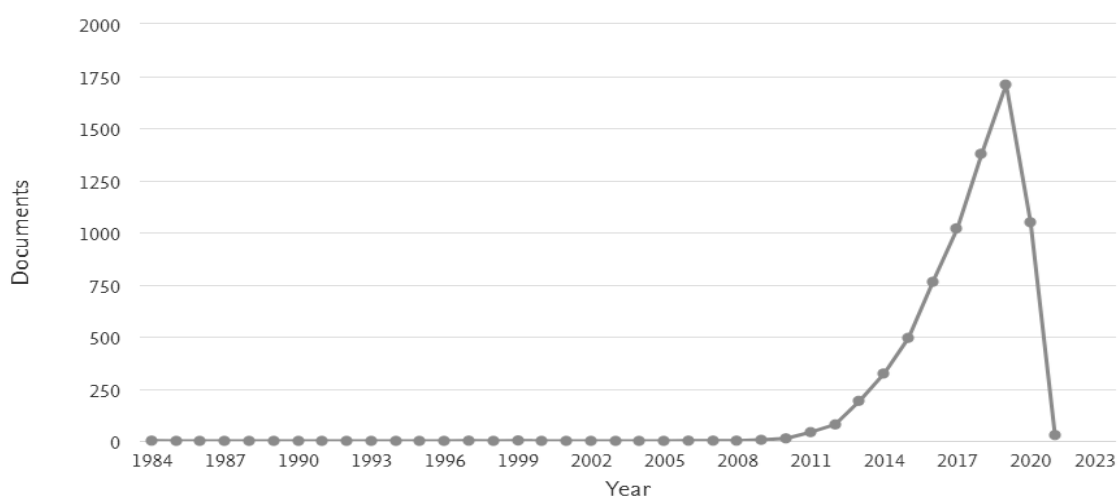
Source: Scopus platform (www.scopus.com)

The results of text mining conducted on abstracts of papers published in the Scopus database for both perspectives are presented in Table 2. In addition to the terms "citi" and "smart", the

terms "data", "system", "technolog", "inform" and "manag" appear in the top 12 terms in papers represented in Scopus databases for both perspectives.

Table 2. Word occurrences in smart city research published in Scopus

	Attribute name	Total occurrences	Document occurrences
1	citi	14.383	2
2	smart	13.732	2
3	data	5.402	2
4	system	4.637	2
5	technolog	3.313	2
6	network	3.092	2
7	develop	2.857	2
8	record	2.731	2
9	servic	2.658	2
10	urban	2.621	2
11	inform	2.468	2
12	manag	2.356	2

Source: Author

Analysis of the common terms and differences between the two databases are presented below while considering the two different perspectives in more detail.

Information systems perspective

Looking at the WoS database from the information systems perspective in the smart city domain, a total of 1.038 records were analysed. The highest number of papers was authored in China (228), followed by the USA (158), Italy (106), England (80), and Spain (71) according to the geographical distribution of the literature on smart city information systems perspective. Word occurrences from this particular perspective in WoS are presented in Table 3.

Table 3. Information systems perspective - word occurrences in WoS database

	Attribute name	Total occurrences	% of represented occurrences	% of total (156.841)
1	citi	2.762	15.07	1.76
2	smart	2.695	14.70	1.72
3	comput	2.341	12.77	1.49
4	scienc	2.184	11.91	1.39
5	univ	1.781	9.72	1.14
6	system	1.577	8.60	1.01
7	ieee	1.375	7.50	0.88
8	data	1.311	7.15	0.84
9	inform	1.225	6.68	0.78
10	network	1.079	5.89	0.69

Source: Author

In the Scopus database for information systems perspective, a total number of 4.631 records were found; however, only the first 2.000 records can be viewed from the database, so the analysis was made on a sample, i.e. a reduced number of papers. The highest number of papers was authored in the USA 599, followed by China 574, India 527, Italy 430, and Spain 329

according to the geographical distribution of the literature on smart city information systems perspective. Word occurrences from this particular perspective in WoS are presented in Table 4.

Table 4. Information systems perspective - word occurrences in Scopus database (from 2.000 papers)

	Attribute name	Total occurrences	% of represented occurrences	% of total (324.443)
1	citi	9.757	23.90	3.01
2	smart	9.585	23.48	2.95
3	data	4.531	11.10	1.40
4	system	3.881	9.51	1.20
5	network	2.742	6.72	0.85
6	technolog	2.357	5.77	0.73
7	servic	2.077	5.09	0.64
8	record	2.068	5.07	0.64
9	inform	1.956	4.79	0.60
10	internet	1.870	4.58	0.58

Source: Author

Looking at the information systems perspective in the smart city domain in the WoS and Scopus databases, it is possible to notice some common phenomena and differences. For example, in the top 10 terms, 6 terms: "citi", "smart", "system", "network", "data", and "inform" are common. Also, all key terms from both databases are related to the smart city domain and information system perspective.

Management perspective

From a management perspective in the smart city domain in the WoS database, 342 records were analysed. The highest number of papers was authored in Italy (51), the USA (43), England (32), China (32), and Russia (26) in terms of the geographical distribution of the literature on the smart city from the management perspective.

Table 5. Management perspective - word occurrences in WoS database

	Attribute name	Total occurrences	% of represented occurrences	% of total (73.943)
1	citi	2.699	24.18	3.38
2	smart	2.398	21.48	3.00
3	univ	1.027	9.20	1.28
4	manag	1.014	9.08	1.27
5	busi	940	8.42	1.18
6	econom	715	6.40	0.89
7	develop	664	5.95	0.83
8	urban	609	5.46	0.76
9	technolog	559	5.01	0.70
10	research	539	4.83	0.67

Source: Author

In the Scopus database from the same perspective, there were 650 records. The highest number of papers was authored in the USA (82), followed by Italy (78), United Kingdom (57), India (56), and Spain (44) in terms of the geographical distribution.

Table 6. Management perspective - word occurrences in Scopus database

	Attribute name	Total occurrences	% of represented occurrences	% of total (99.635)
1	citi	4.626	30.62	4.64
2	smart	4.147	27.45	4.16
3	develop	991	6.56	0.99
4	technolog	956	6.33	0.96
5	urban	896	5.93	0.90
6	data	871	5.77	0.87
7	system	756	5.00	0.76
8	scopu	654	4.33	0.66
9	manag	630	4.17	0.63
10	servic	581	3.85	0.58

Source: Author

Management perspective in the smart city domain in WoS and Scopus databases also has some common occurrences in the top 10 terms such as "citi", "smart", "develop", "technolog", "urban" and "manag". Taking into account the results of common occurrences of terms for each of the perspectives within both databases, it can be concluded that papers categorised as falling within the information system perspective most often include terms related to system, network and inform (information, informatisation), while the papers within the management perspective most often include the terms develop, technologist, urban and manag (management, managerial and so on). If the perspectives are observed within each database separately, it is possible to come up with a somewhat more detailed description of each perspective. Thus, the perspectives information system and management in the WoS database had the common terms "citi", "smart" and "univ". The remaining terms that occur when looking at the information system perspective were "comput", "scienc", "system", "ieee", "data", "inform", and "network", and within the perspective management "manag", "busi", "economy", "develop", "urban", "technolog" and "research". In the Scopus database, the information system and management perspectives had some common terms such as: "citi", "smart", "technolog", "data", "system" and "service". The remaining terms that occur within the information system perspective were "network", "record", "inform" and "internet", and within the management perspective: "develop", "urban", "scopu" and "manag". The above text mining analysis of the occurrences of key terms within the two perspectives in the WoS and Scopus databases indicates that there are common terms that are investigated and studied within the smart city domain regardless of the perspective that the researchers take predominantly. On the other hand, there are also significant differences between the perspectives in papers within each database separately, but also between identical perspectives in different databases. The most obvious one is the term "network" in the information system perspective, this being a condition without which no smart city system would operate, and yet is secondary from the business side of the research.

Relating smart city categories with information system and management perspective

To get more insight into the differences of the observed perspectives in the smart city domain, the occurrence of terms that make up six key categories of the smart city domain were analysed. The results of the occurrence of key terms (representing six key categories), according to the observed perspective and within the WoS and Scopus databases are shown in table 7.

Table 7. Smart city categories – word occurrences in WoS and Scopus databases

Smart city categories	WoS				Scopus			
	IS	%	Mng	%	IS	%	Mng	%
govern	188	0.12	350	0.44	819	0.25	541	0.54
peopl	646	0.41	183	0.23	375	0.12	124	0.12
living	0	0	0	0	0	0.00	0	0.00
mobil	323	0.21		0	1027	0.32	197	0.20
econom*	90	0.06	902	1.13	470	0.14	336	0.34
environ**	304	0.19	199	0.25	1217	0.38	343	0.34
Total	156.841	/	79.943	100	324.443	/	99.635	/

* economi, economia, economico, ** environm, environment
IS = Information system perspective, Mng = Management perspective
Source: Author

Figure 4, similar to table 7, shows the relative occurrence of key terms according to the observed perspective and within the WoS and Scopus databases. However, data visualisation indicates more clearly a noteworthy difference when smart city categories from the information systems and management perspectives are observed.

Figure 4. Smart city categories from the information system and management perspectives
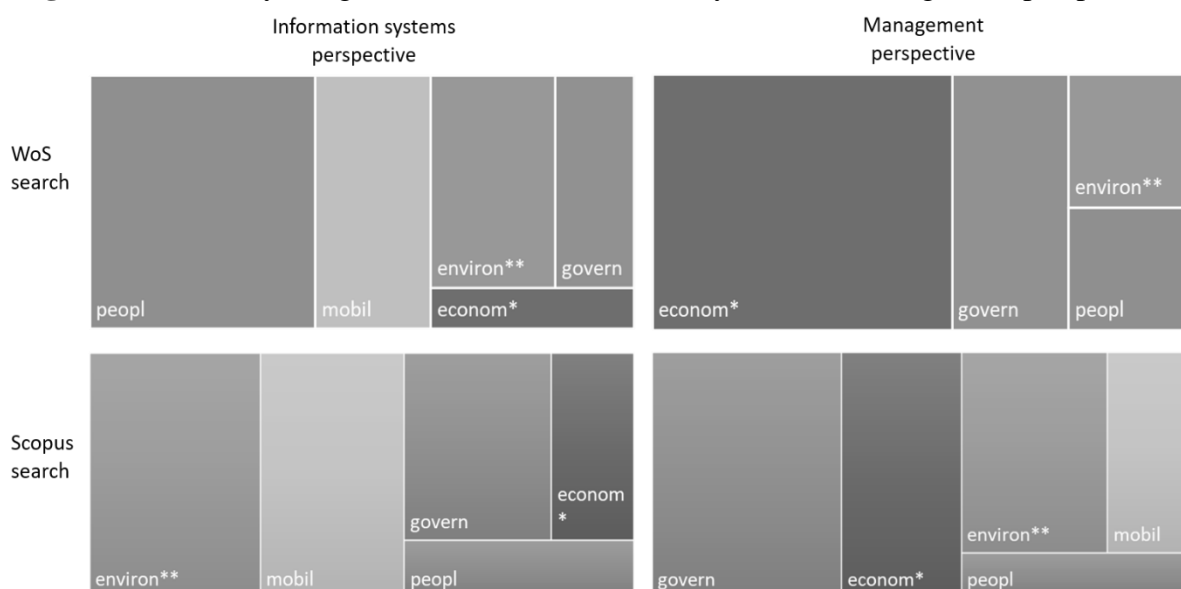
Source: Author

From the information system perspective, the terms "people" and "mobil" in the WoS database, and "environ **" and "mobil" in the Scopus database occur most often. Consequently, from the aspect of smart environment, smart mobility and smart people that stand out as most

important for this perspective, it can be concluded that the convergence of big data, Internet of Things, and artificial intelligence promises to create cities as better, environment-friendly places to live in, by providing a more advanced infrastructure. Another key aspect of smart city research is the issue of mobility as the ultimate goal of many studies is to help improve the current state of congestion in urban areas. Conversely, from the management perspective, the terms "econom*'" and "govern" in the WoS database, and "govern" and "econom*" in the Scopus database occur most often. This connects with research trends where recently smart governance, smart environment, smart mobility, and smart people are the basis for innovation in the business environment (in the smart economy) and everyday life (smart living). Furthermore, although the term "living" has not occurred in any of the variants (nor database or perspective), this category (smart living) is represented by studies that aim to improve health, education, and social services, as the remaining five key categories of smart cities positively impact all of these elements (Appio et al., 2018).

Overview of highly cited papers from the information system and management perspectives in smart city research

In the top ten cited WoS papers from the information systems perspective, the topic of IoT and mobility prevails in smart city research. In these papers, the Internet of Things (IoT) paradigm refers to "a network of interconnected things, i.e. devices with a telecommunications interface, processing, and storage units" (Centenaro, 2016), while the mobility studies mostly deal with traffic congestion, parking problems, and the upcoming advancement of smart vehicles and autonomous technologies (Aloqaily et al., 2019). It should be noted that some authors specifically address aspects of smart services and smart devices in cities. Smart services are an important element of smart cities and complementary to IoT where sensory data play the most significant role (Mohammadi et al., 2018). On the same note, other highly-cited papers, provide an overview of smart devices embedded in smart city infrastructures and a data-driven perspective (Hu et al., 2019), and also describe basic data management techniques used to ensure consistency, interoperability, granularity, and reuse of IoT-data generated for smart cities (Gharaibeh et al., 2017). Centenaro (2016) presented a new approach to connectivity in an IoT environment, discussing its advantages over established paradigms of applications in smart cities. Also, Rathore et al. (2016) propose a system for smart cities and urban planning that uses IoT-generated big data analysis. A complementary topic, smart mobility, has captured the attention of many authors. For example, the future of connected vehicles for smart cities is investigated, especially considering the availability of IoT devices (Aloqaily et al., 2019). To manage distributed and real-time traffic, Ning et al. (2019) propose the integration of fog computing and automotive networks. In their work, Teng et al. (2019) propose a model that uses vehicles to assist IoT applications in terms of data delivery. Another area is strongly impacted by IoT-related research and availability of IoT devices - smart energy; e.g. Liu et al. (2019) focus on designing an IoT-based energy management system that facilitates the integration of different energy sources and automatic control of the operation. Finally, Hossain et al. (2017) propose a smart healthcare monitoring framework that communicates with surrounding smart devices to enable affordable healthcare.

The ten most-cited WoS papers from a management perspective in smart city research are dominated by case study analyses that offer guidelines for smart city development, but also literature reviews and conceptual papers that generate new scientific insights into the field. Topics cover the area of smart governance, but also broadly cover the use of technologies in the areas of the economy, environment, people, mobility, and others. For example, Kumar et al. (2018) propose a smart city transformation framework to help policymakers, urban planners,

and service providers in terms of understanding and better insight into smart solutions for smart city development. Mohamed et al. (2018) focus on technologies such as the IoT, robotics, and autonomous systems, and their integration into smart cities. Chang et al. (2018) define the relationship between IoT, smart cities, and hearing aids and present opportunities for their better development, all to raise the living standards of residents. As already noted, case studies fill the research gap by reporting on the results of multiple case studies conducted in European cities with examples of best practices (Mora et al., 2018). In this area, Caragliu and Del Bo (2018) contribute to the understanding of mechanisms to encourage urban innovation, while Appio et al. (2018) for better explaining the phenomenon of smart cities provide relevant links and thematic clusters in the domain of the smart city. Sepasgozar et al. (2018) develop a citizen-oriented approach to smart cities by understanding the dimensions of technology acceptance, which plays a unique role in the acceptance of an increasing number of smart services by citizens. Similarly, Trencher (2018) aims to increase the understanding of how smart cities can be designed and implemented as a tool for solving social problems and addressing the needs of citizens. Another view of smart city development is increasingly based on knowledge management concepts. For example, Ardito et al. (2018) study the role of universities in the knowledge management of an increasing number of smart city projects, while Ferraris et al. (2017), had as their primary goal to examine how human resources are managed in smart city projects in multinational companies.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Although the paper aimed to eliminate the possible impact of varying paper lengths on the occurrence of key terms by using the abstracts exclusively, it is at the same time a limitation of the study. Specifically, the use of abstracts for text mining is an impairment since the abstracts are very short and represent only a sample of text/words presented in the whole paper. Thus, the subsequent phases would need to incorporate more extensive raw material, i.e. the entire paper, and compare the results. Also, the number of journals by research domain was not limited to get a broader picture and a full overview. Consequently, in future phases of the research, it would be interesting to verify whether the selection of journals specialising in the smart city domain affects the results presented in this paper significantly. Another limitation of the paper is the use of top 10 WoS papers in each perspective to provide an overview of highly cited papers, given that this approach has a significant impact on the selection of highly cited journals as future outlets, for example, uncovering the journal "*Technological Forecasting and Social Change*" as a relevant one. In summation, and in addition to planned changes listed here, the future research agenda will include making a more extensive literature review by also incorporating papers from other databases.

CONCLUSION

As mentioned earlier, for this study, abstracts from almost 5.000 papers from the WoS database and more than 7.000 papers from the Scopus database were downloaded and analysed. Text mining procedure was performed on abstracts to uncover and interpret key terms and phenomena from the information systems and management perspectives in the smart city domain. The use of six key categories of smart cities as keywords within each perspective was also analysed and visualised.

There is a difference in terms of the geographical distribution of smart city research for observed perspectives. When looking at information systems perspective, the highest number of papers was authored in China followed by the USA and Italy and published in the WoS

database, while in the Scopus database authors coming from the USA dominate, followed by authors from China and India. From the management perspective, the highest number of papers was published by authors from Italy, followed by the USA and UK in the WoS database, and in the Scopus database by authors from the USA, followed by Italy and UK. Also, there is a specific trend that can be recognised related to the time of publishing analysed papers, given that in both databases strong growth of published papers from the smart city domain starts in the last decade.

Papers on topics that address the issues of smart mobility, smart environment, and smart people dominate the information system perspective in smart city research. This is confirmed by a comprehensive analysis of the top 10 highly cited WoS papers, given that these papers mostly address the issue of smart mobility and various applications of IoT in the remaining key categories of smart cities, especially smart environment and people.

The management perspective is dominated by papers dealing with the smart economy and smart government. The results are also supported by an analytical overview of the top 10 highly cited WoS papers since these focus on smart governance but also broadly cover the use of technologies in the areas of the economy, environment, people, mobility, and so on.

In summation, and based on the common features but also the differences in smart city research, it can be said that information systems and management perspectives are equally represented and important. Thanks to information systems and hardware infrastructure, on the one hand, and management concepts, on the other hand, smart cities can equally develop all six key categories.

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THE CASE FOR A COUPLED USER-ORIENTED PROCESS (RE)DESIGN AND INFORMATION SYSTEMS DEVELOPMENT

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Abstract: *The paper synthesises studies of two specific conceptual models from a rather wide area of user-oriented process (re)design and the development of related, modern information systems based on smart technologies. Further, it proposes a new approach for coupling (1) a methodology for convergent customer experience management and business process management, with (2) a framework for user-oriented data-driven information systems development. It also analyses the implications and conditions for its implementation in private and public organisations.*

Keywords: *User-oriented, Process redesign, Data-driven development, Information systems.*

INTRODUCTION

The motivation for the research on the topic of user-centric process and information system (re)design stems from the rapid development of smart technologies and growing interest in digital transformation. In particular, the importance of big data technologies has been recognised for digital transformation and the creation of sustainable societies (Pappas, 2018). There is a growing number of studies in this regard; for example, on September 21st, 2020, there are over 51.700 papers in the Google Scholar database (excluding citations and patents) on the topic "digital transformation". Out of these, over 1.100 acknowledge the shift towards "user-centric" processes and solutions (Google Scholar, 2020). In line with the trend, a research group at the University of Split was set up in 2017 with the aim to study different phenomena in a rather wide area of the user-oriented process (re)design and the development of related, modern information systems based on smart technologies. To date, the group has conducted several studies in this area as a part of the research project titled "User-oriented process (re)design and information systems modelling – a case of smart city services" (SmartCity.efst.hr, n.d.).

In reporting the progress of a scientific project and synthesising the research on the topic to date, several relevant studies have been published (available in Croatian scientific bibliography, n.d.). For this paper, two studies are important in particular, one proposing a novel methodology for convergent Customer eXperience Management (CXM) and Business Process Management (BPM) (Pavlić & Ćukušić, 2019b) and the other one describing and evaluating a framework for user-oriented data-driven information systems development (Mijač, Jadrić & Ćukušić, 2019). This paper seeks to identify the potential of combining the two concepts in digital transformation projects and, in one particular case, prerequisites for the implementation of the new, combined approach.

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The structure of the paper is as follows: Section 2 presents the theoretical background of the study and the two concepts in more detail. Section 3 describes the procedure and the potential of combining the concepts, while Section 4 explores the benefits and conditions for the implementation of the approach. Section 5 concludes the paper and presents the limitations of the study.

THEORETICAL GROUNDING

Two trends that informed the decisions in a broader research study within the project: the user-centric view and emphasis on digital transformation in modern organisations have already been pinpointed in the introductory part of the paper. Specific research questions that led to the development of the methodology for convergent CXM and BPM and the framework for user-oriented data-driven information systems development, i.e. the motivation for proposing the new approach is described hereinafter.

New research directions in the field of digital transformation: BPM and CX convergence
Given the current level of maturity BPM, there are many challenges and research directions that stem from the convergence trend of two seemingly contradictory concepts: BPM – usually oriented towards improving internal processes, and CXM – bringing the external perspective of a customer into the organisation. Well-known marketing concepts, user/customer perspective, and customer journey mapping are experiencing a real revolution with the advent of new technologies (De Keyser et al., 2015), outlining the transformation of CX through, for example, the Internet of Things (IoT), Virtual Reality (VR), virtual assistants, chatbots and other (Hoyer et al., 2020), also leading to the development of new frameworks (e.g. Nasution et al., 2014) and popular call-to-action/research (Verhoef et al., 2009, Lemon & Verhoef, 2016). Swift technological development (specifically – in terms of "smart" devices) is manifested, among other things, through the development of new methods and tools for collecting, storing, and processing user data in real-time. In this regard, and due to the abundance of objective user-related data and increased connectivity, researchers explore the advantages of linking two dominant approaches to analysis and process optimisation - an internal-oriented approach such as BPM and a more modern, user-oriented concept of managing user experience (Trkman et al., 2015), for example, through customer journey mapping (CJM) (Misiak, 2018), i.e. Customer eXperience (CX). The prospects and implications of business process analysis and optimisation when using the BPM-CX convergent approach, in comparison with the traditional BPM approach, have been presented elsewhere (Pavlić & Ćukušić, 2019a, Pavlić & Ćukušić, 2019b).

Smart technologies for user-oriented and data-driven information systems development
Smart devices enable a better understanding of customer needs (Hoyer et al., 2020), bringing customer-facing teams a step closer to collecting and understanding user needs as inputs for designing internal business processes and the development of related information systems. Nowadays the use of sensors and mobile applications is being investigated (as e.g. Petsani et al., 2020) to gain insights into user behaviour patterns that would lead to a better definition of user needs and requirements, and massive amounts of data are being analysed in the context of mapping user experiences. The results become the basis for the user-oriented information systems development (Mijač, Jadrić & Ćukušić, 2018b) demonstrating the value and the potential of new technologies in the context of collecting, describing, and understanding user needs and user-oriented information system/service design. The approach to designing and developing information systems and related services under the principles of User-Centred Design (UCD) (Zimmermann & Grötzbach, 2007) thus shifts towards experimenting with the

use of smart devices for data collecting and Data-Driven Development (DDD) (Holmström Olsson & Bosch, 2019), in particular. In this regard, relevant research questions focus on the effects of the technology development (specifically the development of smart devices and IoT) on the expectations of IS users on the one hand, and the possibilities to customise these systems to the users on the other hand. The value of collecting and storing user data and data generated by processes in which users participate to improve the overall user experience has been presented elsewhere (Mijač, Jadrić & Ćukušić, 2018a, Mijač, Jadrić & Ćukušić, 2018b).

COUPLING USER-ORIENTED PROCESS (RE)DESIGN AND IMPLEMENTATION WITH DATA-DRIVEN INFORMATION SYSTEMS DEVELOPMENT

The advancement in the development of user/customer journey mapping has been expedited by the development of new methods and tools for collecting and storing user data and their satisfaction in real-time: wearable devices, object tracking sensors, mobile applications, eye-tracking tools, among others, follow and record every aspect of users' experience, while the analysis and value-extraction from the recorded data become possible with the maturity of big data technologies (Martin, 2016). Organisations thus gain valuable insights into behaviour patterns that consequently inform strategic and operational decisions; examples include targeted advertising, but also product development and process improvement (Kopanakis, 2018). Specifically, collecting and analysing real-user behaviour and needs become foundational for (re)designing internal business processes and developing user-oriented information systems, i.e. information on the experience and perspectives of users as well as the weak points (usually defined in the scope of CJM analyses) are essential inputs for organisations' business process improvement/automation (Vanwersch et al., 2015). Multifunctional teams (made up of marketing experts, development engineers, process owners, and more) are formed accordingly to make the user-oriented and data-driven development strategies a reality. However, even with the growing popularity of data-driven development and emerging frameworks, related efforts can fail due to competing interests and department KPIs, different methodologies employed by professionals coming from marketing, software engineering, BPM, and other backgrounds.

Methodology for convergent BPM and CXM

The implications of the BPM-CXM convergent approach, compared to the traditional BPM approach, have been a continuing research interest of a doctoral student and long-time BPM consultant, D. Pavlić (2020). Starting from a well-established BPM lifecycle model (Dumas et al., 2018), or a continuous cycle comprising six distinct phases, he describes an enhanced version that takes into account customer perspective throughout the lifecycle. Specifically (ibid, p. 23): (i) process identification, (ii) process discovery (also called as-is process modelling), (iii) process analysis, (iv) process redesign (also called process improvement), (v) process implementation, and (vi) process monitoring thus become (i) process and customer experience identification (resulting in process and customer experience architecture), (ii) process and customer experience discovery (including as-is process modelling and as-is customer journey mapping), (iii) process and customer experience analysis (resulting in insights from both perspectives), (iv) process and customer experience redesign (resulting in improvements reflected in to-be process models and to-be customer journey maps), (v) process implementation, and (vi) process and customer experience monitoring and control. In 2019 and 2020, the convergence concept has been endorsed and evaluated with experts, and a set of guidelines have been proposed to demonstrate and operationalise it (Pavlić & Ćukušić, 2019b).

In addition to the scientific relevance of the topic, given the popularity and significance of business transformation projects and BPM and CXM tools, wider acknowledgment and adoption of the new approach is sought and is currently being explored and identified in an international study. The methodology has also been piloted in a (digital) business transformation project in a private organisation, with results still to be reported. The use of BPM-CXM convergence approach, among other advantages, leads to more successful analysis and optimisation of business processes compared to the traditional BPM approach as an ongoing study seeks to confirm.

While the methodology facilitates an integrated analysis of customer experience and internal business processes and reflects the way customer experience can be perceived and analysed through the whole BPM lifecycle, one particular phase - process implementation seemingly overlooks the customer perspective. In the proposed approach, this particular phase was not explicitly considered/labelled as taking into account customer perspective, as it can be argued that the move from the as-is processes to the to-be process reflects the customer perspective identified and recorded in previous phases, especially in the process redesign phase. Process implementation refers to process automation in a strict sense, or a broader sense to the development and deployment of new or improvements of existing IT systems that support to-be processes (Dumas et al., 2018:23). In case the transformation from conceptual process model into executable ones is not done using the Business Process Model and Notation (BPMN) standard (or any other complementary standard), it would be fitting and opportune to explore combining the methodology for BPM and CXM convergence with the relevant framework(s), considering the trends and importance of user-centred and data-driven strategies in the development of information systems (presented earlier in Section 2).

Framework for user-oriented data-driven information systems development
In an attempt to formulate a framework for the user data-driven information systems development, several studies and reports were produced within the MIS4SC project (SmartCity.efst.hr, n.d.) such as (i) report on current status and trends regarding user-oriented information system development (UCD/UDD vs. DDD), (ii) report on the potential of techniques and technologies for collecting and storing user data to improve user experience, (iii) report on problems, disadvantages, and prerequisites for data-driven development, and (iv) recommendations for the user-oriented information systems development. The latter report detailed out a framework developed and evaluated in consultation with experts (and published as Mijač, Jadrić & Ćukušić, 2019). In that, the importance of using objective data, as opposed to soliciting user requirements based on user feedback and interviews, is emphasized.

Collecting objective user-related data is still predominantly based on Google Analytics reports, and there are still only a few studies presenting how objective data are used as a part of data-driven strategies and IS development decisions (see Svensson, Feldt & Torkar, 2019).

The framework acknowledges standard phases of information systems development and draws on an iterative approach to system design (such as the Boehm's spiral model of IS development, cf. Boehm, 1988). Considering the growing emphasis on user experience, the proposed framework ensures user perspective throughout and promotes using the data-driven approach systematically. Specifically, it acknowledges that objective and passive data can be used effectively and frequently to eliminate critical errors and to improve the whole users' journey while interacting with the system. Figure 1 depicts the framework, where the initial phase consists of collecting users' specifications based on existing (usage) data. The information system development phase is then followed by a testing phase supported by the collected usage

data. For that, metrics have to be defined in the development phase. Using the collected data is crucial in the redesigning phase. For redesign purposes, data can be taken from external (tools used for passive tracking) or internal sources (server logs produced by users and by the system itself). Consequently, taking into account usage patterns and objective data, different strategies for improving user experience could be devised and tested throughout the redesign process and repeated during the whole lifecycle. The framework is also aligned with agile development practices as it surmises small and incremental changes that could be a subject of several different sprints in agile development.

Figure 1. Framework for user-oriented data-driven information systems development
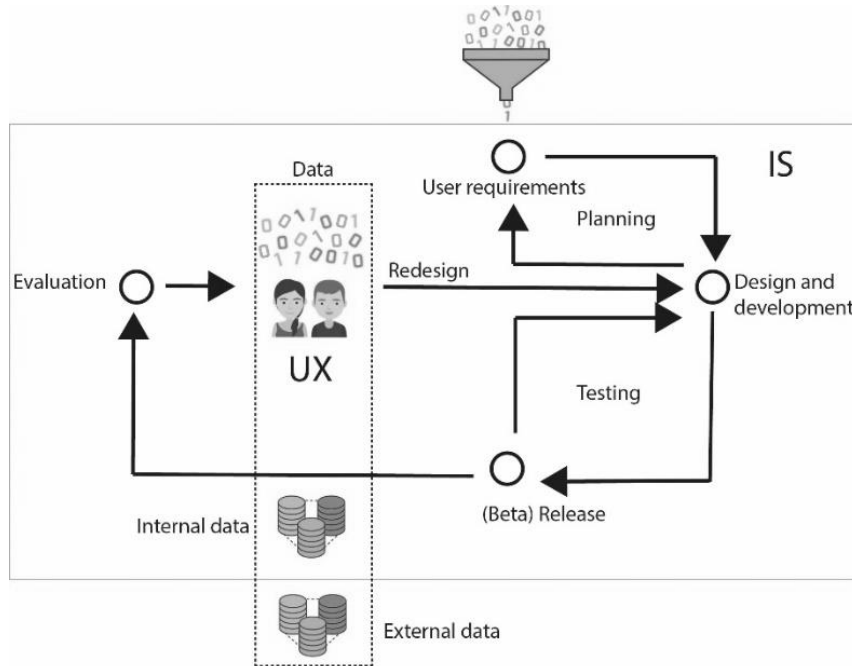
Source: Mijač, Jadrić & Ćukušić, 2019

POSTULATED IMPLICATIONS OF THE AMALGAMATED APPROACH FOR DIGITAL TRANSFORMATION PROJECTS

The relevance and the shift towards "user-centric" processes and solutions in the context of digital transformation projects have been acknowledged in recent studies and reiterated in the introductory part of the paper. Technology has become a conduit for service and/or product transformation in public, and private organisations as processes are automated, and old technologies are being replaced. Following the years where decisions about implementing new technologies were unselective and made without a clear vision and identification of business needs, in recent times, researchers call for digital transformation efforts to be preceded by a diagnostic phase with in-depth input from customers (Tabrizi et al., 2019). Herein lies the key purpose of the approach presented in this paper. Specifically, using:

- the BPM methodology (BPM being at the core of digital transformation projects) that takes into account customer perspective throughout the whole lifecycle (BPM-CXM convergent approach), and in the process redesign and process implementation phases,
- supplementing it with the framework that advocates the use of objective, external and internal data to improve user experience, can result in significant benefits for organisations from the private and public sectors.

Current research studies focusing on the implementation of user-oriented approaches bring about a broad list of advantages of engaging users in digital transformation projects, including both improvements of processes and information systems some of which have been presented already (see Section 1 and 2). The outcomes of the amalgamated approach for digital transformation projects presented herein are still to be analysed and evaluated following the implementation in real-life scenarios. At this stage, at the level of the conceptual model, among other things, it is posited that the new approach can result in two major positive outcomes:

- innovations in the planning and development practices of user-oriented information systems that will be triggered by getting a more objective and realistic overview of users (e.g. as in the case of developing data-driven web personas based on real user-data, and as presented in Mijač, Jadrić & Čukušić, 2018b), and
- more active participation and/or increased satisfaction of users of information systems (whether in the private or public sector), this being the ultimate aim of employing user-oriented strategies.

However, the implementation and evaluation of the approach in real-life scenarios are still to be realised. In that, several conditions have to be fulfilled; whereby the main is ensuring that customer focus is the main driver for business/IT transformations. Even if that is the case, there are organisational settings that are still data-poor, lacking in procedures for collecting and storing user data. Throughout the last couple of years, while devising the new approach, several projects have been realised by the author of the paper that found that lack of systematic data management impairs user-oriented strategies significantly. Although to design a user-centric information system, lack of objective user data can be somewhat mitigated (as was done through experimentation, for example, in Čaljkušić Ivanović, 2018), it is essential to acknowledge and promote the importance of the objective and available data for the development of a user-oriented system.

CONCLUSION

Other than to promote and present two mechanisms developed within the framework of a scientific project, the purpose of the paper was to recollect how smart technologies can affect planning, designing, and managing user experience and how user data analysis and visualisation can contribute to the design of user-oriented information systems. Specific conditions and problems that emerge in the transition towards the user-oriented and data-driven development paradigm have been listed, and the path from traditional information systems development practices towards open, multidisciplinary user-oriented attempts has been outlined. It remains to detail out all the steps of the amalgamated approach for digital transformation projects that includes process and systems improvement and to systematically plan the evaluation of the approach in real scenarios.

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INITIAL THOUGHTS OF COVID-19 UNEXPECTED CONSEQUENCES FOR TOURISM

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Abstract: *This paper addresses some initial scientific points of view about the new topic regarding the Coronavirus influence known until now and the objective is to reveal some unexpected consequences of the virus for tourism. The research aims to present the impact that the virus had on travel blogs from Romania. Because the tourism sector has been and still is affected due to this virus we decided to analyse travel blogs from a comparative perspective, more precisely, the articles posted in 2019, in March-May, and those of this year. The novelty element that the paper brings is represented by the impact of the virus determined on the content generated by travel bloggers, and in Romanian research, there is a small number of such studies, focused on travel blogs.*

Keywords*: Travel, Tourism, Virus, Impact, Consequences, Opportunities, Blogs.*

INTRODUCTION

Tourism is one of the most important and complex phenomena of human activity attested since ancient times. The inclusion of tourism among other sectors of the economy can be explained primarily by economic and cultural intensification, relations between countries in the world through accelerated urbanization, increasing the number of employees, increasing materials, welfare and cultural level of the population and its level of computerization and digitization, through modernization, and rapid development of transport and telecommunications routes (Tălămbuță, 2018, p. 34).

The study of the phenomenon of tourism from several points of view has a strong link to travel and growth or intensification and development in all fields. There is also a difference between the terms "visitor" and "tourist", so that "a visitor is any person who moves through a territory, backpacker or temporary visitor who makes a less than a 24-hour visit, while the tourist is the one that spends the night in another place than his/her home" (Tudor, 2012, p. 162).

Another perspective of tourism is by taking into consideration the branding aspect, because "the general supposition that a 'destination' brand denotes the tourism dimension of a place is widely supported" (Hanna and Rowley, 2008, p. 64). Also, branding is a concept of "marketing and branding of a place in terms of its leisure and tourism" (Maheshwari and

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Vandewalle, 2008, p. 4) or another more nuanced characterization suggests that: "It is in the context of tourism that a geographic location is (or includes) a destination brand" (2006, pp. 276-277).

It must be stated the different approach and meaning of the terms "travel" and "tourism" because most researchers distinguish between them. "Travel is associated with authenticity, adventure, and spontaneity. Tourism, on the other hand, has the less desirable connotations of being planned and superficial" (Azariah, 2017, p. 1) and marketed. This view is well stated in the observation of the American historian Daniel J. Boorstin: "The traveller was active; he went strenuously in search of people, of adventure, of experience. The tourist is passive; he expects interesting things to happen to him. He goes 'sight-seeing'…" (Azariah, 2017, p. 1).

Until the emergence of new technologies and means of communication, tourists used or adopted the practice of "journaling" (Pudliner, 2007, p. 46) "as a popular means of recording their own travel experiences; sharing their feelings and impressions about the places they visited" (Wang and Morais, 2014, p. 239). As mass tourism became the dominating industry, "the development of technology and the emergence of the Internet have made it possible and popular to post and publish personal travel experiences on weblogs" (Buhalis, 2003) and it became "an individual act" (Wang and Morais, 2014, p. 240); alongside modern and contemporary technologies, "tourism and photography are inextricably linked to each other, so much so that they are described as 'modern twins'" (Azariah, 2017, p. 131).

All in all, it can be stated that without tourists there would be no tourism. The tourism industry refers to "the businesses and organizations that help to promote the tourism product" (Wang, 2011, p. 2).

APPEARANCE OF CORONAVIRUS DISEASE

It's not the first time in human history that a Coronavirus "has taken the public health community by surprise. Most will remember the severe acute respiratory syndrome (SARS) coronavirus outbreak of the early 2000s, but many may not realize that another novel coronavirus Middle Eastern respiratory syndrome (MERS) is currently circulating in parts of the world" (Jamal and Budke, 2020, p. 182).

As it is known to this date, Coronavirus 2019 (COVID-19) is "an infectious disease caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2)" (Bakar and Rosbi, 2020, p. 189). The new outbreak of Coronavirus (COVID-19) "was first reported in Wuhan, China and spread rapidly worldwide via human-to-human transmission" (Wen, Wang, Kozak, Liu, and Hou, 2020, p. 1).

The rate at which the COVID-19 virus was transmitted reached the globe, Europe soon became the epicenter of the pandemic, but afterwards has been overtaken by the United States (Johns Hopkins University, 2020). COVID-19 spreads "when a person touches a surface or object that has the virus on it, then touches their eyes, nose or mouth. COVID-19 virus can live up to 72 hours" (Bakar and Rosbi, 2020, p. 189).

As this virus reaches and gains almost all human-inhabited territories, specialists and scientists are working day and night to try to understand, control and annihilate it. "Areas of specialisation include anatomy, physiology, and pathology along with biochemistry, immunology, virology, microbiology, molecular biology, genetics, preventive medicine, and

public health. As the world comes together to fight COVID-19, professionals in these sciences are facing great public pressure to research and develop vaccinations and medications to save lives" (Wen et al., 2020, p. 1).

Tourism is among the first and most severely affected industries by the COVID-19 virus. Recovery in tourism is "expected to start from domestic tourism and continue with recovered destinations which were usually first affected (e.g. Far East, Europe than Americas)" (Cetin, 2020, p. 1). The tourism industry could also face new conditions imposed for international travel. For example, only people under the age of 25 could be allowed, proven to have a lower rate of COVID-19 infection, or agree to spend 14 days in quarantine on arrival (Cetin, 2020).

Regardless of the scenario, tourism will see a sharp and long-term decline, as this pandemic will have or determine major economic effects. Purchasing power will decrease significantly, so online systems begin to take control in all areas (Kirant Yozcu and Cetin, 2019).

Table 1. Positive and negative impact of COVID-19 virus on tourism

Positive Impact	Negative Impact
Increased rate of tourist flow to domestic destinations due to lockdown and imposed limitations	Decreasing the purchasing power of tourists
The emergence of new tourist destinations and the change of the image of the destinations	Tourist psychosis
Sudden increase in family outings to nature-based tourism	Giving up long trips/destinations
Increasing rural tourism, agrotourism	Racism and cultural differentiation
Improved standards in health, travel, communication, shopping, and sanitation	Visibly slow exports
Promoting organic products and changing the eating habits of tourists and visitors	Job loss in the unorganized tourism and alternative accommodation sector
Tourism support – more awareness of nature, culture and ecology	Negative balance of payments due to the increase in domestic tourism
Restrictions on trade of wild animals	
Accelerating the sense of biodiversity conservation	
Stimulating domestic/national tourism	

Source: Chiranjib, 2020, p. 2

And yet, the COVID-19 pandemic determined a positive and a negative impact on tourism, which, of course, varies from country to country (see Table 1 above). The Coronavirus Crisis has brought more innovation and positive impact "through various untapped opportunities" (Chiranjib, 2020, p. 4). Thus, the tourism and the hotel industry could see more domestic tourists than international tourists in the next two years. A segment of luxury and first-class hotels will suffer due to the decline of international customers. Large travel agencies and airlines will have "to cut their revenue index by 30-40% instead of increasing" (Chiranjib, 2020, p. 4).

UNEXPECTED CONSEQUENCES OF THE PANDEMIC FOR TOURISM

The increase in consumption in the tourism sector has been determined by various factors over the years, especially "the growth of new technologies, new lifestyle trends associated with growing global prosperity and the advent of low-cost airlines, which made international travel affordable for the masses" (Folinas and Metaxas, 2020, p. 366).

In the 21st century, "during this period of acute pressure" (Briciu and Briciu, 2020b, p. 23) two important factors influence the development of tourism: climate change and global health emergencies.

The COVID-19 pandemic "has resulted in mass production shutdowns and supply chain disruptions causing global ripple effects across all economic sectors in a manner that was never expected" (Oruonye and Ahmed, 2020, p. 33). The tourism industry is in a major crisis and will face unprecedented threats. Tourism has shown how quickly changes can happen in a few months, as "the industry has collapsed all over the world" (Sheresheva, 2020, p. 73).

The authors Gössling, Scott, and Hall (2020) noted that global tourism has been exposed to a wide range of crises in the last years, which they called "major disruptive events" (p. 3). However, "there is much evidence that the impact and recovery from the COVID-19 pandemic will be unprecedented" (Gössling, Scott, and Hall, 2020, p. 3).

Tourists have played and continue to play a significant role in bringing new cases of COVID-19 virus to other countries, with continuous transmission confirmed from person to person and also transmission from asymptomatic people, which is why the measure has been taken to close the borders, and the tourism industry to be severely affected (Wen et al., 2020).

However, the representatives of the World Tourism Organization (UNWTO) have launched an awareness campaign to communicate solidarity and respect, care for the environment, continuing learning, and generating new opportunities for all. These are the core values of tourism supported by the World Tourism Organization and represent the main objectives of the #TravelTomorrow campaign (UNWTO, 2020). Be part of the #TravelTomorrow transformation has become this organization's response to the current crisis, highlighting the attractive values of tourism. This online campaign generated an important impact through social media and is being "embraced" by a growing number of countries, the #TravelTomorrow amplifying the voice of tourism, which is united in the face of this global and unprecedented challenge (UNWTO, 2020).

NEW MEDIA, BLOGS AND TRAVEL BLOGS

The new mediums of communication are commonly referred to 'new media' (and include social networks, websites, blogs, video games, social media, etc.) (Briciu, Briciu and Găitan, 2019, p. 584). Weblogs offer today a wide range of materials related to health, news, tourist experiences, etc., as "a website owned by an entity (a person, a group of people, a company, etc.) where articles are posted on specific topics, and people who visit the blog can add comments" (Briciu and Briciu, 2021, p. 2611).

Blogs are a means of communication on the WWW that make it easier for people to communicate freely (Gala, 2004) and can be defined as "a website that contains an online

personal journal with reflections, comments, and often hyperlinks provided by the writer" (Kelleher and Miller, 2006, p. 396).

Bloggers can upload videos, photos, and information from their area of interest; there are general blogs, but also thematic blogs according to users' preferences (travel blogs, cooking blogs, fashion, professional development, etc.) From this point of view, travel blogs are online journals and stories designed to provide information and engage the reader in the travel experience.

RESEARCH

This study focuses on Romanian travel blogs as a means of communication between bloggers and consumers during the pandemic caused by the COVID-19 virus. Blogs have the advantage of transmitting transparent information to the public, to achieve certain objectives, including promoting tourism (Briciu and Briciu, 2020a) and disseminating travel experiences. To see how the content generated by the posted articles has changed, how travel bloggers have adapted during this period of pandemics, we developed a comparison situation between March, April, and May of 2019, respectively the same months of 2020.

The sample was defined by the best Romanian travel and tourism blogs from 2019 according to the ranking published by *Biz Magazine* in collaboration with *Zelist*, which annually deliver "Digital Report", a synthesis of the online environment in Romania (Săndulescu, 2019). Regarding the selection criteria, we used the condition of at least five posts within a year and with at least three articles published in the last three months of the analysed period: January 1 - December 31, 2018, so the final sample consists of 14 blogs. The analysis focused on: (1) the visual content, (2) the written content, and (3) the tags most commonly found on travel blogs.

Discussing the results for the first dimension: "Visual Content of Travel Blogs", sponsorships (as a category) were more frequent in 2019 than in 2020, because the COVID-19 virus also influenced this sector, as bloggers could test and provide feedback on products or services last year. Photos related to holidays and travel were more common in 2019, but what we could determine is that in 2020 bloggers posted more photos from previous holidays or different destinations from the previous year. The photos from the category of airlines played an important role during this year because the most common and important topics for tourists were the ones related to planes.

Regarding the result of the second analysed dimension: "Written Content of Travel Blogs", the main categories from 2020 were COVID-19, tourism, other topics, and from 2019: sponsorships, other topics, travel, tips, events. In the COVID-19 category, most articles addressed the subject of airlines, and the fewest were represented by health insurance. In the tourism category, the most approached topic was about the guides for visiting some destinations or attractions, how global tourism will recover, etc. The most common subject in other topics category was about online events, such as museums and galleries that offer virtual tours. The category of sponsored products or services included five main topics: care/ beauty products and online networks, technical or travel equipment, different stores, and promoted destinations.

"Use of Tags on Travel Blogs", the third dimension was characterised by the subject of COVID-19 (126 tags), and destinations from 2019 (108 tags). These tags best illustrate the topics covered by the selected travel blogs. The news category in 2019 includes 45 tags, and in

2020 this topic is all about COVID-19. The labels regarding the destinations in Romania for 2019 are 30 in number, and for 2020 they are 38 in number, and for airlines in 2019 we found 9 tags, and in 2020, 45 tags.

CONCLUSION

The objectives initially set were achieved following the interpretation of the results, so that the influence of Coronavirus was identified by the content of the articles posted on the Romanian travel blogs. The global impact of Coronavirus has generated useful information for consumers. Another important thing is that travel bloggers were able to provide quality content for their followers and have turned this inconvenience into an advantage. Travel bloggers generated content on blogs, regardless of the existence of the COVID-19 virus, and they continued to post and adapt the content of articles from the perspective of the impact of the virus. Thus, they generated relevant information to consumers, attracting them and managing their loyalty through articles posted on travel blogs.

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CREATING PERSONALIZED GUEST EXPERIENCE JOURNEY IN LEISURE HOTEL

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Abstract: *With advancements in technology, the use of Virtual Reality (VR) and Artificial Intelligence (AI) in the hospitality industry has become common. New technologies have changed the guests expectations and their journey. Therefore, the purpose of this paper is to provide a comprehensive conceptualization of the personalized guest experience journey in leisure hotel i.e. the way front-line employees creates personalized and pro-active guest experience that the intelligent use of data and technology support. The paper provides systematic literature review of VR and AI as support tool for front-line employees while creating personalized guest experience during each of the five stages of the guest cycle: pre-arrival, arrival, stay, departure, post-stay. This paper is theoretical, so empirical studies are necessary to validate or reject the proposed concept.*

Keywords: *Guest experience journey, Virtual reality, Artificial intelligence, Front-line employee.*

1. INTRODUCTION

Today's digitally advanced consumers expect more technologically driven products and personalized experiences. They are empowered through technology, well informed, they research and form an impression, cultures are diverse, speed is of the essence, decision making is experiential, they demand a stay which is tailor-made to their expectations and personalized to their needs. They want to be captivated from their first thought of travel to their return home with memories that will last a lifetime. They share and compare a hotel experience with unique experiences they and their network had with any industry (Ruel and Njoku, 2020). This finding is especially true for millennial guests equipped with smartphones, wireless connectivity, and digital literacy (Femenia-Serra, Perles-Ribes, Ivars Baidal, 2018).

In response to customers' expectations and as a means to improve customer experience management, many hospitality businesses have started to adopt new approaches to service experience that involve service automation, mobile applications, artificial intelligence (AI), and even the involvement of service robots (Ivanov and Webster, 2018; Ivanov, Webster, and Berezina, 2017). Those IT innovation capability has been widely recognized as being a source of competitive advantage as it enhances interactions between customers and front-line employees (Ottenbacher and Gray, 2004; Sipe, 2016).

Virtual reality (VR) is an important technology in the provision of high-value tourism propositions (Yung and Khoo-Lattimore, 2017). In VR experiences users are immersed in 3D virtual environments, where they can navigate and, possibly, interact, which triggers sensory

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stimulation (Guttentag, 2010). In the hospitality context, it delivers important information to potential customers in a way they can experience it. Rather than reading through descriptions, which may or may not be trustworthy, it offers customers the chance to experience things for themselves. With affordable VR support device (e.g. Google Cardboard) or available VR contents (e.g. 3D maps or content, web or mobile-based applications) customers can experience a realistic presentation of the hotel or one of the nearby attractions (Tussyadiah, Wang, Jung, and Tom Dieck, M., 2018). Essentially, this allows the hotel industry to benefit from the type of *"try before you buy"* marketing that has been commonplace within the food industry for decades (Zhang, Chen, Huang, and Wan, 2019).

Another technology that can improve and enhance operational efficiency and the customer experience in hotel operations is artificial intelligence (AI) (Bowen and Morosan, 2018; Ivanov and Webster, 2017; Naumov, 2019; Prentice, Lopes, and Wang, 2019). Artificial intelligence (AI) refers to computational agents that act, respond or behave intelligently (Poole and Mackworth, 2010). AI is manifested in humanoid and non-humanoid forms (e.g. automated services) that can mimic or perform human tasks and solve problems through learning, analysing, and interpreting data (Mellit and Kalogirou, 2008). It can be effectively utilised in reasoning, explaining, modelling, predicting, and forecasting. Most hotels use AI services such as chatbots, concierge robots, digital assistants, voice-activated services, and travel experience enhancers. Hilton has adopted in operation AI robot called "Connie" which interacts with guests and provides necessary information. Even though AI brings value to the business, it may cause human talent to be replaced by technology in some cases (Ivanov and Webster, 2017; OECD, 2018; Cain et al., 2019; Prentice et al., 2020). Such findings and claims impact employees' responses within the workplace (Li et al., 2019). On the other hand, McKendrick (2018) and Wirtz et al. (2018) claim that AI can only replace certain tasks, not jobs. Only low-skill and low-wage jobs are likely to be automated and replaced by robots. Wirtz et al., (2018) indicated that customers prefer to deal with "people", not AI-powered robots. In that sense, hospitality businesses are challenged to find the right balance between human touch and technology while providing personalised guest experience.

Hence, the purpose of this study is to provide a comprehensive review of research on VR and AI in travel, tourism, and hospitality. Second, based on the analysis of available literature, this paper will identify research gaps and create the conceptual model of personalized and pro-active guest experience that the intelligent use of data and technology support. Specifically, the paper aims to address the following questions:

Q1. *What are the main developments in VR and AI research in hospitality between 2017 and 2020?*
Q2. *What directions in research would advance the current understanding of VR and AI as supporting tool for creating personalized guest experience in leisure hotel?*

A thorough understanding of what has been done and how VR and AI have performed in the hospitality industry could assist researchers and practitioners in revealing research gaps and creating more personalised guest experience in leisure hotels.

The paper is structured as follows: the below section describes the research methods following the results of a systematic literature review. Based on the research findings, the conceptual model is proposed together with an explanation of the terms that make up personalized guest experience journey in leisure hotel. The paper closes with its contribution and implications for research and practice.

2.   METHODOLOGY

The systematic quantitative approach employed in this paper is adapted from Khoo-Lattimore, Mura, and Yung (2017) to map, analyse and synthesise the existing literature on VR and AI as supporting tool for hotel front-line employees while creating personalized guest experience. The five-step process includes: (1) defining the research aim and objectives; (2) identifying searched keywords, databases and establish literature selection criteria; (3) searching databases, screening searched outcomes against the selection criteria, and refining the inclusion and exclusion criteria; (4) extracting relevant materials from eligible searched outcomes and structure summary table; and (5) synthesising findings and presenting conceptual model.

The intention was to gather as comprehensive as possible a picture of English-language academic research linking the study. The data collection was conducted between August and September 2020. All articles from four top-tier hospitality journals (*Cornell Hospitality Quarterly (CQ), International Journal of Contemporary Hospitality Management (IJCHM), International Journal of Hospitality Management (IJHM) and Journal of Hospitality and Tourism Research (JHTR)*) were gathered and analysed to present a comprehensive review. The four journals were selected because they are the top academic journals for hospitality and tourism as ranked by researchers in those domains (Gursoy and Sandstrom, 2016). They were gathered from three online databases, namely:
1. ScienceDirect (www.sciencedirect.com)
2. Emerald Management eJournals (www.emeraldinsight.com); and
3. Sage Journals (http://online.sagepub.com)

The authors implemented extensive searches in those databases by using a combination of the following search words in the title, abstract, and keywords of the publications: virtual reality, artificial intelligence, guest experience, hospitality. Two selection criteria were applied. First, only full-length papers published in referred hospitality journals were included in the analysis. Research notes, literature review studies, book reviews, and editor prefaces were excluded. The exclusion of non-journal publications has been a regular occurrence in systematic reviews (Kim and Cuskelly, 2017; Thomson et al., 2018; Yang et al., 2017). Second, only papers published in the period from 2017 to 2020 were retrieved to ensure the information analysed and presented was current. Selected journal articles were directly exported to the free reference manager Mendeley which helped the authors organize the research. The authors read the title and the abstract of every publication displayed in the search results to initially assess whether it, indeed, has a focus on VR and AI in hospitality. If the paper was considered relevant for the research, the full text was obtained. At the end of the data collection process, a final sample of 31 papers was generated for analysis. Each publication was further scrutinized closely following the content analysis during which subthemes emerged (cultural context, citation, nature of work, key findings). Based on these findings the conceptual model and conclusions are drawn throughout the paper.

3.   DESCRIPTIVE RESULTS

This section presents the most relevant results of the literature review on VR and AI technology in selected hospitality journals. As shown in Figure 1, publications on this topic began to appear in 2017 and have been growing in number ever since, suggesting an increase in interest in this subject. A total of 31 articles were published during the year 2017-2020, with 2020 (n=17) as the peak year. From the same table is evident that two hospitality journals *International Journal*

of Contemporary Hospitality Management (n=20) and *International Journal of Hospitality Management* (n= 6) included most VR and AI publications between 2017 and 2020.

Figure 1. Distribution of publications by year (2017-2020)
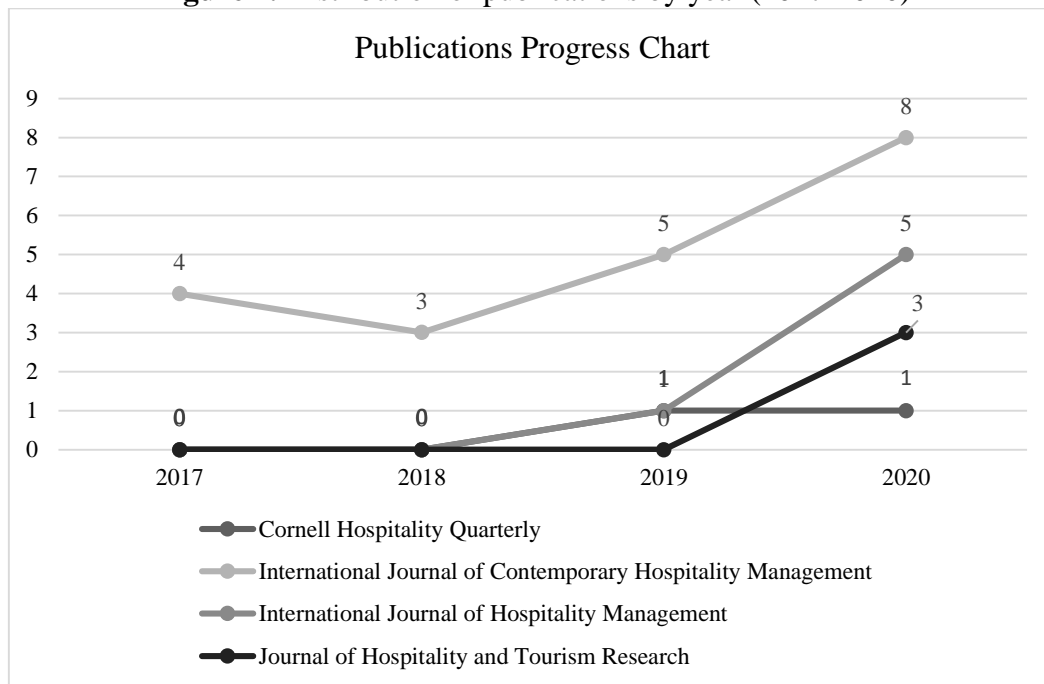
Source: authors

In terms of the cultural context within which the extant research is conducted, this study found that most of the extant VR and AI research has been done in the USA (Table 1), specifically for AI research (n=16). The same Table 1 shows that most of the research has studied AI technology (n=25) while only four of them VR technology. The other two studies are research papers on AI technology without a defined cultural context.

Table 1. Country-wise distribution of articles

Country	VR	AI	Total
USA	3	16	19
USA and Japan	-	1	1
India	-	2	2
Korea	-	2	2
Taiwan	-	1	1
Australia	-	1	1
China	1	-	1
China and UK	-	1	1
London, UK	-	1	1

Source: authors

The most cited articles are shown in Table 2. Out of 31 selected papers in this study, 22 have citations in Web of Science. Table 2 presents the most cited articles in *Web of Science*. Articles with AI research have the highest number of citations which confirms the interest and quality of papers in this subject.

Table 2. Articles with the greatest number of citations in Web of Science

Article	Technology	Citation
Tung and Au (2018)	AI	52
Kuo, Chen, and Tseng (2017)	AI	50
Tung and Law (2017)	AI	48
Sarmah, Kamboj and Rahman (2017)	AI	23
Park and Huang (2017)	AI	14
Beldona, Schwartz and Zhang (2018)	AI	10
Jung, tom Dieck and Chung (2018)	AI	10
Choi, Liu and Mattila (2019)	AI	10
Leung, Lyu and Bai (2020)	VR	5

Source: authors

In the following tables, a chronological summary of identified literature on VR and AI is presented. In total, out of 31 research papers, only 4 of them research VR while 27 of the AI technology. Only one paper has included both VR and AI in their discussion. The empirical papers were broken down by method with first qualitative methods (n = 3), then quantitative methods (n = 28) from which 4 of them are mixed methods.

The literature review shows that hotels use different images of physical environments to attract customers and assist them in their decision-making process, resulting in the purchase of hotel stays. Slevitch, Chandrasekera and Sealy (2020) emphasized in their paper that guest's purchase decisions can be based on the visuals and reviews available on hotels' websites. How hotel companies communicate their image, design, and service before the booking or purchase often becomes a competitive advantage issue. Various types of intelligence technologies such as virtual reality (VR) have transformed the traditional ways that people choose their travel destination and hotel stay. Through the digitally accommodated environment, VR allows customers to experience products, services, or places before they purchase (Chung et al., 2015; Tussyadiah et al., 2018)

There are several definitions of virtual reality (VR) in the academic literature based on a range of technologies, concepts, and theories. This study has focused on VR definition used by Slevitch, Chandrasekera and Sealy (2020) in the hospitality journal. In that study, Steuer (1992) defined VR as a "simulated environment in which a perceiver experiences telepresence. Telepresence refers to "the sense of being present in the remote environment" (Steuer, 1992). It explains customers' indirect, virtual experiences through the website (Li et al., 2002). Table 3 lists the latest empirical studies regarding VR in the hospitality industry. Prior VR research in the hospitality and tourism industry investigated which factors influenced customers' VR acceptance and how VR technology shaped their experiences. Findings of this research highlight that VR can be a great marketing tool for hospitality companies by generating more traffic and drawing customers' attention to the hotel. In that sense Touni, Kim, Choi, and Ali, (2020) point out that the use of digital communication technologies increases guest engagement. Moreover, the VR quality factors are key motivators that affect customers' use of VR to maximize their experience and increase their future visit intention to the destination. However, Leung, Lyu, and Bai (2020) research indicates that VR commercials are effective only in influencing customers' immediate decisions, as this influence does not seem to last long. The same study demonstrates that consumers remember details but forget brand names. The use of virtual reality visualizations as a promotional tool might not be more effective than traditional photos (Slevitch, Chandrasekera and Sealy; 2020). Therefore, hotels need to embed more brand messages in VR commercials to increase brand recall in the long run.

Another innovative technology that is changing the way the hospitality industry presently operates is artificial intelligence (AI) which refers to computational agents that act, respond or behave intelligently (Pool and Mackworth, 2010 in Prentice, Weaven and Wong, 2020). It is manifested in humanoid and non-humanoid forms (e.g. automated services) that can mimic or perform human tasks and solve problems through learning, analysing, and interpreting data. Table 4 below presents the latest findings of AI in hospitality journals. In customer service, AI (e.g. robots and chatbots) are extensively used to engage customers and enhance the service experience by providing convenience and flexibility (e.g. 24/7 automated services, concierge robots, chatbots) (Walchuk, 2019 in Prentice, Weaven and Wong, 2020). Such self-service technology creates entertainment and emotional worth (Xu, Jeong, Baiomy and Shao, 2020). Chatbots are artificial intelligence-based service robots designed to provide human–computer interaction via natural conversation language (Chung, Joung and Kim, 2018 in McLean, Frimpong, Wilson and Pitardi, 2020). Because of machine learning and intelligent software algorithms, they provide human-like conversations that are more engaging to the customers (SAP, 2018 in Pillai and Sivathanu, 2020). The earlier versions of chatbots were simple response platforms, whereas the current AI-based chatbots are much more sophisticated, powerful, and capable, increasing the human–technology interaction (Rajan and Saffiotti, 2017 in Pillai and Sivathanu, 2020). They are used for travel planning and customer booking (Bowen and Morosan, 2018 in Shin and Jeong, 2020). Besides the use of the mobile device for hotel booking, AI provides guests the possibility to do check-in and check out without the need to stop by the reception. The guest's mobile device is used as a room key and as a place from which guests can control lights and temperature before even entering the room. (Pillai and Sivathanu, 2020). Some hoteliers are using service robots in various areas, including front desk, guest service, room service, and housekeeping. Hilton hotel chain, for example, implemented a humanoid robot, Connie, to support guests at the front desk (Statt, 2016 in Shin and Jeong, 2020).

There are certain challenges that service robots may pose such as high costs, skill deficits, and significant changes to the organizational structure and culture of hotels (Xu, Stienmetz and Ashton, 2020). Furthermore, the quality of service robot interaction depends on guest engagement (Cha, 2020). Even the guests have favourable attitudes toward robot concierges, guests prefer human employees because of humans 'sincere and genuine interactions. Human interaction in hospitality is mandatory to create personalized service (Sarmah, Kamboj and Rahman, 2017, Pillai and Sivathanu, 2020, Mclean et al., 2020, Zemke, Tang, Raab, and Kim, 2020). Robots can enhance the productivity of hospitality operations but cannot replace human interaction and quality of experience (Tung and Law, 2017). Similar findings Susskind and Curry (2019) noted in the restaurant industry; therefore, it is hotelier's responsibility to create personalized and memorable guest experience which will satisfy the new technology-minded guest.

4. CONCEPTUALIZATION OF PERSONALIZED GUEST EXPERIENCE IN LEISURE HOTEL

Personalized guest experience is a complex process that is accomplished by any direct or indirect interaction of the customer with the hotel before, during, and after his or her stay at the hotel (Chen and Chen, 2010). Memorable experiences are pivotal in becoming and remaining competitive in the marketplace, especially in the service industry. Sthapit and Coudounaris (2017) point out in their study that memorability is a more appropriate predictor of future behavioural intentions such as revisiting a place or providing a word-of-mouth recommendation than satisfaction. Today's technology-driven, digitally advanced guests

expect personalized experiences at every point of their journey. The framework of this study recommends the application of VR, and AI in leisure hotels as supporting tool for front-line employees while providing personalized guest service during each of the five stages of the guest cycle: prearrival, arrival, stay, departure, and post-stay.

The first stage of the hotel guest cycle is the "pre-arrival" stage during which two main operations are carried out by the potential customer: gathering information and booking. The potential customer initially searches for information about the accommodation options in the destination that interests her/him. He examines different hotel types, compares services, amenities, and prices. At this stage, the hotel needs to be as visible as possible for the potential customer. VR and AI can be applied to engage consumers during all stages of the customer journey (Bec et al, 2019; Flavian et al., 2019) and offer valuable overall experiences. Such technologies used in hospitality can increase customer loyalty, enhancing customer interactions and customer experience (Howell and Hadwick, 2017). In the pre-arrival stage, VR might inspire potential guests by conveying a realistic preview of how the real experience would, in the event, turn out (Neuburger et al., 2018), thus reducing the perceived uncertainty and risk of purchasing the hotel product (Bogicevic et al., 2019). Furthermore, by adding AI to hotel digital concierge service, called chatbots hotel gets in touch with the customer in the earliest stage and creates customized offer. After making a hotel reservation, the guest can use the hotel mobile apps to inform the hotel about her/his preferences such as room lighting, room temperature, extra pillows, food, and beverage order. Moreover, with just one click, guests can order an airport transfer and do the check-in at their convenient time. Such service eliminates much of the administrative work for the front-line employees and thus gives more opportunity for human interaction and the creation of personalized guest experience while the guest is in the hotel. During their stay, modern guests want to remain connected to the Internet (Sarmah, Kamboj and Rahman, 2017) and by using the hotel mobile application they can control room light and temperature, set up a wake-up alarm, turn on the TV, pull the curtains, make a room service order, request spa services and so on. Additionally, through chatbot technology, they can discover information related to the hotel and the attractions and restaurants near the hotel. Even though the chatbots provide reliable information, guests still prefer concierge service face to face (Pillai and Sivathanu, 2020). They are the ones who will add value to the guests' overall experience. Some hotels use robots for room service and room cleaning. Moreover, robot service can assist with administrative tasks during the departure stage, such as payment and ordering help for the luggage, call an Uber driver, or similar. Finally, guests might record 360-degree videos of their hotel experience and later share it with others who might, thereafter, view it in a VR pre-experience and, as a result, opt for that specific hotel. In order to stay in a touch with guests, hotel management needs to stay active on social media, respond accurately to guest's reviews, and gather all information for future promotion. AI offers great opportunities in the field of data analysis. AI platforms track numerous guest reviews from different channels - bookings, transactions, satisfaction surveys, third parties, and so on. Therefore, hotel companies should use this information to create personalized offers and enhance the guest experience in all stages of the guest cycle.

Besides all these advantages, it is very important to emphasize that robot's knowledge and service quality improves with every interaction with guests. If guests do not use them often, the level of provided service quality will be low. Hence, hotel managers must ensure that front-line employees are there for the guest when they need them and trained to excel in the human side of hospitality. In that sense, Bahadur, Azizi and Zulfiqar (2018) and Marković (2019) affirmed that employees play a major role in customer satisfaction and loyalty.

5. CONCLUSION

This study presents a systematic literature review of VR and AI technology in hospitality journals in the period from 2017 to 2020. A total of 31 full-length journal papers were retrieved and thoroughly reviewed. A detailed report for the progress on the research methodologies and findings of VR and AI technologies in hospitality journals over the last four years is presented (Tables 3 and 4). The major research has been done in the last 12 months probably due to COVID 19 situation which forced both scientists and practitioners to find the best way for creating personalized experience in the hotel while practicing COVID 19 restrictions such as social distance. In that sense, Jiang, and Wen (2020) emphasized that implementation of AI and VR together with hygiene and health care have become important hotel marketing and management practices during the COVID 19 pandemic. Although more and more hotel companies have started implementing service robots and chatbots in their operations, some research indicated that guests prefer human employees because of humans' sincere and genuine interactions (Thung and Law, 2017; Shin and Jeong, 2020; Pillai and Sivathanu; 2020). Zemke et al. (2020) pointed out that implementation of robot service in operation is more present for routine tasks in Quick service restaurant industry.

Therefore, the conceptual model of this study contributes to hospitality management because it proposes a strategic tool for creating personalized guest experience during the whole guest's journey. AI and VR technology are supporting tools for front-line employees and if they are used appropriately, they can improve guest experiences.

For future studies, it is important to note that the selection of hospitality journals had a high influence on the review process. While this review paper followed the approach recommended by Gursoy and Sandstrom (2016) and their selection of four top-tier hospitality journals (*Cornell Hospitality Quarterly(CQ), International Journal of Contemporary Hospitality Management (IJCHM), International Journal of Hospitality Management (IJHM) and Journal of Hospitality and Tourism Research (JHTR)*), future research may consider other journals and databases such as EBSCOhost's Hospitality and Tourism Complete and Scopus when the access is available. The review performed in this study also revealed that more than half of the empirical VR/AI research published between 2017 and 2020 represents USA contributions, therefore some more research should be done in European and Asia countries. Furthermore, this paper is theoretical, so empirical studies are necessary to validate or reject the proposed concept in the hotel and some other service settings such as restaurants, museums, entertainment parks.

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APPENDIX

Table 3. A Summary of key research findings VR

No	Authored work (Year)	Nature of work	Technology	Key findings
1	Lee (2018)	Empirical	VR	*Hotel's website is viewed as an important platform that helps develop customers' pre-consumption experiences before customers' onsite experiences.*
2	Slevitch, Chandrasekera and Sealy (2020)	Empirical	VR	*The use of virtual reality visualizations as a promotional tool might not be more effective than traditional photos.*
3	Touni, Kim, Choi, and Ali (2020)	Empirical	VR	*Use of digital communication technologies increases guest engagement*
4	Leung, Lyu, and Bai (2020)	Empirical	VR	*Virtual reality commercials are effective only in influencing customers' immediate decisions, as this influence does not seem to last long. Traditional commercials appear to improve brand attitudes in the long run.*
5	Lee, Lee, Jeong and Oh (2020)	Empirical	VR	*The VR quality factors are key motivators that affected customers' use of VR to maximize their experience and increase their future visit intention to the destination.*

Source: authors

Table 4. A Summary of key research findings AI

No	Authored work (Year)	Nature of work	Technology	Key findings
1	Park and Huang (2017)	Empirical	AI	*The hotel mobile purchasing process needs to be simple, easy to understand and provide customer options to control transactions personally.*
2	Kuo, Chen and Tseng (2017)	Empirical	AI	*The six-dimensional service innovation model using service robots is an innovative model, which can generate a strategy for the sustainable competitiveness of hotels.*
3	Sarmah, Kamboj and Rahman (2017)	Empirical	AI	*Use of smartphone application add a value in hotel service innovation.*
4	Tung, and Law (2017)	Conceptual paper	AI	*Robots can enhance productivity of hospitality operations but cannot replace human interaction and quality of experience.*
5	Beldona, Schwartz, and Zhang (2018)	Empirical	AI	*Hotel guest technologies should be of a higher standard than those at home, for guests to be satisfied with them. Satisfaction with guest technologies has a relatively stronger impact on customer satisfaction in mid-scale and economy hotels compared to that in upscale and luxury hotels.*
6	Tung and Au (2018)	Conceptual paper	AI	*Guests and robots can co-create novel experiences and special relationship*
7	Morosan and DeFranc (2019)	Empirical	AI	*Hotel interactive technology (HINT) improves communication and experience during the whole guest's journey.*
8	Kang and Namkung (2019)	Empirical	AI	*The mobile app provides personalized services to the customers which can build strong customer relationships, but at the same time increase potential risks, such as privacy concerns.*
9	Suarez, Berezina, Yang and Gordon (2019)	Empirical	AI	*Customers of quick-service and midscale restaurants were more likely to adopt tablet-based menus compared to those of upscale establishments where direct employee service is required.*
10	Ineson, Čomić, and Kalmić (2019)	Empirical	AI	*The psychological and physical in-room needs of individual hotel guests are safety, security and control emerge. Some practical suggestions to complement, expand and enrich guests' in-room experiences are virtual travels from the*

				room via electronic media, the accumulation of souvenirs and others.
11	Choi, Liu and Mattila (2019)	Empirical	AI	*Straightforward and clear information (i.e. literal language) provided by frontline employees and technology-empowered service encounters improves service encounter evaluation.*
12	Lei, Wang, and Law (2019)	Empirical	AI	*Use of mobile technologies in hotel marketing and operation adds value.*
13	Susskind and Curry (2019)	Empirical	AI	*Use of tabletop technology add value to the restaurant experience but it does not replace it. It also reduces the amount of service labour needed for the table.*
14	Tuomi, Tussyadiah, and Stienmetz (2020)	Empirical	AI	*The degree to which service robots were used to automate service operations seemed dependent on the desired business model.*
15	Pillai and Sivathanu (2020)	Empirical	AI	*Chatbots provide reliable information to the guest but personal attention is missing.*
16	Cha (2020)	Empirical	AI	*Service robots in the hospitality industry require more customer interaction.*
17	Xu, Jeong, Baiomy and Shao (2020)	Empirical	AI	*Self-service technology is an instrument that can create entertainment and emotional worth.*
18	Jiang and Wen (2020)	Conceptual paper	AI	*Artificial intelligence (AI) and robotics, hygiene, cleanliness and health care have become important hotel marketing and management practices during the COVID 19 pandemic*
19	Shin and Jeong (2020)	Empirical	AI	*Even the guests have favourable attitudes toward robot concierges, they prefer human employees because of humans 'sincere interactions.*
20	McLean, Osei-Frimpong, Wilson and Pitardi (2020)	Empirical	AI	*Communication with a human live chat assistant positively influences customer attitudes and trust towards the website as well as on increased purchasing intention.*
21	Xu, Stienmetz and Ashton (2020)	Empirical	AI	*Even though the service robots are anticipated to increase efficiency and productivity of hotel activities, they may also pose challenges such as high costs, skill deficits and significant changes to the organizational structure and culture of hotels.*

22	Zhu and Chang (2020)	Empirical	AI	*Robotic chefs with human appearance and actions enhance customers' food quality prediction.*
23	Zemke, Tang, Raab and Kim (2020)	Empirical	AI	*Robots have become more and more implemented into Quick Service restaurant industry, but customers still believe that human touch is critical to maintain in some way.*
24	Ho, Tojib, and Tsarenko (2020)	Empirical	AI	*Service robots create higher customer satisfaction than human frontline employees after the exactly similar service failure.*
25	Prentice, Weaven, and Wong (2020)	Empirical	AI	*Services provided by machines or robots can contribute to service quality perception, customer satisfaction and engagement in hospitality business.*
26	Sun, Lee, Law and Hyun (2020)	Empirical	AI	*Hotel employees with less than three-year hotel work-experience are more optimistic of the perceived usefulness of hotel technology.*

Source: authors

LIVING ON CROATIAN ISLANDS – PERCEPTIONS AND REALITIES OF ISLAND DEVELOPMENT POLICY

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Abstract: *The Croatian islands make the second-largest archipelago in the Mediterranean. There are 1244 islands (78 islands, 524 islets, and 642 rocks and rocks awash) that are situated in a range of 450 km along the eastern coast of the Adriatic Sea. The total area covers 3300 km2 (about 5.8 % of Croatian mainland territory) and the length of their coast is 4057 km. Twenty of these islands occupy an area larger than 20 km2 each, and the other 58 ones have a surface from 1 km2 to 20 km2. There are 47 islands that are permanently inhabited. Administratively, islands belong to seven coastal counties and 51 island towns/municipalities. Several small islands are in the jurisdiction of seven coastal cities.*

By the Constitution, islands are considered as a region of special protection and unique value. Islands specificities require development policy that takes account of demographic, economic, environmental, and other island issues. In the situation of the COVID-19 pandemic, island development policy becomes even more challenging and complex.

This paper aims to analyse the attitudes and perceptions of the islanders about the living conditions on the island and the impact of public policies on island development. Identifying the problems from the local perspective helps us to evaluate the success of island development policy. Effective island policy increases the quality of life of the islanders while respecting island specifics. For this purpose, the results of a survey conducted on a sample of the inhabitants of Croatian islands conducted in 2020 are used. The surveys were conducted using the online tool LimeSurvey. The results indicate that 42 percent of the islanders think that living conditions on the islands are not improving. Most of the islanders think that government policy does not encourage island development. The paper also identifies factors that are responsible for differences in attitudes and perceptions of islanders.

Keywords: *Islands, Living conditions, Development policy.*

1. INTRODUCTION

The Croatian islands make the second-largest archipelago in the Mediterranean. There are 1244 islands (78 islands, 524 islets, and 642 rocks and rocks awash) that are situated in a range of 450 km along the eastern coast of the Adriatic Sea. The total area covers 3300 km² (about 5.8 % of Croatian mainland territory) and the length of their coast is 4057 km. Twenty of these islands occupy an area larger than 20 km² each, and the other 58 ones have a surface from 1 km² to 20 km².[3] There are 47 islands that are permanently inhabited. According to the last population census (2011), there were only 124,842 islanders, representing 2.8% of the total population. Administratively, islands belong to seven coastal counties and 51 island towns/municipalities. Several small islands are in the jurisdiction of seven coastal cities.

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This paper aims to analyse the attitudes and perceptions of the islanders about the living conditions on the island and the impact of public policies on island development. Identifying the problems from the local perspective helps us to evaluate the success of island development policy. Effective island policy increases the quality of life of the islanders while respecting island specifics. For this purpose, the results of a survey conducted on a sample of the inhabitants of Croatian islands conducted in 2016 and 2020 are used. The surveys were conducted using the online tool LimeSurvey. The results indicate that island policy has not changed significantly in the recent 20 years.

The paper consists of four parts. After the introduction, we proceed with elaborating the features of the island development policy. In the third chapter, we describe the methodology, used data, and present results. The paper ends with a conclusion and recommendation for future research.

2. SPECIFICS OF ISLAND DEVELOPMENT POLICY

By the Constitution[4], islands are considered as a region of special protection and unique value. Islands specificities require development policy that takes account of demographic, economic, environmental, and other island issues.

The island development policy has a long tradition[5], but policy decisions on island development have always been made on the mainland. Croatia is one of the few countries in the world which has introduced an island development strategy and adopted the special Islands Act. Although Croatia has rather long experience in governing island development, key development issues are remaining unanswered.

Although before 1997 development policy neglect island development specificities, Croatia has never ignored island connections to the mainland. The National Island Development Program (NIDP) was adopted in February 1997[6] and the first Islands Act was adopted in 1999 (OG 34/1999)'.

The Islands Act defined the formulation of 26 Sustainable Island Development Programs (SIDP) and the preparation and implementation of 14 State Programs for Island Development (SPID), which deal with specific sectors and social activities on all the islands. The state programs refer to traffic connections between islands and the mainland and between the islands themselves, the water supply and treatment of wastewater, electricity supply, island telecommunications, health care and telemedicine, preschool, primary and secondary education, and the organization of the cadastre and land registry. The Act also stipulated the Annual Island Program which includes all projects from the Sustainable Island Development Program and the state programs to be financed from the State Budget. Therefore, there was a tool for governing island development policy with both bottom-up (SIDP) and top-down (SPID) components. There are three profound amendments to the 1999 Islands Act (OG 149/1999, 22/2002 and 33/2006), and the new Islands Act was adopted in 2018 (OG 116/2018).

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[4]   The Constitution of the Republic of Croatia, known as the Christmas Constitution, was adopted on 22 December 1990. Article 52 states: "The sea, seashore, islands, … and other natural resources, …. which are specified by law to be of interest to the Republic of Croatia shall enjoy its special protection. The manner in which any resources of interest to the Republic of Croatia may be used and exploited …. shall be regulated by law." (Kordej-De Villa and Starc, 2020: 230).

[5]   For detailed overview of Croatian island policy refer to Starc (2017) and Kordej-De Villa and Starc (2020).

[6]   Starc et al. (1997).

The new Act is better balanced than the old one. For the first time in a legal act, the notion of islandness[7] appears (Kordej-De Villa and Starc, 2020: 243).

From the reports on the implementation of the Island Act, it can be concluded that Croatia has been investing significant funds in island development. The reports present all public expenditures within the year, as well as various EU funds and development loans given by the Croatian Bank for Reconstruction and Development and the Council of Europe Development Bank. Between 2016 and 2019, non-returnable funds invested from the State Budget and EU funds in island development (75%) and average credit investment in island development (25%) totalled 1135 million EUR.

Figure 1. Total investment in island development in the period 2016-2019
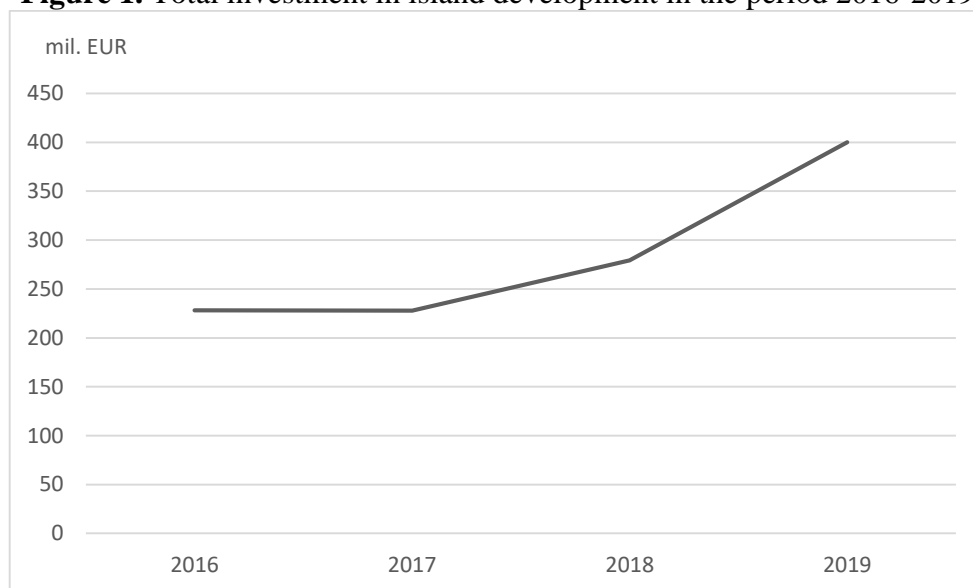
Source: Report on impacts of the implementation of the Island Act, different years

At the beginning of the 1990s European island policy began to emerge[8]. Its most important document, the Resolution on the Special Situation of Islands, was adopted by the EU Parliament in 2015. In 2016, the Smart Islands Initiative formulated the Smart Islands Declaration. These campaigns and policy documents bring the topic of islands to the forefront of European development policies.

3. METHODOLOGY, DATA AND RESULTS

In 2016, Starc (2017) surveyed the advantages and disadvantages of island life and island policy. 602 responses were collected from people which are living and/or working on the island. The results indicate that about a third of respondents (29.2 percent) believe that island conditions have been deteriorating in the last 15 years. Respondents consider limited employment opportunities to be the biggest problem of life on the island. As many as two-thirds (66 percent) of respondents consider that limited employment opportunities are one of

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[7]   Islandness is defined as "a set of geographic, social, historical, economic and ecological specificities resulting from being completely surrounded by the sea." (Article 5).

[8]   The first network of island authorities (ISLENET) was founded in 1993. In 2007, The EU Parliament adopted the Motion for Resolution which recommended customized measures for European islands. In 2011, a political initiative for European islands, called the Pact of Islands, was recognized by the European Parliament.

the five most significant problems on the Croatian islands. This is followed by an increasingly elderly population (46 percent of respondents), rare connections with the mainland (44 percent of respondents), a lack of doctor specialists (40 percent of respondents), and limited opportunities for progression in the professional career (34 percent of respondents). The problems of accessibility of island settlements concerning the mainland, which is especially visible on islands that are connected to the mainland only indirectly through another, neighbouring island are also noticed by other researchers (e.g. Marinković, 2018). The analysis of the public services on the islands conducted by Marinković (2018a) showed that only 19 percent of the settlements on the islands have a doctor, and only 12 percent have one of the specialized medical doctors which clearly shows the problem with the accessibility of health services on islands[9].

On the other hand, the beauty of nature and the environment, and a peaceful and healthy lifestyle are considered the main advantages of living on the islands, and such an attitude is especially prevalent among respondents who continuously live on islands (Starc, 2017). As expected, the attitude that limited employment opportunities and limited opportunities for progression in the professional career are among the biggest problems of the island's everyday life is more prevalent among the younger population. Interestingly, the aging of the population is the biggest problem for respondents of older age groups (67.4 percent of respondents aged 61 and over) and the least for respondents aged 31 to 40 (42.4 percent of respondents of that age group). It is surprising that "rare connections with the mainland" are a bigger problem for people who do not live on the islands or occasionally live on the island than for people who have lived on the island since birth. This problem is considered significant by 57.4 percent of respondents who do not live on the island and 56.2 percent of those who live on the island occasionally. Respondents believe that the state implements an island policy that mostly neglects small islands, especially those that are further away from the mainland[10].

Figure 2. Basic problems of everyday life on the island, n=602, 2016
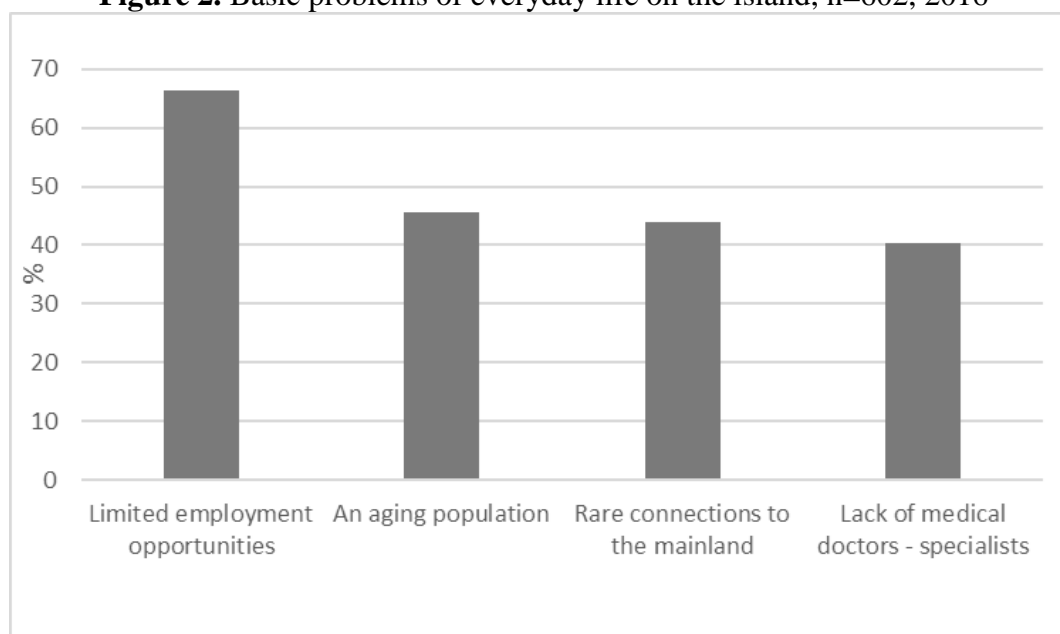
Source: Starc, 2017

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[9]   See also Babić (2004).
[10]   Satisfaction with the quality of life on Croatian small islands are presented in Podgorelec et al. (2015).

After elaborating on the main problems on the islands, we wanted to investigate whether islanders think that the situation on the islands has been improving and what factors affect a certain perception of the population about everyday life on the islands. The analysis is based on the results of the survey conducted among people who permanently or occasionally live on the islands. The survey was conducted in June of 2020. The survey collected views on the living conditions on the island and the impact of public policies on island development. The questionnaire was collected from 205 respondents. Data collection was performed using the LimeSurvey tool for the development of survey questionnaires, which is intended for the collection of anonymous responses from respondents. The statistical program SPSS Statistics 23 was used for data analysis.

The basic claims analysed in the paper are "Island living conditions are improving" and "State island policy encourages the development of all islands". Respondents had to rate these statements on a scale from 1 (strongly disagree) to 5 (strongly agree). Also, data were collected about the island on which the respondent permanently or occasionally are living. Since this was not a mandatory question, the data on the islands covered by the survey is not fully known because about half of the respondents did not answer this question. Also, some respondents have a residence on two islands. Islands included in the analysis are Cres, Dugi otok, Ilovik, Iž, Krk, Lošinj, Olib, Pag, Pašman, Rab, Silba, Susak. Ugljan, Vir and Zlarin. So out analysis cover at least 15 from 47 permanently inhabited islands. Table 1 contains basic data on islands that are known, that are covered with the analysis.

Table 1. Basic data about islands in the sample, descriptive statistics

Variable	Number of islands	Mean	Median	Minimum	Maximum	Std. Dev.
Island area, km^2	15	105.1	51.1	3.8	405.7	140.8
Length of coast, km	15	99.3	70.2	12.9	302.5	94.3
Number of settlements on the island	15	11	5	1	68	18.0
Average population density (inhabitant/km^2)	15	51.1	37.3	5.4	135.7	43.1

Source: authors analysis based on Croatian bureau of statistics data

Table 2 shows the characteristics of the sample. As can be seen, the questionnaire was mostly answered by people living permanently on the island, and they make up 87 percent of the total number of respondents. The remaining 13 percent are people which live on the island for more than 3 months a year. Such a structure of respondents allows us to examine the respondents' perception of the influence of the government policy on everyday life on the island.

Table 2. Sample characteristics

Variable		%
Gender	Male	41.7
	Female	58.3
Education	Secondary school	35.8
	University of higher	64.2
Age	18-34	17.8
	35-59	68.2
	60+	14.0
Living status on the island	Permanent inhabitant	87.0
	Respondent is living on the island for more than 3 months yearly	13.0

Source: authors´ analysis based on survey data

The paper examines the islanders' opinions about the living conditions on the island. Figure 3 shows the perception of respondents about living conditions on Croatian islands.

Figure 3. Perception of living conditions on islands
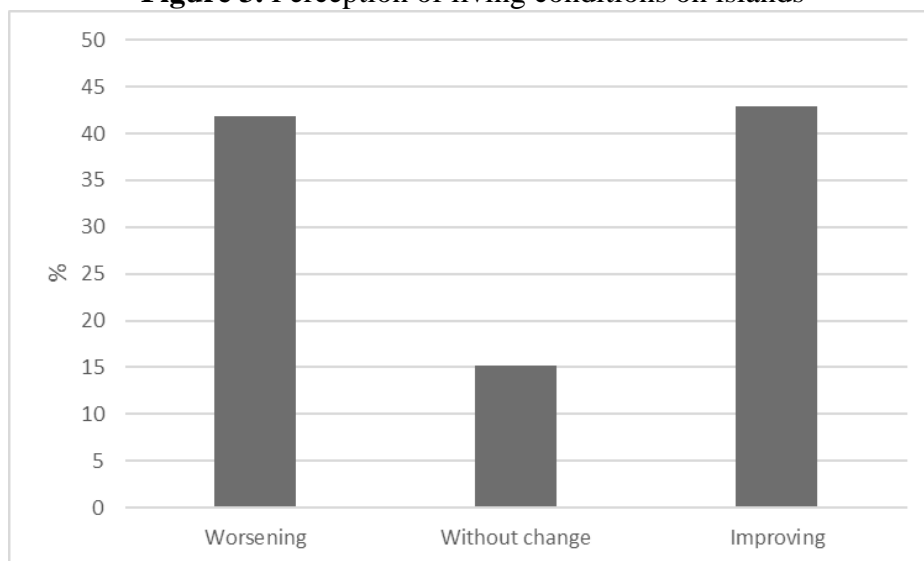
Source: authors´ analysis based on survey data

Looking on average, around 42 percent of respondents think that living conditions on islands have improved, while 15 percent of them think that there is no change in the living conditions on islands.

Figure 4. Living conditions on islands has been improving
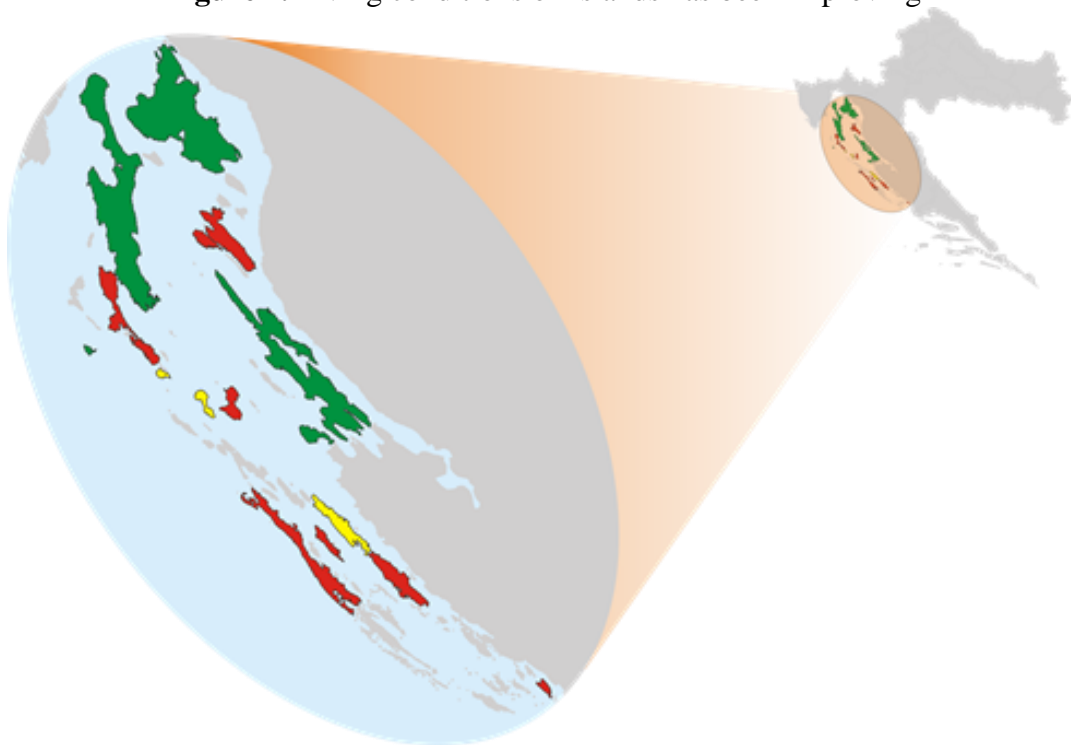
Note: red – islands where most of the respondents disagree with the statement, yellow – islands where respondents neither disagree nor agree with the statement, green – islands where respondents mostly agree with the statement.
Source: authors´ analysis based on survey data

Figure 4 shows the differences in average attitudes of respondents about the living conditions on different islands. On island Pag, Cres, Krk, Vir and Susak respondents, looking on average, feel that living conditions have improved. The islands on which the respondents, looking on average, have an opinion that the living conditions on the islands have neither improved nor worsened are Ugljan, Ilovik and Silba. On islands, Rab, Pašman, Olib, Lošinj, Dugi otok, Iž and Zlarin most of the respondents have the opinion that the living conditions are worsening.

In the next step, we wanted to explore what people who live permanently or occasionally on the islands think about government policy focused on the islands. In particular, whether the state encourages the development of the island with its island policy. Figure 5 shows the results of the survey.

Figure 5. Impact of government policy on the development of islands
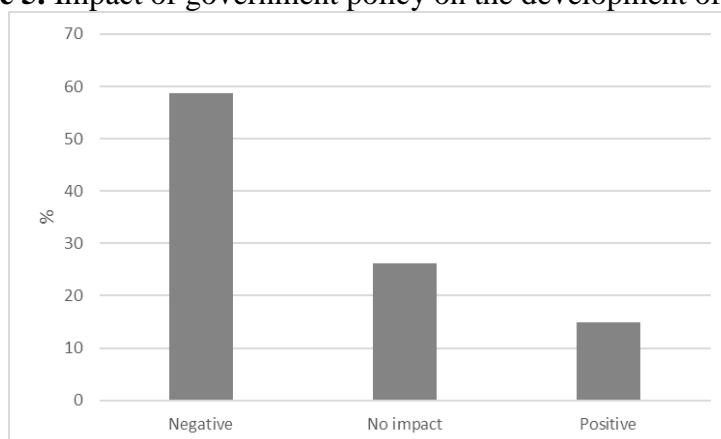
Source: authors´ analysis based on survey data

As many as 85 percent of respondents have a negative opinion about the island's policy conducted by the state. Thus, 59 percent of respondents believe that the government does not encourage the development of the island. Besides, 26 percent of respondents believe that government island policy has no impact on island development. Only 15 percent of respondents believe that the government encourages the development of the island.

A chi-square test was conducted to determine differences in attitudes between respondents about living conditions on islands and government island policy. Results are presented in table 3.

Table 3. Chi-square test

	Do not agree, %	Neither agree nor disagree, %	Agree, %
Living conditions on islands has been improving			
Age (Pearson chi-square: 14.598, df=8, p=0.067) (in%)**			
18-34	26.3	26.3	47.4
35-59	38.9	15.3	45.8
60+	78.6	0.0	21.4
Island area (Pearson chi-square: 5.238, df=8, p=0.732 (in%)			
1-15 km²	57.1	28.6	14.3
15-50 km²	28.6	14.3	57.1
Larger than 50 km²	41.3	14.1	44.6
Number of inhabitants on the island (Pearson chi-square: 11.748, df=12, p=0.466)			
85-300	62.5	25.0	12.5
301-3000	60.0	13.3	26.7

3001-7000	27.3	15.2	57.6
More than 7001	42.9	12.2	44.9
County (Pearson chi-square: 8.103, df=8, p=0.423)			
Primorje-Gorski kotar County	37.7	13.0	49.3
Zadar County	52.2	13.0	34.8
Šibenik-Knin County	100	0.0	0.0
Expectation of respondent regarding their income in the next three months (Pearson chi-square: 16.678, df=8, p=0.034* (in%)**			
Increase	42.1	5.3	52.6
Stay the same	27.3	21.2	51.5
Decrease	50.9	14.5	34.5
Government conduct policy which encourages the development of islands			
Age (Pearson chi-square: 18.563, df=8, p=0.017*)**			
18-34	36.8	52.6	10.5
35-59	64.8	22.5	12.7
60+	53.3	13.3	33.3
Island area (Pearson chi-square: 11.344, df=8, p=0.183%)			
1-15 km^2	42.9	14.3	42.9
15-50 km^2	57.1	28.6	14.3
Larger than 50 km^2	59.8	27.2	13.0
Number of inhabitants on the island (Pearson chi-square: 20.572, df=12, p=0.057)**			
85-300	50.0	12.5	37.5
301-3000	66.7	20.0	13.3
3001-7000	60.6	36.4	3.0
More than 7001	55.1	24.5	20.4
County (Pearson chi-square: 7.669, df=8, p=0.466)			
Primorje-Gorski kotar County	58.0	24.6	17.4
Zadar County	65.2	26.1	8.7
Šibenik-Knin County	25.0	25.0	50.0
Expectation of respondent regarding their income in the next three months (Pearson chi-square: 16.609, df=8, p=0.034*)**			
Increase	73.7	21.1	5.3
Stay the same	41.2	41.2	17.6
Decrease	64.8	18.5	16.7

Source: authors´ analysis based on survey data

The results shown in the table indicate that the size of the island measured by the area of the island and the number of inhabitants on the island does not affect the existence of statistically significant differences in the attitudes of the respondents. However, the share of respondents who believe that island conditions are not improving is higher on small islands than on medium and large islands measured by the island area. Only 15 percent of respondents from islands which have an area smaller than 15 km^2 is optimistic regarding living condition on islands. Also, the smallest number of those who feel that situation on islands is improving comes from smaller islands in terms of population, i.e. from islands with less than 3000 inhabitants. Belonging to an individual county does not affect the statistically significant difference in attitudes, although more respondents who believe that island conditions are worsening come from islands located in Šibenik-Knin County, and a quarter of them think that government does not encourage island development.

On average, there are statistically significant differences in the attitudes of different age groups on this issue. 79 percent of respondents older than 60 have an opinion that island conditions are not improving and only 26 percent of respondents aged 18 to 34 have the same attitude.

The results further show that respondents of different age groups have different views on government island policy as well. Thus, 65 percent of respondents between the ages of 35 and 59 and 53 percent of respondents over the age of 60 believe that the government implements an island policy that does not encourage the development of all islands.

The results also indicate that there are statistically significant differences in the attitudes of residents depending on their expectations regarding their income in the next 3 months. Thus, 51 percent of respondents who expect that their income will decline in the future believe that living conditions on the islands are worsening. Interestingly, such an attitude is shared by 42 percent of respondents who expect an increase in income, while it is least represented among respondents who do not expect a change in income in the next 3 months.

4.   CONCLUSION

Presented results indicate that island policy has not changed significantly in the recent 20 years. The main problems are limited employment opportunities, an increasingly elderly population, inadequate health care, and rare connections with the mainland. In the situation of the COVID-19 pandemic[11], island development policy becomes even more challenging and complex. E.g. COVID-19 pandemic could compromise the entire national health system. Therefore, there are still many questions on the research agenda related to the quality of everyday island life, especially on the small islands. The results show that government policy particularly neglects the development of the small island, so the policy measures should target small islands more effectively. Small islands have not yet gained from the 1999 Islands Act and "they have not become equal parts of Croatia in terms of development policy" (Kordej-De Villa and Starc, 2020: 245). As tourism is an important sector of the Croatian economy and in the situation of COVID-19 pandemic it has experienced a great loss, research of adjustments of tourism capacities and infrastructure will attract special attention.

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EVIDENCE OF INTRADAY MULTIFRACTALITY IN BRIC STOCK MARKETS: AN ECONOPHYSICS APPROACH

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Abstract: *The pandemic outbreak (Covid-19) has affected the global economy, and the impact on financial markets seems inevitable. In view of these events, this essay intends to analyse the efficiency, in its weak form, in the BRIC markets, namely the stock indexes of Brazil (BRAZIL IBOVESPA), China (Shanghai Stock Exchange), India (S&P BSE SENSEX), Russia (MOEX Russia). The data are intraday (1 hour), from May 2019 to May 2020; to obtain more robust results, we divided the sample into time scales up to 5 days (Period I), and above 10 days (Period II), in a complementary way, and we use the opening and closing prices to estimate the adjustment time of each market. The results indicate that the BRIC markets have significant persistence (over 10 days), which may jeopardize market efficiency, in its weak form. On the other hand, the low initial correlation in certain stock indexes may create some arbitrage opportunities. However, our study did not analyse anomalous returns in these financial markets. These conclusions also open space for market regulators to take measures to ensure better information between these markets and international ones.*

Keywords: *COVID-19, BRIC, Long memories, Arbitration.*

1. INTRODUCTION

On December 31, 2019, the World Health Organization (WHO) in China received a report of 29 pneumonia cases of unknown ethology in the city of Wuhan, in central Hubei province, China. The virus was quickly identified as a new beta-coronavirus and the genetic sequence was shared on January 12, 2020. The infection is officially called Covid-19. The news of this outbreak caused many public health officials to feel spontaneous by recalling the events of the outbreak of severe acute respiratory syndrome (SARS) that emerged in China in November 2002 (Jimmy Whitworth, 2020).

The outbreak of COVID-19 has caused global concern. On 30 January, WHO declared it a global health emergency. The easy spread of this virus has caused uncertainty in the global population. This epidemic has also changed people's lifestyles, millions of people have been placed in isolation in order to reduce the transmission of the virus, companies have closed to control the spread of the virus, causing income losses and leading to significant levels of

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unemployment. In general, economic activities have been disrupted and stock exchanges have dropped sharply (Saadat, Rawtani, and Hussain, 2020).

This essay intends to examine the efficiency, in its weak form, in the BRIC markets, namely the stock indexes of Brazil (BRAZIL IBOVESPA), China (Shanghai Stock Exchange), India (S&P BSE SENSEX), Russia (MOEX Russia). The data are intraday (1 hour), from May 2019 to May 2020; to obtain more robust results, we divided the sample into time scales up to 5 days (Period I), and above 10 days (Period II); also, we use the opening and closing prices to estimate the adjustment time for each market. The results indicate that the BRIC markets have significant persistence (over 10 days), which may jeopardize market efficiency, in its weak form. On the other hand, the low initial correlation in certain stock indexes may create some arbitrage opportunities.

This investigation adds two main contributions to the literature. The first contribution refers to the study of informational efficiency in the BRIC markets, with intraday data (1 hour), in the context of the global pandemic (Covid-19). As far as we know, this is the first study to analyse these financial markets in isolation. However, there are recent studies that have investigated the impact of the 2020 global pandemic on financial markets, namely the studies by authors Ma, Rogers, and Zhou (2020), Liu, Manzoor, Wang, Zhang, and Manzoor (2020). However, the research questions, the markets analysed, and the approach was essentially different from the one followed in this essay.

The second contribution is of an econophysical nature since two econophysical methods are compared that corroborate each other. In particular, the Detrended Fluctuation Analysis (DFA) methodology, which will measure the presence or absence of long memories in these stock indexes and test whether these markets are efficient, in their weak form. We will use the Detrended Cross-Correlation Analysis (DCCA) to measure cross-correlations without trend between the opening and closing prices of each market, to assess whether the markets adjust efficiently during trading.

In terms of structure, this essay is organized into 5 sections. Section 2 presents an analysis of the State of the Art regarding articles on the hypothesis of an efficient market in international financial markets. Section 3 describes the methodology. Section 4 contains the data and results. Section 5 concludes.

2. LITERATURE REVISION

An efficient market is a market in which the prices of securities traded reflect all available information. The Efficient Market Hypothesis (HME), in its weak form, understands that the previous movement of stock prices is incorporated in the current prices of securities; therefore, it can be used to predict the current price or profitability. (Agustin, 2019)

The topic about the efficient market hypothesis (EMH) has motivated other studies to analyse the implications for the market efficiency hypothesis, according to which the current price of the assets reflects all the information available, at a given moment, and the adjusted price quickly, as new and unforeseen information hits the market (Fama and French, 1988).

Nisar and Hanif (2012), Mehla and Goyal (2013), El Khamlichi et al. (2014), Mobarek and Fiorante (2014) tested the random walk hypothesis in several stock markets. Nisar and Hanif (2012) analysed the stock markets of India, Pakistan, Bangladesh and Sri Lanka, and show (in)

market efficiency, in its weak form. Mehla and Goyal (2013) suggest that the Indian market does not support the random walk hypothesis, showing signs of inefficiency. El Khamlichi et al. (2014) show that Islamic indices have the same level of (in) efficiency as benchmarks, but the MSCI and FTSE indices are less inefficient. Mobarek and Fiorante (2014) show that the stock markets of Brazil, Russia, India and China (BRIC) can be considered efficient, in their weak form, in the analysed period.

Krsikapa-Rasajski and Rankov (2016), Hamid, Suleman, Ali Shah, and Imdad Akash (2017), Iyengar, Rao, Kosuri, and Vytla (2017) examined market efficiency, in its weak form, testing whether yields are predictable. Krsikapa-Rasajski and Rankov (2016) show that Servia's stock market, namely the two most important indices on the Belgrade stock exchange (BELEX 15 and BELEX LINE), are not efficient, in their weak form. The authors argue that this inefficiency is related to the underdevelopment of Servia's market, low trading volumes, lack of regulation, and transparency, which leads to a lack of investors. Hamid, Suleman, Ali Shah, and Imdad Akash (2017) analysed the financial markets of Pakistan, India, Sri Lanka, China, Korea, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand, Taiwan, Japan, and Australia. The authors show that prices do not follow the random walk hypothesis. Iyengar, Rao, Kosuri, and Vytla (2017) investigated the efficiency of 11 prosperous markets reported by Goldman Sachs. The authors show that the stock markets PSI (Philippines), NSE 30 (Nigeria), BIST 100 (Turkey) and JKSE (Indonesia) are efficient, in their weak form. In addition, the results suggest integration into the stock markets of KOSPI (South Korea), EGX 30 (Egypt), HNXI (Vietnam), IPC (Mexico) and DSE (Bangladesh).

Narula (2018), Ali, Shahzad, Raza and Al-Yahyaee (2018), Rehman, Chhapra, Kashif, and Rehan (2018) examined the market efficiency, in its weak form, in the BRIC. Narula (2018) examined the efficiency of the BRICS markets in three periods: pre (January 1, 2006 to December 31, 2008), during (January 1, 2009 to December 31, 2010) and post (January 1, 2006) from 2010 to December 31, 2015). The general results of the study always prove the inefficiency of stock exchanges. The markets show signs of overreaction at various times, equilibrium is reached within a short period. The markets show trends of average reversal in all periods. Ali, Shahzad, Raza and Al-Yahyaee (2018) demonstrate that developed markets are relatively more efficient, followed by the BRICS stock markets. The authors show that almost all Islamic stock markets, except for Russia, Jordan and Pakistan, are more efficient than their conventional peers. Rehman, Chhapra, Kashif, and Rehan (2018) show that the stock indexes of Pakistan, India and Bangladesh are not efficient, in their weak form.

Da Silva, Guedes, Ferreira, Dionísio and Zebende (2019), Agustin (2019), Jain (2020), tested the random walk hypothesis, examining its efficiency. Da Silva, Guedes, Ferreira, Dionísio and Zebende (2019) analysed the main indices in the world: North America, South America, Asia and Europe. The authors show a perfect cross-correlation ρDCCA in the long run between the opening and closing prices; however, in the short run, there are differences between the different stock markets. Agustin (2019) examined the hypothesis of an efficient market, in its weak form, in the Indonesian market (ISSI); the author shows that ISSI is not efficient, in its weak form, during the study period. Jain (2020) examined efficiency, in its weak form, in the Indian market, showing signs of (in) efficiency in this stock market.

The authors Milos, Hatiegan, Milos, Barna, and Botoc (2020) verified the presence of long memories and long-term correlations, showing that the stock markets are not efficient, in their weak form, and have not yet reached a mature stage of development. Meanwhile, Karasiński (2020) examined efficiency, in its weak form, in European markets, and shows that global

efficiency tended to improve after the 2008 global financial crisis. Lahmiri and Bekiros (2020) tested the market hypothesis efficient, in its weak form, on the Casablanca Stock Exchange (CSE), Dow Jones and S & P500 stock markets. The authors show that prices are potentially predictable in the 3 markets and all industrial sectors.

In summary, this work aims to contribute to the provision of information to individual and institutional investors seeking benefits from diversification in the BRIC markets. Therefore, the context of this work is to examine the market efficiency, in its weak form, among these markets, in the period of the global pandemic (Covid-19).

3. METHODOLOGY

DATA

Data on the opening and closing prices of the stock markets in Brazil (BRAZIL IBOVESPA), China (Shanghai Stock Exchange), India (S&P BSE SENSEX), Russia (MOEX Russia), were obtained from the Thomson Reuters platform. Prices are intraday (1 hour) and cover the period from May 2019 to May 2020, the same being in the local currency, to mitigate exchange rate distortions (see tables 1 and 2).

Table 1. The name of countries and their indices used in this paper

Country	Index	Symbol	Currency
Brazil	BRAZIL IBOVESPA	IBOV	BRL
China	Shanghai Stock Exchange	SHCOMP	CNY
India	S&P BSE SENSEX	SENSEX	INR
Russia	MOEX Russia	IMOEX	RUB

Source: Own elaboration.

Table 2. Sample intraday data (1 hour)

Country	Start	End	Hours/Day	N
Brazil	15/05/2019 18:00	15/05/2020 18:00	8	1990
China	15/05/2019 02:00	14/05/2020 07:00	5	1220
India	16/05/2019 04:30	15/05/2020 10:30	7	1717
Russia	15/05/2019 08:00	15/05/2019 16:00	9	2268

Source: Own elaboration.

METHODOLOGY

The development of the research took place over several stages. Although Hurst's exponent is not used directly, a methodology that indirectly proposes the same information will be applied: the Detrended Fluctuation Analysis (DFA). DFA is an analysis method that examines time dependency on non-stationary data series. This technique, assuming that the time series are non-stationary, avoids spurious results when the analysis focuses on the relationships of the data series in the long run. This methodology was developed by Peng et al. (1994), having its origin in the study of DNA behaviour. This method was later used to examine the behaviour of financial series. The DFA has the following interpretation: $0 < \alpha < 0,5$: series anti-persistent; $\alpha = 0,5$ series features *random walk;* $0,5 < \alpha < 1$ persistent series.

The function of this technique is to examine the relationship between the values x_k e x_{k+t} at different moments (Ferreira, Dionísio, Guedes, and Zebende, 2018).

The Zebende (2011) non-trend cross-correlation coefficient is a method for quantifying the level of cross-correlation between two non-stationary time series. The coefficient is based on the DFA (Peng et al., 1994) and DCCA (Podobnik and Stanley, 2008) methods.

Thus, for a better understanding of the ρDCCA, we will present your algorithm in five steps, namely:

Step 1: Considering two time series, x_t & y_t, with *t = 1,2, 3,...,N* (*N is the size of the time series*). *Then these time series are integrated, obtaining two new series*

$$xx_k = \sum_{t=1}^{k} x_t \quad e \quad yy_k = \sum_{t=1}^{k} y_t \tag{1}$$

Stage 2: The two integrated series were divided,, xx_k & yy_k with (*N - s*) overlapping boxes of equal length s, with

$$4 \leq s \leq \frac{N}{4} \tag{2}$$

Step 3: The local trend of each box is calculated by adjusting the least-squares of each series, $xP_i(k)$ & $yP_i(k)$. Then, we calculate the covariance of the residues in each box by:

$$f_{xy}^2(s,i) = \frac{1}{(s+1)} \sum_{k=1}^{i+s} \left(xx_k - xP_i(k)(yy_k - yP_i(k)) \right) \tag{3}$$

Step 4: The averages over all N-s, overlapping boxes are calculated to obtain a new covariance function:

$$F_{xy}^2(s) = \frac{1}{(N-s)} \sum_{i=1}^{N-s} f_{xy}^2(s,i) \tag{4}$$

Step 5: Finally, the cross-correlation coefficient is calculated ρDCCA by:

$$\rho DCCA(s) = \frac{F_{xy}^2(s)}{F_{xx}(s)F_{yy}(s)} \tag{5}$$

As we can see, the cross-correlation coefficient depends on the length of the box s (time scale). One of the advantages of this cross-correlation coefficient is centred on the possibility of measuring the correlations between two non-stationary time series at different time scales. The cross-correlation coefficient $\rho DCCA$ varies within the range -1 ≤ ρDCCA ≤ 1 logically 1 means perfect cross-correlation, -1 means perfect anti-cross-correlation and 0 means that there is no correlation (Zebende, 2011).

4. RESULTS

Figure 1 shows the evolution of the BRIC markets, in levels, from May 2019 to May 2020, with intraday data (1 hour), which is a period of considerable complexity, due to understanding the global pandemic (COVID -19). Yields reveal the marked volatility in January, February and March 2020.

Figure 1. Evolution, in levels, of the opening, maximum, minimum and closing prices of the BRIC financial markets, in the Complete period
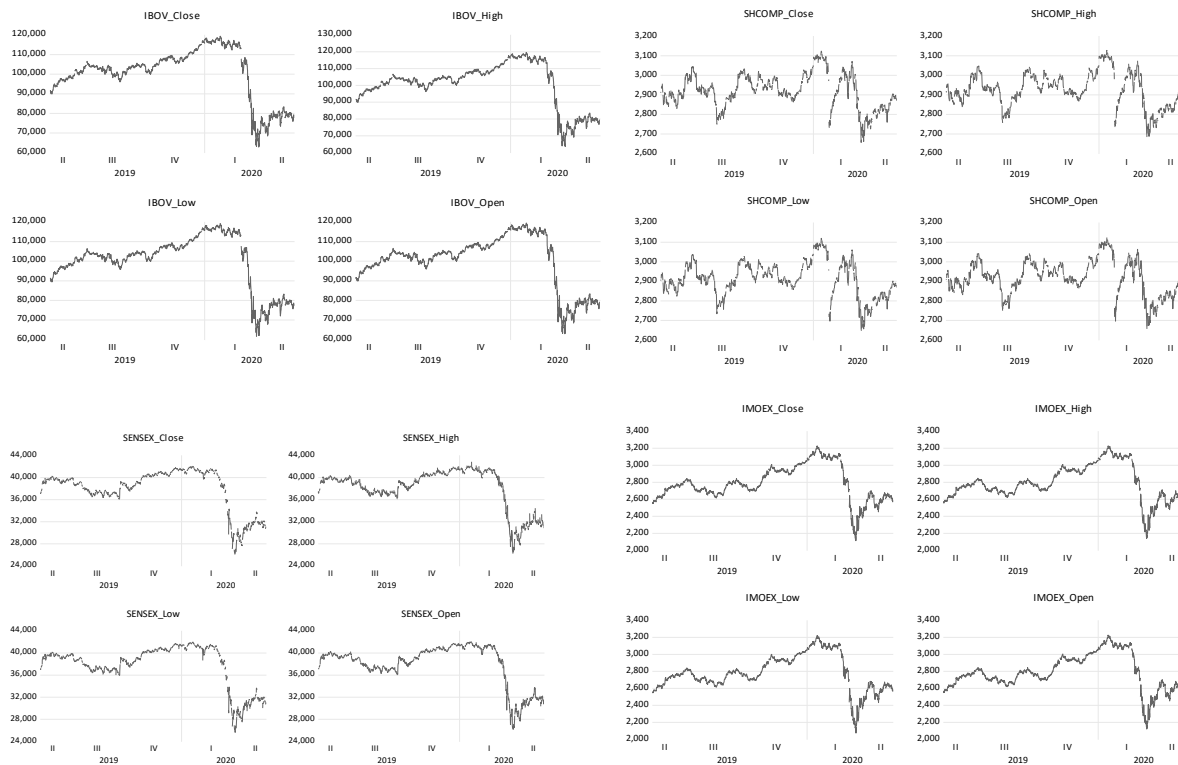
Source: Own elaboration.

Table 3 shows the main descriptive statistics on the profitability of the BRIC financial markets. The analysis of descriptive statistics allows us to verify that profitability has negative daily averages, except for the Russian market (IMOEX). In addition, the Brazilian market has the largest standard deviation, asymmetries are negative in the 4 markets. Short-circuits are above 3, which shows signs of deviation from the hypothesis of normality, with a greater incidence in India (SENSEX). Additionally, the coefficients of asymmetry and kurtosis are statistically different from those of a normal distribution.

Table 3. Descriptive statistics on returns, of the BRIC financial markets, in the Complete period

Data	Mean	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum
IBOV	-3,5E-05	0,004012169	-3,01101	59,10114	-0,05812	0,0352118
SHCOMP	-4,9E-06	0,002166613	-3,12864	45,45041	-0,03272	0,0092525
SENSEX	-4,5E-05	0,00311989	-3,43219	76,81591	-0,04565	0,0379368
MOEX	1,72E-06	0,002248933	-1,68925	45,74062	-0,03474	0,0200892

Source: Own elaboration.

In table 4 we can see the DFA exponents referring to the stock indexes of the BRIC markets. Period I comprise a time scale below 5 days (effective functioning of the exchange), while period II is contained in a time scale above 10 days (effective functioning of the exchange). Most stock indices show, in period I, an opening exponent similar to the closing price, except for China markets (0.51-0.53). The indexes closest to 0.5, in the period I, are the markets of

Brazil, China, India. The Russian market, on the other hand, shows signs of some anti-persistence. In period II, the BRIC markets have significant long-term memories, except for the China stock index (0.51). Therefore, it can be inferred that the assumption of the market efficiency hypothesis is questionable since the forecast of the market movement can be improved if considering the lagged movements of the other markets, allowing the occurrence of arbitrage operations. These results are validated by the authors Liu, Manzoor, Wang, Zhang and Manzoor (2020), Şenol and Zeren (2020), Mzoughi et al. (2020) that show that the global pandemic (Covid-19) has an impact on the memory properties of financial markets.

Table 4. DFA exponent for index and return. The values of the linear adjustments for α DFA always had R2 > 0.99.

Country	Symbol	Open		Close		
		Period I	Period II	Period I	Period II	Hours/Day
Brazil	IBOV	0.52	0.64	0.52	0.64	8
China	SHCOMP	0.51	0.51	0.53	0.52	5
India	SENSEX	0.50	0.64	0.50	0.64	7
Russia	IMOEX	0.44	0.73	0.44	0.73	9

Source: Own elaboration.

Table 5 presents the results for $\rho x, y$ between stock exchange indices for opening and closing prices. Our results show that in most markets and, for time scales n> = 10 days, we have a value of $rhoDCCA$ close to 1 (strong correlation) showing a trend towards a perfect cross-correlation of $\rho DCCA$, that is, a tendency towards convergence, which means fewer memory signals, being evident in the markets of China (SHCOMP) and Russia (IMOEX). However, our results show, for time scales n <= 5 days, the existence of low cross-correlations $\rho DCCA$, that is, we have a value of $rhoDCCA$ leaving 0 (weak correlation), between the opening and closing returns on the stock market indexes of Brazil (IBOV) and India (SENSEX). These findings show signs of (in) efficiency, that is, some periods can be used by investors to obtain anomalous returns without incurring additional risk.

Table 5. $\rho x, y$ as a function of time scale n for $DCCA$ cross-correlation between Open and Close stock market index
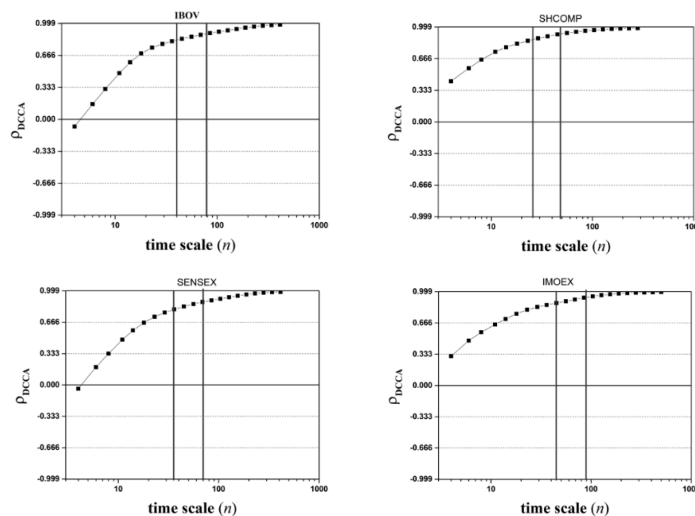
Source: Own elaboration.

5. CONCLUSION

The general conclusion to be retained and sustained by the results obtained, through tests carried out with econophysical models, demonstrate that the global pandemic has a significant impact on the adjustment of the analysed financial markets. The results indicate that the BRIC markets have significant persistence (over 10 days), which may jeopardize market efficiency, in its weak form. On the other hand, the low initial correlation in certain stock indexes may create some arbitrage opportunities. However, our study did not analyse anomalous returns in these financial markets. These conclusions also open space for market regulators to take steps to ensure better informational information between the BRIC markets and the international financial markets. In conclusion, we believe that investors should diversify their portfolios, and invest in less risky markets such as the market for some commodities (precious metals), in order to mitigate risk and improve the efficiency of their portfolios.

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SAFE HAVEN, HEDGE AND DIVERSIFICATION FOR STOCK MARKETS: GOLD VERSUS SILVER

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Abstract: *This paper aims to analyse if whether Gold (Gold Bullion: Zurich) and Silver (Silver Paris Spot E/KG) will be a safe haven for portfolio diversification in the financial markets of Germany (DAX 30), USA (DOW JONES), France (CAC 4 0), Italy (FTSE MID), United Kingdom (FTSE 100), Hong Kong (Hang Seng), China (SHANGHAI SE ASHARE), Japan (NIKKEI 225), in the period between 1 January 2019 to 2 September 2020. In order to perform this analysis where undertaken different approaches to analyse if: (i) the gold and silver market will be a safe haven when financial markets break down? (ii) If so, can market shocks question portfolio diversification? The results suggest 53 pairs of integrated markets (out of 90 possible). Gold and Silver have integrations with each other and with the USA, but the other financial markets integrate with Gold and Silver, namely the US, France, UK, Italy and Hong Kong markets (the latter only with Silver). The China market has a single integration but is integrated by the USA, France, the United Kingdom, Italy, and Germany, which partially rejects the first investigation question. In corroboration, causality tests show 67 causal relationships (out of 90 possible). The Markets of Italy (FTSE MID), the USA (DOW JONES) cause, in the Grangerian sense, all its peers (9 out of 9 possible), while France (CAC 40), the United Kingdom (FTSE 100), Japan (NIKKEI 225), and Germany (DAX 30) cause 8 out of 9. Silver and Gold cause the financial markets 7, and 6 times (out of 9 possible), respectively, while the Hong Kong (Hang Seng) and China (SHANGHAI) markets cause 3 and once, respectively, which validates the second investigation question. Given the high level of integration and shocks between markets, portfolio diversification may be brought into question. These findings also make room for market regulators to take steps to ensure better information among international financial markets.*

Keywords: *Gold, Silver, Hedging, Safe haven, Risk diversification.*

1. INTRODUCTION

The fastest dissemination of the Coronavirus (COVID-19) has caused stress in the financial markets all around the world. The global pandemic of 2020 generated an unprecedented level of risk, causing investors to suffer significant losses, in a short amount of time. The new Coronavirus disease evolved quickly from a provincial health outbreak to a global collapse, affecting the global economy, damaging one-quarter of the global

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wealth in less than a month. (Larry, 2020; Ali, Alam, and Rizvi, 2020; Zhang, Hu, and Ji, 2020).

The growing trend of integration and interdependence in international financial markets has increased the probability of risk transmission between markets. In times of agitation, investors should rebalance their portfolios by closing long positions in markets with significant levels of risk. (Dias, da Silva, and Dionísio, 2019; Mohammadpoor and Rezazadeh, 2019; Morales and Gassie, 2014).

The growing uncertainty of the global economy has been passed on to the global financial market, which causes investors to tend to distribute their portfolios from high-risk markets to low-risk markets. From the perspective of investors, and risk managers, gold is regularly regarded as a hedge or safe haven against stock markets, so understanding the relationship between gold and financial markets has relevant implications. (Ma, Yang, Zou, and Liu, 2020; Yamaka and Maneejuk, 2020).

The goal of this paper is to test if whether Gold (Gold Bullion, Zurich) and Silver (Silver Paris Spot E/KG), will be a safe haven for portfolio diversification in financial markets of Germany (DAX 30),), EUA (DOW JONES), France (CAC 40), Italy (FTSE MID), United Kingdom (FTSE 100), Hong Kong (Hang Seng), China (SHANGHAI SE A SHARE), Japan (NIKKEI 225), in the period between 1 January 2020 to 2 September 2020. In order to perform this analysis, different approaches will be undertaken to analyse the two investigation questions: (i) will the gold and silver market be a safe haven when financial markets break down? (ii) If so, can market shocks question portfolio diversification? The results show that the high level of integration and shocks may question portfolio diversification.

This research adds two contributions to the literature. The first refers to the study of risk diversification in international markets, and the Gold Bullion (Zurich) and Silver (Silver Paris Spot E/KG) markets. Most of the previous studies focused on the correlations or average dependencies between gold and financial market movements, and between gold and currency depreciation. The second contribution relates to the combination of some of the most relevant financial markets in global terms and tests whether the gold and silver market will be a safe haven when these stock markets break down from high levels of risk, particularly during the global pandemic (Covid-19). As far as we know, there are recent studies that have looked at risk diversification, crossing the stock and gold markets, namely the authors, Naeem, Hasan, Arif, Balli, and Shahzad (2020), Hussain Shahzad, Bouri, Roubaud, and Kristoufek (2020), Yamaka and Maneejuk (2020); however, the approach was quite different from the one followed in this paper.

In terms of structure, this paper is organized into 5 sections. Section 1 is represented by the current introduction. Section 2 presents a Literature Review on articles about assets that may be safe ports in portfolio diversification. Section 3 describes the data and methodology. Section 4 contains the results. Finally, section 5 presents the general conclusions of the work.

2.   LITERATURE REVIEW

Understanding the international connections between financial markets in times of financial crisis is relevant for investors, fund managers, and academics in different respects, particularly on the subject of portfolio diversification. (Kumar, 2017; Sheik and Banu, 2015).

Balcilar, Hammoudeh, and Asaba (2015), Batten, Ciner, Kosedag, and Lucey (2017), Laily et al. (2017) analysed gold synchronism with certain assets and markets. Balcilar, Hammoudeh, and Asaba (2015) show that gold is a less volatile asset when compared to silver and oil, ensuring its use as a "safe haven asset". Batten, Ciner, Kosedag, and Lucey (2017) evidence the lack of causal relationships between the price of gold and the stock markets analysed. On the other hand, Laily et al. (2017) show a positive relationship between crude oil prices, and the price of gold, and a negative synchronization between inflation rate, GDP, interest rates, and exchange rates.

Tursoy and Faisal (2018), Siddiqui and Roy (2019), D. Huang and Kilic (2019) examined the importance of gold as a safe risk hedging asset. Tursoy and Faisal (2018) show a negative relationship between the price of gold and stock prices and a positive relationship between crude oil and stock prices. Siddiqui and Roy (2019) show that gold is a more effective hedging asset than crude oil for institutional investors in India. D. Huang and Kilic (2019) demonstrate that gold prices fall into recessions, although to a smaller extent than platinum prices.

Balcilar, Demirer, Gupta, and Wohar (2020), Kang, Yoon, Bekiros, and Uddin (2020), Bouri, Shahzad, Roubaud, Kristoufek, and Lucey (2020), Corbet, Larkin, and Lucey (2020), Yamaka and Maneejuk (2020) examined several assets to test whether they are an alternative to stock markets. Balcilar, Demirer, Gupta, and Wohar (2020) show that precious metals cause shocks in stock markets in periods of high volatility. However, treasury bonds present negligible risk in periods of stock stress which implies that these assets would serve as more effective hedges (or safe havens) for investors in international stock markets. Kang, Yoon, Bekiros, and Uddin (2020) investigated the dynamic relationship between Bitcoin and U.S. stocks (S&P 500), U.S. dollar, treasury bonds and gold futures, evidencing that Bitcoin can be used as a safe haven for investors. Bouri, Shahzad, Roubaud, Kristoufek, and Lucey (2020) compared bitcoin's safe harbour properties, gold and commodity index with stock markets. The authors show that the degree of co-movement between gold and the profitability of the shares affects the VaR level of the portfolio. Specifically, the benefits of diversification vary in frequency of time, with Bitcoin showing superiority over gold and the commodity index. Corbet, Larkin, and Lucey (2020) evidence significant causalities and shocks between China's major stock markets and Bitcoin during the global pandemic (Covid-19), showing reservations about this new financial product in portfolio diversification. Yamaka and Maneejuk (2020) presented significant causalities between gold and the volatility of Asian stock markets during the global financial crisis (2008).

Naeem, Hasan, Arif, Balli, and Shahzad (2020), Hussain Shahzad, Bouri, Roubaud, and Kristoufek (2020), Yamaka and Maneejuk (2020) examined the synchronization between the stock markets with oil, gold and Bitcoin. Naeem, Hasan, Arif, Balli, and Shahzad (2020) show that the global financial crisis of 2008 accentuated the shocks between BRIC stock markets with oil and gold. Hussain Shahzad, Bouri, Roubaud, and Kristoufek (2020) demonstrate that gold and Bitcoin are safe ports but have distinct hedging characteristics. Gold is an undisputed haven and protection in the G7 stock markets, while Bitcoin takes on these two functions in Canada. They suggest that the diversification benefits offered by gold to capital investments in the G7 markets are comparatively higher and more stable than Bitcoin. Yamaka and Maneejuk (2020) evidence the existence of significant causalities between gold shocks and volatilities in Asian stock markets. The authors show strong correlations between the South Korean stock markets and India, and the gold market, during the global financial crisis when compared to the pre and post-crisis periods. Additionally, there are indications of the existence of contagion effects between the gold market and the stock markets analysed.

In summary, this work aims to contribute to the provision of information to investors and regulators in international stock markets, where individual and institutional investors seek diversification benefits. Therefore, the context of this work is to examine the integration and shocks between the stock markets under analysis and the prices of Gold and Silver, to understand whether these commodities will be a safe haven in the period of the global pandemic (Covid-19).

3. METHODOLOGY

DATA

The data analysed are the index prices from the stock markets of Germany (DAX 30), EUA (DOW JONES), France (CAC 40), Italy (FTSE MID), United Kingdom (FTSE 100), Hong Kong (Hang Seng), China (SHANGHAI SE A SHARE), Japan (NIKKEI 225), and gold prices (Gold Bullion: Zurich) and Silver(Silver Paris Spot E/KG), between the period of 1 January 2019 to 2 de September 2020. The quotations are daily and were obtained from the Thomson Reuters platform. The quotes are in local currency to mitigate distortions in exchange rates.

Table 1. The name of countries and their indices used in this paper

Country	Index
Germany	DAX 30
USA	DOW JONES
France	CAC 40
Italy	FTSE MID
United Kingdom	FTSE 100
Hong Kong	HANG SENG
China	SHANGHAI SE A SHARE
Japan	NIKKEI 225
Gold	Gold Bullion (Zurich) kg (995) CHF
Silver	Silver Paris Spot E/KG

Source: Own elaboration.

METHODOLOGY

The development of the research took place along several stages. The characterization of the sample used was performed through descriptive statistics, the adherence test of Jarque and Bera (1980), and the quantile charts. In order to assess the stationarity of the time series, we will use the ADF tests (Dickey and Fuller, 1981) and PP (Perron and Phillips, 1988). For the verification of integration or segmentation between the financial markets analysed, we'll use the methodology of Gregory and Hansen (1996) because we are looking at a very troubled period in the financial markets. Additionally, the reason why standard cointegration tests such as Engle and Granger (1987) and Johansen (1988), are not appropriate to test the cointegration with regime change that such tests assume that the cointegration vector is invariant in time.

To examine the clashes between markets we will use the *VAR Granger Causality/Block Exogeneity Wald Tests* model, which employs Wald's statistics, which tests whether the null hypothesis that the coefficients of the out-of-date endogenous variables of the variable "cause" are null or not "cause" in the Grangerian sense of the dependent variable. However, the result of this test has a high sensitivity to the number of lags considered in the model, so the first concern is to conveniently estimate this value, in order to reach robust evidence (Gujarati,

2004). To determine the number of lags to include in causality tests, we will use the *Final Prediction Error* (FPE) and *Akaike information criterion* (AIC) criteria to validate the robustness of the model we will estimate the *VAR Residual Serial Correlation LM Tests*.

4. RESULTS

Figure 1 shows the evolution of the financial markets, at levels, between 1 January of 2019 to 2 September 2020, being this a period of great complexity, due to the global pandemic outbreak (Covid-19). Most of the markets reveal structural breakdowns between February and March of 2020.

Figure 1: Evolution, in levels, of the ten financial markets, between the period of 1 January 2019 to 2 September 2020
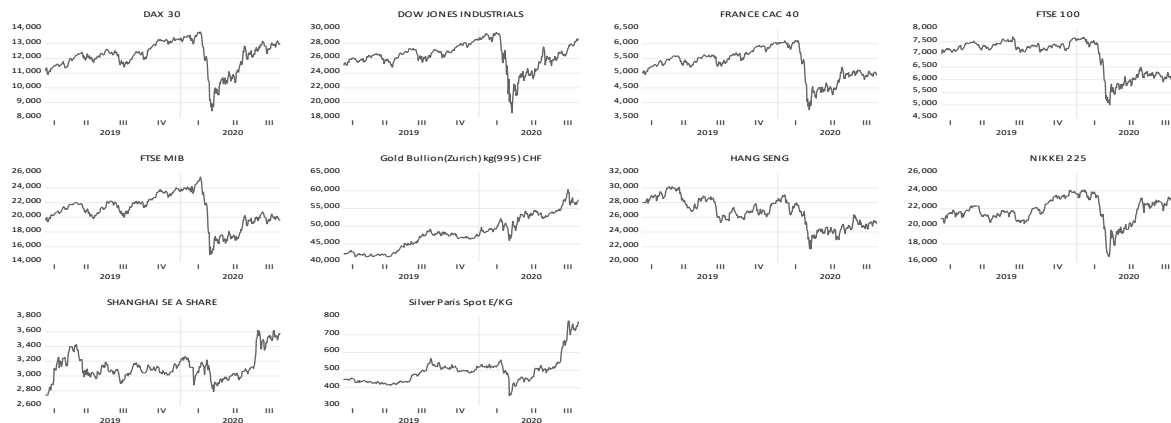
Source: Own elaboration.

Figure 2 shows the evolution, in % of the differences, of the 10 financial markets under analysis. In all series, a relatively high dispersion around the mean is noted, as well as a relatively synchronized behaviour between the data series. Through graphical analysis, high volatility is observed, especially in February, March, and April 2020.

Figure 2. Evolution, in % of the differences, of the 10 financial markets, between the period of 1 January 2019 to 2 September 2020.
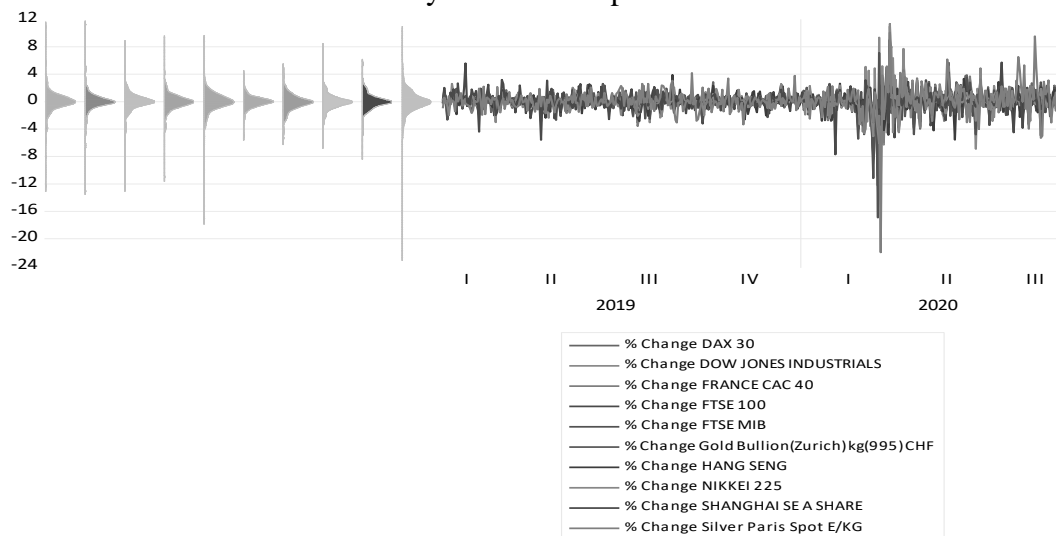
Source: Own elaboration.

Tables 2 and 3 show the main descriptive statistics from the financial markets analysed. The profitability of stock indices has positive daily averages, except for the Markets of France (CAC 40), The United Kingdom (FTSE 100), and Hong Kong (HANG SENG). However, all the series showed signs of deviation from the hypothesis of normality, considering the coefficients of skewness and kurtosis. The asymmetry characteristics are negative, especially in silver prices. Additionally, the coefficients of skewness and kurtosis are statistically different from those in a normal distribution, these indices are corroborated by the Jarque-Bera adherence test.

Table 2: Descriptive statistics, in profitability, of the 10 financial markets, between the period of 1 January 2019 to 2 September 2020.

	DAX 30	DOW JONES	CAC40	FTSE 100	FTSE MIB
Mean	0.000359	0.000323	-3.94E-05	-0.000435	2.25E-06
Std. Dev.	0.016387	0.018343	0.016123	0.014549	0.017947
Skewness	-1.160567	-1.060573	-1.728236	-1.407132	-3.292874
Kurtosis	18.42201	19.26823	17.63492	17.46935	35.74753
Jarque-Bera	4195.652***	4642.918***	3900.710***	3748.119***	19247.08***
Sum	0.148781	0.133574	-0.016302	-0.180295	0.000932
Sum Sq. Dev.	0.110904	0.138953	0.107359	0.087423	0.133021
Observations	414	414	414	414	414

Source: Own elaboration.

Notes: ***. **. *. represent significance at 1%. 5% and 10%, respectively.

Table 3. Descriptive statistics, in profitability, of the 10 financial markets, between the period of 1 January 2019 to 2 September 2020.

	GOLD	HANG SENG	NIKKEI 225	SHANGHAI	SILVER
Mean	0.000745	-0.000256	0.000270	0.000636	0.001306
Std. Dev.	0.009279	0.012770	0.013390	0.012568	0.020734
Skewness	-0.449500	-0.385542	0.207371	-0.767970	-3.731415
Kurtosis	8.868926	5.879456	9.485668	10.07067	54.52105
Jarque-Bera	608.1056***	153.2807***	728.5692***	903.0985***	46749.44***
Sum	0.308557	-0.106060	0.111788	0.263511	0.540774
Sum Sq. Dev.	0.035560	0.067350	0.074046	0.065233	0.177553
Observations	414	414	414	414	414

Source: Own elaboration.

Notes: ***. **. *. represent significance at 1%. 5% and 10%, respectively.

The quantile charts demonstrate that the distribution of profitability rates is leptokurtic and asymmetric or skewed. The distribution is leptokurtic because the graph is shaped like "S", on the 45° line, and is asymmetric because the "S" is not symmetrical on the line, evidencing the existence of nonlinear relationships (see Figure 3).

The results from the stationarity tests, through the ADF tests (Dickey and Fuller, 1981), and PP (Perron and Phillips, 1988), reveal that the temporal series analysed are stationarity, in profitability, fundamental presupposition for estimating the model *VAR Granger Causality/Block Exogeneity Wald Tests* (attachments A, B e C).

Figure 3. Quantile charts of profitability rates, from the financial markets under analysis, between the period of 1 January 2019 to 2 September 2020
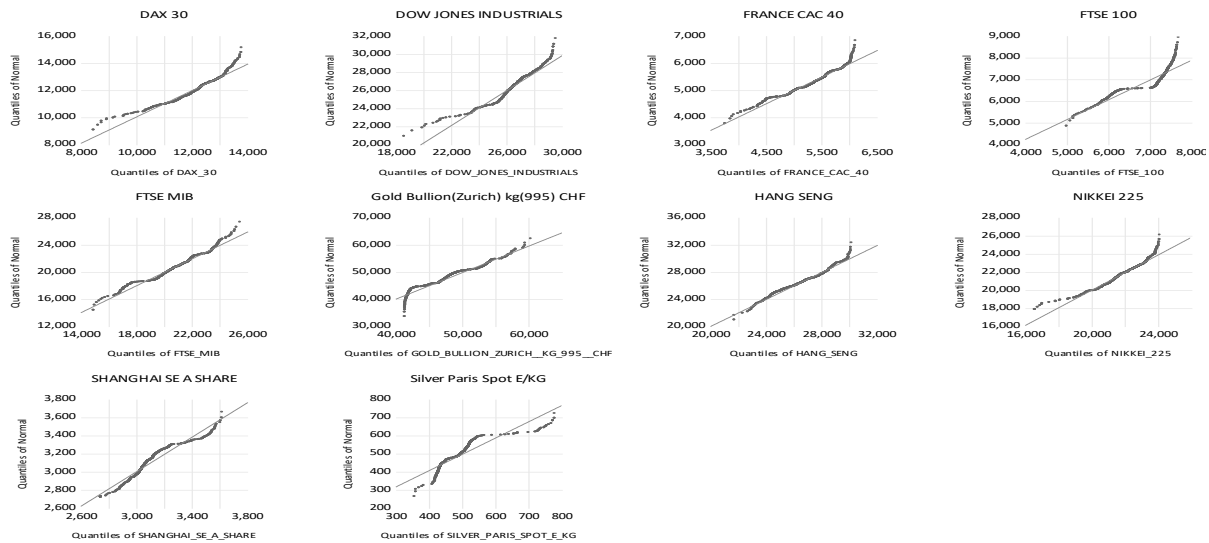
Source: Own elaboration

In Table 4 are the results from the Gregory-Hansen integration test, with structure breakage, and we found 53 pairs of integrated markets (out of 90 possible); we also saw that the structural breakdowns occur, mostly, in March 2020. The UK market (FTSE 100) has 9 integrations (out of 9 possible), while the US (DOW JONES), France (CAC 40), Italy (FTSE MID) markets show 8 integrations. The Hong Kong (HANG SENG), Japan (NIKKEI 225), and Germany markets show 5 integrations, Gold and Silver have 2 integrations. The China market (SHANGHAI) has a single integration with the United Kingdom (FTSE 100). In response to the first investigation question, gold and silver prices have integrations with each other and with the US, but the other financial markets integrate with Gold and Silver, namely the US, France, UK, Italy, and Hong Kong markets (the latter only with Silver). The China market has a single integration, but is integrated by the USA, France, THE UNITED KINGDOM, Italy, and Germany; these findings show that portfolio diversification could be put into question due to the high level of integration between the stock markets and Gold and Silver.

Table 4. Gregory-Hansen tests, between the period of 1 January 2019 to 2 September 2020.

Markets	t-statistic	Method	Lags	Break Date	Results
GOLD / SILVER	-6.75***	Regime	0	17/03/2020	Integration
GOLD / DJ	-4.81*	Regime	0	27/02/2020	Integration
SILVER / GOLD	-5.63***	Regime	3	18/03/2020	Integration
SILVER / DJ	-5.81***	Regime	3	03/06/2020	Integration
DJ / GOLD	-5.21**	Regime	2	12/03/2020	Integration
DJ / SILVER	-53.43**	Trend	2	28/02/2020	Integration
DJ / CAC 40	-53.47**	Regime	4	04/03/2020	Integration
DJ / FTSE MID	-54.38**	Trend	2	10/04/2020	Integration
DJ / HANG SENG	-56.10**	Trend	2	28/02/2020	Integration
DJ / NIKKEI 225	-6.76***	Trend	1	12/03/2020	Integration
DJ / DAX 30	-62.15***	Trend	1	12/03/2020	Integration
DJ / SHANGHAI	-5.48***	Trend	2	28/02/2020	Integration

CAC 40 / GOLD	-6.89***	Trend	1	02/03/2020	Integration
CAC 40 / SILVER	-6.39***	Trend	1	02/03/2020	Integration
CAC 40 / DJ	-6.18***	Trend	1	03/03/2020	Integration
CAC 40 / FTSE MID	-6.52***	Regime	4	30/01/2020	Integration
CAC 40 / HANG SENG	-5.49***	Regime	0	29/07/2019	Integration
CAC 40 / NIKKEI 225	-6.22***	Regime	1	10/03/2020	Integration
CAC 40 / DAX 30	-6.55***	Regime	2	03/03/2020	Integration
CAC 40 / SHANGHAI	-7.69***	Trend	2	02/03/2020	Integration
FTSE 100 / GOLD	-6.63***	Trend	1	02/03/2020	Integration
FTSE 100 / SILVER	-6.59***	Trend	1	02/03/2020	Integration
FTSE 100 / DJ	-5.47***	Trend	0	02/03/2020	Integration
FTSE 100 / CAC 40	-5.09**	Regime	0	02/03/2020	Integration
FTSE 100 / FTSE MID	-5.37**	Regime	0	02/03/2020	Integration
FTSE 100 / HANG SENG	-5.56***	Regime	0	02/03/2020	Integration
FTSE 100 / NIKKEI 225	-6.99***	Regime	0	02/03/2020	Integration
FTSE 100 / DAX 30	-6.82***	Regime	1	02/03/2020	Integration
FTSE 100 / SHANGHAI	-6.46***	Regime	1	02/03/2020	Integration
FTSE MID / GOLD	-5.68***	Trend	0	03/03/2020	Integration
FTSE MID / SILVER	-5.75***	Trend	0	03/03/2020	Integration
FTSE MID / DJ	-5.41**	Trend	4	04/03/2020	Integration
FTSE MID / CAC 40	-6.64***	Trend	4	30/01/2020	Integration
FTSE MID / HANG SENG	-5.53***	Regime	0	30/07/2019	Integration
FTSE MID / NIKKEI 225	-6.24***	Regime	1	10/04/2020	Integration
FTSE MID / DAX 30	-48.20***	Trend	5	04/03/2020	Integration
FTSE MID / SHANGHAI	-6.75***	Trend	3	02/03/2020	Integration
HANG SENG / SILVER	-4.70*	Regime	1	03/03/2020	Integration
HANG SENG / CAC 40	-5.09**	Trend	0	02/03/2020	Integration
HANG SENG / FTSE 100	-4.88*	Trend	0	21/05/2020	Integration
HANG SENG / FTSE MID	-5.66***	Trend	0	02/03/2020	Integration
HANG SENG / DAX 30	-5.08**	Trend	0	19/12/2020	Integration
NIKKEI 225 / DJ	-6.09***	Regime	1	26/05/2020	Integration
NIKKEI 225 / CAC 40	-6.71***	Regime	1	10/03/2020	Integration
NIKKEI 225 / FTSE 100	-50.14**	Trend	1	16/05/2019	Integration
NIKKEI 225 / FTSE MID	-5.84***	Trend	2	10/03/2020	Integration
NIKKEI 225 / DAX 30	-6.23***	Regime	1	17/09/2019	Integration
DAX 30 / DJ	-5.39**	Regime	1	28/05/2020	Integration
DAX 30 / CAC 40	-5.70***	Regime	0	04/03/2020	Integration
DAX 30 / FTSE MID	-4.92*	Regime	0	04/03/2020	Integration
DAX 30 / NIKKEI 225	-6.19***	Trend	1	03/05/2019	Integration
DAX 30 / SHANGHAI	-5.04**	Trend	2	02/03/2020	Integration
SHANGHAI / FTSE 100	-5.02**	Regime	5	05/06/2020	Integration

Source: Own elaboration.

Notes: ***. **. *. represent significance at 1%. 5% and 10%, respectively.

To analyse the significance of causal relationships between financial markets under analysis, we applied the VAR Granger Causality/Block Exogeneity Wald Tests. To determine the number of *lags* to be included in causality tests, we used the *Final prediction error* (FPE) criteria and AIC (Akaike information criterion) that suggest 4 lags. A smaller number of lags increases the degrees of freedom; a greater number of lags decreases the problems of autocorrelation (see Table 5).

Table 5. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
4	13686.73	224.7519	**1.36e-41***	**-65.72639***	-61.66555	-64.11888

Source: Own elaboration.
Note: * indicates lag order selected by the criterion.

In Table 6 is possible to check the results of *VAR Residual Serial Correlation LM* Tests, we estimate a VAR with 4 lags, and verified the existence of autocorrelation in the residues (5 lags). To eliminate the correlation in series we estimated a VAR with 6 lags, and then performed the autocorrelation test to 7 lags, the null hypothesis was not rejected, which corroborates that the present model is a robust estimate.

Table 6. VAR Residual Serial Correlation LM Tests

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
7	**93.71510**	**100**	**0.6579**	**0.936181**	**(100, 2360.2)**	**0.6582**

Source: Own elaboration.

Table 7. Granger Causality Testes / Block Exogeneity Wald Tests, between the period of 1 January 2019 to 2 September 2020.

	GOLD	SILVER	DJ	CAC 40	FTSE 100	FTSE MID	HANG SENG	NIKKEI 225	DAX 30	SHANGHAI
GOLD	*********	5.51(6)***	3.66(6)***	6.54(6)***	4.67(6)***	7.85(6)***	2.23(6)**	2.35(6)**	6.43(6)***	**0.50(6)**
SILVER	17.78(6)***	******	9.83(6)***	10.07(6)***	10.29(6)***	17.69(6)***	**1.01(6)**	3.06(6)***	9.16(6)***	**0.94(6)**
DJ	4.52(6)***	4.92(6)***	********	9.86(6)***	4.28(6)***	14.73(6)***	**1.40(6)**	6.16(6)***	10.75(6)***	**0.83(6)**
CAC 40	2.01(6)*	3.93(6)***	11.52(6)***	*******	3.62(6)***	7.97(6)***	**1.49(6)**	3.86(6)***	**1.08(6)**	**0.75(6)**
FTSE 100	2.26(6)**	5.20(6)***	7.31(6)***	5.61(6)***	*******	7.03(6)***	**0.51(6)**	4.53(6)***	3.54(6)***	**0.33(6)**
FTSE MID	**1.43(6)**	**1.48(6)**	8.75(6)***	**1.51(6)**	2.21(6)**	*******	**1.60(6)**	3.03(6)***	1.84(6)*	**1.09(6)**
HANG SENG	2.32(6)**	4.98(6)***	10.92(6)***	5.32(6)***	4.74(6)***	8.63(6)***	********	6.01(6)***	5.73(6)***	**0.45(6)**
NIKKEI 225	2.22(6)**	2.83(6)**	11.16(6)***	19.87(6)***	10.99(6)***	19.94(6)***	4.51(6)***	*******	24.17(6)***	1.92(6)*
DAX 30	**1.46(6)**	4.95(6)***	10.13(6)***	2.43(6)**	3.46(6)***	7.24(6)***	**1.18(6)**	2.99(6)***	*******	**0.65(6)**
SHANGHAI	**0.95(6)**	**1.78(6)**	2.54(6)**	2.82(6)**	**1.64(6)**	3.51(6)***	3.52(6)***	**1.03(6)**	2.32(6)**	*******

Source: Own elaboration.
Notes: Column markets "cause" online markets. The lateral values in parentheses refer to lags. ***. **. *. represent significance at 1%. 5% and 10%, respectively.

The results of Granger's causality tests for the financial markets under analysis are shown in Table 7. The causality tests show 67 causal relationships (out of 90 possible). The Markets of Italy (FTSE MID), the USA (DOW JONES) cause, in the Grangerian sense, all its peers (9 out

of 9 possible), while France (CAC 40), the United Kingdom (FTSE 100), Japan (NIKKEI 225), and Germany (DAX 30) cause 8 out of 9. Silver and Gold cause the financial markets 7, and 6 times (out of 9 possible), respectively, while the Hong Kong (Hang Seng) and China (SHANGHAI) markets cause for 3 and once, respectively. The caused markets in the Grangerian sense are the stock indices NIKKEI 225 (9), HANG SENG (8), DOW JONES (7) FTSE 100 (7), CAC 40 (6), DAX 30 (6), SHANGHAI (5), FTSE MID (4), while Gold and Silver are caused by 8 and 7, respectively. These results show that the Gold and Silver market are not a safe haven, and they are not an alternative to portfolio diversification in these stock markets. These findings are in line with the evidence presented by the authors Yarovaya and Lau (2016), Diaz, Molero, and Perez de Gracia (2016), Ferreira, Dionísio and Movahed (2017) show significant movements in various financial markets, which calls into question portfolio diversification.

5.   CONCLUSION

The general conclusion to be retained and, supported by the results obtained, through the tests carried out with econometric and mathematical models, demonstrate that the global pandemic has a significant impact on the memory properties of the markets analysed. The results indicate that markets have very significant integrations and causalities, i.e. Gold and Silver do not function as safe havens to portfolio diversification in these stock markets. These findings also make room for market regulators to take steps to ensure better information among international financial markets. In conclusion, we consider that investors should diversify their portfolios, and invest in less risky markets, to mitigate risk and improve the efficiency of their portfolios.

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Attachment A:

Null Hypothesis: Unit root (common unit root process)							
Method			Statistic		Prob.**		
Levin, Lin & Chu t*			-36.1140		0.0000		
** Probabilities are computed assuming asymptotic normality							
Intermediate results on UNTITLED							
	2nd Stage	Variance	HAC of		Max	Band-	
Series	Coefficient	of Reg	Dep.	Lag	Lag	width	Obs
DAX 30	-0.86834	0.0003	0.0001	1	17	4.0	412
DOW JONES	-0.91109	0.0003	4.E-05	6	17	16.0	407
CAC 40	-0.86010	0.0003	0.0005	1	17	0.0	412
FTSE 100	-0.95483	0.0002	3.E-05	7	17	11.0	406
FTSE MIB	-0.87840	0.0003	0.0001	1	17	5.0	412
GOLD	-0.97380	9.E-05	2.E-06	0	17	107.0	413
HANG SENG	-1.04163	0.0002	2.E-05	0	17	20.0	413
NIKKEI 225	-0.82111	0.0002	5.E-06	1	17	73.0	412
SHANGHAI	-0.98287	0.0002	9.E-06	0	17	34.0	413
SILVER	-1.01008	0.0004	5.E-05	3	17	16.0	410
	Coefficient	t-Stat	SE Reg	mu*	sig*		Obs
Pooled	-0.94505	-45.506	1.002	-0.500	0.707		4110

Source: Own elaboration.

Attachment B:

Null Hypothesis: Unit root (individual unit root process)			
Method	Statistic	Prob.**	
ADF - Fisher Chi-square	1079.53	0.0000	
ADF - Choi Z-stat	-31.0917	0.0000	
** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.			
Intermediate ADF test results UNTITLED			
Series	Prob.	Lag	Max Lag	Obs
DAX 30	0.0000	1	17	412
DOW JONES	0.0000	6	17	407
CAC 40	0.0000	1	17	412
FTSE 100	0.0000	7	17	406
FTSE MIB	0.0000	1	17	412
GOLD	0.0000	0	17	413

HANG SENG	0.0000	0	17	413
NIKKEI 225	0.0000	1	17	412
SHANGHAI	0.0000	0	17	413
SILVER	0.0000	3	17	410

Source: Own elaboration.

Attachment C:

Null Hypothesis: Unit root (individual unit root process)		
Method	Statistic	Prob.**
PP - Fisher Chi-square	1559.15	0.0000
PP - Choi Z-stat	-38.5919	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Intermediate Phillips-Perron test results UNTITLED

Series	Prob.	Bandwidth	Obs
DAX 30	0.0000	9.0	413
DOW JONES	0.0000	5.0	413
CAC 40	0.0000	8.0	413
FTSE 100	0.0000	7.0	413
FTSE MIB	0.0000	10.0	413
GOLD	0.0000	18.0	413
HANG SENG	0.0000	3.0	413
NIKKEI 225	0.0000	1.0	413
SHANGHAI	0.0000	1.0	413
SILVER	0.0000	7.0	413

Source: Own elaboration.

FINANCIAL LEASING IN THE FUNCTION OF ECONOMIC DEVELOPMENT OF BOSNIA AND HERZEGOVINA (STATISTICAL APPROACH)

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Abstract: *The leasing institution is typical for countries with developed market economies, although it keeps gaining more and more importance in transition countries. Therefore, the research in this paper is focused on the financial leasing market in Bosnia and Herzegovina, as one of the countries undergoing transition process. Its basic features have been assessed, together with determining turnover over the observed ten-year period, both in Bosnia and Herzegovina as a whole and in its respective entities. The research aims to establish to what extent has financial leasing contributed to the development of the small and medium enterprise (SME) sector and the economic development of Bosnia and Herzegovina. Modern statistical methods have been applied to analyze the connection and interdependence of leasing and certain macroeconomic indicators in Bosnia and Herzegovina. For the purpose and in the context of this research, the following indicators, such as the values of leasing, gross domestic product, export, import, and foreign direct investments related to the period from 2009 to 2018 are presented in the respective tables and charts. The analysis is based on the application of descriptive and econometric statistical methods of correlation and regression, as well as on the following statistical packages: IBM SPSS ver. 21, Microsoft XLSTAT. A particular, dedicated segment of the analysis refers to determining the impact of financial leasing on the level of SME investment to classic bank loans. That is, to what extent is financial leasing in the function of investment decision-making of small and medium enterprises in Bosnia and Herzegovina.*

Keywords: *Financial leasing, GDP, Export, Import, FDI, SME.*

INTRODUCTION

Leasing is a distinct form of obtaining fixed assets through the lease. According to International Accounting Standard 17): *A lease is an agreement whereby the lessor conveys to the lessee in return for a payment or series of payments the right to use an asset for an agreed period.* In its original form, leasing is letting (renting) movable and immovable property to a party, i.e. a new type of contract that has gained its particular economic characteristics in business practice. Since the goods are placed outside the usual forms, being cash and loans, it is said that a lease is a distinct method of financing, based on a particular contract, and with a leasing fee. This method generates preconditions for companies to procure equipment without exhausting depreciation funds and emptying their accounts. Instead of purchasing new equipment using their funds or by loans, companies turn to a leasing

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company by practically renting the required equipment for a certain period, under appropriate conditions and respective compensation (Vunjak, 2005).

The research conducted in the paper is related to Financial Leasing Market in Bosnia and Herzegovina and is divided into three parts. The first part of the paper focuses on the financial leasing market in the period from 2009 to 2018. Leasing arrangements in both entities (the Republic of Srpska and the Federation of BH) have been determined, as well as total financial leasing arrangements at the Bosnia and Herzegovina level. The annual trend of financial leasing was monitored, accompanied by a tabular and graphical presentation. The second part of the paper contains a statistical analysis of the interdependence of economic indicators (financial leasing, GDP, exports, imports and FDI), based on the application of econometric statistical methods of *correlation* and *regression*, obtained with the assistance of statistical software suites: IBM SPSS ver. 21, Microsoft XLSTAT. The final segment of the paper, through comparative analysis assessed the role of leasing in equipment investment of small and medium enterprises in Bosnia and Herzegovina in relation to investing through standard bank loans for the period from 2009 to 2018. The conclusion segment of the paper highlights the key findings and summarized research results.

1. (FINANCIAL) LEASING MARKET IN BOSNIA AND HERZEGOVINA

In the countries of the Western Balkans, including Bosnia and Herzegovina, the leasing sector has grown despite the lack of appropriate legislation. Although this can be perceived as a temporary relief for credit-laden companies, it is an area of great importance due to the lack of a suitable framework for supervising the consequences for the financial sector (Vukmirović, 2007). Due to the lack of legal regulations on leasing operations, in the BH market, leasing functioned similarly to bank loans until 2007. Small and medium enterprises (SMEs), as well as entrepreneurs, leasing beneficiaries, procured fixed assets and equipment through loans. This was regulated by the current Law on Obligations and Basics of Property-Legal Relations, which were not appropriate for leasing. This type of financing was sometimes more expensive for small and medium enterprises in comparison to standard bank loans, as it obliged users to sign a comprehensive insurance policy. Therefore, in both entities (the Republic of Srpska and the Federation of BH), the adoption of the Law on Leasing was inevitable, thus enabling leasing services to transcend from a "quasi-banking" loan into adequate support for the development of small and medium enterprises and entrepreneurship.

In the Republic of Srpska, the Law on Leasing was passed in mid-2007, providing for two types of leasing: *(1) operating leasing, (2) financial leasing.* According to this Law, the minimum amount of share capital of leasing companies is 250 000 Bosnian Convertible Marks (BAM), with the Banking Agency of the Republic of Srpska issuing the respective licenses and performs control and supervision of the operations of lessors. By bringing leasing within the legal framework, leasing services have been regulated as in developed market economies. This has made the leasing business a simpler and cheaper source of financing for small and medium-sized enterprises compared to standard bank loans. The adoption of the Law on Leasing has particularly affected those companies lacking sufficient capital to purchase fixed assets and equipment, or collateral mandatory to secure expensive bank loans.

The Federation of BH adopted the Law on Leasing at the end of 2008. According to this Law, the Banking Agency of the Federation of BH shall issue licenses and perform supervision and control over the operations of leasing companies within its area of jurisdiction. It should be

noted that the Law on Leasing in both entities regulates the mandatory payment of value-added tax (VAT) on interest in any of the financial leasing arrangements.

According to the Central Bank of Bosnia and Herzegovina, in the year 2018, seven leasing companies in Bosnia and Herzegovina had leasing assets of 152.4 million euros, which is an increase of 18.97 million or 14.2% compared to the year before. The increase in the balance total was achieved by two leasing companies of 24.36 million euros, while four leasing companies registered a decrease in their balance total in the amount of 6.30 million euros, compared to 2017. 88% of the value of the leasing contract is related to financial leasing, and the remaining 12% relates to operating leasing. The value of leasing operations in 2018 amounted to 98.82 million euros, which is 32.2% more than in the year 2017. At the end of 2018, the leasing sector recorded a positive financial result of 1.69 million euros. Three leasing companies reported a loss of 1.23 million euros, and four leasing companies reported a profit of 2.92 million euros (Central Bank of Bosnia and Herzegovina, 2018). From January-December 2018, there were no registered lessors based in the Republic of Srpska.

The following table shows the turnover of financial leasing in Bosnia and Herzegovina (BH), by entities (the Republic of Srpska and the Federation of BH), and total turnover in Bosnia and Herzegovina, over ten years.

Table 1. Comparative indicators of financial leasing turnover in Bosnia and Herzegovina (000 EUR)

Year	The Republic of Srpska	(%)	Federation of Bosnia and Herzegovina	(%)	Bosnia and Herzegovina	(%)
2009	35,151	31.5	76,496	68.5	111,647	100
2010	44,887	34.6	84,743	65.4	129,630	100
2011	27,326	40.0	41,045	60.0	68,371	100
2012	27,527	44.5	34,357	55.5	61,884	100
2013	28,764	55.1	23,438	44.9	52,202	100
2014	27,991	63.7	15,947	36.3	43,938	100
2015	32,274	53.9	27,541	46.1	59,815	100
2016	32,250	78.2	8,967	21.8	41,217	100
2017	30,820	78.5	8,436	21.5	39,256	100
2018	37,474	72.8	13,982	27.2	51,456	100

Source: Banking Agencies from both entities (the Republic of Srpska, Federation of Bosnia and Herzegovina), Annual Reports 2009-2018

Chart 1: Financial leasing turnover in Bosnia and Herzegovina (000 EUR)
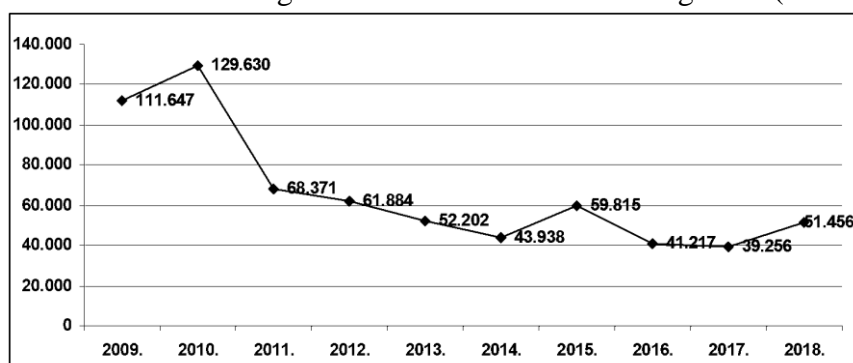
Source: Authors' processing

Financial leasing at the financial market of Bosnia and Herzegovina registered a sharp decline in 2011, amounting to 61.258 million euros or 47.26%. The trend line of financial leasing maintained its decline until 2015, when a sharp increase of 36.13% was noted, only to be followed by a further decline in 2016 by 31.09%.

Chart 2. Turnover in financial leasing by entities (RS, Federation of BH) (000 EUR)
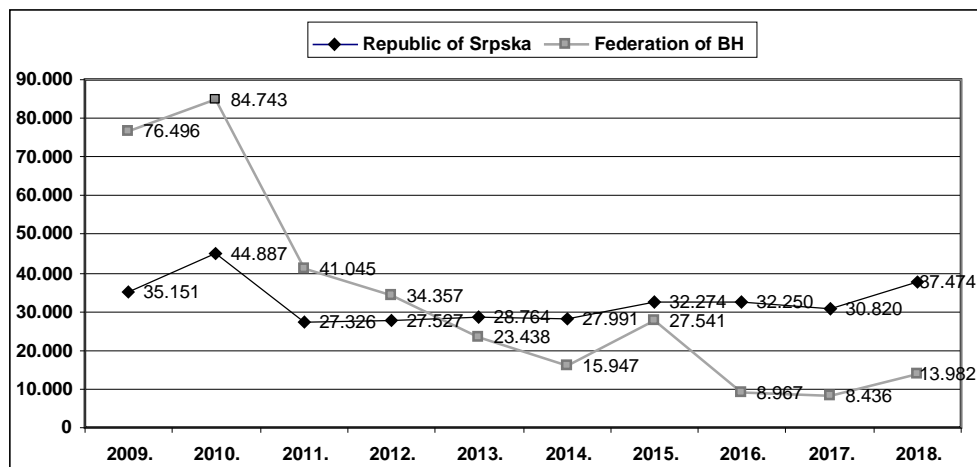
Source: Authors' processing

Based on the indicators presented (Chart 1), it can be concluded that financial leasing placements in the Republic of Srpska recorded a sharp decline in 2011 of 17.56 million euros or 39.12%. After 2011, the trend line of financial leasing maintained a slight growth until 2018. In contrast to financial leasing arrangements in the Republic of Srpska, financial leasing in the Federation of BH recorded a sharp decline of 43.698 million euros or 51.56% in 2011. The trend line of financial leasing registered a decline until 2015, when a slight increase was recorded, followed by a further decline in leasing investments in 2016.

Chart 3: Turnover in financial leasing by entities (RS, Federation of BH) (%)
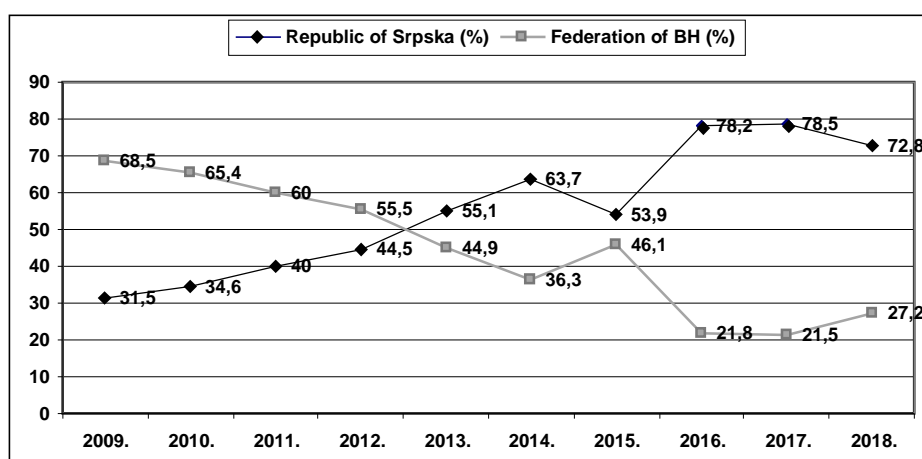
Source: Authors' processing

The percentage share of financial leasing arrangements in the Republic of Srpska registered a constant growth until 2015, concerning the total financial leasing arrangements in Bosnia and

Herzegovina. On the other hand, the percentage share in financial leasing of the Federation of BH decreased until 2015 in the total financial leasing turnover in Bosnia and Herzegovina.

Based on the data from Table 1, it is evident that financial leasing was more present in the Republic of Srpska from 2013 to 2018 to financing through leasing in the Federation of BH. This leads to the conclusion that small and medium enterprises in the Federation of BH used a greater percentage of other sources to finance their business activities.

Despite this situation in the leasing market, it should be noted that innovations in *leasing operations* have not missed the BH leasing market, which is best confirmed by the activities of the *European Bank for Reconstruction and Development (EBRD)*. Namely, the European Bank for Reconstruction and Development, as the largest investor in Central and Eastern Europe and the Commonwealth of Independent States, approved a credit line for small and medium enterprises in Bosnia and Herzegovina of 7 million euros through *Raiffeisen Leasing Sarajevo*. Since the beginning of 2007, this bank has financed small and medium enterprises in Bosnia and Herzegovina through leasing, by assisting in the implementation of 130 projects, in the amount of 1.8 billion euros (https://lat.rtrs.tv/vijesti/vijest.php?id=207892).

2. ANALYTICAL APPROACH TO THE RELATIONS BETWEEN ECONOMIC INDICATORS IN BOSNIA AND HERZEGOVINA

The analyzed economic indicators of Bosnia and Herzegovina are presented in Table 2 and represent different levels of a certain phenomenon by years.

Table 2. Economic indicators in Bosnia and Herzegovina (mil. EUR)

YEAR	LEASING	GDP	EXPORT	IMPORT	FDI
2009	112	13,523	2,835	6,332	166
2010	129	13,296	3,638	6,982	545
2011	68	13,731	4,216	7,961	314
2012	61	13,948	4,029	7,821	466
2013	52	14,491	4,297	7,778	225
2014	43	14,455	4,768	7,936	424
2015	59	15,108	5,068	7,803	268
2016	42	15,914	5,429	8,017	236
2017	39	16,671	6,434	9,077	414
2018	51	17,453	6,956	9,556	409

Source: Council of Ministers of Bosnia and Herzegovina, Directorate for Economic Planning, Economic Trends - Annual Reports 2009 - 2018

In order to assess the relationship between the observed phenomena, as well as their mutual influence, it is necessary to apply correlation and regression analysis. The correlation analysis should indicate whether there is a quantitative matching between the observed phenomena, while the regression analysis assessed the level of impact of variables such as leasing, exports, imports, and foreign direct investment (FDI) on the gross domestic product (GDP). The results of the correlation analysis are given in Table 3.

Given that the impact of leasing, exports, imports, and foreign direct investment on GDP will be assessed in the remainder of the paper, it was necessary to analyze how these variables are related to the GDP variable (Table 3). As the variables do not deviate from the normal distribution, the Pearson correlation coefficient was used and the results indicate that all

variables, except for FDI, are in a statistically significant correlation with GDP. Likewise, it is necessary to stress that the leasing variable is negatively correlated with GDP, thus indicating that the growth of one variable is associated with a decrease in the other variable ($\rho = -0.666$). Apart from this connection, it is evident that a direct and strong correlation is established by the variables export and import with GDP ($\rho = 0.962$ and $\rho = 0.875$). It is important to note that there is an extremely strong correlation between export and import. Such correlation is direct and indicates that the growth of one implies the growth of the other variable ($\rho = 0.951$). Both import and export establish a statistically significant correlation with leasing, but this relation is indirect, meaning that the increase of one variable implies the decrease of another.

Table 3. Correlation analysis

Correlations		LEASING	GDP	EXPORT	IMPORT	FDI
LEASING	Pearson Correlation	1	-0.666*	-0.714*	-0.747*	0.116
GDP	Pearson Correlation	-0.666*	1.000	0.962**	0.875**	0.013
EXPORT	Pearson Correlation	-0.714*	0.962**	1.000	0.951**	0.191
IMPORT	Pearson Correlation	-0.747*	0.875**	0.951**	1.000	0.283
FDI	Pearson Correlation	0.116	0.013	0.191	0.283	1.000

Source: Authors' processing

In addition to the correlation analysis, a regression analysis was performed, aimed to show whether the changes in these four variables have an impact (and to what extent) in explaining the changes in the GDP variable. On the account of the above, a multiple regression was applied in which GDP was the dependent variable, whereas the independent (explanatory) ones were leasing, export, import, and FDI. Due to the strong correlation between the variables of export and import, it was necessary to exclude one of them from further analysis, as multicollinearity would occur otherwise. With this in mind, leasing, export, and FDI remained explanatory variables in further analysis. The results of the regression analysis are given below:

Table 4. Coefficient of determination

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.982[a]	0.965	0.948	321.780
a. Predictors (Constant), FDI, LEASING, EXPORT				

Source: Authors' processing

The table above shows the level of variation of the dependent variable which is explained by the observed model. In this case, this level is extremely high and it can be said that about 94.8% of the GDP variation is explained employing this model which includes the three aforementioned variables.

The above indicator was tested by the F test, and the results obtained indicate that it is statistically significant (*F=55.36*; *p value = 0.000*).

Table 5. Statistical significance indicators of the model

ANOVAᵃ						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	17194762.652	3	5731587.551	55.355	0.000b
	Residual	621253.348	6	103542.225		
	Total	17816016.000	9			
a. Dependent Variable: GDP						
b. Predictors (Constant), FDI, LEASING, EXPORT						

Source: Authors' processing

By calculating the coefficients of multiple linear regression, more information will be obtained on the statistical significance of certain coefficients and their impact on GDP.

Table 6. Multiple linear regression coefficients

Coefficientsᵃ										
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Correlations**			**Collinearity Statistics**	
		B	Std. Error	Beta			Zero-order	Partial	Part:	Tolerance	VIF
1	(Constant)	9314.165	855.952		10.882	0.000					
	LEASING	7.057	5.387	0.153	1.310	0.238	-0.666	0.472	0.100	0.424	2.359
	EXPORT	1.247	0.133	1.113	9.392	0.000	0.962	0.968	0.716	0.414	2.415
	FDI	-2.494	0.959	-0.217	-2.600	0.041	0.013	-0.728	-0.198	0.834	1.199
a. Dependent Variable: GDP										

Source: Authors' processing

The results presented in Table 6, indicate that the two coefficients are statistically significant and uniquely contribute to the prediction of the dependent variable. The coefficients in question are B2 (*t test = 9.392; p value = 0.000*) and B3 (*t test = -2.600; p value = 0.041*), respectively, i.e. the variables export and FDI. In contrast, the leasing variable lacks a statistically significant coefficient B1 and its contribution cannot be treated as significant and unique. In the column of standardized coefficients (beta) it is evident that the export variable has more than five times higher contribution to the explanation of GDP than variable FDI (1.113 > │-0.217│). Therefore, it can be said that in the observed model, a unique and statistically significant contribution to the elaboration of GDP is given by export and FDI, while the leasing variable bears no statistical significance.

3. FINANCIAL LEASING IN THE FUNCTION OF INVESTMENT DECISION-MAKING OF SMALL AND MEDIUM ENTERPRISES IN BOSNIA AND HERZEGOVINA

In developed western countries, leasing plays a very important role in economic development, and especially in the development of small and medium enterprises. The purpose of leasing here is, above all, the development of the economy, as evidenced by over 90% of leasing placements aimed at legal entities (small and medium enterprises). Small and medium-sized enterprises (SMEs) that require working capital, and that borrow funds on that account, leasing arrangements are a very convenient and useful option. Leasing arrangements, which make up

over 20% and in some cases over 30% of the total equipment procurement in the world, allow for a simpler and cheaper way of purchasing equipment. These arrangements are particularly applicable when an entity is faced with insufficient equity and bank loans that are still unfavorable. One of the greatest advantages of financial leasing is the *effective protection of creditors*, which makes leasing competitive in relation to other financial arrangements and bank loans (Subotić, Erceg and Mitrović, 2018).

Banks in Bosnia and Herzegovina require high loan collateral, thus transferring as much risk as possible onto the borrower. The following is normally used as collateral: deposits, guarantees of other commercial banks, real estate, debtors' promissory notes, and other forms of loan collateral. An additional problem for companies when applying for this type of loan is the extensive documentation that is normally an integral part of the procedure. The amount of the loan mainly depends on the creditworthiness of the company.

Small and medium enterprises (SMEs) in Bosnia and Herzegovina are increasingly facing the problem where the necessity for financial assets exceeds the amount of newly created money accumulation remaining at their disposal. Such events and developments cause them to increasingly direct their financial demand to banks and bank loans. By approving and placing loans, banks enable small and medium-sized enterprises to maintain liquidity, permanent continuity, and business stability (Subotić, Erceg and Mitrović, 2018).

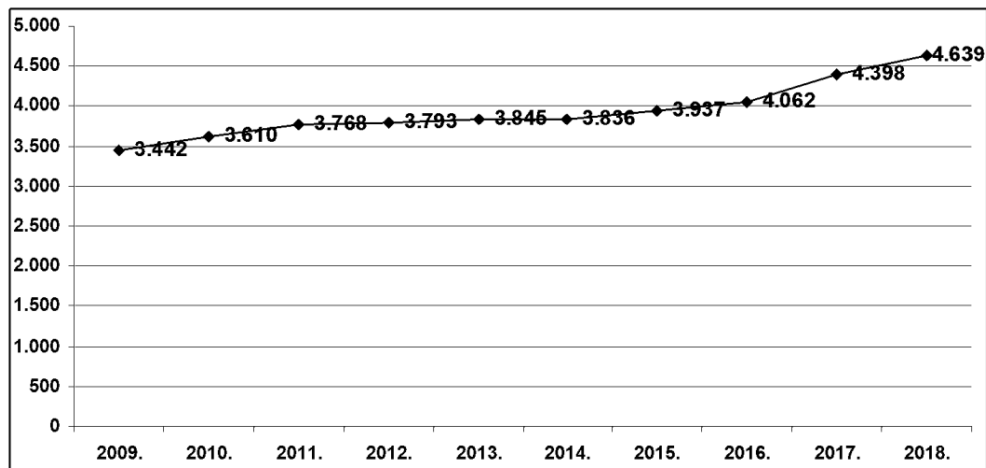**Table 7**. Loan placement in Bosnia and Herzegovina (000 EUR)

Year	THE REPUBLIC OF SRPSKA (RS)			FEDERATION OF BOSNIA AND HERZEGOVINA (Federation of BH)			TOTAL BOSNIA AND HERZEGOVINA
	Public enterprises	SME	Total RS	Public enterprises	SME	Total Federation of BH	
2009	27,449	911,825	939,274	94,361	2,408,347	2,502,708	3,441,982
2010	36,504	982,261	1,018,765	122,105	2,469,451	2,591,556	3,610,321
2011	224,33	988,913	1,214,017	32,075	2,521,942	2,554,017	3,768,263
2012	99,189	928,390	1,027,579	128,837	2,636,594	2,765,431	3,793,010
2013	105,927	938,102	1,044,029	133,214	2,667,830	2,801,044	3,845,073
2014	111,985	919,891	1,031,876	129,772	2,674,907	2,804,679	3,836,555
2015	109,510	957,223	1,066,733	138,208	2,732,610	2,870,818	3,937,551
2016	109,481	942,038	1,051,519	121,779	2,889,093	3,010,872	4,062,391
2017	123,315	938,464	1,061,779	107,929	3,228,491	3,336,420	4,398,199
2018	137,705	939,151	1,076,856	164,868	3,397,765	3,562,633	4,639,489

Source: Banking Agencies from both entities (the Republic of Srpska, Federation of Bosnia and Herzegovina), Annual Reports 2009-2018

A closer look at credit placements in public and state-owned enterprises, as well as in small and medium enterprises (SMEs) in Bosnia and Herzegovina (Table 6), allows us to register a growth tendency in the period from 2009 to 2018. Total credit placements in Bosnia and Herzegovina over the same time period also recorded growth (Chart 4).

Loans to small and medium-sized enterprises (SMEs) in Bosnia and Herzegovina followed the growth of total loans by year, as presented in Chart 5.

Chart 4. Loan placement in Bosnia and Herzegovina (mil. EUR)
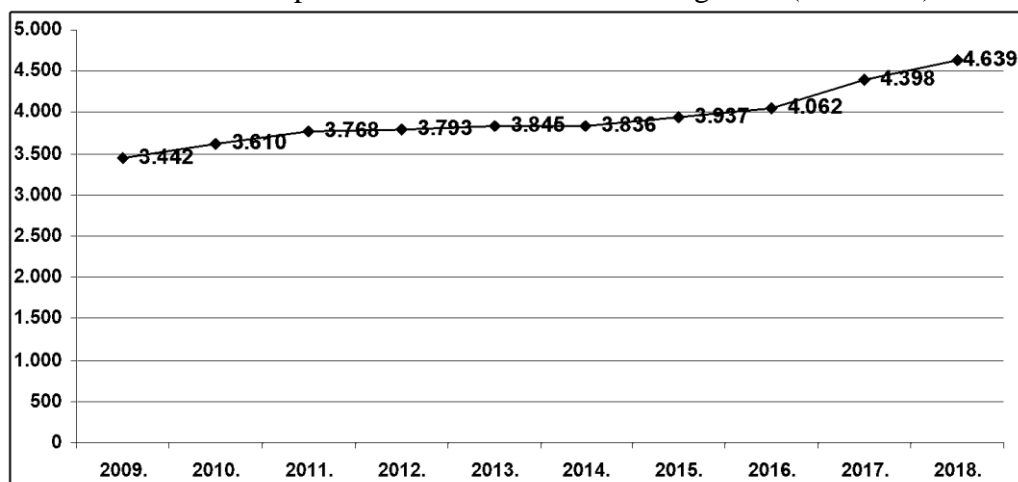

Source: Authors' processing

Chart 5. SME Loan placement in Bosnia and Herzegovina (mil. EUR)
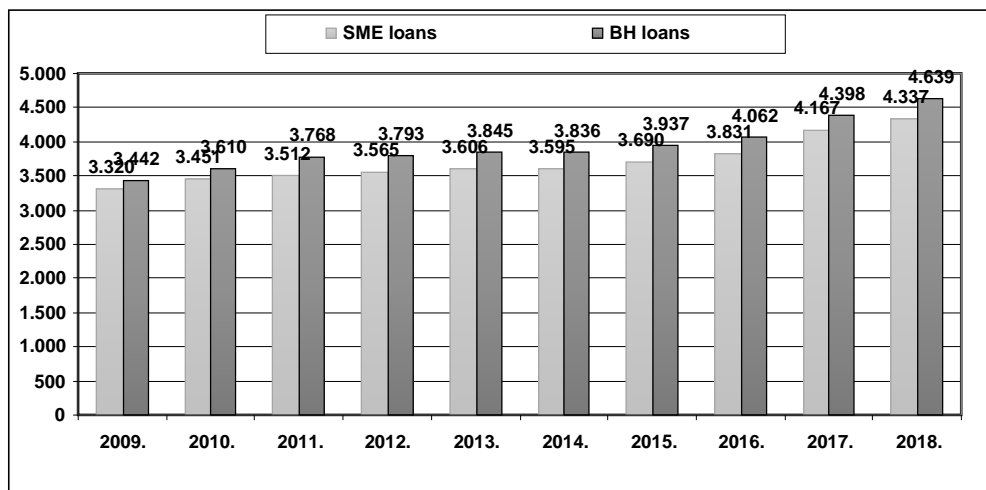
Source: Authors' processing

Chart 6. Loan placement in Bosnia and Herzegovina (mil. EUR)

Source: Authors' processing

Chart 7. Financial Leasing in Bosnia and Herzegovina (mil. EUR)
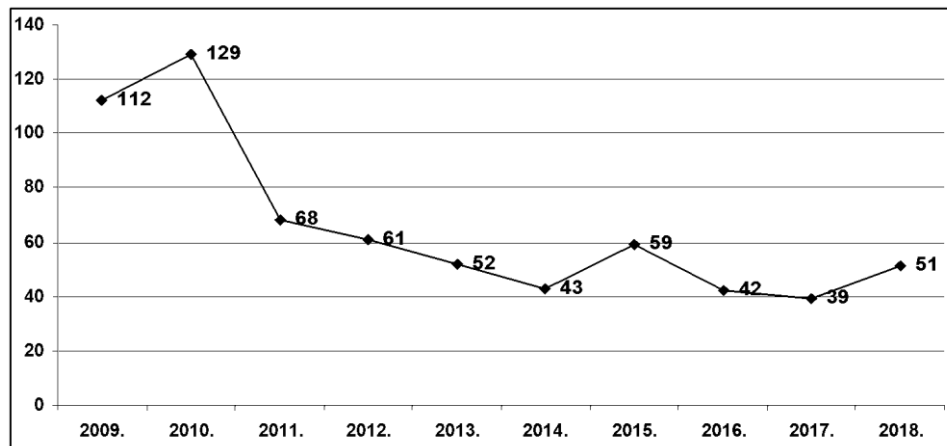
Source: Authors' processing

Chart 8. Leasing in Europe (bn. EUR)

Source: http://www.leaseurope.org
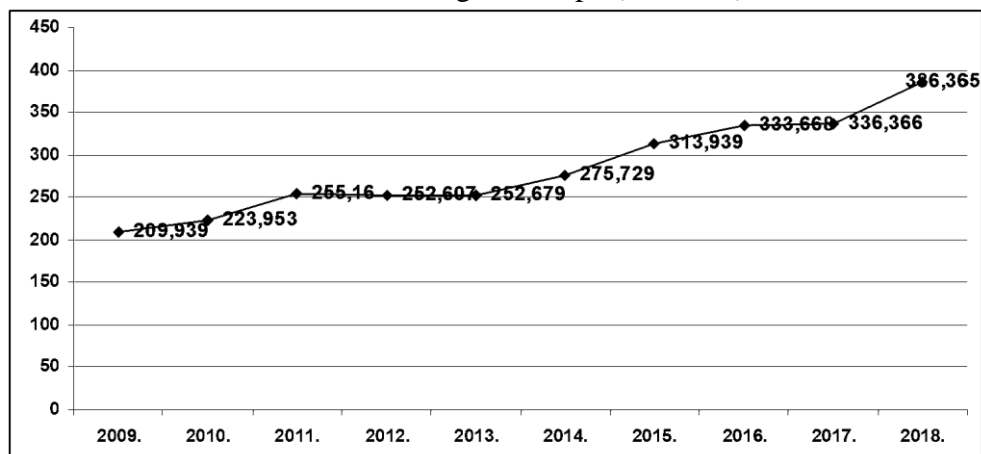
The results of the comparative analysis of the indicators presented in the charts above indicate that credit placements in Bosnia and Herzegovina grew permanently from 2009 to 2018. Loans to small and medium-sized enterprises (SMEs) in Bosnia and Herzegovina also registered a permanent annual growth and follow the growth of total credit placements. In contrast to credit placements, financial leasing arrangements in Bosnia and Herzegovina have recorded a permanent decline since 2011, except a slight increase in 2015 (Chart 7). On the other hand, leasing arrangements in European countries record a permanent annual growth from 2009 to 2018. That is, the line of leasing trend in Bosnia and Herzegovina keeps declining, except for 2015 and 2018, while the leasing trend line in European countries maintains slight growth.

4. CONCLUSION

The results of this research showed that the financial leasing market in Bosnia and Herzegovina is quite scarce and underdeveloped, while financial leasing activities are performed by seven different leasing companies located in the Federation of Bosnia and Herzegovina. In the Republic of Srpska, as the second entity in Bosnia and Herzegovina, there are no entities registered for financial leasing operations. Despite this fact, the financial leasing market in the Republic of Srpska registered a slight growth in the period from 2011 to 2018. In contrast to financial leasing arrangements in the Republic of Srpska, financial leasing in the Federation of

Bosnia and Herzegovina registered a decline in the period from 2011 to 2015, therefore making the downward-upward trend line of financial leasing in this entity.

In order to assess the relationship between economic indicators in Bosnia and Herzegovina, and their mutual effect and influence, a correlation and regression analysis were used. Correlation analysis allowed to determine the quantitative matching between the observed phenomena, while the regression analysis assessed the level of influence of the following variables: leasing, export, import, and foreign direct investment (FDI) onto the value of the gross domestic product (GDP). By using the Pearson correlation coefficient, the results that were obtained indicated that all variables, except FDI, were statistically significantly correlated with GDP. Variable leasing is negatively correlated with GDP, indicating that the growth of one variable is related to the decrease of another variable. On the other hand, a direct and strong correlation of variables such as export and import with GDP was observed. It is important to note that a statistically significant indirect relation is achieved both between import & export and leasing, meaning that the growth of one variable implies the decline of another variable and vice versa. The results of the regression analysis indicate that two coefficients (B_2 and B_3) are statistically significant, giving a unique contribution to the prediction of the dependent variable, namely the variables of export and FDI. In contrast, the leasing variable has no statistically significant coefficient B_1 and its contribution cannot be treated as significant and unique. Based on the above, it can be concluded that in the observed model, a unique and statistically significant contribution to the elaboration of GDP is provided primarily by export and FDI, while the leasing variable has no statistical significance.

A comparative analysis of financial leasing and loans, as a form of financing, indicates the fact that financial leasing was not in the function of deciding and making strategic decisions to replace credit arrangements by this distinct and more favorable form of financing business activities in Bosnia and Herzegovina. Namely, while a permanent decline in leasing arrangements has been registered over the last few years, credit placements have been growing at a much faster rate. In contrast to leasing arrangements in Bosnia and Herzegovina, which maintained their tendency to decline over the recent years, leasing financing in developed European countries has been growing steadily, which was particularly notable in the period from 2015 to 2018.

By summarizing the results of financial leasing market research, as well as of statistical indicators of correlation and regression analysis, together with the results of comparative analysis of financial leasing and loans, it can be said that the impact of financial leasing on SME development and economic development of Bosnia and Herzegovina over the observed ten year period was negligible and insignificant.

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COMPARATIVE ANALYSIS OF STRUCTURAL Σ-CONVERGENCE OF EXPORTS

Vera Pirimova[1]

Abstract: *The paper analyses the structural σ-convergence of exports of six CEE countries to the Euro area. The countries are Estonia, Latvia, Lithuania, Slovakia, and Slovenia, which are members of the Euro area, as well as Bulgaria, which was included in the ERM II currency mechanism on 10.07.2020. The main goals are to measure and compare the structural σ-convergence of exports of the six CEE countries and to prove whether the introduction of the common currency (the euro) has an impact on the convergence. The research consists of the theoretical and empirical parts. The theoretical part systematizes basic concepts of economic, trade, club, and structural convergence. One index method used by his authors to study economic convergence has been adapted to the structural σ-convergence of exports. This is the dissimilarity index of Von Hagen and Traistaru. In the empirical part, the values of the index, by commodity groups, according to SITC, Rev. 4, for the six countries during the period 2002-2018 are determined. The index is calculated also as aggregated, referring to the total exports of the selected countries and for the whole period. The results are presented in graphical form. Based on them, the structural and dynamic characteristics of the convergence and divergence of exports of the six countries compared to the exports of the Euro area are derived. Conclusions are made about achieved the different degree of similarity, that is uncertain and unstable and so the convergence can be only partially attributed to the adoption of the euro. Methods of analysis and synthesis, induction and deduction, methods of the empirical index, and comparative analysis are applied.*

Keywords: *Convergence, Divergence, Export structure, Export dissimilarity Index.*

INTRODUCTION

Convergence problems have become an increasing scientific and practical significance in recent years. Different groups of countries from the European Union or other regions of the world are studied, evidence of the presence or absence of similarities in the development of the main macroeconomic processes is presented, criteria and methods to achieve nominal and real, as well as structural convergence, are applied. Some analyses reveal opportunities for synchronizing the dynamics of economies (GDP growth), using methods that allow studying other processes and indicators, including similarities or differences in the field of foreign trade. They become more in-depth by the detection of signs of convergence or divergence in the structural characteristics of GDP and foreign trade. Theoretical and empirical analyses summarize many factors of convergence, discuss the role of the adoption and use of the common European currency (euro) for the Euro area and European Union countries.

The problems of structural convergence in the field of exports acquire new significance for Bulgaria after the inclusion of the country and the Bulgarian lev in the currency mechanism

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ERM II on July 10, 2020. In the context of Bulgaria's future membership in the Euro area, it is interesting to compare it with other EU countries, such as those in the CEE region, which have already adopted the euro and have similar starting economic conditions.

In this context, the main objective of the present study is to determine the structural σ-convergence of exports of six CEE countries to exports of the Euro area as a whole. The group of countries includes Bulgaria and the five countries from the region of Central and Eastern Europe, which already use the euro (Estonia, Latvia, Lithuania, Slovenia, and Slovakia).

To achieve the main goal, several more specific tasks are solved, including:
1. Theoretical and methodological analysis is performed, in which dependencies between the economic, trade, structural, and club convergence are revealed, through the prism of the possibilities for application of certain combined methods for their analysis;
2. An empirical index and comparative analysis shall determine the extent and trends of convergence change in the selected group of six CEE countries. An additional task is to prove whether the introduction of the euro has an impact on the convergence process.

The methods of analysis and synthesis, induction and deduction, as well as the methods of empirical, comparative, and mathematical-statistical (index) analysis are applied. To determine the structural σ-convergence of exports, the values of the dissimilarity index by the method of Von Hagen and Traistaru are calculated. This index is subject to some modification and adaptation insofar as it is applied as a rule for the analysis of structural economic convergence. The values of the index are calculated for each of the six CEE countries, for seven commodity groups, subdivided according to SITC, rev. 4, by individual years in the period 2002-2018. Also, the values of the aggregated index (for all exports), for each year of the period, for the six CEE countries have been measured. The results are expressed in absolute value (under module) and are illustrated with graphs. Eurostat data on an annual basis are used in the analysis.

THEORETICAL AND METHODOLOGICAL BASES OF THE ANALYSIS

The analyses of achieving greater similarity between EU countries reveal in several areas the relationship between beta and sigma convergence, as well as between economic, trade, structural, and club convergence. On this basis, it is possible to apply similar methods to determine the degree and trends in the dynamics of structural economic and trade convergence/divergence.

As a result of the development of integration, the ties between the economies are deepened and trade between the EU countries is expanded. On this basis, and given the share of exports and imports in the GDP indicator, it becomes possible to examine economic and trade convergence in parallel. This is clearly expressed in the application of the basic methods and models of the neoclassical and endogenous theory of economic growth. A study by Devasmita Jena and Alokesh Barua (2020) summarizes that based on the model of Solow (1956) and Swan (1956) many empirical analyses of convergence have been performed, reflected for example in Barro (1991), Barro and Sala-i-Martin (1991, 1992, 1997, 2003), Sala-i-Martin (1996), Quah (1996), Bernard and Durlauf (1996), Rodrik (2003, 2011) and others. It is underlined, that as early as the 1990s in the analyses of Barro and Sala-i-Martin (1991, 1992), the basic principles of beta and sigma convergence were developed. Besides, Quah (1996) and Sala-i-Martin (1996) express the view that the presence of beta convergence is a prerequisite for achieving sigma convergence. Therefore, in order to reduce the differences between countries in the created per

capita income over time (sigma-convergence), income must grow faster in relatively poorer countries than in richer countries (beta-convergence).

The theoretical is supplemented by empirical comparative models. They focus on certain groups of countries and allow to reveal the peculiarities of the so-called "club" convergence. It was introduced as a term by Baumol (1986), which proves that groups of countries with similar initial structural characteristics of economies can show a tendency to converge, to achieve a sustainable balance through a relatively balanced growth path. Many studies have concluded that club convergence analysis provides a more realistic view of regional income growth and hence of regional convergence than traditional concepts of beta-convergence and sigma-convergence (e.g. Durlauf et al, 2005; Quah, 1996). The results of Barro (1991), Mankiw et al. (1992), Barro and Sala-i-Martin (1991, 1992), confirm the view that the conditional convergence corresponds to a large extent to the club's convergence. The relationship between these two types of convergence is also argued by Alexiadis (2013). He emphasizes that theoretical grounds for the concept of club convergence can be found in neoclassical and some endogenous growth models. According to him, the economies are not converging, there is a certain polarization of regions, poor "peripheral" regions, and rich "central" regions are divided, with growing differences between them. Alexiadis emphasizes the similar characteristics of "clubs" of different countries in Europe, not only in terms of geography but also in terms of the creation and implementation of technologies and the external influences of the agglomeration. In other analyses, the club is linked and studied by the methods of beta convergence (see in more detail the summaries of Varbanov (2020) and its other factors are supplemented.

Based on the dependencies between conditional and club convergence, Borsi and Metiu (2015) differentiate four convergence clubs within the EU-27. According to them, the creation of these clubs is based on geographical regions, not on membership in the European Union. On the other hand, Lyncker and Thoennessen (2015) adduce arguments for club convergence in the EU-15, while in terms of divergence, they found differences in income growth in Northern, Central, and Southern Europe. Scharpf (2016) emphasizes the "monetary over-integration of structurally heterogeneous "northern" and "southern" political economies" and proposes the possibility of moving towards a "system of differentiated monetary integration that could adopt structurally diverse and highly interdependent European political economies".

In a similar context, the present study focuses on the structural sigma convergence in the exports of a certain group (club) of six EU countries, which are characterized by initial similarity in economic conditions. Conclusions from beta convergence analyses have been taken into account that relatively lagging countries can achieve higher rates of economic growth and faster intensification of their trade flows with more advanced countries. However, these conclusions are not definite and unambiguous. On the one hand, there are arguments in support of the concepts of beta and sigma convergence, for example in the research of Armstrong (1995); Ben-David (1993, 2001); Dewhurst and Mutis-Gaitan (1995); Leonardi (1995); Kutan and Yigit (2009); Boldrin and Canova (2001); Barua et al. (2006); Villaverde and Maza (2008); Dobrinsky (2013); Próchniak and Witkowski (2013); Campos et al. (2014); Goedemé and Collado (2016). On the other hand, there is a simultaneous evidence of both convergence and divergence in certain indicators or in certain periods (Marques and Soukiazis (1998); Dunford (1996); Simionescucu (2014)). There are also generalizations in which only signs of divergence predominate (Arestis and Paliginis (1995); Hallett (1981); Slaughter (1997, 2001)). From such a point of view, it is of interest to determine whether trends of expansion

(or restriction) of structural convergence (divergence) of exports of the six CEE countries to the Euro area prevail.

In the present analysis it is recognized that the notions of convergence in the economy and foreign trade are improved with the development of the understanding and empirical analyses of the structural convergence. It presupposes achieving similarity in the commodity structure of exports and imports, which is also linked to the sectoral structure of the economies. Depending on the degree of disaggregation of the indicators used, the degree of similarity or difference in the specialization of production and exports of groups of EU and world countries is determined. In recent years, a huge variety of theoretical models and empirical analyses have been developed, focused on the problems of structural convergence in foreign trade (see in more details Pirimova, 2019a, 2019b). Among them are, for example, studies by Derado (2008), Benedictis and Tajoli (2007), Nikolić (2011), Erlat and Ekmen (2009), Kaitila (2013), Joseph and Osbat (2016), etc.

Taken into account the relationship between economic and trade convergence in the empirical part of the present study, the σ-convergence method is applied. It has been previously adapted by us to the analysis of structural trade convergence, insofar as in its original form it has been constructed and applied for the analysis of structural economic convergence/divergence.

Here, a dissimilarity index (DISSIM) compiled by Von Hagen and Traistaru (2005) is calculated. In its original form, this index represents the structural σ-convergence of a country's economy, for which purpose the share of one economic sector in the GVA of the respective country is compared with the share of the same sector in the reference group of countries (Euro area). After adapting to the structural convergence in exports, the basic equation retains its general form:

$$DISSIM_{nx} = - \sum \left| E_{nx} - E_{EZx} \right| \qquad (1)$$

however, the following indicators have been introduced and used:
E_{nx} is the relative share of a given product group x in the exports of the respective CEE country n (Bulgaria, Estonia, Latvia, Lithuania, Slovenia, Slovakia);
E_{EZx} is the relative share of the same commodity group x in the exports of the Eurozone (EZ - the reference group of countries).

The dissimilarity index (DISSIM) is calculated based on Eurostat annual data and preliminarily calculated by us relative indicators for the exports of Bulgaria and the other five CEE countries toward the Euro area, for each of the seven commodity groups, according to SITC, rev. 4, for the period 2002-2018. The commodity groups are: 1.) food, drinks and tobacco; 2.) raw materials; 3.) mineral fuels, lubricants and related materials; 4.) chemicals and related products, n.e.s.; 5.) other manufactured goods; 6.) machinery and transport equipment; 7.) commodities and transactions not classified elsewhere in the SITC. In addition, aggregated values of the index for the export for each year of the period have been calculated. This allows for the whole past period to express the prevailing generalized trends of change and transition to greater resemblance (convergence) or distinction (divergence) in the structural characteristics of exports of each of the six countries relative to Euro area exports. The results are presented in absolute values, graphs are built on their basis.

When interpreting the obtained results, it is taken into account that if the values of the sub-module indices are small and tend to zero, they are a sign of weaker divergence and respectively

stronger structural convergence, i.e. for greater convergence (or complete coincidence at DISSIM = 0) of the exports of a certain commodity group from a given CEE country to the exports of the same commodity group from the Euro area as a whole. At higher values of the indices there are more significant differences, stronger divergence (rather than convergence) in the commodity structure of exports of a particular country to the reference group of Euro area countries. As an illustration, the graph lines appear lower and closer (in convergence) or higher and further away (in divergence) from the abscissa, giving a graphical expression of the Euro area export reference values.

STRUCTURAL Σ-CONVERGENCE OF EXPORTS OF SIX CEE COUNTRIES TO THE EURO AREA

The results obtained for the DISSIM index are relatively low, but different by countries, years and commodity groups in exports. All values are in the range between 0 and 1, i.e. 1>DISSIM>0, sometimes lower and tending to zero, but in no case equal to 0. Based on them, mixed, ambiguous conclusions can be made - in some cases, there are signs of greater convergence, while in other cases there is still greater divergence in exports.

According to the values of the DISSIM dissimilarity index, several commodity groups stand out, in which each of the six countries shows the greatest similarities with the exports of the similar commodity group from the Euro area (see Table 1). For these commodity groups, the values of the index are relatively low, sometimes closer to zero. Therefore, the six CEE countries have achieved comparative similarity (convergence) with Euro area exports. The graphs (see Fig. 1 to Fig. 6) clearly show that their dynamic lines are the lowest, i.e. they are characterized by a maximum approximation to the abscissa and therefore to the reference values for Euro area exports.

Table 1. Commodity groups in the exports of six CEE countries with the greatest similarity (convergence) with the exports of the Euro area according to the DISSIM index*

Country	The greatest similarity with the exports of the Euro area according to the DISSIM index
Bulgaria	1. commodities and transactions not classified elsewhere in the SITC 2. food, drinks and tobacco 3. raw materials
Estonia	1. food, drinks and tobacco 2. commodities and transactions not classified elsewhere in the SITC 3. other manufactured goods
Latvia	1. commodities and transactions not classified elsewhere in the SITC 2. mineral fuels, lubricants and related materials 3. other manufactured goods
Lithuania	1. raw materials 2. other manufactured goods 3. commodities and transactions not classified elsewhere in the SITC
Slovakia	1. raw materials 2. commodities and transactions not classified elsewhere in the SITC 3. mineral fuels, lubricants and related materials
Slovenia	1. raw materials 2. commodities and transactions not classified elsewhere in the SITC 3. mineral fuels, lubricants and related materials

Source: Author's systematization based on own calculations of the DISSIM index values according to Eurostat annual data.

Figure 1. DISSIM index, by commodity groups for Bulgaria's exports to the Euro area
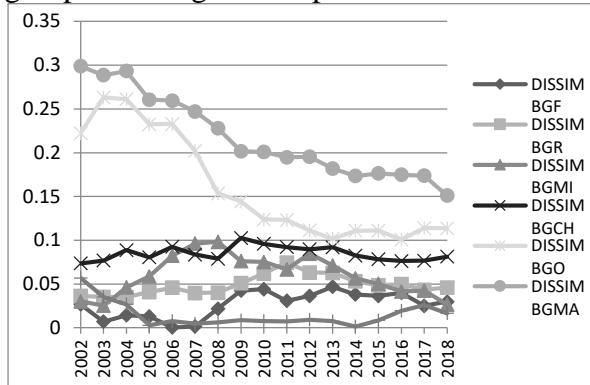
Source: Author's calculations based on Eurostat data.

Figure 2. DISSIM index, by commodity groups for Estonian exports to the Euro area
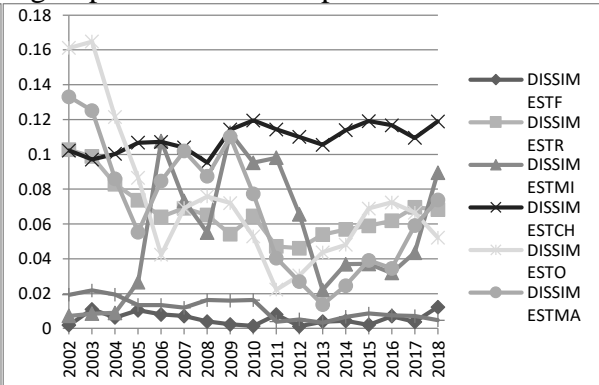
Source: Author's calculations based on Eurostat data.

Figure 3. DISSIM index, by commodity groups for Latvia's exports to the Euro area
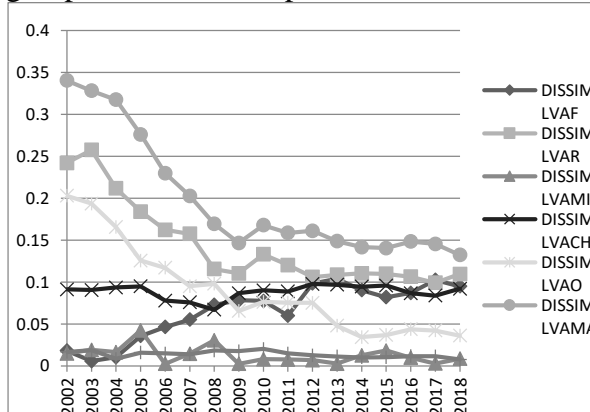
Source: Author's calculations based on Eurostat data.

Figure 4. DISSIM index, by commodity groups for Lithuanian exports to the Euro area
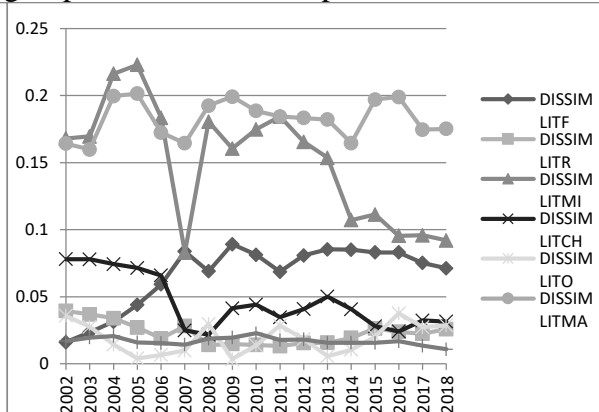
Source: Author's calculations based on Eurostat data.

Figure 5. DISSIM index, by commodity groups for Slovakia's exports to the Euro area
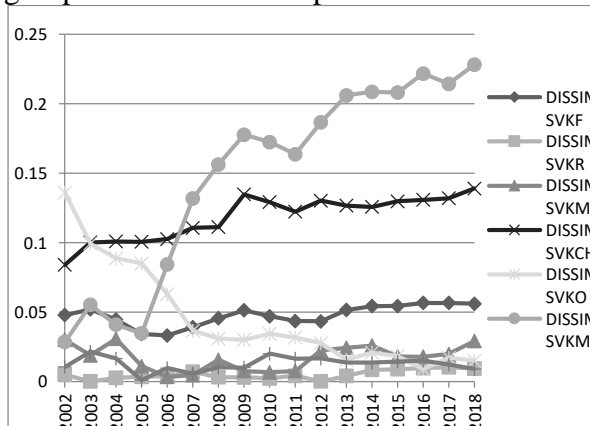
Source: Author's calculations based on Eurostat data.

Figure 6. DISSIM index, by commodity groups for Slovenia's exports to the Euro area
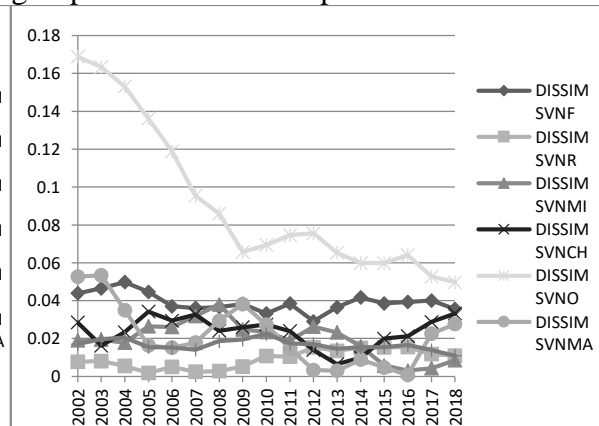
Source: Author's calculations based on Eurostat data.

The ranking of the first three commodity groups with the lowest DISSIM indices, on which comparative structural convergence with the Euro area exports was achieved, does not show significant differences between countries. By one specific commodity group - "commodities and transactions not classified elsewhere in the SITC", all six CEE countries have a relatively strong similarity to Euro area exports. However, the index values vary from country to country, and this commodity group is not always in the first place or the same place. It has the lowest DISSIM indices and ranks first for Bulgaria and Latvia, second for Estonia, Slovakia and Slovenia, third for Lithuania. Another commodity group, which is more represented because four of the countries (Bulgaria, Lithuania, Slovakia and Slovenia) achieve a relatively large approximation to the exports of the Euro area, is the group of "raw materials". It is followed by "other manufactured goods" included in the forefront in three of the countries (Estonia, Latvia and Lithuania), as well as "mineral fuels, lubricants and related materials" - also in three countries (Latvia, Slovakia and Slovenia).

Regarding the dynamics of structural convergence by individual commodity groups, the change in the values of the DISSIM index must be monitored. They are declining almost continuously and consistently for most commodity groups, for four countries (Bulgaria, Latvia, Lithuania and Slovenia) and thus show a gradual reduction in their structural divergence with Euro area exports. A different and not always positive trend is realized by separate commodity groups for Estonia (where there are uneven, frequent and divergent fluctuations) and by some commodity groups for Slovakia (where there is an increase in divergence). Indicative of this is the form and orientation of the graphical lines of the DISSIM indices by the respective commodity groups and countries.

In order to draw certain conclusions about the role of the euro, the peculiarities of structural convergence should be compared, on the one hand, for the exports of Bulgaria, and on the other hand, for the exports of the other five CEE countries. The results and conclusions are not unconditional for all commodity groups and all other CEE countries. On this basis, it cannot be indisputably proven that the introduction of the common currency is one of the leading and sustainable factors for greater structural convergence of exports.

It has already been shown that according to the calculated values of the DISSIM index there is no great peculiarity for Bulgaria in comparison with the other five CEE countries (members of the Euro area) in terms of the leading convergent commodity groups. There is a certain difference in the fact that in some cases the values of the DISSIM index for Bulgaria are higher and with relatively larger amplitudes (by years and by commodity groups), compared to the other five countries. Thus, in the past period, the degree of achieved structural convergence of Bulgarian exports can be defined as lower. At the same time, however, Bulgaria (as well as Latvia and Lithuania) is characterized by a steady trend of growing structural similarity with Euro area exports during the period - the dynamic lines of all seven commodity groups are downward. It is specific for Bulgaria that the structural convergence is more pronounced for commodity groups with a lower degree of product processing - because only for Bulgaria in the groups with the lowest values of the index are included simultaneously "food, drinks and tobacco" and "raw materials". However, this may be due to the different sectoral structure of the economies of Bulgaria and the other five CEE countries, as well as the relative shares of the respective commodity groups in GDP and the total exports of the six countries. For these reasons, at the beginning of the period, the weakest convergence was in the exports from Bulgaria of the commodity groups "machinery and transport equipment" and "other manufactured goods". The lines of their DISSIM indices are then significantly above the DISSIM lines of the other commodity groups. But over the years there has been a steady trend

of narrowing the gap, gradually descending and bringing the lines closer to those of other commodity groups and the Euro area. Nevertheless, these two commodity groups continue to dominate the difference in 2018 (when their lines remain the highest, above the lines of other commodity groups).

The insufficiently strong or emphasized role of the euro is also evident in the trends in the change of structural convergence, respectively divergence of exports as a whole. They can be derived based on calculated aggregated indices of dissimilarity (Aggregated DISSIM index) by country, for each year of the period.

Figure 7. Aggregate DISSIM Index of Bulgaria, Estonia, Latvia, Lithuania, Slovakia and Slovenia
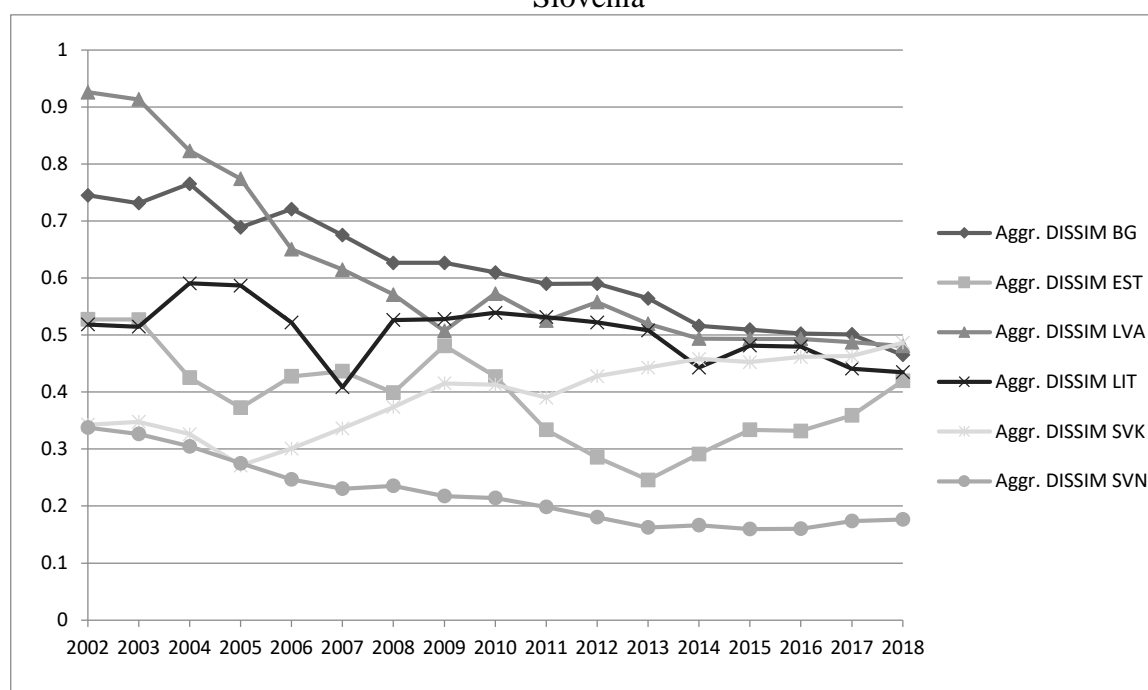
Source: Author's calculations of the values of the Aggregated DISSIM index according to Eurostat data.

The Aggregated DISSIM indices and the graphical lines based on them (see Fig. 7) show a peculiarity in the reduction or expansion of the similarity in exports with the Euro area achieved by each country. For the outstanding generalized trends in the structural convergence of exports in the period 2002-2018, the following conclusions can be made by country:

- For Bulgaria, there is a steady trend of increasing structural convergence in exports compared to exports of the Euro area within the study period. This trend is confirmed by the declining values of the Aggregated DISSIM index and their graph line, which is descending. At the beginning of the period, the differences are larger, towards the end of the period the values of the index decrease (from 0.74 to 0.46), exceeding the typical for three other CEE countries. Thus, the structural convergence of Bulgarian exports is growing, being comparable to that of Latvia and Slovakia, but remains weaker than that of the other three CEE countries, members of the Euro area. The line of Aggregated DISSIM for Bulgaria is the highest almost throughout the period, for 2018 it overlaps with the lines of Latvia and Slovakia.
- For 2018, Estonia is in second place in terms of the degree of convergence in exports among the six CEE countries. However, it is characterized by uneven changes and

frequent fluctuations in the values of the Aggregated DISSIM index, without an unconditional trend of greater convergence. The graphical line of the index is wavy and even ascending in the last few years, i.e. contains signs of deviation from Euro area reference values. Although the differences with the exports of the Euro area countries decreased from 2008 to 2013, then and towards the end of the period, the divergence in exports increased.

- The revealed generalized tendencies for Latvia are similar to those for Bulgaria. From the highest value of the Aggregated DISSIM index for all six countries in 2002, after its successive decrease, greater structural convergence of exports was reached at the end of the period. For 2018, the values of the index are almost equal to those for Bulgaria and are the highest for the six CEE countries. Thus, Latvia and Bulgaria (and Slovakia) find themselves lagging behind in the convergence of exports to the Euro area, compared to the other three CEE countries. It is specific to Latvia that after 2008-2009 and especially after 2013 the convergence in exports remains at a relatively constant level, the graph line becomes approximately horizontal.

- Lithuania is characterized by fluctuations and separate increases in the divergence in exports in the first years of the period and until 2008. After that, the change of the Aggregated DISSIM index becomes smoother and more gradual, with a slight increase in convergence until 2018.

- Slovakia is the only one of the six CEE countries for which there is a steady negative trend of increasing divergence and declining convergence in exports compared to that of the Euro area. Until 2005 there was a definite decrease in Aggregated DISSIM, but then began and continued until the end of the period increase in the values of the index. As a result, in 2018 Slovakia turned out to be the country with the highest Aggregated DISSIM index (0.49) and a clear upward graph.

- Slovenia is the country that has achieved the greatest convergence in exports of the six CEE countries. For it, the values of Aggregated DISSIM are the lowest (falling from 0.33 in 2002 to 0.17 in 2018), the graphics line is the lowest and significantly below that of other countries. This is also the country that shows a well-defined and smooth trend of increasing convergence in exports during the period.

Based on the Aggregated DISSIM index, different, not always positive trends in the change of convergence in exports of the five CEE countries, members of the Euro area, were highlighted. The key role of the common currency in deepening convergence has not been established, as trends do not change significantly immediately after the year of the introduction of the euro in Slovenia (2007), Slovakia (2009), Estonia (2011), Latvia (2014), Lithuania (2015). Although it still uses its national currency, Bulgaria is achieving increasing structural convergence of exports to the Euro area. On this basis, there are insufficient grounds to expect that the forthcoming introduction of the euro in Bulgaria will significantly contribute to greater structural convergence of exports. It is likely that other internal or external factors will have a more significant impact on the convergence of Bulgaria's exports in the coming years.

CONCLUSION

In consequence of the performed theoretical and methodological analysis, the application of some similar methods for studying the structural economic and trade convergence was justified. As a result of the empirical index and comparative analysis, the structural and dynamic characteristics of the convergence in exports of Bulgaria (in which the introduction of the euro is forthcoming) and the other five CEE countries (that already use the euro) to Euro area exports were derived.

Based on the obtained values of the DISSIM index for the period 2002-2018, it was concluded that Bulgaria and the Euro area have a growing degree of export similarity and a relatively achieved convergent commodity structure of exports. The convergence trend is more pronounced in relation to some of the studied product groups. There are some similarities between the six CEE countries in achieving greater convergence across some commodity groups.

The structural similarities in exports can be interpreted as a challenge for the six CEE countries because they express increasing competitive pressure, the need to increase the competitiveness of production, quality, technical characteristics of goods involved in their exports to the EU and the Euro area.

The results obtained are not unambiguous, indicating both convergence and still available divergence in exports. Slovenia, Bulgaria and Latvia have a steady trend of increasing convergence during the period. Limiting convergence and expanding divergence is typical of Slovakia. For the other two countries - Latvia and Lithuania, after the middle of the period there is a retention of the achieved degree of convergence. For Estonia, there is marked instability and frequent fluctuations, with a predominant increase in the divergence in exports compared to the Euro area. The five CEE countries have been admitted to the Euro area at different times, no link has been established between the year of accession and the duration of their membership in the Euro area, on the one hand, and the dynamic characteristics of the structural convergence of their exports, on the other.

Therefore, the introduction of the euro is neutral or does not have a significant impact on the structural sigma convergence of the studied group of countries to the Euro area. However, given its stimulating effects on the growth of regional trade within the EU, it can be expected that the trend of deepening Bulgaria's trade convergence towards the Euro area will continue after the real introduction of the euro.

Given the diverse dynamic features and structural specifics, there are not enough signs and indirect grounds to support the reveal of club convergence in the exports of the selected six CEE countries.

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THE INFLUENCE OF SELECTED FACTORS ON THE AT-RISK-OF-POVERTY RATE OF SLOVAK HOUSEHOLDS

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Abstract: *Since the goal of any advanced society is to reduce poverty and improve the social status of the population, it is important to know the causes of its emergence. In connection with Slovakia's membership in the European Union, we have taken over European legislation in this area. The Europe 2020 strategy is currently in force in the countries of the European Union, while one of its five main objectives is "Fight against poverty and social exclusion". Poverty research is undoubtedly a topical, multidimensional problem. One of the issues it focuses on is the so-called income poverty. The poverty line is considered to be 60% of the median national equivalent disposable household income. In order for assistance to those at risk to be truly targeted at those who need it most, it is necessary to map the situation in detail and identify the factors that have the greatest impact on the incidence of poverty. In our paper, the subject of analysis will be the quantification of the influence of selected factors from The European Union Statistics on Income and Living Conditions (EU-SILC) database on the at-risk-of-poverty rate in Slovak households. The at-risk-of-poverty rate represents the proportion of people (in percent) in the whole population, whose equivalent disposable income is below the at-risk-of-poverty line. We will verify the impact of selected factors on the at-risk-of-poverty rate using a logistic regression model in the SAS Enterprise Guide statistical tool.*

Keywords*: Income poverty, Risk of poverty rate, EU-SILC, Logistic regression.*

INTRODUCTION

Poverty reduction is one of the key challenges of the Europe 2020 strategy. By setting a poverty reduction target, the EU has put this social problem at the same level with economic goals. Achieving the goal of reducing the number of people at-risk-of-poverty and social exclusion will depend on the successful implementation of other priorities, such as providing better employment and education opportunities.

The main indicator "people at-risk-of-poverty or social exclusion" shows the number of people affected by at least one of the three forms of poverty: income poverty, material deprivation, and low work intensity. The most widespread form of poverty is income poverty which seems to be one of the main challenges for achieving the objectives of the Europe 2020 strategy. The proportion of people at-risk-of-income poverty is closely linked to income inequality. As stated in the synthesis report Peer Review in Social Protection and Social Inclusion 2011 (Kenneth, 2011, p. 30), reducing income inequality cannot be achieved simply by rising the average wage.

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Social protection measures shall be taken as well as the efficiency and effectiveness of employment and income support shall be improved.

EU-SILC

In this article, there is income poverty as the subject of analysis. One of the sources for calculating indicators and measuring income poverty is data from EU-SILC. The harmonized statistical survey on household income and living conditions EU-SILC (*The European Union Statistic on Income and Living Conditions*) is carried out in all countries of the European Union which are currently in the number of 27. It has been implemented regularly in Slovakia since 2005. It is carried out by the Statistical Office of the Slovak Republic at annual intervals pursuant to a comparable international methodology within the project of European statistical surveys. The data are compared based on a uniform list of mandatory indicators together with their definitions, uniform procedures for the application of statistical methods, guidelines, rules, and calculations of poverty indicators. Such a comparison allows us to determine the social situation of the household in Slovakia, as well as an international comparison of Slovakia with the rest of the European Union and the countries participating in the survey.

The statistical unit of the survey is a private household and persons (i.e. current and former household members), the interconnection of data enables multidimensional analysis at the level of households and persons (The European Commission, 2008). The data obtained are recorded in four types of questionnaires - two questionnaires concern the household and the other two pertain to its members. The main areas of the survey at the level of households and individuals are listed in (Ivančíková, 2004).

One of the main indicators of income poverty is the **At-Risk-of-Poverty Rate** (ARPT60i), which represents the share of people (in percent) from the whole population whose equivalised disposable income is below the at-risk-of-poverty threshold (60% of the median of the yearly national equivalised disposable income) (Gerbery, 2011). *The equivalised disposable income of households* in the total disposable household income divided by the equivalent household size, which takes into account the size and composition of the household. Household disposable income is the sum of all monetary incomes received from any sources by each member of the household, including income from work, investments, and social benefits after deduction of taxes and social contributions paid. To calculate the equivalent size, there is used the so-called modified OECD scale.

The article aims to assess and quantify the statistical significance of the influence of the considered factors on the probability that the Slovak household will be at-risk-of-poverty through a logistic regression model based on data from the database of EU-SILC 2018. Factors whose impact we decided to verify are sex (RB090), marital status (PB190), household type (HT), the highest ISCED level attained (EDUCATION), the most frequent status of economic activity in the income reference period (PX050), general health (PH010), degree of urbanisation (DB100) and region according to NUTS 3(REGION). A list of them with variations of individual factors is given in the annex.

METHODOLOGY

We decided to assess the statistical significance of the considered factor influence on the probability that the household will be suffering by income poverty via logistic regression model

with the logit link function (Šoltés et al., 2020; Hurbánková, 2018; Hilbe, 2016; Hosmer and Lemeshow, 2013; Bagley et al., 2001):

$$logit(p_i) = ln\frac{p_i}{1-p_i} = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik} \tag{1}$$

where
p_i is the probability, that the household will suffer by the income poverty, i.e. $y_i = 1$, $\beta_0, \beta_1, \ldots, \beta_k$ are parameters of the logit model and $x_{i1}, x_{i2}, \ldots, x_{ik}$, where $i = 1, 2, \ldots, n$, are the values of explanatory variables $X_1, X_2, \ldots, X_k$ observed for the i-th statistical unit (in our case, the household). To estimate the parameters of the logistic regression model, we used the standard applied method of maximum likelihood, which maximizes the likelihood function.

We used three Chi-square tests to verify the significance of the model as a whole (Likelihood ratio, Score statistics, Wald statistics). These tests verify the validity of the null hypothesis $\boldsymbol{\beta}^T = (\beta_1 \ \beta_2 \ldots \ \beta_k) = \mathbf{0}^T$ against alternative hypothesis, which states, that at least one regression coefficient is non-null one. For large samples, there is no reason to prefer any of these tests and they generally provide comparable results. (Allison, 2012).

The Wald test was used to verify the null hypothesis that explanatory variable does not affect the probability of the occurrence of the observed phenomenon. We verified the significance of the influence of the explanatory variables on the probability p in the SAS Enterprise Guide using test statistic:

$$Wald = \widehat{\boldsymbol{\beta}}^T . S_b^{-1} . \widehat{\boldsymbol{\beta}} \tag{2}$$

where $\widehat{\boldsymbol{\beta}}$ is the vector of estimates of the regression coefficients standing for the artificial variables for the relevant factor – categorical explanatory variable and S_b is a covariance matrix of a vector $\widehat{\boldsymbol{\beta}}$. The Wald test statistic has asymptotically χ^2 distribution with degrees of freedom that are equal to the number of the estimated vector´s $\boldsymbol{\beta}$ parameters.

In logistic regression, the influence of the explanatory variable X_j on explained variable Y is quantified through odds ratio (OR), whose estimate is given by the relation $OR_j = e^{\widehat{\beta}_j}$ where $\hat{\beta}_j$ is the estimate of the relevant regression coefficient. The odds ratio in binary logistic regression expresses how is changed the odds that $Y = 1$ (in our case, the household will be at-risk-of-poverty) against the odds that $Y = 0$ (in our case that the household is not at-risk-of-poverty), for the unit increase of the explanatory variable under the condition of ceteris paribus. If the explanatory variable is the artificial variable, the odds ratio compares the odds of the event occurrence at two different levels of the predictor.

INFLUENCE OF SELECTED FACTORS ON INCOME POVERTY IN SLOVAKIA

We decided, at the beginning, to model the dependence between the probability, that the household is at-risk-of-poverty (the profile of the modelled variable is given in Table 1) and explanatory variables, using a complete logistic regression model, i.e. all explanatory variables – factors according to the Annex – entered the model.

As the number of households within some of the originally defined variations (categories) of individual factors was low, we adjusted the set compared to the original EU-SILC 2018 and

aggregated some categories. All explanatory variables except the sex variable are multinomial categorical variables that needed to be transformed into *s*-1 artificial variables, while the category for which no artificial variable was created is the so-called reference category (REF).

The standard method of maximum likelihood was used to estimate the model parameters. Based on the p-value (Table 2) which is lower than the commonly used significance level, the significance of the model as a whole was confirmed by three different tests: Likelihood ratio, Score and the Wald test. To identify statistically significant explanatory variables, we used the *Stepwise selection* method, which resulted in a reduced logistic regression model. As the most important variables, which entered the model for modelling the probability that the household is at-risk-of-income poverty, were: the economic activity of the head of household in the income period, the type of household, and the level of education attained by the head of household. Potential 8 factors were reduced to 6 by stepwise selection (Table 3). Their significance for the model can be assessed based on Wald or score chi-square statistics (Table 3). Sex and general health were identified as statistically insignificant factors. They did not enter the model.

Table 1. Profile of the modelled variable

Response Profile		
Ordered Value	**ARPT60i**	**Total Frequency**
1	0	4964
2	1	654

Probability modelled is ARPT60i='1'.

Table 2. Model significance tests

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	946.6306	27	<.0001
Score	1167.4497	27	<.0001
Wald	648.1629	27	<.0001

Table 3. Outcome of the Stepwise selection for the model ARPT60i

Summary of Stepwise Selection							
Step	**Effect**		**DF**	**Number In**	**Score Chi-Square**	**Wald Chi-Square**	**Pr > ChiSq**
	Entered	**Removed**					
1	PX050		3	1	707.1888	251.6755	<.0001
2	HT		8	2	278.0643	221.0341	<.0001
3	EDUCATION		4	3	104.8842	99.5970	<.0001
4	PB190		3	4	76.3092	82.0489	<.0001
5	REGION		7	5	35.8572	22.0810	<.0001
6	DB100		2	6	8.5900	8.4300	0.0121

Source: EU-SILC 2018, own calculation in SAS EG

Interpretation of the outcomes of the logistic regression will be made under the estimation of the model parameters as well as the odds ratios (Table 4), while all interpretations are under the conditions of ceteris paribus (which we will not be mentioned further). Resulting from the estimated odds ratios, it can be concluded, that the influence of the factors - economic activity

and the highest level of education attained – is dominating. The odds, that the household will be below the at-risk-of-poverty threshold, are 16.187 times higher if the head of household is an unemployed person in comparison with the household where the head of household is an employed person. In case the household is headed by a person with less than secondary education, the odds, that the household will be below the at-risk-of-poverty threshold, are 5.986 times higher than in the case that the household is headed by a person with tertiary education of the 2nd or the 3rd stage.

Table 4. Estimates of parameters of binomial logistics models and estimates of odds ratios

PARAMETER		Model ARPT60i		
		BETA	**Pr > ChiSq**	**Odds ratio**
Intercept		-3.3443	<.0001	
PB190	1	0.4974	0.0023	1.644
PB190	3	-0.7337	<.0001	0.480
PB190	4	0.7470	<.0001	2.111
EDUCATION	1	1.94	<.0001	5.986
EDUCATION	2	0.6551	<.0001	1.925
EDUCATION	3	0.3205	0.3883	1.378
EDUCATION	4	0.3054	0.4545	1.357
PX050	2	2.42	<.0001	16.187
PX050	3	0.5403	0.0001	1.716
PX050	4	1.97	<.0001	5.583
HT	1	-0.4479	0.0321	0.639
HT	2	-1.2760	<.0001	0.279
HT	3	-2.2351	<.0001	0.107
HT	4	-2.0379	<.0001	0.130
HT	5	0.6167	0.0221	1.853
HT	6	-0.5086	0.0183	0.601
HT	8	0.8589	0.0010	2.360
HT	9	-0.9668	<.0001	0.380
DB100	2	0.2906	0.0610	1.337
DB100	3	0.4537	0.0035	1.574
REGION	2	0.2095	0.3842	1.233
REGION	3	0.4320	0.0615	1.540
REGION	4	0.4895	0.0284	1.632
REGION	5	0.5786	0.0089	1.784
REGION	6	0.6638	0.0025	1.942
REGION	7	0.8691	<.0001	2.385
REGION	8	0.5648	0.0086	1.759

Source: EU-SILC 2018, own calculation in SAS EG

In terms of household composition, the worst situation is in families with two adults and more than two children where the odds of the risk-of-poverty are 2.36 times higher than in the case of a household consisting of 2 adults and 2 children. However, in a household of 2 adults without dependent children where one adult is over 65 years old, the odds that such a household will be poor are 9.345 times lower than the household of 2 adults with 2 children. According

to marital status, the household which is the most at-risk-of-poverty is that one where the head of household is divorced (odds are 2.111 times higher) compared to the household with the married head of household. On the contrary, they are lower if the household is headed by a widow/widower. From the regional point of view, the worst situation is in Prešov region (the odds that the household will be at-risk-of-poverty are 2.385 times higher than in the Bratislava region), which includes several districts with fewer job opportunities and subsequently low financial recognition in the labour market. In general, however, in all regions outside the Bratislava region (where the capital city is located), households face a higher risk-of-poverty. The odds that households located in thinly-populated areas are 1.574 times higher to be at-risk-of-poverty than households in densely populated areas.

CONCLUSION

Resulting from the estimated logistic model, the Slovak household which is the most at-risk-of-poverty is found in Prešov region, in a thinly populated area, headed by an unemployed, divorced person with less than secondary education, whose composition consists of 2 adults with three or more dependent children. An interesting fact is that the influence of the sex of the head of household, as well as his/her health condition, proved to be insignificant in quantifying the risk-of-poverty.

Figure 1. Estimates of the probability of the risk of poverty depending on the composition of the household and the status of economic activity of the head of the household for the reference categories of other explanatory variables
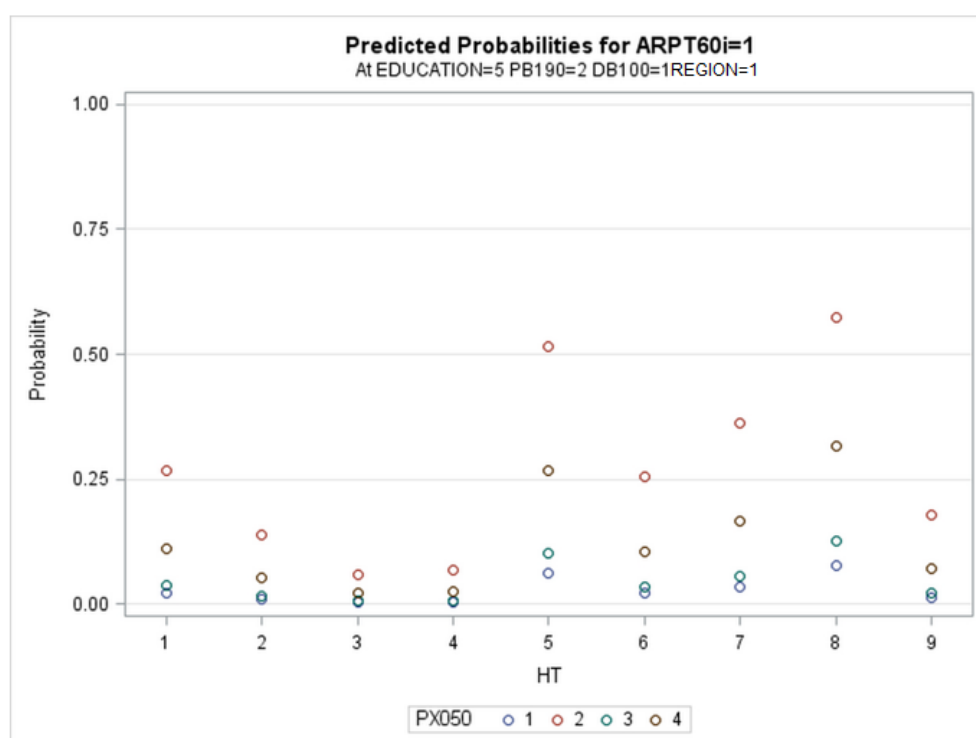
Source: EU-SILC 2018, own calculation in SAS EG

For two statistically most significant factors - the most frequent status of economic activity and household composition (Figure 1), the probability that the Slovak household will face the risk-

of-poverty was predicted based on the estimated model. Other factors remained at the level of the reference categories, i.e. we considered a household living in the region of Bratislava, in a densely populated area, headed by a married person with tertiary education of the second or third stage. If the person is unemployed, the household is significantly more likely to face the risk-of-poverty compared to households headed by the employed head of household. The most vulnerable group of households with the probability of the risk of poverty of almost 60% is that one which is composed of two adults and three or more dependent children where the head of household is the person, who although attained tertiary education of the 2nd or 3rd stage, is unemployed. By contrast, the least at-risk groups are the households of two adults without dependent children, where at least one person is over the age of 65. For these households, it can be assumed that the risk of income poverty is significantly reduced by receiving old-age pensions.

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Annex: Input explanatory variables

Variable	Target variable name	Values		Note
RB090	Sex	1		Man
		2		Woman
PB190	Marital status	1		Single
		2	REF	Married
		3		Widower / widow
		4		Divorced
EDUCATION	Highest level of education attained (according to ISCED)	1		Less_than_Secondary
		2		Upper_Secondary
		3		Post_Secondary
		4		Tertiary_1
		5	REF	Tertiary_2_3
PH010_a	General health	1	REF	Good
		2		Fair
		3		Bad
PX050	The most frequent economic activity status in the income reference period	1	REF	Employed person
		2		Unemployed person
		3		Old-age retiree, early retiree
		4		Other inactive person
HT	Household type	1		One person household
		2		2 adults no dependent children, - both adults under 65 years
		3		2 adults, no dependent children - at least one adult 65 years or more
		4		Other households without dependent children
		5		Single-parent household, one or more dependent children
		6		2 adults, one dependent child
		7	REF	2 adults, two dependent children
		8		2 adults, three or more dependent children
		9		Other households with dependent children
DB100	Degree of urbanization	1	REF	Densely-populated area
		2		Intermediate urbanised area
		3		Thinly-populated area
REGION	Region according to NUTS 3	1	REF	Bratislava
		2		Trnava
		3		Trenčín

		4		Nitra
		5		Žilina
		6		Banská Bystrica
		7		Prešov
		8		Košice
ARPT60i	Below the at-risk-of poverty threshold	1		Yes
		0		No

Source: EU-SILC 2018, own calculation in SAS EG

INFLUENCE OF PERSONAL VALUES ON CONSUMER CHOICE AND INTENTION TO BUY: A CASE OF CROATIAN AUTOMOBILE MARKET

Ivana Tonković Pražić[1]

Abstract: *This paper aimed to identify the factors and segments of car buyers based on their personal values and analyzing their relation to car buyers' choice and intention to buy. A survey involving 561 participants was conducted using the PVQ scale and additional questions about car-buying behavior. Upon collecting the data, statistical analysis was conducted that allowed for nine value types to be successfully distinguished among car buyers: benevolence, universalism, self-direction, stimulation, hedonism, achievement, and power, security, conformity, and tradition. Additionally, based on the abovementioned value types, different consumer segments were distinguished: "opened to change", "self-transcendent", "self-enhanced" and "conservative". Furthermore, the results show that segments of car buyers differ in their preferences of car models, i.e. they choose or intend to buy different car models. The conclusion presents the contribution of the paper, limitations, and guidelines for future research.*

Keywords: *Personal value types, Segments of car buyers, Car buying intention.*

INTRODUCTION

The fact that personal values play a pivotal role in predicting human behavior has been accepted by authors of various scientific disciplines, including marketing. Relevant researchers have shown that individuals use personal values as a basis for forming their attitudes, intentions, assessments, comparisons, activities, and decisions, regardless of the specific object or situation (Burgess, 1992). Schwartz (1994) defines human values as motivational constructs that are related to desirable nonspecific goals, which differ in importance, and serve as guiding principles in the life of an individual or social entity. Personal values can serve to clarify the motives of consumer behavior because they serve individuals as criteria of behavior, are limited in number, and are extremely stable over time (Rokeach, 1973).

Marketing research on personal values proved that personal values affect various aspects of consumer behavior, such as ethical consumption (Shaw et al., 2005), perception of product or brand position (Da Silva Añaña and Nique, 2007) preferences for salty snacks (Perkins and Reynolds, 1988, Dibley and Baker, 2001), purchase of gifts (Beatty, Kahle and Homer, 1991), etc., but the influence of personal values on behavior related to car buying has not been investigated to an acceptable degree.

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LITERATURE REVIEW

The most influential author in the field of values is Schwartz, who not only defined personal values but also proposed one of the most influential theories of the universal content and the structure of human values and designed measuring instruments to investigate human values (Burgess and Harris, 1998). The final result of Schwartz's value analysis is the successful separation of four higher-level value dimensions that encompass ten value types and represent the opposite poles of the two dimensions - self-transcendence versus self-enhancement, and openness to change versus conservation. (Schwartz, 1992)

Schwartz also developed the Portrait Values Questionnaire (PVQ), an instrument for measuring personal values whose validity has been successfully confirmed in surveys conducted in 18 countries (on 31 samples). One of the main advantages of this measuring instrument is its flexibility since it can be carried out in person, in writing, by telephone, or via the Internet (Schwartz, 2003). PVQ consists of 40 statements/descriptions of persons, and respondents can express their similarity to the described person by five degrees (Schwartz, 2003). The abovementioned was the reason why PVQ was considered adequate and therefore used as a measuring instrument in this research.

Further analysis of the marketing literature in the field of personal values indicated the need to investigate differences between consumers based on their personal values in order to provide additional insight into the motivations of different consumer groups to buy or their intention to buy certain products (Sukhdial, Chakraborty and Steger, 1995). Also, there was a need to understand the differences in the context of buying/consuming certain products between consumer segments distinguished based on personal values (de Juan Vigaray and Hota, 2008). Finally, Vinson, Scott and Lamont (1977) point to the need to extract consumer segments in a population-based on their personal values, and to investigate differences in the assessment of attributes and product classes (they emphasized cars) between such segments.

Considering all the above mentioned, this paper attempted to answer the question of whether and to what extent personal values affect the purchase of durable goods, i.e. cars. Specifically, this paper aimed to discover whether the research into personal values of car buyers can result in identifying distinct consumer segments which would differ in their intentions to buy and also own different car makes.

RESEARCH METHODOLOGY

The sample consisted of car buyers from the Republic of Croatia and only respondents who bought a personal vehicle within the last five years were considered. The survey, based on PVQ, was conducted on a sample of 561 respondents selected using the random stratified sample method. Respondents were mostly contacted by telephone, while many surveys were completed online.

After conducting the survey, the collected data was analyzed using several statistical methods. These methods include the Cronbach's Alpha reliability coefficient, the factor and cluster analysis method, the variance analysis method (ANOVA), and the application of crosstabulation. The Cronbach's Alpha coefficient was used in order to verify the reliability and validity of the measuring scale. An exploratory and confirmatory factor analysis was performed to assess the validity (convergent and discriminant) and extract factors of values from the total number of claims. After extracting personal value factors, cluster analysis (K-

means method) was performed. Finally, analysis of variance (ANOVA) and crosstabulation was performed, in order to identify the connection between distinguished clusters/segments of car buyers and their car make ownership or intention to buy.

ANALYSIS AND RESULTS

Before conducting exploratory and confirmatory factor analysis in order to identify the underlying structure of personal values, the suitability of the collected data for factor analysis was examined. The Keiser-Meyer-Olkin test measuring the adequacy of sampling produced a value of 0,812 thus providing evidence that the sample is adequate for further factor analysis. Also, the results of the Bartlett test of sphericity (p=0,000) indicated the appropriateness of the factor model for the data set. Based on Kaiser's rule of selection, nine factors were extracted (explained variance of the manifest variables 64,65%; p=0,000).

The first of the nine extracted factors was named *achievement and power* since it described behavior connected with obtaining „social status and prestige" but also „personal success through demonstrating competence according to social standards" (Schwartz, 2003, p. 267). The next factor is named *hedonism* since it points individuals towards „pleasure" and achieving „sensuous gratification for oneself" (Schwartz, 2003, p. 267). *Stimulation* is a factor that incites the need for „excitement, novelty, and challenge in life" (Schwartz, 2003, p. 267). One considers „independent thought, creating and exploring" (Schwartz, 2003, p. 268) important if one emphasizes the value factor of *self-direction*. The next factor is *universalism*, and it encompasses „understanding, appreciation, tolerance, and protection for the welfare of people and nature" (Schwartz, 2003, p. 268). *Benevolence* is a value factor that directs individuals towards „preservation and enhancement of the welfare of people with whom one is in frequent personal contact" (Schwartz, 2003, p. 268). If one values *tradition*, one holds in high regard „commitment to the customs and ideas that traditional culture or religion provide" (Schwartz, 2003, p. 268). The next factor promotes „restraint from actions that are likely to upset or harm others and violate social norms" (Schwartz, 2003, p. 268), which is why it is called *conformity*. Finally, the ninth factor is named *security*, and it promotes actions that ensure „safety, harmony and stability of society, relationships and oneself" (Schwartz, 2003, p. 268).

In order to segment car buyers, cluster analysis (K-means) was used. Four segments were distinguished with the analysis, and the results are shown in table 1.

Table 1. Results of cluster analysis of car buyers, mean segment values and F-ratio

Variables	Opened to change	Self-enhanced	Self-transcendent	Conservative	F-ratio	P
Benevolence	19,69	18,04	20,71	20,50	23,829	0,00
Self-direction	17,27	16,94	16,46	16,99	30,640	0,02
Stimulation	11,31	11,03	9,78	10,29	12,358	0,00
Hedonism	11,44	12,27	9,45	10,50	30,426	0,00
Achievement and power	21,78	29,57	14,10	21,63	59,389	0,00
Security	15,41	18,24	18,04	20,99	89,071	0,00
Conformity	13,90	14,54	16,04	17,63	61,441	0,00
Tradition	9,97	11,67	12,76	15,03	73,871	0,00
Universalism	16,61	15,08	17,75	17,71	39,417	0,00

Source: adapted from Tonković Pražić (2018)

As can be seen in table 1, the first of the extracted segments comprises the value types of *self-direction* and *stimulation* which makes it similar to one of Schwartz's value dimensions, which is called "*openness to change*" and thus this segment of car buyers is named *opened to change*. In the second segment, the factor *achievement and power*, as well as *hedonism*, has a higher average score. The aforementioned value types correspond to the value dimension of *self-enhancement* which is why this segment was called *self-enhanced*. Because it encompasses the value types of *benevolence* and *universalism* the third segment of car buyers is named *self-transcendent* due to the fact that the said values can be related to Schwartz's value dimension of *self-transcendence*. Finally, according to the cluster analysis, the value types *security*, *conformism,* and *tradition* were extracted in the fourth segment, so this segment is called *conservative*.

In order to examine whether the selected segments of car buyers differ significantly according to characteristics related to buying and owning a car, i.e. the car makes a respondent owns and intends to buy, ANOVA analysis was used. The results of the conducted analysis are presented in table 2.

Table 2. Results of ANOVA analysis

Car buyers' segments	Car makes owned	Car makes intended to buy
	F = 0,270 p = 0,847	F = 4,758 p = 0,003
Opened to change	5,723	7,608
Self-enhanced	5,582	6,555
Self-transcendent	5,695	8,791
Conservative	5,676	8,728

Source: author's calculations

According to table 2, car buyer segments' differences are statistically significant when the observing car makes respondents are intending to buy. In other words, members of a particular segment of car buyers do not intend to buy the same car makes as the other car buyers. On the other hand, there is no statistically significant difference between segments based on the car makes the respondents currently own.

The differences between segments based on their car make ownership and intention to buy were analyzed with crosstabulation and Pearson's chi-squared test and the results are presented in table 3.

Table 3. Car makes buyers currently own and intend to buy

Car Makes	% Within Cluster Number of Case				% Within Cluster Number of Case
Owned **Intended**	**Opened to change**	**Self-enhanced**	**Self-transcendent**	**Conservative**	
Alfa Romeo	0,7	0,0	0,0	1,4	0,6
	0,7	0,0	1,5	0,0	0,6
Audi	3,3	0,0	4,8	2,9	3,0
	6,8	0,0	3,8	4,8	4,2
BMW	2,0	4,2	1,4	2,0	1,9
	3,4	14,1	3,1	4,0	5,5
Chevrolet	2,0	1,1	3,4	0,7	1,9

	0,0	0,0	3,1	2,4	1,4
Chrysler	0,0	0,0	1,4	0,7	0,6
Citroen	3,9	7,4	5,4	7,2	5,8
	1,4	0,0	0,0	2,4	1,0
Dacia	0,7	2,1	0,7	0,0	0,7
	1,4	0,0	0,0	1,6	0,8
Daewoo	0,0	0,0	1,4	0,7	0,6
Fiat	2,0	1,1	2,0	2,9	2,1
	0,0	3,3	0,0	1,6	1,0
Ford	3,9	2,1	4,8	5,8	4,3
	0,7	3,3	0,7	3,3	2,0
Honda	2,0	0,0	2,0	0,7	1,3
	0,7	0,0	0,0	1,6	0,6
Hyundai	3,9	0,0	2,0	1,4	2,1
	2,0	0,0	2,3	2,4	1,8
Kia	0,7	2,1	5,4	0,7	2,2
	0,0	2,2	3,1	0,0	1,2
Mazda	2,6	4,2	2,7	0,7	2,4
	0,7	3,3	0,8	2,4	2,4
Mercedes	1,8	2,2	1,0	0,0	1,3
	1,4	6,5	2,3	1,6	2,6
Mitsubishi	1,3	1,1	1,4	0,0	0,9
	0,0	0,0	3,1	0,0	0,8
Nissan	2,6	2,1	1,4	1,4	1,9
Opel	11,1	14,7	5,4	13,7	10,9
	2,7	4,3	6,2	10,3	5,9
Peugeot	7,8	4,2	4,8	2,9	5,1
	0,7	1,1	1,5	1,6	1,2
Renault	5,2	3,2	3,4	7,9	5,1
	2,0	0,0	6,2	1,6	2,6
Seat	1,3	1,3	0,0	0,0	0,7
Suzuki	0,7	0,0	0,7	2,2	0,9
	0,0	0,0	0,0	0,8	0,2
Škoda	3,9	2,2	0,0	2,2	2,2
	6,1	0,0	0,8	0,8	2,2
Toyota	3,3	2,1	3,4	2,9	3,0
	2,0	5,4	5,3	1,6	3,4
Volkswagen	9,2	11,6	13,6	10,1	11,0
	13,6	12,0	10,0	7,1	10,7
Volvo	0,0	1,1	0,7	0,0	0,4
	0,7	2,2	0,0	0,0	0,6
Do not know	53,1	41,3	46,2	48,4	47,0
Chi Squared					0,164
					0,000

Source: author's calculations (adapted from Tonković Pražić, 2018)

CONCLUSION

Based on the results of the research, the influence of personal values on car buyers' choice and intention to buy was partially proven. It was shown that car buyers can be segmented based on their personal values and that those segments differ significantly according to the car makes they intend to buy. On the other hand, the differences based on car make ownership were existent but not statistically significant.

Segments of car buyers differ one from another based on the car model that they already own, but the difference is not statistically significant. Most respondents own a Volkswagen since it is owned by 11% of respondents, followed by Opel (10,9%). When analyzing the differences among the segments, it can be concluded that the conservative segment is characterized by owning a car makes such as Alfa Romeo, Ford, Fiat, Opel, and Renault, while they are least likely to own a Dacia, Mercedes, Mitsubishi, Seat, and Volvo. Car buyers who are open to change are most likely to own a Honda, Hyundai, Nissan, Peugeot, Seat, and Škoda but compared to other segments of car buyers they are least likely to own a Chrysler, Daewoo, or Volvo. As far as the self-enhanced segment of car buyers is concerned, the members of that segment are more likely to own a BMW, Citroen, Dacia, Mazda, Mercedes, Opel, Seat, and Volvo. On the other hand, members of this segment are not as frequently owners of Alfa Romeo, Audi, Chrysler, Daewoo, Honda, Hyundai, and Suzuki as members of other segments. Finally, self-transcendent respondents are more likely to be owners of Audi, Chevrolet, Chrysler, Daewoo, Honda, Kia, Mitsubishi, Toyota, and Volkswagen than other respondents. On the other hand, they tend to own an Alfa Romeo, Seat, and Škoda less frequently than members of other segments.

As far as the car purchase intention is concerned, most of the respondents could not say what car make they would buy next time they buy a car (47%). But the most of the respondents who indicated their buying intentions intend to buy a Volkswagen (10,7%). When comparing segments of car buyers, it is obvious that the conservative segment of car buyers mostly intended to buy a Citroen, Dacia, Ford, Honda, Hyundai, Ford, Opel, Peugeot, or Suzuki, while it was the opposite for Alfa Romeo, Kia, Volvo, and Mitsubishi. The self-enhanced segment of car buyers were the most numerous intended buyers of Volvo, BMW, Fiat, Ford as well as Mercedes, but they did not intend to buy a Mitsubishi, Škoda, Suzuki, Alfa Romeo, Dacia, Renault, Honda, Hyundai, Chevrolet, Audi or Citroen. Mitsubishi was the preferred choice by members of the self-transcendent segment, but also Alfa Romeo, Kia, Renault, and Chevrolet. This segment was least likely to choose a Citroen, Honda, Fiat, Dacia, Volvo, or Suzuki the next time they would buy a car. Finally, members of the open-to-change car buyers' segment were most likely to choose Škoda, Audi, or Volkswagen for their next car, while they would not opt for a Mitsubishi, Chevrolet, Fiat, Kia, or Suzuki.

Results of the conducted research may enable marketing experts to develop the more appropriate marketing and advertising strategies. Marketing experts, when planning for an advertising campaign of car makes self-transcendent car buyers intended to buy, should emphasize the positive influence of the car make on the environment and other people, maybe through social marketing actions. Self-enhanced car buyers might respond more favorably if the car makes them intended to buy displayed luxury, elegance, fun, and enjoyment with their design and marketing appeals. The car makes conservative car buyers intended to buy should have a marketing campaign that appealed to their makes' tradition, stability, and safety features. Finally, those open to change might be more prone to buying a car make if they considered it original, special, and unique.

This research also has its limitations that need to be corrected in future research. The research was conducted on a sample of car buyers, while future research might consider looking into different samples, such as furniture or home appliances buyers, tourists, etc. Also, aspects other than ownership and intention to buy should be considered, such as buying habits, attitudes about car makes, model preferences, etc.

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JUGGLING WORK AND PRIVATE LIFE IN TELEWORKING DURING THE EPIDEMIC COVID-19

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Abstract: *In 2020, the world was hit by the Covid-19 epidemic and the countries made different decisions on when and how to adopt adequate measures. One of them was teleworking; many people stayed at home where they worked and at the same time took care of their family members and assisted their school-age children.*
After one month of working from home, the respondents assessed that their family members had a better understanding of the concept of working from home. Besides, the respondents were more organised for this type of work and took care of their school-age children. The fear of losing their job has also reduced, but they were more concerned about salary cuts.
The selection of findings and measures could become a guide for employees in order to help them balance private life and work and thus manage stress when working from home.

Keywords*: Teleworking, Stress management, Stress related to teleworking, Contemporary technologies, Covid-19 epidemic.*

INTRODUCTION

On 31 December 2019, the WHO was informed of several pneumonia cases of unknown cause in the Chinese city of Wuhan. At the point of writing this study, the coronavirus has hit societies around the world hard and the countries continue to recommend their citizens to stay at home as much as possible. The countries have also imposed restrictions on social activities, whereas the severity of restrictions varies among countries (World Health Organization, 2020). In Slovenia, where the current study is being conducted, the restrictions were introduced on 13 March 2020, whereas the infectologists called for measures to restrict public life. All EU member states have adopted similar measures to those in Slovenia and are gearing up for a potential further spread of the virus. Slovenia has, on a proposal from infectologists, already taken the following measures: (1) closure of educational institutions, (2) restrictions on border crossings with Italy, (3) restrictions on public life, (4) work from home (Government Communication Office, 2020).

At the point of writing of the present article, the amount of research on the topic of telework during the Covid-19 epidemic is limited for now. However, right at this time, many articles are being created and more of them will be generated in the coming years. Some research was done on home-based telework in the wake of natural disasters, where it was shown that individual home-situations and manager involvement were important factors in the success of telework (Donnelly & Proctor-Thomson, 2015). More recent studies focus on the researches on the

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impact of distance learning (Di Domenico, Pullano, Pullano, Hens, & Colizza, 2020), whereas other works explore more along the lines of the impact of telecommuting on productivity (Okubo, 2020), Internet security (Abukari & Bankas, 2020) and also the experiences of teleworking (Baert, Lippens, Moens, Weytjens, & Sterkens, 2020).

With this said, the research question, that this study will be looking to answer, is: "How to balance private and work obligations when working from home during the Covid-19 epidemic?"

THEORETICAL BACKGROUND

a.   Organisation of work and teleworking

Globalisation dictates changes; there are cultural and ethical changes on the one hand and information and communication technology on the other. Down through history, this has already happened several times.

In the light of the current situation, it is crystal clear that different forms of a network organisation will assert themselves more significantly in the future (modular network, virtual network/organisation, etc.). A fast-changing business environment and competition require constant development and adjustment. As a consequence, new organisational forms are emerging in business practice (Fann Thomas, n.d.). Virtual organisation as one of modern organisational forms goes beyond the limits of a traditional organisation. The importance of physical structure is reduced; therefore, virtual organisation enables in particular flexibility and responsiveness. It is mainly based on information and telecommunication technology but also on the work where physical movement is required. Virtual teams represent a new development stage of teamwork as they enable the members of a team, through the use of appropriate technology, to have interactions beyond the boundaries of an organisation, time and space. In practice, we meet only a few virtual teams, whereas conventional teams, which make use of virtual elements, are becoming increasingly recognised. The mentioned data also indicates the direction of teamwork's development in the future. The virtual organisation, which uses virtual teams in its activities, is only one of the possible modern organisational forms (Raspor & Nežič, 2020).

The emergence of the Covid-19 should be seen in the light of the health aspect. Besides, the impact of the virus, which will be seen in economic crisis, is not negligible. In fact, no two crises are equal and it is also very difficult to predict in advance all their elements. Nevertheless, exceptional circumstances always bring the need to change an organisation. Identifying the beginning of the crisis period in organisation, is of crucial importance. A company needs to have a prepared strategy on how it will operate in troubled times. Every contingency plan must also include a perspective on the future.

Telecommuting can be both useful and challenging; useful in a way that you can work at the desired location and challenging in a way that certain questions can raise regarding team building, group participation and communication. Remote jobs offer many benefits, whereas a lot of discipline and time management are required for success. Nevertheless, innovative technology offers a wide range of tools with which telecommuting can become a less demanding environment. The technology enables individuals to perform the same work from everywhere. The companies' owners, therefore, implement technologies in order to help their co-workers carry out work assignments in time and encourage team spirit. Certainly,

telecommuting requires the right tools for time management that direct us from urgent to important tasks and keep us regularly informed about where we stand on our way to reach a certain goal (*Necessary Tools Checklist To Plan Your Time Working Remotely*, n.d.).

b.   Tension between work and private life

The main points of home-based telework are the blurred lines between work and non-work. The pros and cons of the flexibility of telecommuting are related to the distribution of work hours as well as to the social and personal impact of not having to physically be at work. But when it comes to telework during the Covid-19, the conditions are not the same as for teleworking under normal circumstances. More precisely, during this coronavirus period, the workers have to fulfill many tasks other than work assignments. So, the individuals who work remotely are in a tough position. Teleworking is heavily encouraged not only by employers but also by the authorities with its recommendations. Hence, remote work is not the workers' choice as they are forced to work in such a way. Consequently, telecommuting might be experienced differently than when it is chosen freely (World Health Organization, 2020).

"Nowadays, we tend to aim to create a balance between family and work responsibilities. Broader researches indicate that people who are aware of the balance between work and life roles are more satisfied with life and report on better physical and mental health" (Haar, Russo, Sune, & Olliver-Malateere, 2014; Kopitar, 2020).

The impact of coronavirus will be felt at all levels; therefore, the management system will certainly have to be changed. The leaders will have to master more techniques regarding the remote management supervision of co-workers since more telecommuting itself is expected in the future. Such a working system will suit very well some co-workers (at least for a while), whereas to others, it will cause great stress. The leaders can also react differently to new circumstances. In this period, it is their job to organise work and lead co-workers. They must also ensure that co-workers can recognise and respond to potential problems in terms of other co-workers' mental health and reducing all negative impacts of work from home. A sudden change in the way of leading can be very difficult for leaders. They may be concerned about disturbances in the process for which they are in charge. On the one hand, some believe that leaders must be physically present in order to be good leaders; on the other hand, other people do not trust the co-workers whom they cannot see.

In the light of new circumstances, it is recommended that the leaders of the future – all, without exception – become familiar with a new way of work and leadership regardless of the leadership style that has been in use up to now. Effective work from home largely (according to the Gallup research from 2020, even up to 70%) depends on the engagement of leaders and their support to co-workers. Based on the finding above, we will provide instructions that will help you to better lead the co-workers who work from home (Gallup, 2020; Larson et al., 2020; Forbes, 2019).

Although working from home is the best scenario for many co-workers in the given situation, many leaders may have a hard time coping with such a form of work. They can feel as if they do not have any control over telecommuting or they may find that it is a challenge to maintain the same level of trust with a remote working team. Nevertheless, that is the future of leadership and the leaders must adapt to it so that the situation will be functional for all concerned. Such situations will be (as we shall see later in this chapter) more and more frequent; therefore, we will have to get used to it. Remote team leadership is also an investment. At a time when co-

workers are mainly left to themselves and have very little interaction with their co-workers and the leader, it is very important how they will maintain or perhaps even upgrade the relationships within their team and with the leader. Once things return to normal and the companies will operate as usual, it will be important with what energy will the co-workers come back to the workplace. In terms of their approach and attitude, the leaders can make a significant contribution so that the co-workers' constructive commitment to work can be the way it used to be before transition to telecommuting.

Hallin suggested: (1) A necessary adjustment to a digital way of working has been made. (2) Digital communication is used to supplement the usual need for physical social interaction, and it helps to do so but is not as socially fulfilling as regular social interactions. (3) The coronavirus outbreak has hurt social life within and outside of work. (4) The boundaries have become more blurred. (5) It is easier to structure the day to meet personal needs and goals. (6) The workdays are less varied. (7) The feelings of uncertainty regarding the future. (8) The Covid-19 epidemic has had personal negative effects and has caused negative emotions in people. (9) A new insight has been gained, especially when it comes to the viability of digital solutions, and adaptations to personal habits have been made (Hallin, 2020).

c.   School dismissals or closures

During the Covid-19 period, a particular burden for people working from home was that children were also at home. School dismissal refers to the situation when a school campus remains open with administrative staff and teachers present while most children stay at home. School closure is a stricter intervention in which a school campus is closed for all children and all staff. (Fong et al., 2020). School closures can also have adverse impacts on ethical and social equity, particularly among vulnerable groups (e.g. low-income families), which could be ameliorated by dismissing classes but allowing some children to attend school for free school meals or to enable parents to go to work.

d.   Stress

Staff management plays a very important role in organisation of work. Excessive requirements lead to stressful situations because a worker is no longer capable of dealing with them. The situation even becomes worse if a worker is not able to admit it. However, insufficient requirements can also be stressful for a highly qualified worker as he or she can feel superfluous, overlooked and useless. The manager must know how to organise work, make a fair distribution of work, recognise potential conflict situations and prevent them before breaking out (Tajnšek, 2020).

Deep-rooted gender norms on the division of roles in the household, regarding telecommuting, may aggravate gender inequality concerning housework and care for children. More exactly, an employee working from home can spend too much time on domestic work and childcare and it can come to multitasking, reduction in the quality of mother's work, and an increase of their stress in connection to their husbands (Lyttelton, Zang, & Musick, 2020). Among those who prefer to telecommute, women are more likely to prefer teleworking for the sake of family responsibilities, stress reduction and having more time for themselves, whereas men often prefer telecommuting to get more work done (Mokhtarian, Bagley, & Salomon, 1998). Certainly, the distribution of work among family members and a detailed schedule that includes activities are important for stress reduction.

METHODS

A survey questionnaire was used for the research. It was made by using the 1ka online survey and submitted on 14 April 2020 via e-mail and was also published on social networks. The survey was available from 14 to 26 April 2020. The interval for conducting the survey was set for a short period to enable the respondents to experience the first days of quarantine to the greatest extent possible and to compare this period to the situation after one month of working from home. The first part of the questionnaire collected information on gender, age, education, profession, and marital status. The second part of the questionnaire included statements on information technology. The third part consisted of questions about working from home. All questions were measured according to the 5-point Likert scale. By using the scale, the respondents expressed their level of agreement with individual statements. The questions related to stress when working from home were prepared by using a table with two scales because we wanted to show a comparison of experiencing stress after one week and one month of working from home. The e-mail containing the questionnaire was sent to 68 faculties, 24 primary schools, 53 companies, 16 adult education centres, 26 secondary schools, 18 libraries, 5 music schools, 13 museums and 9 business incubators. At the same time, the questionnaire was shared on Facebook and LinkedIn. The data was statistically analysed and tested using *SPSS*.

a.   Research Instrument

The employees from 232 different organisations were invited to take part in our random sample. 727 employees replied to the survey questionnaire of which 631 worked from home during the Covid-19 epidemic. The level of stress after the first week and after the first month of working from home was compared. The obtained replies were analysed by using SPSS.
We adjusted the questions to the Slovenian population as well as tested and revised the questionnaire before the final version.

To test the questionnaire, we conducted a preliminary research small-scale analysis (five samples) and revised the disparity of answers as well as the general understanding of the questions.

The first part of the questionnaire collected information on gender, age, education, profession, and marital status. The second part of the questionnaire included statements on information technology. The third part consisted of questions about working from home. All questions were measured according to the 5-point Likert scale.

b.   Demographic data

Through the random sampling procedure, we managed to collect opinions from 727 respondents (605 females and 122 males). Women participating in the survey represent 0.15% of the working-age population, while the share of men is 0.02%. The sample gender ratio reflected the organisation gender ratio 8:2 in favour of females. Sampled employees were almost equally divided into two age groups: 26 to 35 years and 36 to 45 years. There were 61% with a university degree in the sample.

To summarise the socio-demographic data of the research, the participants were mostly women from the age groups of 26–35 and 36–45 and had a university degree. The majority of the respondents were employed in schools, offices, and health care systems and had up to five

years of work experience. 85 % of respondents were married and 33 % took care of their school-age children.

c.   Hypotheses

Based on the review of the theories, we set the following research question: "How to balance private and work obligations when working from home during the Covid-19 epidemic?"

We set up the following hypotheses:

H1: Stress as a result of work from home also affects the individual's private life.

The set hypothesis was the basis for the following statements: In the period of working from home due to the Covid-19, I have experienced stress; Because of work from home, the number of conflicts between me and my family has increased; As a result of adjustments in relation to work from home, it has also come to tensions in private life.

H2: Due to juggling private and working life, the individual working from home is more exposed to stress.

In order to obtain the results of the mentioned hypothesis, we observed the respondents who worked from home in the epidemic period and also the respondents who did not work. The comparison was done in terms of the feeling of stress at work in both groups.

RESULTS

H1: Stress as a result of work from home also affects the individual's private life. With this hypothesis, we wanted to determine the correlation between stress as a result of work from home and the conflicts in private life. The questionnaire contained three statements (see table 1) related to the set hypothesis: In the period of working from home due to the Covid-19, I have experienced stress; Because of work from home, the number of conflicts between me and my family has increased; As a result of adjustments in relation to work from home, it has also come to tensions in private life.

Table 1. Description of variables – hypothesis 1 (n = 631)

Variable	Minimum	Maximum	Average	Standard deviation
Because of work from home, the number of conflicts between me and my family has increased.	1	5	1.87	1.152
In the period of working from home due to the Covid-19, I have experienced stress.	1	5	3.35	1.413
As a result of adjustments in relation to work from home, it has also come to tensions in private life.	1	5	2.39	1.284

Source: Author's calculations

In determining correlation, we combined the statements "Because of work from home, the number of conflicts between me and my family has increased" and "As a result of adjustments

in relation to work from home, it has also come to tensions in private life" into a new variable "conflicts".

With the help of Pearson correlation coefficient (see table 2), we figured out the medium correlation of the mentioned two variables in the above case. In terms of stress present after the first week of working from home, there is a connection between stress at work from home and the conflicts in private life; $r = 0{,}434$, p (2-sided) $< 0{,}01$. In the employees who experienced stress after the first week of working from home, tensions and conflicts also appeared in their private life. Regarding the fact that the two variables are correlated, we can confirm the hypothesis.

Table 2. Pearson correlation coefficient between the variables "stress at work from home" and "conflicts in personal life – first week"

		stress_at_work_ from_home_first_week	conflicts
stress_at_work_ from_home_first_week	Pearson correlation coefficient	1	0.434**
	Importance (2-sided)		0.000
	Total	631	631
Conflicts	Pearson correlation coefficient	0.434**	1
	Importance (2-sided)	0.000	
	Total	631	631

**. Statistical importance at 0.01 (2-sided).

Source: Author's calculations

H2: Due to juggling private and working life, the individual working from home is more exposed to stress.

For the mentioned hypothesis, we observed the respondents who worked from home in the epidemic period and also the respondents who did not work. The comparison was done in terms of the feeling of stress at work in both groups. Table 3 shows descriptive statistics. The total number of people working from home during the epidemic is 631, whereas the share of those not working from home and that answered to the given question is 93. In terms of agreeing with the statement, the arithmetic mean is 3.47 in the respondents who worked from home and 3.25 in those who did not, which demonstrates that in both cases it is close to the agreement with the grade 3 – "I somewhat agree". The standard deviance in those who did not work from home is in relation to the arithmetic mean greater than in those who did work from home.

Table 3. Descriptive statistics of hypothesis 2

	Work from home	Number	Arithmetic mean	Standard deviance	Std. error of arithmetic mean
Work causes stress to an individual	YES	631	3.47	0.892	0.036
	NO	93	3.25	1039	0.108

Source: Author's calculations

With the use of Levene's test on differences between the two variances, we figured out that $p > 0.05$, therefore, we will retain the assumption of homogeneity of variances. The difference between the two samples can be generalised to the entire population with a 5% risk.

In terms of T-test (see table 4), we obtained the result $p < 0.05$ ($p = 0.030$). On such a basis, we can conclude that the differences between the two arithmetic means are statistically important.

Table 4. T-test of hypothesis 2

|		t	Degree of freedom	Statistical importance (2-sided)	Average difference	Std. error difference
STRESS_ work	*Equal variances assumed*	2.174	722	0.030	0.220	0.101
	Equal variances not assumed	1.941	112.872	0.055	0.220	0.113

Source: Author's calculations

On average, the employees who worked from home were more exposed to stress (M = 3.47, SE =0.036) than those who did not (M = 3.25, SE=0.108). Such difference is statistically important: t (722) = 2.174, p < 0.05, so the hypothesis can be confirmed.

FUTURE RESEARCH DIRECTIONS

If we want to be successful in stress management, we first have to understand the concept. The figure below (figure 1) shows the relations between work obligations that we perform at home. With that said, we have also provided the answer to the initial research question: "How to balance private and work obligations when working from home during the Covid-19 epidemic?"

Figure 1. Relations between work obligations that we perform at home
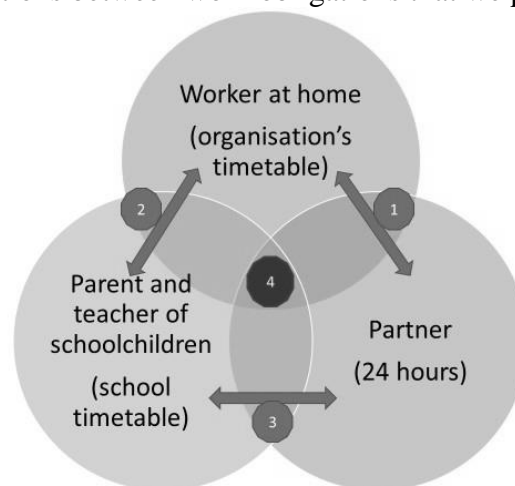
In this case, it is important to ask to what degree do we have a free hand in scheduling and who are the persons that we collaborate with. The more rigid the schedule and the more interactions we have with other co-workers, the bigger the gap (gap 1) between work and private obligations. In terms of work duties and obligations of schoolchildren, the situation is similar (gap 2). Here is particularly important when children have obligations and how autonomous they are in a way that they can fulfill the given responsibilities. The younger they are and the less they are informationally literate, the more help they need. It is also important how children

distribute their mandatory presence and self-study. If we continue, the third gap (3) is seen between our private obligations and those of schoolchildren. This relates to housework, taking care of other household members (who are relatively able to take care of themselves) or of parents, etc. There are situations in which adaptations are not possible, e.g. emergency meetings, helping children with their work at a specific time, medical appointment, etc. If any of the mentioned instances occur, we need external aid in order to eliminate the gap.

In his contribution, Vičič (2020) presented the measures with which employers can help the employees with different psychological aspects, which may become manifest in the case of long-term work from home. These measures are human contact, informing, division of labour, maintaining predictability and safety, additional motivation mechanisms, and monitoring the mood of employees. In relation to that, the leaders must not forget to also take care of themselves. With the help of such measures, the employer can contribute to stress reduction in the working life of an individual and consequently in the individual's private life as well.

With a house full of children and working parents, it is important to be realistic about your working situation and to have the willpower it will take to succeed – that also means taking time to explain to your family what is happening. Being transparent about every family member's schedule can make it easier for children to understand when you are not available to them. Scheduling is vital, but when it comes to setting up your schedule, do not try to mimic your day at the office; it is important to acknowledge that the situation has changed; i.e. from office work to teleworking. Instead, create a daily plan for the entire family that includes work and school schedules, and also make it easily visible to everyone. For parents with younger children, consider an early morning work shift before "school hours" begin. With a couple of hours of work already under your belt, it makes it easy for you to take a break in the mid-morning to help the children with their schoolwork. Creating opportunities for productivity is one option; if both parents work, divide up the day into blocks that give one parent space away from the children at a specific time. Identify your priorities regarding your work and focus on the essentials – all the unimportant stuff can wait. Figuring out how to make the best of the given situation rather than dwelling on its challenges might also make you more productive. Multiple studies show the positive link between happiness and productivity (DiMaria, Peroni, & Sarracino, 2020; Ledford, 1999; Oswald, Proto, & Sgroi, 2015). Under lockdown that could mean sneaking in an online yoga class with your child, finding time to play catch, or giving children a couple of extra hugs throughout the day. Avoid judging yourself – or others – on what you can get done each day. People at all levels of a company are adjusting to a new normal, including your boss (Dizik, 2020).

The epidemic has been some sort of a test of our abilities to adapt to a different way of working. Besides, every individual has had the time to check how much is he or she capable of switching between private and professional life. We have been given a chance to test what really means to work from home, which has been in operation for quite some time in some parts of the world.

The employees themselves can raise awareness of certain causes of stress and psychosocial risk factors in the workplace with the help of questions for self-assessment, e.g. in relation to the physical environment (too much noise, poor air quality, low/high temperature, powder), perception and experience of work in itself (satisfaction, difficulty, challenges, overburden with work assignments, role conflict, confounding factors, repetitive tasks, monotonous work, time pressure, norm, etc.), labour relations (bad interpersonal relations, lack of communication, mobbing, bullying, other behaviours of control and coercion). (Podgornik, 2020).

CONCLUSION

What will tomorrow bring to us and with what challenges will be faced the employers, co-workers, and their leaders? What response will the school system give to these challenges? Artificial intelligence and industry 5.0 enable unexpected and extraordinary levels of development. Interconnecting man and machine will lead to an increase in virtual meetings and researches (Raspor & Nežič, 2020)**.**

It is expected that the actual events will enhance the development of industrial revolution **5.0**, which will be based on autonomous integration. In doing so, we will probably reach the singularisation phase of man and machine. There are more and more advanced companies, which will be capable of overcoming such obstacles and combine knowledge from different fields. The fifth industrial revolution (industry 5.0) is, in the spirit of personalisation, oriented towards stronger and more qualitative integration of automation, human brain, and emotional intelligence (Raspor & Nežič, 2020). The move from the fourth to the fifth industrial revolution will give more emphasis on the man's work in in the production and it will bring together the best from both worlds – people and machines – and it will also provide greater productivity. Monotonous, repetitive tasks will be carried out by mechanics, whereas people will open themselves to a creative side of the business. In doing so, greater responsibility will be entrusted with them and they will also have greater control over the system and consequently, the opportunity to raise the production quality. Fast nano processing and seemingly infinite memory, robots, drones, autonomous vehicles, and other machines will set us free from the boredom of everyday life and work and they will enable our mind to reach new heights (Blagajac, n.d.). On the other hand, an increasing amount of work will be performed from home. The companies must be aware of its pros and cons. Hence, they must appropriately train their employees so that they will efficiently work from home. However, the employees themselves must organise their work in a way that their family life will not suffer.

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