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Contents

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Aims and Scope

The mission of Balkans JETSS is to publish peer-review empirical research papers that test, extend or build theory and contribute to practice. All empirical methods – including, but not limited to, qualitative, quantitative, field, laboratory, and combination methods are welcome. Empirical, theoretical and methodological articles from all major fields of economics, management, tourism, law and the like are featured in the journal. Theoretical and/or review articles that integrate existing bodies of research and that provide new insights into the field are also encouraged.

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Manuscripts should not exceed 16 pages (450 word per page). This page limit includes all figures, tables, appendices and references.

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Original Scientific Article

Regional Differences in the Human Resource Conditions in the European Union

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Abstract: *In recent years, the pandemic crisis generated challenges for countries highlighting serious economic structural problems. Significant social and economic development differences remain not only between countries but also within countries. There is a consensus among economists that human resources are one of the most important factors in countries to realize technological progress and improve competitiveness, which aims to moderate income disparities. The income and technological inequalities between regions can be derived from differences in human resources, which also prevent the improvement of competitiveness and economic growth. This research aims to illustrate the inequalities of human resource conditions in the NUTS-2 level regions of the European Union. Using the latest version of the Regional Competitiveness Index and the Regional Innovation Scoreboard, the regional differences in human resources by innovation performance groups are analyzed with multivariate statistical methods to identify the critical human factor(s) that affect the region's competitiveness and innovation performance. The improvement of these factors can be essential to moderate regional inequalities in the European Union.*

Keywords: *Human resources, Regional disparities, Regional competitiveness, Innovation, European Union.*

JEL Classification O15 · O31

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1. INTRODUCTION

In recent years the pandemic highlighted increasing regional differences despite that the European Union's regional policy aims to reduce disparities between the European regions by catching up the underdeveloped areas. Lukovics (2009) pointed out that regional disparities cannot be measured only with the GDP per capita, a complex indicator based on competitiveness can be used to identify which factors cause the regional inequalities. As the OECD (2023) formulated, a competitive region can attract and maintain successful firms, and skilled labour and maintain or increase standards of living for the region's inhabitants. The pyramidal model of regional competitiveness contains research and technological development, as well as human capital as development factors of regional competitiveness (Lengyel, 2000). The relationship between innovation, human capital, and regional competitiveness was analysed by Golejewska (2013b) who concluded that innovation and human capital have a growing impact on regional competitiveness. In the era of the Fourth Industrial Revolution, the role of human factors is more appreciated, and the regional adaptation to digital challenges can be the main driver of reducing regional disparities in the European Union. Despite supporting the digital adaptation of regions, as Balakrishnan et al. (2022, p. 19) also pointed out, regional disparities in Europe increased in recent years due to the pandemic. The authors concluded that the convergence had stopped between countries pre-pandemic, but was still progressing within countries. In addition, the major part of the level of disparities across regions can be attributed to disparities in regional productivity. The pandemic effect depends on the sectoral specialisation, differs from region to region, and may exacerbate regional disparities (Hudecz et al., 2020). After the pandemic, the concept of sustainable regional competitiveness became more important emphasizing that not only economic but also social and environmental factors need to be considered (Dziembała, 2021). According to Dziembała (2021), the economic dimension of sustainable competitiveness including the education and human capital factor is fundamental for economic growth. The role of human resources in regional development is also emphasized by Jašková and Havierniková (2020), Saleh et al. (2020), Affandi et al. (2019), Gennaioli et al. (2013), Golejewska (2013a), Faggian and McCann (2009) and Kokuytseva and Ovchinnikova (2020).

This study analyses the regional differences in the field of human resources in the European Union using the Regional Competitiveness Index 2.0. After the pandemic crisis, the methodology of the Regional Competitiveness Index (RCI) was revised, and it revealed a remarkable spatial pattern across EU regions. The analysis involves the indicators of basic and higher education, as well as digital skills, in addition to the different forms of employment that are important for competitiveness in the digital era. The human conditions of regions will be compared by regional innovation performance groups using the Regional Innovation Index to highlight what is the critical human area that has to be improved to realize a more competitive regional economy. The correlation between the Regional Innovation Index and the Regional Competitiveness Index is strong and positive (the correlation coefficient is 0.8663). Because of this strong relationship, the categorization of regional innovation performance groups can be used to analyse the differences in the human resource conditions at the regional level. Two hypotheses are formulated related to our analysis.

Hypothesis One: Comparing the human resource conditions of European regions by innovation performance groups, we assume that there is a significant difference in all fields that are related to human resources, not only in basic and higher education but also in innovation-related employment.

Hypothesis Two: Analysing the regional differences in human resources in the European Union, it is assumed that those human factors that are required by innovation in the era of the Fourth Industrial Revolution differentiate better the innovation performance groups.

2. DATABASE AND METHODOLOGY

The analysis refers to the regional differences in human resources in the European Union using the Regional Competitiveness Index and Regional Innovation Index. The Regional Competitiveness Index measures the major factors of competitiveness for all the NUTS-2 level regions across the European Union. The latest version of RCI 2.0 is a set of indicators classified into three sub-indices – Basic, Efficiency, and Innovation – and 11 pillars. The Basic sub-index refers to the basic drivers of all types of economies, it contains Institutions, Macroeconomic stability, Infrastructure, Health, and Basic education pillars. The Efficiency sub-index includes three pillars, such as Higher education, training and lifelong learning, Labour market efficiency, and Market size. The innovation sub-index focuses on the drivers of improvement at the most advanced stage of economic development, it contains Technological readiness, Business sophistication, and Innovation pillar. Based on Dijkstra et al. (2023) one of the main findings of the RCI 2022 was that the capital regions tend to be the most competitive ones within the Member States, except for three countries, Germany, Italy, and the Netherlands where the capital regions are not the most competitive. In most countries, the gap between the capital city region and the remaining regions is particularly wide, especially in France, Spain, Portugal, and many of the eastern EU Member States. The best-performing region based on the 2022 edition of the RCI was the region of Utrecht (Netherlands), followed by Zuid-Holland (Netherlands) and the French capital region of Île-de-France. In the TOP 10, there were 5 regions of the Netherlands, 2 regions of Belgium, and one region of France, Sweden, and Denmark. The bottom 10 regions are related mainly to Romania (6 regions) while there were two regions from the worst performing ones in Bulgaria and Greece. Comparing the RCI and its components over time, it can be concluded that the less developed regions are catching up. The performance improved not only in Basic, but also in the Innovation sub-index, and a clear process of catching-up was observed in regions located in the eastern and southern EU Member States.

The analysis focuses on human resources, so 13 variables are selected from the RCI which are related to basic education, higher education and lifelong learning, technological readiness, and innovation-related employment to measure the regional differences in the 234 regions of the European Union. The variables are as follows:

- *Basic education* (3): low achievement in reading, maths, and science (15-year-olds);
- *Higher education and lifelong learning* (5): higher educational attainment, lifelong learning, early school leavers, university accessibility, lower-secondary completion only;
- *Technological readiness* (1): individuals with above-basic overall digital skills;
- *Innovation* (4): core creative class employment, knowledge workers, human resources in science and technology, employment in technology and knowledge-intensive sectors.

In the case of basic education, the variables whose source is the PISA test are measured at the country level so there are no regional differences within countries. 5 variables from the 13 such as low achievement in reading, maths, and science, early school leavers, and lower-secondary completion only are measured in reverse scale. There are missing values related to some variables, in these cases, there are no imputations.

The regional economic performance can be measured from the aspect of innovation which is a key element in both competitiveness and growth. Like the European Innovation Scoreboard (EIS), innovation performance can be measured at the regional level. The Regional Innovation Scoreboard (RIS) which is a regional extension of the EIS, provides a comparative assessment of the factors related to innovation across European regions. It is not surprising that the most innovative regions are typically in the most innovative countries. Based on the Regional Innovation Index

2023 created from the Regional Innovation Scoreboard to measure the overall innovation performance, the most innovative region in Europe is Hovedstaden in Denmark, followed by Helsinki-Uusimaa in Finland, Ober-Bayern in Germany, Stockholm in Sweden, and Berlin in Germany. Using the Regional Innovation Index (RII) which is created from the RIS, the EU's regions can be classified into four innovation performance groups:

- *Regional innovation leaders* (performing more than 125% above the EU average),
- *Regional strong innovators* (performing between 100% and 125% of the EU average),
- *Regional moderate innovators* (performing between 70% and 100% of the EU average),
- *Regional emerging innovators* (performing below 70% of the EU average).

According to RIS, 30 regions are innovation leaders, 66 regions are strong innovators, 74 regions belong to moderate innovators, and 64 regions are emerging innovators (the classification of the regions is in the appendix).[3]

To analyse the differences in human resources across EU regions grouped by innovation performance, parametric and non-parametric tests can be used. Firstly, the normal distribution of variables is tested using the Kolmogorov-Smirnov test. If a variable has a normal distribution, ANOVA is used to compare means of more than two innovation performance groups, in contrast, in the lack of normal distribution, the Kruskal-Wallis test can be run. The Levene test is used to test homoscedasticity which is another prerequisite of the ANOVA. If equal variances are not assumed, Welch's test is used to compare means instead of the classical F test related to ANOVA. In the case of independent two samples, like innovation performance group by pairs, a t-test can be run if there is a normal distribution and the Mann-Whitney U test in the case of lack of criteria. Using these hypothesis tests we got a comprehensive picture of significant differences between innovation performance groups at the regional level in selected human resource factors.

3. EMPIRICAL RESULTS

Firstly, the selected variables related to human resources are compared to highlight the differences between regional innovation performance groups. We separate the reverse-scaled variables from the normal indicators, the comparison can be seen in Figure 1.

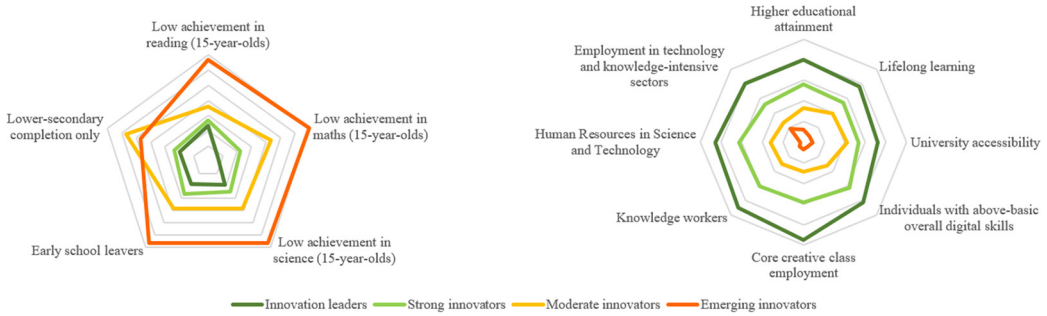

Figure 1. The difference between the EU's regional innovation performance groups in the field of human resources

Source: Own construction based on RCI (2022) and RIS (2023)

[3] The number of regions are not equal in the RCI and in the RIS. The RCI contains 234 regions, while the RIS includes 239 regions. The difference is come from mainly the different region categorization of Austria, Belgium and France. The other source of difference is that the RCI manages the capital region with their commuting zone. Cyprus, Estonia, Latvia, Luxembourg and Malta are included at the country level in both database.

Figure 1 shows that in the field of higher education and innovation-related employment, there can be significant differences between regional innovation performance groups. Regional innovation leaders' advantage is the highest in core creative class employment and knowledge workers while in the field of lifelong learning and university accessibility, both strong and moderate innovators approach them. Moderate innovators lag behind strong innovators in the variable of individuals with above-basic overall digital skills and higher educational attainment. There is no huge difference between moderate and emerging innovators in employment in technology and knowledge-intensive sectors but they lag behind leaders and strong innovators. In the case of reverse-scaled variables, there is a surprising difference between innovation leaders and strong innovators with low achievement in maths. In lower-secondary completion only, the performance of moderate innovators is worse than emerging innovators.

In the next step of the analysis, the normality of variables is tested by the Kolmogorov-Smirnov test, but there are only two variables that have normal distribution, higher educational attainment and knowledge workers. In the case of normal distribution, ANOVA is used, in other cases, the Kruskal-Wallis test is run to compare the means of the variable to show significant differences between regional innovation performance groups (see Table 1).

Table 1. The results of the Kolmogorov-Smirnov tests, ANOVA, and the Kruskal-Wallis tests in comparing regional innovation performance groups

Variable	*Test of normality*		*Comparing means*	
	Test statistic	**Sig.**	**Test statistic**	**Sig.**
Low achievement in reading (15-year-olds)	,236	,000	9,907	,019
Low achievement in maths (15-year-olds)	,221	,000	54,832	,000
Low achievement in science (15-year-olds)	,251	,000	20,902	,000
Higher educational attainment	*,057*	*,065*	35,836*	,000
Lifelong learning	,118	,000	92,782	,000
Early school leavers	,113	,000	14,913	,002
University accessibility	,151	,000	73,895	,000
Lower-secondary completion only	,149	,000	14,919	,002
Individuals with above-basic overall digital skills	,072	,005	100,491	,000
Core creative class employment	,085	,000	126,237	,000
Knowledge workers	*,040*	*,200*	74,185*	,000
Human Resources in Science and Technology	,062	,032	121,334	,000
Employment in technology and knowledge-intensive sectors	,111	,000	74,239	,000

***** ANOVA is used because the variable has normal distribution and homoscedasticity (tested by the Levene test)

Source: Own calculations based on RCI (2022) and RSI (2023)

Using ANOVA and the Kruskal-Wallis test to compare the means of four innovation performance groups, there is a significant difference in all fields. It is not surprising because human factors affect both competitiveness and innovation. In the case of basic education, the difference is quite the same between groups with low achievement in reading and science, while innovation leaders' performance is about 20%, and the emerging innovators' ratio is 26%. In the case of low achievement in math, the ratios are higher and the difference is greater between groups, innovation leaders' performance is about 40%, and the ratio is 50% in emerging innovator regions. There is a huge difference in LLL, adult participation in lifelong learning is fourfold in innovation leaders than in emerging innovators. There is also a significant difference in individuals with above-basic overall digital skills, while innovation leaders' performance is 150.64 % of the EU average, emerging innovators realize only 63.35%. In the field of innovation-related employment, the difference between best and worst-performing regions is about double, but the difference in employment in technology and knowledge-intensive sectors is threefold.

Because of the comparison which can be seen in Figure 1, it is worth comparing means of innovation performance groups by pairs that fit the order. Table 2 shows the results of t-tests if the variable has a normal distribution and Mann-Whitney tests in the case of lack of normality.

Table 2. The results of the t-tests and the Mann-Whitney tests in comparing regional innovation performance groups by pairs

Variable	*Comparing means between innovation leaders and strong innovators*		*Comparing means between strong and moderate innovators*		*Comparing means between moderate and emerging innovators*	
	Test statistic	**Sig.**	**Test statistic**	**Sig.**	**Test statistic**	**Sig.**
Low achievement in reading (15-year-olds)	-3,024	,002	-5,593	,000	-7,156	,000
Low achievement in maths (15-year-olds)	-,483	**,629**	-1,131	**,258**	-1,847	**,065**
Low achievement in science (15-year-olds)	-2,847	,004	-4,929	,000	-2,002	,045
*Higher educational attainment**	3,296	,002	3,875	,000	3,787	,000
Lifelong learning	-3,146	,002	-3,415	,001	-3,382	,001
Early school leavers	-1,854	**,064**	-2,365	,018	-7,016	,000
University accessibility	-1,431	**,153**	-1,743	**,081**	-1,816	**,069**
Lower-secondary completion only	-3,375	,001	-2,271	,023	-4,991	,000
Individuals with above-basic overall digital skills	-,522	**,602**	-3,621	,000	-1,227	**,220**
Core creative class employment	-2,824	,005	-5,214	,000	-3,882	,000
*Knowledge workers**	5,301	,000	6,200	,000	4,471	,000
Human Resources in Science and Technology	-4,940	,000	-5,944	,000	-4,178	,000
Employment in technology and knowledge-intensive sectors	-4,170	,000	-5,730	,000	-4,939	,000

* t-test is used because the variable has a normal distribution

Source: Own calculations based on RCI (2022) and RSI (2023)

When means are compared by pairs using the t-test and the Mann-Whitney test, there is no significant difference in some cases. The indicators of low achievement in maths (15-year-olds) and university accessibility are specific because all comparison by pairs shows that there is no significant difference between paired regional innovation performance groups. The difference is not significant in individuals with above-basic overall digital skills between innovation leaders and strong innovators, as well as between moderate and emerging innovators. There is no significant difference in early school leavers between innovation leaders and strong innovators.

4. FUTURE RESEARCH DIRECTIONS

This analysis is the starting point of a complex comparison in the field of human resources among European regions. We can conclude that there is a strong relationship between human factors, innovation, and regional development, the regional disparities can be explained by differences in human resources. In the future, it is worth creating a complex indicator for measuring the human resource conditions and trying to group the regions in two dimensions, such as economic innovation and human conditions.

5. CONCLUSION

In recent years the regional disparities increased in Europe despite the accelerated digital adaption due to the pandemic. This study tries to illustrate the regional differences in human resource conditions which are important for both innovation and economic growth. Using the Regional Competitiveness Index and Regional Innovation Scoreboard human factors, i.e. basic and higher education, lifelong learning, digital skills, and innovation-related employment are compared between innovation performance groups. There is a significant difference in all selected human factors, the following innovators mainly lag behind in mathematical competencies related to basic education, participation in lifelong learning, individuals above-basic overall digital skills, and employment in technology and knowledge-intensive sectors. This analysis focuses on education, technological readiness, and innovation-related employment, we can conclude that there is a higher difference between innovation leaders and followers in the human factors which are required by innovation.

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APPENDIX

Table 1. The classification of regions by country based on the innovation performance using RII

INNOVATION LEADERS (30)			
Region name	Country Name	Region name	Country Name
Vienna and its commuting zone	Austria	Köln	Germany
Burgenland	Austria	Hovedstaden	Denmark
Brussels and its commuting zone	Belgium	Midtjylland	Denmark
Antwerpen	Belgium	Nordjylland	Denmark
Limburg (BE)	Belgium	Helsinki-Uusimaa	Finland
Oost-Vlaanderen	Belgium	Ile-de-France	France
West-Vlaanderen	Belgium	Gelderland	Netherlands
Prague and its commuting zone	Czechia	Utrecht	Netherlands
Berlin and its commuting zone	Germany	Zuid-Holland	Netherlands
Stuttgart	Germany	Noord-Brabant	Netherlands
Karlsruhe	Germany	Limburg (NL)	Netherlands
Tübingen	Germany	Stockholm	Sweden
Oberbayern	Germany	Östra Mellansverige	Sweden
Mittelfranken	Germany	Sydsverige	Sweden
Hamburg	Germany	Västsverige	Sweden
STRONG INNOVATORS (66)			
Region name	Country Name	Region name	Country Name
Kärnten	Austria	Syddanmark	Denmark
Steiermark	Austria	País Vasco	Spain
Oberösterreich	Austria	Com. Foral de Navarra	Spain
Salzburg	Austria	Comunidad de Madrid	Spain
Tirol	Austria	Cataluña	Spain
Vorarlberg	Austria	Länsi-Suomi	Finland
Hainaut	Belgium	Etelä-Suomi	Finland
Liège	Belgium	Pohjois- ja Itä-Suomi	Finland
Namur	Belgium	Bretagne	France
Luxembourg (BE)	Belgium	Languedoc-Roussillon	France
Kýpros	Cyprus	Midi-Pyrénées	France
Jihovýchod	Czechia	Auvergne	France
Freiburg	Germany	Rhône-Alpes	France
Oberpfalz	Germany	Provence-Alpes-Côte d'Azur	France
Oberfranken	Germany	Zagreb and its commuting zone	Croatia
Unterfranken	Germany	Budapest and its commuting zone	Hungary

Schwaben	Germany	Northern and Western	Ireland
Bremen	Germany	Southern	Ireland
Darmstadt	Germany	Eastern and Midland	Ireland
Gießen	Germany	Prov. Autonoma di Trento	Italy
Braunschweig	Germany	Friuli-Venezia Giulia	Italy
Hannover	Germany	Emilia-Romagna	Italy
Düsseldorf	Germany	Sostinės regionas	Lithuania
Detmold	Germany	Luxembourg	Luxembourg
Rheinhessen-Pfalz	Germany	Amsterdam and its commuting zone	Netherlands
Koblenz	Germany	Groningen	Netherlands
Arnsberg	Germany	Friesland (NL)	Netherlands
Saarland	Germany	Drenthe	Netherlands
Dresden	Germany	Overijssel	Netherlands
Leipzig	Germany	Zeeland	Netherlands
Schleswig-Holstein	Germany	Småland med öarna	Sweden
Thüringen	Germany	Övre Norrland	Sweden
Sjælland	Denmark	Zahodna Slovenija	Slovenia
MODERATE INNOVATIORS (74)			
Region name	Country Name	Region name	Country Name
Jihozápad	Czechia	Nord-Pas de Calais	France
Severovýchod	Czechia	Picardie	France
Střední Morava	Czechia	Alsace	France
Moravskoslezsko	Czechia	Champagne-Ardenne	France
Niederbayern	Germany	Lorraine	France
Kassel	Germany	Pays de la Loire	France
Mecklenburg-Vorpommern	Germany	Aquitaine	France
Lüneburg	Germany	Limousin	France
Weser-Ems	Germany	Poitou-Charentes	France
Münster	Germany	Piemonte	Italy
Trier	Germany	Valle d'Aosta/Vallée d'Aoste	Italy
Chemnitz	Germany	Liguria	Italy
Sachsen-Anhalt	Germany	Lombardia	Italy
Eesti	Estonia	Abruzzo	Italy
Attiki	Greece	Molise	Italy
Kriti	Greece	Campania	Italy
Kentriki Makedonia	Greece	Puglia	Italy
Ipeiros	Greece	Basilicata	Italy
Thessalia	Greece	Calabria	Italy
Dytiki Elláda	Greece	Prov. Autonoma di Bolzano/Bozen	Italy
Peloponnisos	Greece	Veneto	Italy
Galicia	Spain	Toscana	Italy
Principado de Asturias	Spain	Umbria	Italy
Cantabria	Spain	Marche	Italy
La Rioja	Spain	Lazio	Italy
Comunitat Valenciana	Spain	Vidurio ir vakarų Lietuvos regionas	Lithuania
Illes Balears	Spain	Malta	Malta
Andalucía	Spain	Małopolskie	Poland
Región de Murcia	Spain	Warszawski stołeczny	Poland
Åland	Finland	Área Metropo-litana de Lisboa	Portugal
Centre — Val de Loire	France	Centro (PT)	Portugal
Bourgogne	France	Norte	Portugal
Franche-Comté	France	Alentejo	Portugal
Basse-Normandie	France	Norra Mellansverige	Sweden
Haute-Normandie	France	Mellersta Norrland	Sweden
Aragón	Spain	Vzhodna Slovenija	Slovenia
Castilla y León	Spain	Bratislavský kraj	Slovakia

EMERGING INNOVATIORS (64)			
Region name	Country Name	Region name	Country Name
Severozapaden	Bulgaria	Sicilia	Italy
Severen tsentralen	Bulgaria	Sardegna	Italy
Severoiztochen	Bulgaria	Latvija	Latvia
Yugoiztochen	Bulgaria	Śląskie	Poland
Yugozapaden	Bulgaria	Wielkopolskie	Poland
Yuzhen tsentralen	Bulgaria	Zachodniopomorskie	Poland
Severozápad	Czechia	Lubuskie	Poland
Voreio Aigaio	Greece	Dolnośląskie	Poland
Notio Aigaio	Greece	Opolskie	Poland
Anatoliki Makedonia, Thraki	Greece	Kujawsko-pomorskie	Poland
Dytiki Makedonia	Greece	Warmińsko-mazurskie	Poland
Ionia Nisia	Greece	Pomorskie	Poland
Sterea Elláda	Greece	Łódzkie	Poland
Castilla-La Mancha	Spain	Świętokrzyskie	Poland
Extremadura	Spain	Lubelskie	Poland
Ciudad de Ceuta	Spain	Podkarpackie	Poland
Ciudad de Melilla	Spain	Podlaskie	Poland
Canarias	Spain	Mazowiecki regionalny	Poland
Corse	France	Algarve	Portugal
Guadeloupe	France	Região Autónoma dos Açores	Portugal
Martinique	France	Região Autónoma da Madeira	Portugal
Guyane	France	Nord-Vest	Romania
La Réunion	France	Centru	Romania
Mayotte	France	Nord-Est	Romania
Panonska Hrvatska	Croatia	Sud-Est	Romania
Jadranska Hrvatska	Croatia	Sud-Muntenia	Romania
Közép-Dunántúl	Hungary	Bucureşti-Ilfov	Romania
Nyugat-Dunántúl	Hungary	Sud-Vest Oltenia	Romania
Dél-Dunántúl	Hungary	Vest	Romania
Észak-Magyarország	Hungary	Západné Slovensko	Slovakia
Észak-Alföld	Hungary	Stredné Slovensko	Slovakia
Dél-Alföld	Hungary	Východné Slovensko	Slovakia

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Original Scientific Article

Relationship between FDI Inflow and Unemployment in the Case of the Former Yugoslav Republics

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Abstract: *Foreign Direct Investments - FDIs are recognized in the economics literature as one of the vital determinants of economic growth. A particular interest of any host economy is to reach the employment effect of the FDIs. The purpose of the paper is to analyze the relationship between the inflow of the FDIs and the unemployment rate in the case of the former Yugoslav republics and to identify whether and how the new economies have benefited from the FDI inflow. The paper develops a model identifying the FDI as a determinant of the unemployment rate. A regression analysis is used to examine the correlation between the FDI inflow and the unemployment rate over the period of 30 years. The results show differences in FDIs inflow and huge individual variations in the unemployment rate in each country.*

Keywords: *FDI, Unemployment, Analysis.*

JEL Classification E24 · E22 · F21

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1. INTRODUCTION

Although foreign direct investment (FDI) trends in the last decade varied significantly (UNCTAD, 2021), they are examined and treated as a factor of economic growth for both developed and developing countries. The impact of FDIs on the host economy is an issue of continual theoretical and empirical interest of the scientific community on one hand, and on the other, it is an integral part of national development policies. The FDI's research interest could be equally focused on the quantitative and qualitative aspects and their interactions with the host environment through launching production facilities, hiring and training workers, establishing linkages with local suppliers, and affecting the export performances of the local economy. Especially, FDIs in developing and emerging economies and countries in transition are considered an essential source of modernization, employment, and development (OECD, 2002). Inward FDIs have played an important role in the transition process of developing countries. Foreign investors initially moved into the Central European Economies (CEE) region due to the cost advantages concerning labour, but over time many FDIs have upgraded their operations, as evidenced by the growth of high-technology industries and high technology exports (Narula & Guimon, 2010). At the same time, the experience of the former Yugoslav republics referring to the influence of FDI inflow and employment exercises different practices. The rationale for this paper is to analyse the tendencies in the FDI inflow and unemployment rate in order to reveal whether the former Yugoslav republics have reached the employment spill-over effect from the FDI inflow. The paper identifies very different tendencies suggesting the influence of the FDI on unemployment is more intensive in some countries, but less in others. The first part of the paper summarises the theoretical background on the linkages between FDI inflow and employment in the host economy as a research issue. The second part presents the methodology used in the analysis and determines the relationship between the FDI inflow and unemployment data in the analyzed economies. Finally, the paper is summarized with the derivation of conclusions based on the regression analysis with suggestions for further research.

2. LITERATURE REVIEW

There is always arguing about the influence of the FDI inflow on the labor market. The results of the empirical research are very divergent and ambiguous. The study performed by Dinga and Munich (2010) indicates a positive and statistically significant effect of large FDIs on unemployment. Tegep et al. (2019) studied the relationship between Foreign Direct Investment (FDI) and the unemployment rate in Indonesia. They concluded that FDI alone is insufficient to explain the unemployment rate fluctuations. Research conducted by Gökçeli (2023) examined the impact of total foreign direct investment (FDI) on the unemployment rate in Turkey from 1992 to 2020. The findings indicate no significant effect of FDI inflows on the employment rate. This lack of significant impact could be due to the fact that the influence of FDI on employment rates differs across various sectors. The findings of a study conducted by Alalawneh and Nessa (2020) in the Middle East and North Africa, spanning from 1990 to 2018, indicate that foreign direct investment (FDI) contributes to a decrease in the long-term unemployment rates for both men and women. Additionally, the study suggests that there is no causal relationship between FDI and unemployment in the short term. Wang and Choi (2021) analyzed panel data from 26 OECD countries spanning the years 2006 to 2018. Their findings show that foreign direct investment (FDI) inflow has a significant positive impact on domestic employment, albeit with a one-period time lag, suggesting that there is a delay in the effect of FDI on employment growth. Kwan and Tang (2020), through cross-sectional data analysis of 19 industries in Malaysia, identified a positive and long-term effect of foreign investment on employment. Bayar et al. (2020) conducted a study on the unemployment effects of greenfield and brownfield investments in 11 post-transition EU members from 2003 to 2017. The study's findings indicated that

brownfield investments contributed to long-term unemployment, whereas greenfield investments did not significantly impact overall unemployment in the long run.

Hunya and Geishecker (2005) referring to the employment effect of FDI suggest that job losses and job creation are appearing simultaneously. They summarized FDI's effect on employment as direct and indirect. Job loss through restructuring of formerly inefficient state-owned companies against the job creation through greenfield investment. Their research about the employment effects of FDI in Central and Eastern Europe (CEE) identified differences in employment opportunities and wages between young skilled workers employed by the FDI and less skilled and elder people. Brincikova and Darmo (2014) analyzing the impact of FDI inflow on employment in Visegrad group countries have revealed no significant impact of FDI on the unemployment rate. Research results by Jude and Pop Silaghi (2016) recognized a modest importance of FDI as a determinant of employment compared to economic restructuring and output growth. The influence of the FDI on increasing employment or diminishing the unemployment rate, Dicken (2015), has put in relation to the nature of the FDI inflow. Greenfield investment results in a higher positive employment effect, against the acquisitions or purchasing of privatized companies. Research by Estrin (2017) reveals very interesting findings about the relationship of FDI to unemployment in transition economies. In CEE countries, a pattern of inverse correlations between FDI and unemployment appears after the completion of enterprise restructuring. Against CEE countries, Estrin (2017) has identified different experiences in Balkan countries suggesting that the process of restructuring was longer and it was less dependent on FDI. So, the FDIs in this case, had less impact on the decrease in unemployment because the FDIs were more resource-oriented. Zdravkovic et al. (2017) have analysed the long-run impact of FDI on the unemployment rate in 17 transition countries and found out that it is very loose or does not exist and the impact of FDI on unemployment depends on its nature – greenfield and brownfield structure. Stepanok (2022) has developed a model in which is shown that the FDI increases unemployment. FDI in developing countries has resulted in the redistribution of employment, Bogliaccini and Egan (2017), influencing the unemployment rate positively or negatively.

The impact of foreign direct investment (FDI) inflows on unemployment is the subject of considerable debate within scholarly literature. While some contend that FDI leads to a significant decrease in unemployment rates, others argue that it brings about adverse effects. There is also a perspective suggesting an ambiguous or indeterminate effect of FDI on unemployment.

3. DATA AND METHODOLOGY

The model developed in this paper follows partially the regression model of the impact of FDIs on the accumulation of human capital within developing countries in the study of Gittens and Pilgrim (2013). We take this model since FDI has a human capital content through the processes of employment creation and employment redistribution in the host economies. Both of them influence directly the unemployment rate. The model relates the unemployment rate to the FDI inflow of the former Yugoslav republics. The proposed regression equation (1) links the dependent variable unemployment (Unemp) and FDI inflow.

$$Unemp = \beta_0 + \beta_1 FDI + u \tag{1}$$

The error term u in equation (1) accounts for the unobservable and omitted effects and if it takes 0 the function *f* looks:

$$f(Unemp) = \beta_0 + \beta_1 FDI \tag{2}$$

The change in the unemployment rate reflects the overall influence of the FDI inflow on the creation and redistribution of employment in the period of 30 years, from 1990 to 2021.

For the analysis, two sets of data were utilized. The first set pertains to the unemployment rate during the analyzed period, sourced from the World Bank database (worldbank.org). Notable disparities in the unemployment rate across the former Yugoslav republics were evident during the analyzed period (see Figure 1). The Macedonian economy, as well as Bosnia and Herzegovina and Montenegro, exhibit the highest rates of unemployment. Croatia and Serbia, on the other hand, demonstrate comparatively lower levels of unemployment, albeit marked by significant fluctuations. In contrast, Slovenia displays a notably stable trend characterized by very low unemployment rates.

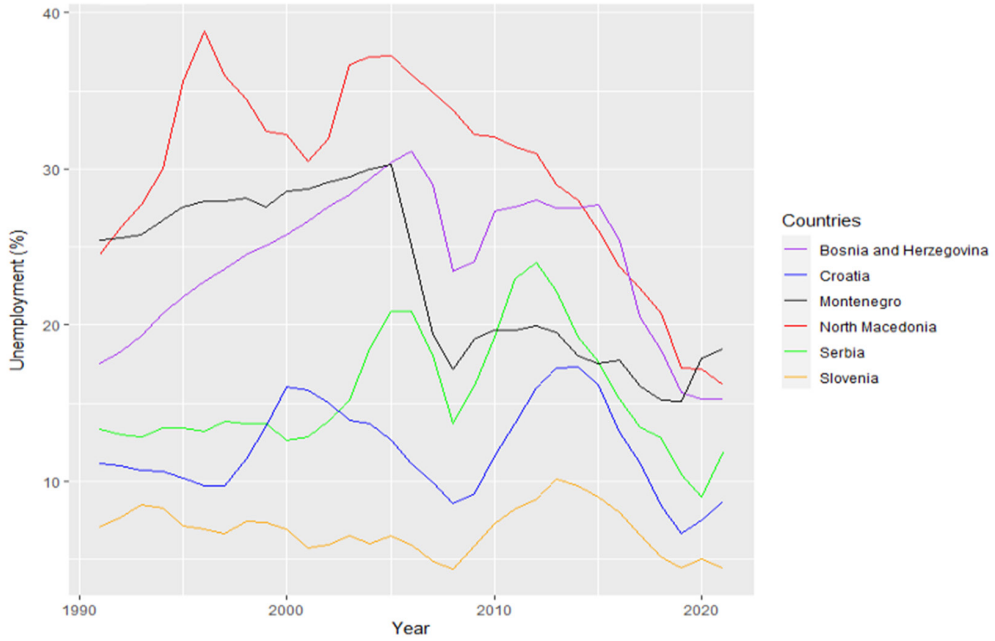

Figure 1. The unemployment rate in the Former Yugoslav economies in the period 1990-2021
Source: On the basis of data from https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

The second set of data pertains to the inflow of FDIs and is sourced from the UNCTAD World Investment Database for the period 1990-2021 (Figure 2). The data depicted in Figure 2 highlights the FDI inflow, revealing substantial discrepancies and similarities in the FDI trends across the former Yugoslav republics. Upon analysis, three main phases in the FDI inflow are discernible. The initial phase, corresponding to the first 10 years of independence, is characterized by a very low, almost negligible inflow of FDIs. Primarily, these inflows were in the form of acquisitions and privatizations of state-owned mining enterprises and raw materials facilities. The second period, spanning from 2001 to the global financial crisis in 2010, was marked by a focus on modernization, privatization, and restructuring in sectors such as finance, telecommunications, petroleum, metallurgy, electricity, and water distribution. Foreign Direct Investment (FDI) during this phase was primarily associated with the privatization and acquisition of existing enterprises. The third phase, following the global financial crisis in 2011, saw a shift in FDI inflow, particularly towards greenfield foreign investment. To attract more greenfield investments, several former Yugoslav republics pursued aggressive strategies to entice foreign investors through various benefits and incentives. As a result, there was a noticeable increase in both the quantity and quality of FDI inflow.

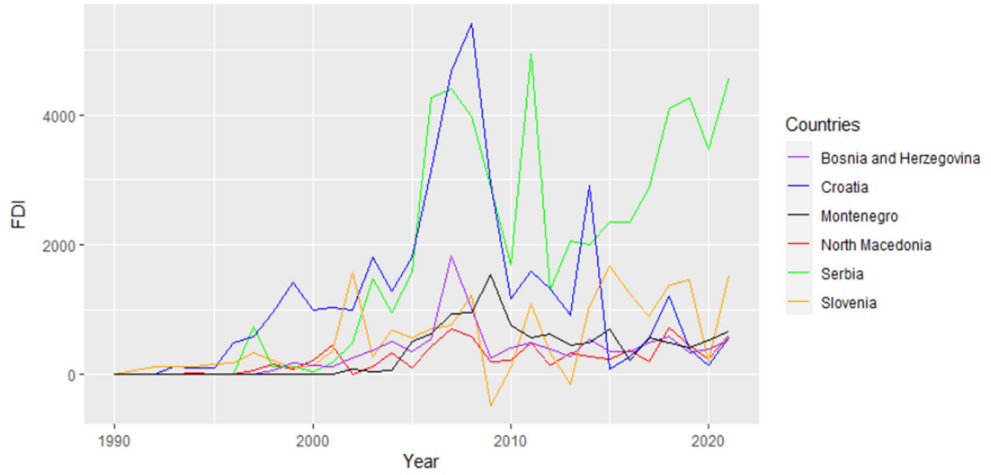

Figure 2. The FDI inflow in the Former Yugoslav Republics in the period 1990-2021
Source: On the basis of data from https://unctad.org/data-visualization/global-foreign-direct-investment-flows-over-last-30-years

4. RESULTS AND DISCUSSION

To investigate the relationship between the FDI inflow and unemployment regression equation 2 is used. The results are obtained using R as an open-source programming language and software environment for statistical computing and graphics. Findings summarised in Table 1 reveal diversity and no substantial correlation between the FDI inflow and unemployment rate in the case of the former Yugoslav republics. In the analyzed period, the R-squared values are very low, except for the Montenegro and Macedonian economies.

Table 1. Results of the Regression Analysis

Country	Intercept	FDI	R-squared	Adjusted R-squared	Correl. coeff. (r)	p-value	F-test
N. Macedonia	33.904878	-0.012844	0.1615	0.1279	-0.401853	0.03773	9.564833
Slovenia	7.2534170	-0.000697	0.0713	0.03927	-0.267018	0.1465	6.829826
Croatia	12.08	-0.000078	0.001156	-0.03452	-0.034005	0.8584	5.144272
Serbia	15.93	0.000032	0.0001589	-0.04331	0.012607	0.9523	6.702362
Montenegro	24.625198	-0.007091	0.2206	0.1773	-0.469702	0.03666	2.279017
B&H	24.578010	0.001048	0.006036	-0.03914	0.077689	0.7182	1.820535

Source: Author's calculations

Based on the analysis for Slovenia, the relationship between Foreign Direct Investment (FDI) inflow and the unemployment rate from 1990 to 2021 reveals a weak and not statistically significant correlation. The calculated correlation coefficient is -0.267, indicating a slight negative relationship between FDI and unemployment. However, this relationship is not strong. The regression analysis further supports this finding, with an R-squared value of 0.071, suggesting that only 7.13% of the variance in the unemployment rate is explained by FDI inflows. The slope of the regression line (Figure 3) is -0.0007, indicating a minor decrease in the unemployment rate with an increase in FDI, but this effect is not statistically significant (p-value = 0.146). Therefore, the analysis suggests that FDI inflows have minimal impact on the unemployment rate in Slovenia during the studied period.

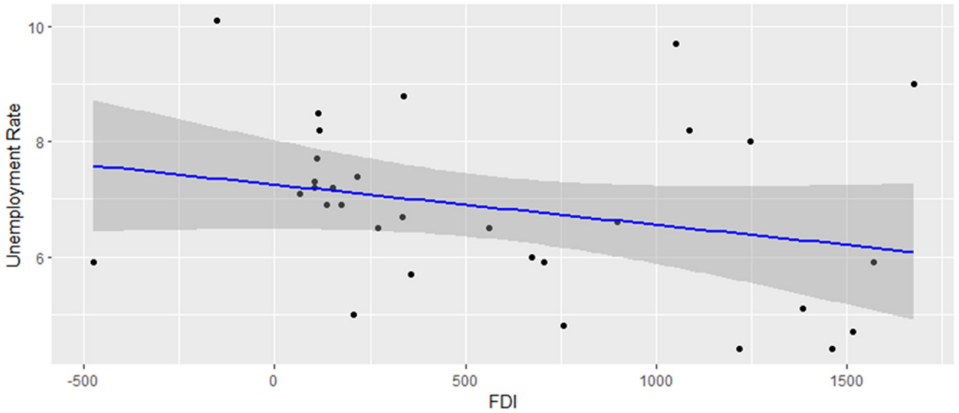

Figure 3. Slovenia's regression analysis between FDI and Unemployment (1990-2021)
Source: Author's calculation

The analysis for Croatia reveals no significant relationship between Foreign Direct Investment (FDI) inflows and the unemployment rate from 1990 to 2021. The correlation coefficient is -0.034, indicating a weak inverse relationship between FDI and unemployment. The regression analysis supports this finding, with an R-squared value of 0.001, suggesting that only 0.12% of the variance in the unemployment rate is explained by FDI inflows. The slope of the regression line is -0.000078, indicating a negligible change in the unemployment rate with an increase in FDI (Figure 4). The p-value of 0.858 suggests that the observed relationship lacks statistical significance. Thus, FDI inflows do not appear to have a meaningful impact on the unemployment rate in Croatia during the studied period.

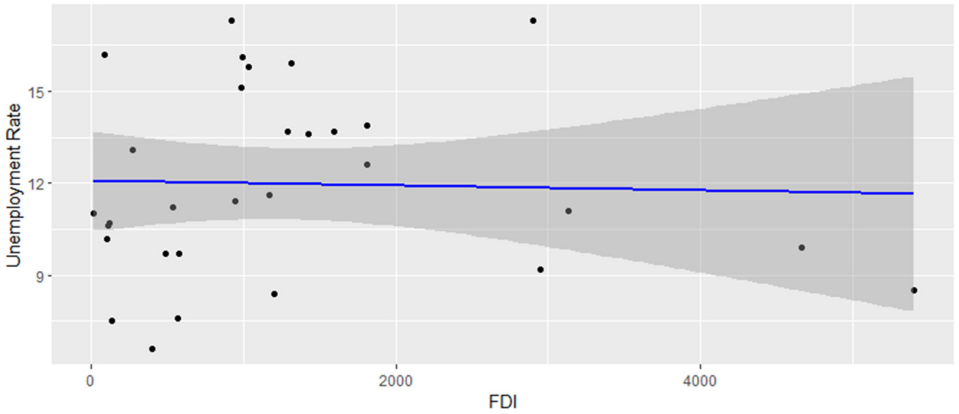

Figure 4. Croatia's regression analysis between FDI and Unemployment (1990-2021)
Source: Author's calculation

The analysis for Serbia indicates no significant relationship between Foreign Direct Investment (FDI) inflows and the unemployment rate from 1990 to 2021. The correlation coefficient is 0.0126, suggesting an extremely weak positive relationship. The regression analysis supports this finding with an R-squared value of 0.00016, meaning only 0.016% of the variance in the unemployment rate is explained by FDI inflows. The slope of the regression line is 0.0000326, indicating a negligible change in the unemployment rate with an increase in FDI (Figure 5). The p-value of 0.952 further indicates that this relationship is not statistically significant. Therefore, FDI inflows do not appear to have a meaningful impact on the unemployment rate in Serbia during the studied period.

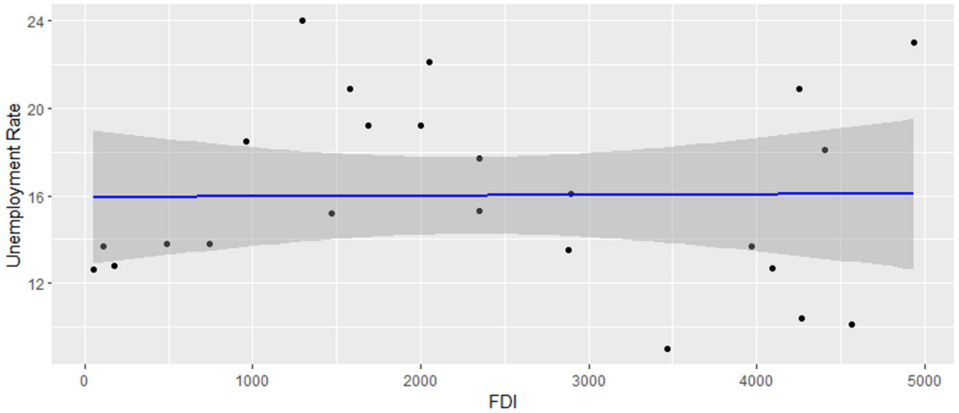

Figure 5. Serbia's Regression Analysis between FDI and Unemployment (1990-2021)
Source: Author's calculation

The analysis for Montenegro reveals a statistically significant relationship between Foreign Direct Investment (FDI) inflows and the unemployment rate from 1990 to 2021. The correlation coefficient is -0.470, indicating a moderate inverse relationship between FDI and unemployment. The regression analysis supports this finding, with an R-squared value of 0.221, suggesting that approximately 22% of the variance in the unemployment rate is explained by FDI inflows. The slope of the regression line is -0.007, indicating that for every unit increase in FDI, the unemployment rate decreases by 0.007 units. The p-value of 0.037 further confirms that this relationship is statistically significant. Thus, FDI inflows appear to have a meaningful impact on reducing the unemployment rate in Montenegro during the studied period (Figure 6).

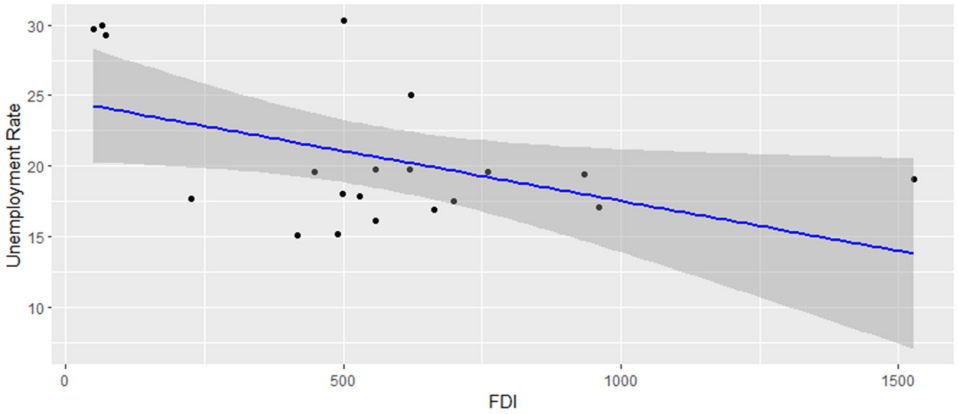

Figure 6. Montenegro's Regression Analysis between FDI and Unemployment (1990-2021)
Source: Author's calculations

The analysis for Bosnia and Herzegovina reveals that there is no significant relationship between Foreign Direct Investment (FDI) inflows and the unemployment rate from 1990 to 2021. The correlation coefficient is 0.078, indicating a very weak positive relationship between FDI and unemployment. The regression analysis supports this finding, with an R-squared value of 0.006, suggesting that only 0.60% of the variance in the unemployment rate is explained by FDI inflows. The slope of the regression line is 0.001, indicating a negligible change in the unemployment rate with an increase in FDI. The p-value of 0.718 further indicates that this relationship is not

statistically significant. Thus, FDI inflows do not appear to have a meaningful impact on the unemployment rate in Bosnia and Herzegovina during the studied period (Figure 7).

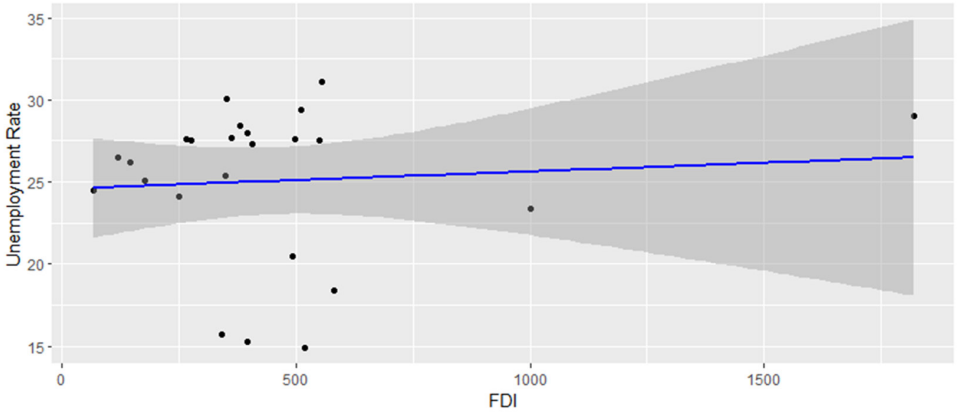

Figure 7. B&H's Regression Analysis between FDI and Unemployment (1990-2021)
Source: Author's calculations

The analysis of the relationship between Foreign Direct Investment (FDI) inflow and the unemployment rate in North Macedonia reveals a moderate inverse correlation, with an R-squared value of 0.161 indicating that changes in FDI explain 16.1% of the variance in the unemployment rate. The regression results show a statistically significant negative relationship, where an increase in FDI is associated with a decrease in the unemployment rate (Figure 8). Despite the significance of this relationship, the low R-squared value suggests that other factors also significantly influence unemployment. These findings support the notion that while attracting FDI can help reduce unemployment, comprehensive strategies addressing multiple economic factors are essential for achieving substantial and sustainable improvements in the labor market.

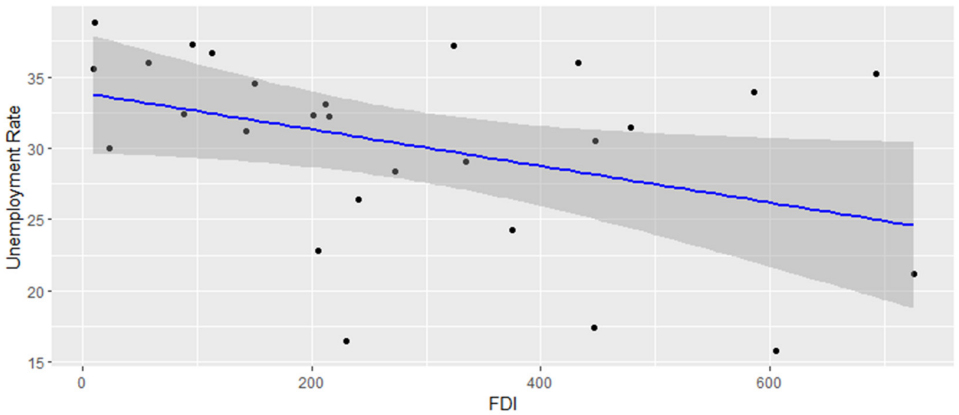

Figure 8. Macedonia's Regression Analysis between FDI and Unemployment (1990-2021)
Source: Author's calculations

Upon comparing the obtained p-values and regression lines, it becomes evident that there is a significant relationship between FDI and unemployment in the cases of Montenegro and the Macedonian economy. These nations display a pattern where an increase in FDI is linked to a decrease in unemployment. Conversely, the other economies exhibit weak or negligible evidence of such a relationship.

5. CONCLUSION

The main objective of this research is to examine the contribution of FDI inflow to the unemployment rate in the case of the former Yugoslav republics over the period ranging from 1990-2021.

Our regression model has revealed substantial differences in FDI inflows and significant individual variations in the unemployment rate across countries. The main finding suggests that FDI has no significant influence on the unemployment rate in most countries. However, individual analysis shows that only Montenegro and Macedonian economies exhibit a relationship between FDI inflow and a decreased unemployment rate. Initially, both countries had high unemployment rates. Nevertheless, as foreign direct investment (FDI) increased, the unemployment rates began to decline. This trend was particularly noticeable in Montenegro and Macedonian economies, as they faced significant unemployment and lacked FDI, especially greenfield FDI, during the transition period. The increased quantity and quality of FDI resulted in more apparent employment opportunities. The second group of countries comprises Serbia, Croatia, and Bosnia and Herzegovina. According to the regression analysis, there is a weak or non-significant relationship between FDI inflow and the unemployment rate in these countries. Over extended periods, it has been observed that FDI and unemployment move in the same direction, suggesting that an increase in FDI inflow is associated with a rise in the unemployment rate, and vice versa. In our analysis, Slovenia emerges as a distinct case with an impressively low and stable unemployment rate over the entire period under review. The regression trend analysis demonstrates a somewhat ambiguous impact of FDI on the unemployment rate, largely influenced by the nature of the FDI inflow. Predominantly, FDI inflows manifest as mergers and acquisitions, while greenfield investments, which are theoretically more conducive to job creation, are comparatively limited. Avsenik (2021) studying the effect of FDI in Slovenia found out that half of the surveyed companies reported an increase in employment due to FDI. However, the other half indicated no change or a decrease in employment as a result of FDI.

It is important to note that these conclusions are based solely on the p-values and regression lines obtained from the analysis. Further analysis and considerations, such as the strength of the relationship, effect sizes, and other contextual factors, are necessary for a comprehensive understanding of the FDI and unemployment dynamics in each country.

The relationship between FDI inflows and unemployment is complex and multifaceted. While FDI has the potential to reduce unemployment through job creation, skill enhancement, and economic growth, its impact can vary significantly depending on the host country's economic structure, sectoral distribution of FDI, and the nature of the labor market. Policymakers need to consider these factors to harness the full potential of FDI in reducing unemployment.

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Original Scientific Article

Digital Skills in the Context of the Economic Growth of Countries

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Abstract: *The digital environment has become an essential part of everyday life, work, and education. Digital skills are crucial for personal and professional success in today's technological age. OECD and EU statistics indicate that approximately 90% of job positions require digital skills at various levels. The more skilled and adept employees are in businesses, the more the company progresses, which subsequently influences the country's economic growth and development. Different indices have been created to compare the digital performance of countries. One of the most used is The Networked Readiness Index (NRI) and The Digital Economy and Society Index (DESI). The aim of the article is to describe the levels of digital skills of citizens and compare the level of digital skills in Slovakia and EU countries in the year 2022. The data will be obtained from the databases of the mentioned NRI and DESI indices.*

Keywords: *Digital skills, Digital competencies, Economic growth.*

JEL Classification F43

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1. INTRODUCTION

In an increasingly complex and technology-driven world, the essence of humanocentricity lies in placing human needs, values, and potential at the center of technological and organizational development. This approach emphasizes the importance of designing systems and processes that enhance human well-being, foster creativity, and support meaningful interactions. It is essential to develop competencies across three pivotal areas: digital, social, and cognitive. Digital competence encompasses the skills and knowledge necessary to effectively navigate and leverage technology. Social competence involves the ability to communicate, collaborate, and build relationships within diverse and often virtual environments. Cognitive competence refers to the mental skills and strategies that enable individuals to think critically, solve problems, and make informed decisions. By focusing on these three areas, we can develop a well-rounded skill set that not only enhances individual capabilities but also contributes to a more resilient, innovative, and human-centered society.

Information technology (IT) has had a significant impact on economic growth over the past few decades. The diffusion of information and communication technologies (ICT) in different areas has accelerated the growth of the global economy (Rozite et al., 2019). One of the main ways in which IT has impacted economic growth is by increasing productivity. IT has allowed businesses to automate many tasks, reducing the time and cost required to perform them. This has led to increased efficiency and productivity, which in turn has boosted economic growth. The development of the global knowledge society and the rapid integration of ICT make it imperative to acquire digital skills necessary for employment and participation in society (Laar et al., 2017). The current labor market makes digital competencies obligatory for every person who wants to work professionally (Rogacka, 2022). The development level of digital skills depends on the digital transformation of the economy, which creates not only socio-economic conditions but also gives an impetus to mastering digital skills, essential both for career growth and for the performance of basic actions according to new digital requirements (Bondarenko, 2023). First, it is necessary to define what is meant by the term digital skills. According to Livingstone et al. (2023) digital skills are defined as the ability to use ICTs in ways that help individuals to achieve beneficial, high-quality outcomes in everyday life for themselves and others' and that 'reduce potential harm associated with more negative aspects of digital engagement. UNESCO (2018) defined digital skills as a range of abilities to use digital devices, communication applications, and networks to access and manage information. Today, with the development of the digital field, the world and Europe are offered a wide range of opportunities for business growth (Kiseľáková et al., 2022). Generally, the relationship between digital skills and economic growth is complex and multifaceted. Digital skills refer to the ability to effectively use digital technologies and tools to access, understand, create, and communicate information. Economic growth, on the other hand, typically refers to an increase in a country's production of goods and services.

2. LITERATURE REVIEW

In the rapidly evolving landscape of the 21st century, the acquisition and application of digital skills have emerged as essential factors influencing various facets of individuals' lives, industries, and societies. According to World Economic Forum (2022) every single job of the future will have a digital element. At the most basic level, digital skills refer to the essential skills needed to use computers and digital devices to access and manage information. However, digital skills go beyond basic knowledge and cover more complex sets of skills (DevSkiller, 2022). Usually to the basic digital skills belong computer literacy, data entry, social media, email, and chat or word processing. Increasing of digital skills is part of the European Union's action plan to year 2030. According to this

action plan, the EU will launch actions to increase the number of qualified and competent Information and communication technology (ICT) professionals and train more digital experts to reach 20 million ICT professionals in Europe (Misheva, 2021). According to Balacescu et al. (2019) digital skills have been identified as one of the pillars of economic development, both at the social and community level, as well as at the individual level. The influence of information and communication technologies, especially digital skills, is also confirmed by several other studies and publications. The results of Niebel (2017) confirm the positive contribution of ICT to economic growth. The results is study of Ishnazarov et al. (2021) shows that ICT is important predictor of economic growth. The study of Jayaprakash and Pillai (2022) indicates a positive significance of ICT on economic growth, but the intensity of the usage of ICT highly depends on the nature of the society.

Economic and digital indexes provide possibilities for comparing individual countries from different points of view. One of the most important indexes for European Union countries is the Digital Economy and Society Index (DESI). The Networked Readiness Index (NRI) serves best for the global comparison of countries. The aim of the paper is to describe the levels of digital skills of citizens and compare the level of digital skills in Slovakia and EU countries in a year 2022 – year with the actual data. The data will be obtained from the databases of the mentioned NRI and DESI indices.

3. DATA AND METHODOLOGY

The Digital Economy and Society Index (DESI) summarises indicators of Europe's digital performance and tracks the progress of EU countries. The European Commission has been monitoring Member States' digital progress through the Digital Economy and Society Index reports since 2014. Each year, DESI includes country profiles which support Member States in identifying areas requiring priority action as well as thematic chapters offering a European-level analysis across key digital areas (European Commission, 2023). DESI has four main dimensions:

Dimension 1: Human capital
Dimension 2: Connectivity
Dimension 3: Integration of digital technology
Dimension 4: Digital public services

For the purposes of this article, data from the first dimension (Human capital) was used. This dimension has the latest structure from year 2022 shown in Table 1.

Table 1. Structure of the dimension Human capital

Internet user skills	Advanced skills and development
• At least basic digital skills • Above basic digital skills • At least basic digital content creation skills	• ICT specialists • Female ICT specialists • Enterprises providing ICT training • ICT graduates

Source: Digital Economy and Society Index (DESI) 2022 – Methodological Note, Own processing

The Network Readiness Index (NRI) report maps the network readiness landscape of 131 economies based on their performance in four areas (Portulans Institute, 2023):

Area 1: Technology
Area 2: People
Area 3: Governance
Area 4: Impact

For the analysis data from the second area were used – People. This area has three sub-dimensions and 15 indicators. In this article one indicator - ICT skills in the education system that is similar to DESI indicators was used.

The dataset for DESI was obtained from European Commission pages and includes the year 2022. The dataset for NRI was obtained from the Portulans Institute page and includes the year 2022. Basic descriptive statistics and forms of logarithmic data transformation were used for data evaluation.

4. RESULTS

The subject of this paper are digital skills of EU citizens. It is important to find out how EU countries are grouped according to selected DESI indicators. For this we use clusters. The clusters are groups of countries with similar values of the indicators. In the research, Ward's method of minimum gloss dispersion was used in accordance with DESI 2022 data. Analyzes were performed in Statgraphics Centurion 18. Based on the following 6 DESI indicators, we grouped the countries of the European Union into 6 different groups:

Indicator 1: At least Basic Digital Skills
Indicator 2: Above basic digital skills
Indicator 3: ICT Specialists
Indicator 4: Female ICT specialists
Indicator 5: Enterprises providing ICT training
Indicator 6: ICT graduates

The outputs of the cluster analysis are presented by the cluster dendrogram, the values of the centroids of the DESI indicators, and the list of countries included in the clusters. Countries are grouped in the following clusters:

Cluster 1: Finland, Netherlands, Sweden
Cluster 2: Denmark, Estonia, Ireland, Luxembourg, Malta
Cluster 3: Austria, Greece, Spain, France, Croatia, Lithuania, Latvia
Cluster 4: Belgium, Cyprus, Germany, Portugal, Slovenia
Cluster 5: Czech, Hungary, Italy, Poland, *Slovakia*
Cluster 6: Bulgaria, Romania

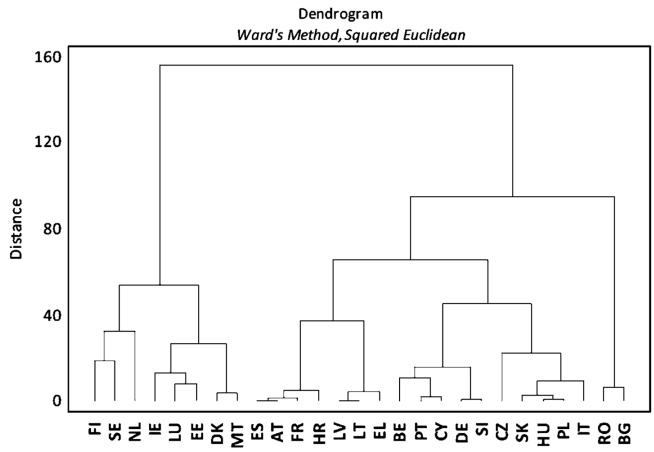

Figure 1. Cluster dendrogram EU countries based on selected DESI indicators
Source: European Commission, 2023, Own calculations

Countries with similar levels of skills are in clusters 2, 3, 4, and 5. Slovakia belongs to cluster 5 along with the countries Czechia, Hungary, Italy, and Poland. Countries with the best digital skills are in Cluster 1 (Finland, the Netherlands, Sweden). These countries hold top positions in the DESI rank. Romania and Bulgaria belong to countries with the worst digital skills. The dendrogram below shows the hierarchical clustering of six observations – Figure 1.

Basic statistical measures were used for calculating the cluster centroids and DESI indicators. Complete results are shown in Table 2.

Table 2. Values of the cluster's centroids and DESI indicator's basic statistical measures

Cluster's Centroids			**At least Basic Digital Skills**	**Above basic digital skills**	**ICT Specialists**	**Female ICT specialists**	**Enterprises providing ICT training**	**ICT graduates**
Cluster	**Members**	**Clusters proportion**	% individuals	% individuals	% individuals in employment	% ICT specialists	% enterprises	% graduates
1	**Finland, Netherlands, Sweden**	11%	75	45	7	21	31	5
2	**Denmark, Estonia, Ireland, Luxembourg, Malta**	19%	64	34	6	22	25	7
3	**Austria, Greece, Spain, France, Croatia, Lithuania, Latvia**	26%	58	29	4	21	17	4
4	**Belgium, Cyprus, Germany, Portugal, Slovenia**	19%	52	23	5	19	26	3
5	**Czech, Hungary, Italy, Poland, Slovakia**	19%	50	22	4	14	18	4
6	**Bulgaria, Romania**	7%	30	8	3	27	6	6
DESI indicators basic statistical measures		**max**	79	52	8	28	38	9
		min	28	8	3	10	6	1
		range	51	44	5	18	32	7
		average	56,3	27,8	4,8	20,1	21,1	4,6
		standard deviation	12,1	10,3	1,4	4,0	7,7	1,8
		standard error	0,4	0,4	0,1	0,1	0,3	0,1

Source: European Commission, 2023, Own calculations

Countries in Cluster 1 have the highest values in indicators like At least Basic Digital Skills, Above basic digital skills, ICT Specialists, and Enterprises providing ICT training. However, the

countries in Cluster 2 are better in the indicator of Female ICT specialists and ICT graduates. These countries also belong to the countries with the high DESI rank. The cluster's centroids valued by the DESI indicators are shown in Figure 2.

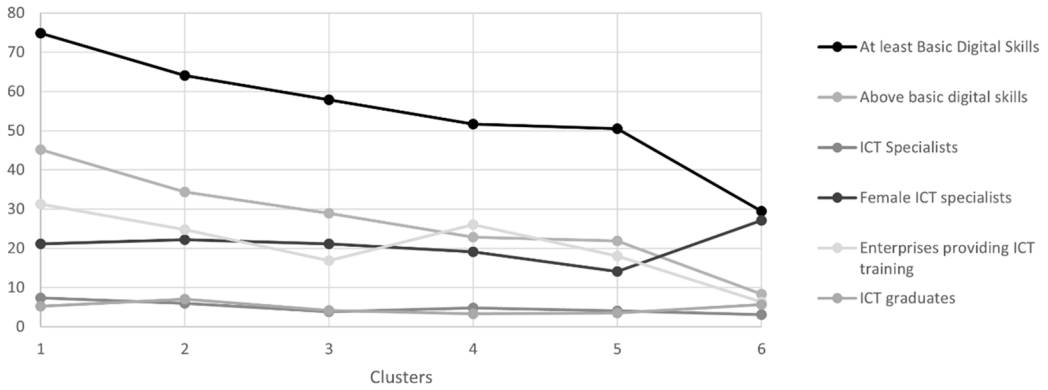

Figure 2. Cluster's centroids value by the DESI indicators
Source: European Commission, 2023, Own calculations

Countries in first five clusters have really high values in the indicator At least Basic Digital Skills. According to these values, more than 50% of individuals have some digital skills. In order to calculate the NRI, it was necessary to extract countries from the European Union, as the NRI measures and compare countries from around the world. Similar indicator to the DESI indicator At least Basic Digital Skills is the indicator ICT skills in the education system. This indicator measures the extent to which the active population possesses sufficient digital skills. According to this indicator, the countries with the highest scores are the countries in the first cluster – Finland and Sweden. If we rank the countries based on these indicators, Slovakia is in the 15th position for the 'At least Basic Digital Skills' indicator and in the 19th position for the 'ICT Skills in the Education System' indicator.

5. FUTURE RESEARCH DIRECTIONS

According to the official European Commission website data.europa.eu (2022) more than three-quarters of companies in the EU report difficulties to find workers with the appropriate skill set. In future research, emphasis will be placed on a deeper study of other indicators that can help improve information about digital skills in the broader context of societal needs. It will be studied whether socio-economic indicators such as gross domestic product, income, or population size have an impact on digital skills or digital education. Workers with advanced digital skills can earn more than those without digital skills, which can contribute to the profitability of companies and lead to an increase in the GDP of countries.

6. CONCLUSION

In the present era, technology plays a central role in both society and business, and data stands as a crucial asset for fostering economic and societal advancement. To actively contribute to this progress and harness its advantages, it is imperative to equip individuals with the necessary digital skills and an understanding of data. According to the results of the DESI, countries with a high percentage of citizens possessing at least basic digital skills or above are ranked as leaders within the EU. These countries include Finland, the Netherlands, and Sweden, where 75% of individuals have at least basic

digital skills, and 45% have above-basic digital skills. Additionally, these nations boast a significant number of ICT specialists (7%) and enterprises offering ICT training (31%). On the other end of the spectrum, the worst-performing countries according to these indicators are Bulgaria and Romania. Slovakia falls within the group of countries positioned in the lower half of the ranking. Similar findings can be observed in the NRI index, which underscores the need to increase the number of ICT specialists. As per the DESI results, all European countries are grappling with this challenge.

The European Commission is actively engaged in initiatives aimed at bolstering the advancement of digital skills. Among these initiatives is the Digital Europe Programme (DIGITAL), a newly established EU funding programme with a primary focus on facilitating the integration of digital technology into businesses, enhancing digital literacy among citizens, and streamlining digital processes within public administrations. Additionally, there is the Digital Skills and Jobs Platform, which has been launched to provide accessible information and resources pertaining to digital skills. In ongoing research, it will be imperative to investigate the influence of digital skills on socioeconomic indicators, including GDP. It is crucial to share the findings of this research with fellow researchers and, more importantly, with the general public.

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Original Scientific Article

Influence of Professional Competence in Financial Control on the Digitalization of Control Procedures

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Abstract: *The publication examines the relationship between the basic requirements for professional competence in financial control and the digitization of control procedures. Aspects of the digitalization of business processes and their correlation with the need to form specific qualities and skills in financial control are analyzed. In connection with proving the hypothesis that the quality of control procedures requires the assessment of the risk of digitalization, a correlation analysis is made. The aim is to confirm that, despite the penetration of technology in the control process, control bodies do not sufficiently apply new technologies to minimize risk. Financial control bodies should streamline processes, increase efficiency, and improve financial information and analysis accuracy.*

Keywords: *Professional competence, Digitalization, Financial control, Control procedures.*

JEL Classification G32 · F38

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1. INTRODUCTION

The dynamism of business processes has accelerated the introduction of new technology solutions by digitizing them. The acquisition of digital skills has now become a prerequisite for individual, industry, and regional success (Muro et al., 2017). The COVID-19 pandemic proved to be evidence and contributed to establishing such claims. People stayed in their homes and were given assignments. Reporting on their performance was done through online platforms, and workshops were conducted virtually in an online space. It, in turn, demonstrated the digital inequality between users of business processes. On the other hand, to the full extent, it also applies to those working in control institutions and carrying out control procedures.

In this context, the European Commission has recommended building a system of competencies that includes eight critical competencies for lifelong learning (European Commission, 2008). The system aims to equip EU citizens with digital competencies. Digital competence leads to new knowledge and skills in people. Therefore, they are committed to training themselves to acquire the necessary competencies to develop in an increasingly fast-growing digital society (Cervera et al., 2016).

Digital competence is a set of skills, abilities, and knowledge that are different for each professional field of implementation. Due to the wide variety of models, concepts, dimensions, and levels of competence, it is necessary to review the existing literature. The authors of the paper want to identify and isolate the factors of professional competence that can influence financial control processes.

The paper will focus on the rapid pace of digital transformation that affects the professional competence of control bodies that influence business processes. Some of the main characteristics of control are the existence of social relations (object-subject), the critical attitude of the subject towards the object, and the power imputed to the subject to employ a control influence on the object. It is only possible if the subject of control has the necessary skills and abilities to exercise the power provided by law. On the other hand, if there is trust in the object-subject relationship, it creates authority. Otherwise, coercion and sanctions become the primary control mechanism.

The main research areas of the author's team are financial control and auditing. We focus on these areas because our main objective is to analyze the interrelationships between control procedures and the rapid development of digitalization of business processes. The authors decided to use correlation analysis using Spearman's rank correlation coefficient. In order to achieve this goal, the authors set out to answer the following **two hypotheses:**

> ***Hypothesis 1.*** *Dynamic digital transformation creates prerequisites for using various digital tools in the control activity.*
>
> ***Hypothesis 2.*** *Control authorities need to sufficiently implement the potential of digital tools, leading to effective financial controls.*

The article is organized as follows: Section 2 reviews the academic literature on digitalizing business processes and control procedures. Section 3 describes the methodology used in the research paper to find the relationships between the different indicators. Section 4 contains the results of the correlation analysis performed regarding the relationship between control procedures and business process digitalization rates. Finally, the conclusions are summarized in Section 5.

2. LITERATURE REVIEW

The term „digitization" is widely used by economists. The precise meaning is a topic of much discussion, particularly when measuring digitization's impact on economies (Manyika et al., 2015). Digitization, also known as digital transformation, transforms data into digital form. Likewise, society's increasing dependence on such digital data, documents, structures, and processes can also be considered digitization. Mergel et al. (2019) attempt to distinguish three terms used interchangeably - digitization, digitalization, and digital transformation. The authors put as the essence for the term digitalization „*highlighting the transition from analog to digital service and adding a technological delivery channel*," for the term digitalization „*focusing on potential process changes beyond the simple digitalization of existing processes and phenomena*" and for the term digital transformation „*highlighting cultural, organizational and relational changes in order to distinguish better different forms of outcomes achieved*" (p. 12).

The authors conceive of digital transformation as the concept that, in its most general sense and totality, contains the meaning of the form of data, its management, and knowledge about it. The terms digitization, digitalization, and digital transformation cannot be used synonymously. Each has specific characteristics, which give an idea, on the one hand, about the transition process from analogue to digital content and, on the other, about the change of digital tools cause in corporate strategies and economic alternatives (Tanushev, 2022).

Digital transformation is one of the priorities of the European Union, in addition to promoting the development of digital competencies in all groups of citizens (European Commission, 2022). According to the European Parliament policies, digital transformation offers new opportunities for businesses, helps to achieve neutrality, and promotes the development of people's digital literacy, i.e., increasing their competence (European Parliament, 2023). According to the European Digital Decade 2030 Policy Agenda, a digital business transformation has the potential to support more than 90% of small and medium-sized enterprises and facilitate their transition to a digitalization of processes (European Commission, 2022). It, in turn, also ensures sustainability in a competitive market.

In their scientific analysis, Gong and Ribiere (2021) conclude that digital transformation is inherently the implementation of advanced digital technologies to develop and maintain organizational identity. In the sense, we cannot disagree that the tools and technologies available to businesses provoke activities to transform into digital operations. According to Süße et al. (2018), digital competence is the ability to implement digital technologies using digital tools to assess problems and propose solutions critically.

2.1. Digitalization of Business Processes

The use of information and communication technologies is an essential requirement for economic development. Dissemination of digital information is a significant process among industries. One of the main reasons is that consumers have turned to using internet resources and social networking. Thus, businesses have been forced to shift to remote service and operation. Of course, technological innovations have led to changes in technological and managerial processes. Such digital transformation of business activities is achieved through Business 4.0 and Industry 4.0 (Sergi et al., 2022). Consequently, innovations such as artificial intelligence, cloud computing, the Internet of Things, etc., are used to create and deploy business operations (Marcon et al., 2022).

In their study, a collective of authors (Norveel et al., 2022) found that digital competencies of bank employees have a low level of competence. They conclude that it is up to organizations to take care of the digital competencies of their staff. It is a barrier hindering the transition from an analog to a digital environment, as evidenced by the enterprises themselves (Steinlechner et al., 2021). Identifying digital barriers is one of the main challenges of business process management. In their study, a collective of authors (Uzule & Verina, 2023) identified two types of barriers - individual and organizational. On this basis, a properly designed HR structure provides a clear picture of the business unit's barriers. It ensures that the recruitment process selects those capable of performing certain digital operations and will continuously develop their digital competencies. Therefore, to grow at a competitive pace relative to other business organizations, the senior management team is responsible for supporting the development of staff digital competencies (Wang et al., 2024).

The digitalization of business also increases the risks of applying techniques through which companies and individuals can commit financial fraud (Kitsios et al., 2022). In addition, financial transactions that are sufficiently sophisticated and digitized are increasingly common. In 2021, cybercriminals committed $8.6 billion of financial fraud, a 30% increase from 2020 (Grauer et al., 2022). Companies are thus shifting their profits to offshore accounts registered in tax havens, providing further opportunities to hide the proper taxable size of the income (Kutera, 2022). Given this, the increase in the volume of complex financial transactions and their digitization requires a change in the procedures carried out to increase the efficiency of financial control.

2.2. Digital Competence of Financial Control Authorities

Accelerated business processes and their digitalization have also provoked changes in the actions of institutions applying financial control. In order to meet the needs of business units, state institutions have implemented several projects (Bulgarian Custom Agency, 2022; Bulgarian Ministry of Finance, 2018) to transform the collected analog data into digital format.

Rapid advances in information technologies such as the Internet of Things, machine learning, artificial intelligence (Aleksandrova et al., 2023), and big data lead to a high risk of financial fraud (Ruan et al., 2019). Recent years have seen cases of companies working together to avoid liability from financial misconduct through connected transactions (West & Bhattacharya, 2016). This further increases the risk of vulnerability to financial fraud and a low success rate of detection or containment by control institutions.

A collective of authors (Zhu et al., 2021) provides an overview of intelligent financial fraud detection practices by classifying data into three groups - structured, semi-structured, and unstructured. Based on the data type, they group the more well-known financial frauds (credit, insurance, loan fraud, money laundering, financial statement fraud, e-commerce transaction fraud, and others). They conclude that analyzing the multitude of data from different sources and using machine learning-based methods are the answers against financial fraud. However, financial fraud schemes are rapidly evolving, and attention needs to be paid to the models and the skills and competencies that control authorities need to develop to work successfully with new solutions involving machine learning and artificial intelligence.

As a result of professional competence, financial control bodies are making an effective link between technology and the requirements for proficiency in financial software, managing enterprise resource planning (ERP) systems, and using data analysis tools. The streamlines processes, increases efficiency, and improves the accuracy of financial information and its analysis.

The digitalization process requires a transformation that targets business activities, processes, competencies, and models to fully exploit the changes and opportunities of digital technologies and their impact on society as a whole in a strategic and prioritized way (Anciollo & Gavrila, 2023; Bansal et al., 2023). At the same time, significant new risks arise related to expanding the scope of financial control. In order to minimize them, adequate control procedures need to be implemented, including verification of information provided by software and applications; text data from social networks; videos; captured images, sensor data (e.g., GPS location, data, RFID data) combining financial and non-financial information (Amiram et al., 2018).

3. METHODOLOGY

The survey was conducted among more than 453 experts working in the national financial control bodies: The National Revenue Agency, the Customs Agency, the State Audit Office, and the State Financial Inspection Agency. The first two are the primary revenue administrations, collecting 80% of all revenues in the state budget. The Audit Chamber and the State Financial Inspection Agency inspect 90% of the organizations that manage budget funds. The survey was conducted in May of 2023. The data are collected through a Google Forms questionnaire and processed with the statistical tool SPSS. The obtained results are based on a guaranteed probability equal to 95% and a guaranteed factor of Z = 2, which requires a minimum of 437 respondents for the sample's representativeness.

The use of Spearman's rank correlation coefficient in the study is justified for several reasons. In the study, we examine two sets of nominal variables: digital tools and elements of the information management process. The rank coefficient measures the relationship between nominal independent variables, assessing the monotonic relationship between variables. Because we are not looking for a linear relationship between the final scores and the correlated factors, the Spearman coefficient gives an idea of the strength and direction of the relationship between the different nominal categories.

The correlation analysis examines the degree of correlation between the methodological tools applied by the control bodies and the possibilities for digitizing control procedures. It is perceived that when the coefficient is equal to +1.00, there is a positive linear correlation (or a right proportional relationship), and conversely when it is similar to -1.00, there is an absolute negative correlation (inverse relationship). The closer to 0 it is, the weaker the relationship. However, the converse is not true - it does not follow from the correlation coefficient being equal to 0 that there is no relationship between the two variables.

It is necessary to point out that the data from the study are rank-ordered, and therefore, using Spearman's correlation coefficient (rs) is appropriate. The latter is called the coefficient of rank correlation or Spearman's rank. Spearman's rho „measures the strength of the increase or decrease in the relationship between two variables by not using the original data, but by ranking and analyzing them. The coefficient measures the connection using the following formula:

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)}, \text{ where}$$

$\sum d_i^2$ – the sum of the square of the differences between the ranks of the assessments
n – number of the sum of observed cases

The choice of the coefficient is based on the following circumstances:
– rank scales were used in the survey, and therefore, the data can be defined as such;
– because a significant number of persons were not surveyed, the use of other types of scales would not be helpful as there would not be a normal distribution;
– the Spearman coefficient is appropriate precisely because it uses the ranks of the observations rather than their values and thus gives an idea of the strength of the relationship because it minimizes the influence of outliers.

4. RESULTS

Based on the analysis of dependencies between individual procedures and approaches, there needs to be more connection between personal control activities regardless of the ratio between personal control activities. It is due to an overextended range of procedures and approaches, which leads to inefficiencies. Therefore, it is necessary to update and improve the toolkit, with control bodies directing their efforts to increase their professional competence in the following directions:
- the implementation and use of more automated and digitized applications, techniques, or (IT) controls is crucial. These changes will achieve faster and more reliable detection of deviations and inconsistencies in the control system, enhancing the overall efficiency and effectiveness of our operations.
- performing an assessment of new types of risks caused by cyberspace, the cyber environment and the implementation of a significant part of the processes in an online (digital) environment;
- to reduce the possibility of missing significant deviations and ignore the fact that, taken together, individual variations can be more significant and convincing, it is necessary to examine them in their entirety (totality), not only individually.

The following conclusions can be drawn from the established interdependencies and their analysis:

First, the research found that many digital tools are applied in the field of financial control, which confirmed our first hypothesis.

Second, the established risk assessment procedures and approaches do not necessarily mean that they are not subject to updating and renewal. In order to carry out effective counter-control procedures, adequate tools must be applied at all levels of control. Since then, it has been found that a strong positive correlation depends on the availability of a digital tool and its application in only a few cases - between the assessment review of and risk software (0.565), between inquiries and applications (0.759), verification and recalculations (0.510) and most -very -strong between survey and CRM (0.701), all shown in Table 1. The strong negative correlation indicates that the digital tools for minimizing the risk in executing the control procedures must be applied sufficiently. In this case, appropriate and adequate controls must be implemented to reduce them to an acceptably low level.

In order to increase the professional competence of control authorities, it is necessary to focus your efforts on implementing and using more automated and digitized applications, techniques and IT controls. Introducing these technologies will allow faster and more reliable detection of deviations and inconsistencies in the control system. Automation will leverage the time to perform checks and increase data accuracy, thereby improving operations' overall efficiency and effectiveness. Control authorities need to keep up with the latest technologies and integrate them into their procedures in order to meet the control and supervision requirements.

Table 1. Interdependence (by Spearman) between applied risk assessment procedures (horizontally) and the applied approaches for assessing the risk of material deviations (vertically)

	Software		Application		ERP systems		CRM		Rerun		Recalculation		Analytical Procedures	
	r_s	t-stat	r_s	t-stat	r_s	t-stat	r_s	t-stat	r_s	t-stat	r_s	t-stat	r_s	t-stat
Inquiries	-0,409	0,092	**0,759***	0,000	0,07	0,758	0,131	0,603	-0,111	0,661	0,193	0,444	-0,227	0,365
Observations	-0,210	0,404	0,046	0,858	0,048	0,851	**0,701****	0,001	0,021	0,933	-0,142	0,575	-0,452	0,060
Documents check	-0,272	0,275	0,377	0,123	-0,319	0,197	0,325	0,188	-0,171	0,498	0,212	0,399	0,007	0,977
Review the organization's risk assessment and documentation process	**0,565***	**0,015**	**-0,842****	**0,000**	-0,034	0,892	-0,018	0,944	0,029	0,909	**-0,491***	**0,039**	0,091	0,720
Verification of transactions and their processing	-0,068	0,790	0,334	0,175	0,247	0,323	-0,460	0,055	-0,059	0,818	0,142	0,574	0,101	0,690
Process check	0,008	0,976	0,163	0,519	0,134	0,597	**-0,688****	**0,002**	0,240	0,336	**0,510***	**0,031**	0,068	0,789
Inspection	0,358	0,145	**-0,535***	**0,022**	-0,231	0,357	0,067	0,792	-0,141	0,576	-0,172	0,494	0,256	0,304

Source: Own calculations

Control authorities should focus on assessing the new risks posed by cyberspace and the digital environment. As online activities increase, the risk of cyber-attacks and abuses increases significantly. It necessitates the development and implementation of new approaches to the assessment and management of these risks. Control authorities must be prepared to identify and respond to cyber threats while maintaining high security and data protection. For this purpose, it is crucial to organize specialized training and seminars to increase employees' knowledge and skills in the cybersecurity field.

Control bodies should adopt a comprehensive approach to assessing these deviations to reduce the possibility of missing material deviations. Instead of looking at each variation individually, they must analyze all deviations. This approach will allow a better understanding of the interdependencies between the various factors and provide a more complete picture of potential risks and problems. Using integrated software solutions and tools to collect and analyze data from various sources will help control authorities achieve more effective control and supervision. This approach will improve the quality of assessments and reduce the likelihood of errors and omissions.

A correlation and interdependence between risk and the lack of competent employees in the audited organization, as a procedure, was established. The dependence is strongly positive, indicative of proportional reliance, or the more significant the lack of competent employees is found, the more appropriate it is to use the risk-based assessment approach. It is also because in the absence of such employees, tests of details are performed, i.e., a limited number of them are used to update the risk assessment.

The knowledge and implementation of ERP and CRM systems significantly increase the quality of control bodies' work. ERP systems provide a comprehensive view of all financial transactions and processes, making it easier to detect discrepancies and fraud. CRM systems contribute to transparency through detailed data on interactions with audited public sector organizations, supporting better accountability. ERP and CRM systems facilitate risk management and regulatory compliance by offering integrated data and analytical tools. The financial control authorities can more effectively manage risk and ensure compliance. Integrated systems have powerful analytical tools that support financial transactions and making informed decisions, which is essential for the professional competence of supervisory authorities.

In conclusion, the analysis of the dependencies between the procedures and approaches highlights the need to update and improve the control tools to increase the professional competence of the control bodies. Applying automated and digitized technologies will speed up the detection of deviations and improve the effectiveness of controls. Assessing new risks in cyberspace requires specialized knowledge and continuous training in cyber security. A holistic approach to analytics will provide a better understanding of complex interdependencies and prevent gaps. Hypotheses related to the application of digital tools and the need to update risk assessment procedures were confirmed, underscoring the importance of digitization and adequate control at all levels.

4. FUTURE RESEARCH DIRECTIONS

The research will be a starting point for a thorough study of digitizing the primary information flows in the control activity. The focus will be on the application of business intelligence and large databases' processing and verification capabilities. The authors will focus their research on the possibilities of artificial intelligence, virtual reality, blockchain technologies, and their integration control activity. The aim is to argue for practical approaches to identifying errors and fraud to ensure the accuracy and fidelity of financial and non-financial information. Data quality assessment will ensure integrity, consistency, validity, completeness, and timeliness.

5. CONCLUSION

Financial fraud has profound economic implications for industry, government, the corporate sector, and ordinary consumers. Growing reliance on new technologies has compounded the problem in recent years. Traditional methods involving manual detection, matching, and analysis are not only time-consuming, too „expensive," and uncertain but impractical in the digital transformation of information.

Financial control professional competence encompasses skills and responsibilities critical to effective financial management by cultivating expertise in financial analysis, risk management, regulatory compliance, technology, communication, and strategic planning. Competent authorities should anticipate potential risks, develop risk mitigation strategies, and establish internal controls to protect against fraud, error, or non-compliance. In the end, they should identify, assess, and mitigate financial risks that could affect the stability or profitability of the organization. To achieve that, controllers must strive to adapt to changes in business processes and seek professional development opportunities.

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Original Scientific Article

Exploring Customer Participation and Customer-to-Customer Interactions in Service Experiences

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Abstract: *Customer Participation (CP) and Customer-to-Customer Interaction (CCI) are prevalent characteristics in contemporary service experiences in different sectors, such as healthcare, museums, and education. Several studies have explored the association between CP and its impact on customer satisfaction. The results reveal that the customers indeed assess the quality of service based on their interactions with the service system, e.g., their role and effort in the service process and their interactions with the other customers. Despite these important findings, the literature on CP, CCI, and customer satisfaction is still fragmented. The main objective of this study is to conduct a comprehensive bibliometric analysis based on the relevant literature. The study analyzes 124 articles published between 1994 and 2023, Our study concludes that academic interest in CP and CCI is continuously growing and identifies the emerging research directions for future work.*

Keywords: *Customer participation, Customer-to-Customer interaction, Service quality, Customer satisfaction.*

JEL Classification D11 · P36

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1. INTRODUCTION

Customer participation (CP) and customer-to-customer interactions (CCI) have experienced impressive growth in many service businesses, building on beliefs about its potential impacts for value creation and consequently for improving service effectiveness and competitiveness. Likewise, in service management research, the topics of CP and CCI have been attracting increased attention. Looking retrospectively, many service companies have significantly increased and diversified the participatory role of customers as a co-value creator. Nowadays examples of customers assuming pivotal roles in service activities, and potentially enhancing the whole service experience, abound across very diverse sectors, including virtual services, social media, hospitality, higher education, healthcare, etc. (Paruthi et al., 2023; Rowley, 1996; Zgolli & Zaiem, 2017). Early on, Kelley and Hoffman (1997) advanced the perspective of customers as a productive resource, opening the discussion about the implications of customer productive roles for service outcomes, quality, and ultimately satisfaction. Likewise, the importance of interactions and exchanges with other customers has progressively been put forward as a promising arena for service improvements.

Frequently cited examples of domains for the management of CCI include, for example, service settings where customers share time and space. Research results have supported that, when customers stand in long queues, waiting to be served, their perceived experience can be positively or negatively influenced by the presence and actions of other customers. The perception of the waiting time can be reduced by making the wait more enjoyable, profiting from the presence of other customers, establishing contact, promoting the initiation of relationships, and social conversations, or even experiencing pleasant smiles from them. In contrast, a grumpy impatient customer, or the observation of annoying behavior from other customers can negatively affect a customer's perceived experience, increasing the waiting time inconvenience (Dabholkar, 1990; Dong, 2015; Gallan et al., 2013; Nicholls, 2020).

Despite the growth in the examples and interest in these topics, the observation of the literature in the field suggests that the existing research contributions remain largely fragmented and far from exhaustively addressing the full implications of CP and CCI for managerial actions and decision-making. This paper contributes to the advancement of knowledge about the implications and management of CP and CCI, building a bibliographic literature review, and analyzing 124 articles selected from the Scopus database, published until June 2023. Specifically, the study addressed the following three research questions (RQs):

RQ1) Does CP and CCI play a role in the quality of service and satisfaction?
RQ2) In what type of service sectors CP and CCI are identified as key role players?
RQ3) What are the emerging fields that evolve the literature trend?

The study offers a timely and relevant contribution as it attempts to bring together literature on CP and CCI as an integrated research and debate – prevalent research perspectives have addressed these topics independently. Using VOSviewer software to provide a bibliometric approach in this field, we analyze keyword networks and identify trends in these fields.

The rest of this paper is organized as follows: we first describe our methodology. Then, we present and discuss our results. Finally, we conclude by summarizing the main findings and providing some suggestions for future work.

2. METHODOLOGY

2.1. Data Selection and Filtering

This study presents a bibliographic review of CP, CCI, service quality, and customer satisfaction to identify the link between them. The purpose of the work is to contribute to understand better the connection related studies in this domain and support managerial decisions about the integration of CP and CCI in service value creation.

Relevant publications were identified from Scopus (http://www.scopus.com), one of the widely reliable and popular academic databases. We aimed to obtain as many relevant publications as possible, including a vast pool of research meeting the purpose of our addressed problem, using a set of criteria that are described for the sake of rigor and reproducibility of the work. To this end, we conducted a two-phase search in this database (Khan et al., 2003; Tranfield et al., 2003).

- In the first phase, the following search query was used: customer participation OR customer-to-customer interaction AND service quality OR customer satisfaction, either in the article title or in the abstract or keywords. The initial article extraction resulted in a total of 257 publications. The time frame covered in this study extends from the beginning of database records to the end of June 2023.
- From these publications, the second phase of the search was performed as follows. The document type was limited to journal articles, the language to English, and the subject area to "Business and Social Science". Applying these criteria, the final article extraction resulted in a total of 124 articles.

In the end, the analysis involved monitoring 124 articles published on the Scopus database from 1994 to June 2023. Table 1 summarises the actions taken in each of these search phases for identifying the relevant publications.

Table 1. Search criteria for identifying relevant publications

Search stages	Output (articles)
Phase I)	
Electronic database: *http://www.scopus.com/;* Search Formula: *"Customer participation OR customer-to-customer interaction AND service quality OR customer satisfaction", by "article title, abstract, and keywords"* Year: *1994-2023 (June)*	**257**
Phase II)	
Document Types: *Articles* Language: *English* Subject Areas: *Business and Social Science*	**124**

Source: Authors

2.2. Descriptive Statistics

For these 124 articles, Figure 1 illustrates the number of papers published each year in the period from 1994 to 2023 (30 years of exploration). At first glance, we notice that the number of published works has rapidly expanded in recent years, indicating significant growth in the interest of researchers, especially during the last decade (Figure 2), in studying the implications of CP and CCI on service quality and customer satisfaction.

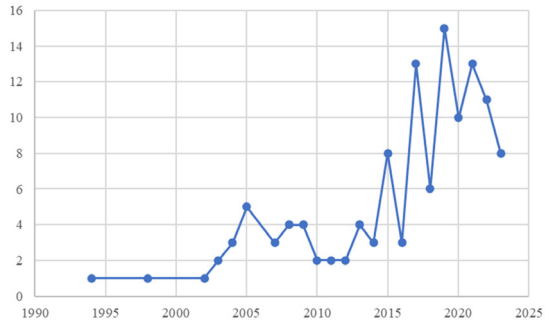


Figure 1. Distribution of the articles by the published year, until June 2023
Source: Authors

Figure 2 offers an illustration of the number of papers published in each of the past three decades. In particular, research on this area emerged in the 90s and it has become a hot topic since 2015. Furthermore, the interest has considerably increased (tripled) from the second to the third decade.

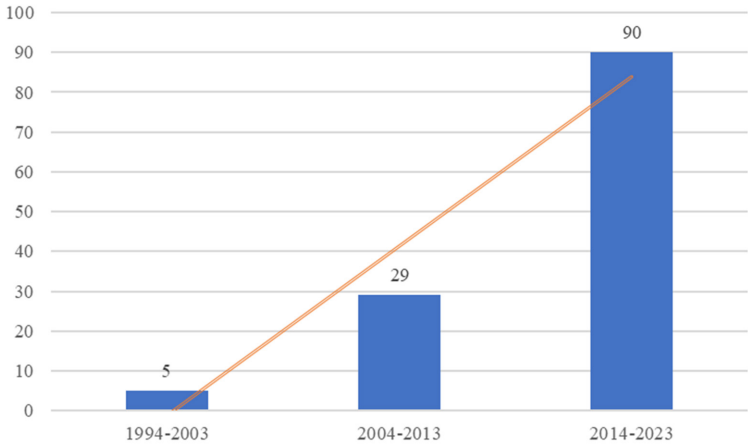


Figure 2. Number of publications during recent three decades
Source: Authors

After downloading the articles in CSV format from the database, we proceeded to use VOSviewer software (version 1.6.19) to analyze the collected articles. VOSviewer is a powerful tool, developed by Van Eck and Waltman (2010, 2014), for visualizing and analyzing bibliometric networks for mapping and clustering articles based on their citation, co-citation, bibliographic coupling, keyword co-occurrence, and co-authorship networks.

3. ANALYSIS AND RESULTS

Answer to RQ1 (Does CP and CCI play a role in quality of service and satisfaction?)

The study involved a bibliographic literature review to address the presence of CP and CCI in service management research. Our purpose in this RQ was to understand the implications of CP and CCI for the quality of service and customer satisfaction. From the first analysis of the articles' keywords network visualization illustrated in Figure 3, we observe that there are three predominant keywords namely, *customer participation*, *customer satisfaction*, and *service quality* which

historically have a strong link between them (Bendapudi & Leone, 2003; Dabholkar, 1990; Kelley et al., 1990). We also see that the frequency of the keyword of *customer participation* is highly followed by *customer satisfaction*, *service quality*, and *customer-to-customer interactions*. We notice that these three dominant keywords have kept their importance over the years, and CCI has started to emerge more recently.

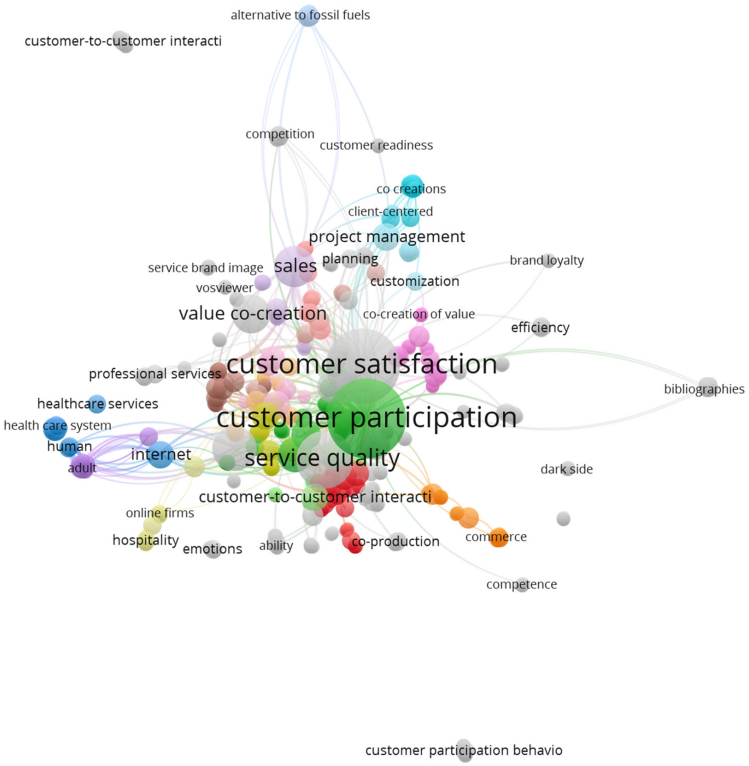
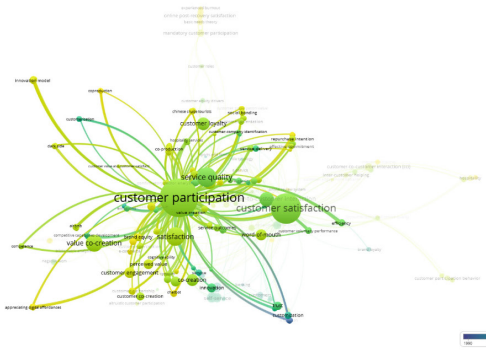
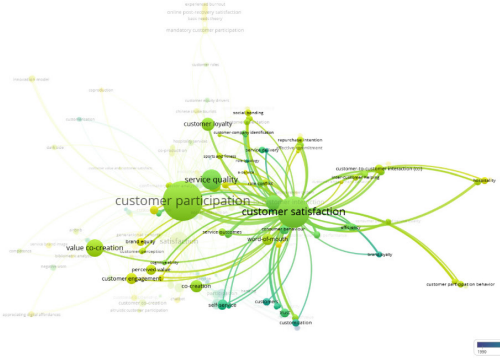


Figure 3. The Network Visualization
Source: Authors

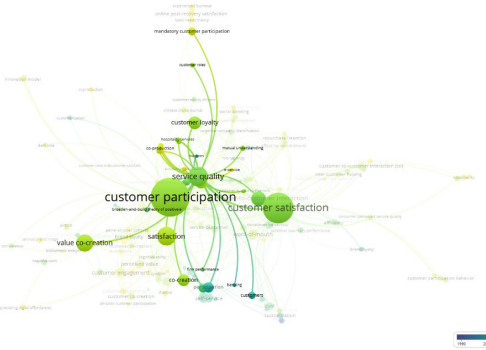
CP and CCI certainly affect service quality and customer satisfaction. Several authors, e.g., Hu et al. (2017), describe the existence of an association between a positive CCI and increased satisfaction levels. Other authors – e.g., Mohd-Any et al. (2015) – make a different point, highlighting the existence of customer (perceived) value dimensions that are intrinsically related to participatory behaviors (e.g., social value, perceived control, etc.). Overall, the authors refer to associations between the quality of the perceived CP and CCI and the increased satisfaction levels. Many of the contributions explore the implications of altering the volume or the content of the tasks and behaviors required from the customers (e.g., complexity, effort, etc.). In this regard, although there seems to be a shared view on the potential benefits of CP and CCI to customer satisfaction, the picture is not so clear when it comes to defining or specifying what should be the nature of the exact characteristics of the tasks that need to be performed by the customers, therefore suggesting some research road ahead. Figure 4 provides more information regarding our four keywords, and as we can see customer participation (a) has the highest occurrences, customer satisfaction (b) has the highest total link strength, and customer-to-customer interaction has the newest average publication year. Additionally, we can see the strength of each correlation between keywords. For example, service quality (b) has a link to CP, customer satisfaction, customer loyalty, value co-creation etc.



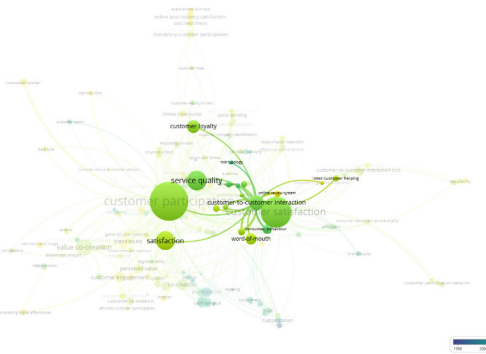
a) Customer Participation
Avg. pub. Year: 2016.42
Links: 312
Total link strength: 424
Occurrences: 60



b) Customer Satisfaction
Avg. pub. Year: 2014.38
Links: 351
Total link strength: 447
Occurrences: 53



c) Service Quality
Avg. pub. Year: 2016.68
Links: 134
Total link strength: 186
Occurrences: 28



d) Customer-to-Customer Interaction
Avg. pub. Year: 2019.00
Links: 13
Total link strength: 4
Occurrences: 3

Figure 4. Network information about the links of our four selected keywords
Source: Authors

The published papers were distributed across the world, and among 41 countries, the United States published the largest number of articles (44), followed by China (26) and then Taiwan (15). Additionally, the most influential authors are Bendapudi and Leone (2003), Chan et al. (2010), and Nambisan and Baron (2009) with 2353, 1411, and 1270 citations, respectively. All authors were discussing about CP.

Answer to RQ2 (In what type of service sectors CP and CCI are identified as key role players?)

The overview of the research on CP and CCI in different service setting suggests that there are some service industries more permeable to the effects of CP and CCI, leading to pioneering studies in the field. Not surprisingly, many of the service settings addressed traditionally require customers to spend time in the service facilities and to share the experience and the space with other customers. These circumstances contribute to the increase in the scope and intensity of CP and CCI for several reasons. The presence of customers in the service spaces creates opportunities for service providers to engage them in some activities, allowing also for the adoption of customer socialization strategies to promote engagement, learning, and enjoyment. For example, Rowley (1996), in an early study in the context of education services, refers to the dimension of customer compatibility as a key aspect affecting the quality of the service. Hu et al. (2017) studied user satisfaction and motivation on Facebook and revealed more positive CCI indicates more satisfaction and commitment. Mohd-Any et al. (2015) investigated the value created by the user travel website users and concluded that website-perceived participation influences e-value more than actual participation. Also, in the healthcare service sector, more positivity makes customers more inclined to participate in CP behaviors, and customer satisfaction is directly and indirectly affected by participation (Gallan et al., 2013; Yoo et al., 2012). Among the broad service settings, we could observe that, still today, CP and CCI and their link to service quality and customer satisfaction, involve to a great extent some presence and the interaction of customers in the service premises (healthcare, higher education, library, restaurant, tourism, hotel, retail). This scenario is not so dominant in banking services, for which many of the encounters between customers and providers are now made virtually. Notwithstanding, results also point to the growing importance of CP and CCI in virtual service settings. On the one hand, the virtualization of the delivery is, in many cases translated into an increase in customer tasks and roles in the service experience (e.g., self-service technologies). On the other hand, in virtual services, customers are deprived of many service clues and informal instructions that are usually embedded in the service spaces as well as from the assistance of employees who assist them in going through the service delivery steps and operations. For these reasons, customers might be more likely to resort to other customers to get guidance and instructions (i.e., CCI) even before the service actually takes place (Amorim & Bashashi Saghezchi, 2014; Touni et al., 2022; Xie et al., 2020). From our bibliographic study, the main sectors that we came across are sales, hospitality, restaurant chain, and healthcare. Although we would expect in other sectors where there are more people together such as tourism, education, health, retail but those sectors did not appear so much maybe because they are more sectoral specific terms that are not captured in our keywords literature review.

Answer to RQ3 (What are the emerging fields that evolve the literature trend?)

To further understand the dynamic change of research keywords (RQ3), we considered the keywords in three decades in Figure 5. From 1994 to 2003 (a), from 2004 to 2013 (b), and from 2014 to 2023 (c). The lighter colors indicate recent studies and the darker colours indicate older studies. According to our findings, the first appearance of CP and customer satisfaction was in 1994 (the same year appearance) and the first appearance of service quality and CCI was in 2002 and 2007 respectively. Therefore, the newest keyword refers to CCI in 2007.

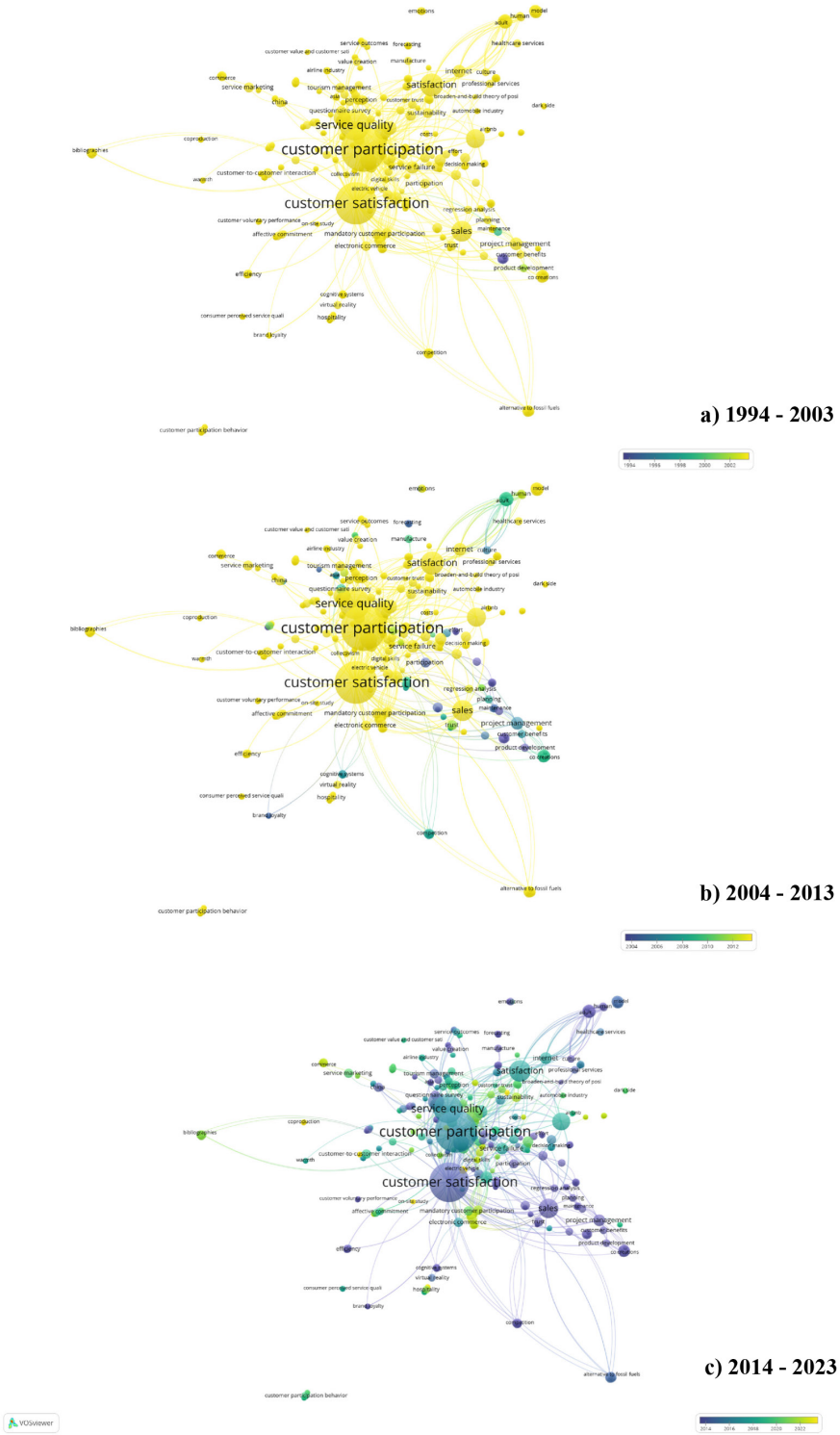


Figure 5. Keyword Network Visualization in three decades
Source: Authors

As shown in Figure 5 (c) fields related to digital technologies (e.g., Online post-recovery satisfaction, Metaverse, Electric vehicle, Appreciating digital, Online review system, Chatbot, and Brand equity) are the emerging fields that evolved the literature trend.

4. CONCLUSION

This study employed VOSviewer for bibliometrics analysis on CP, service quality, customer satisfaction, and CCI. It analysed 124 articles published in the Scopus database from 1994 to 2023. The study provides an overview of these articles by highlighting the main contributing countries and the most influential authors in the field. Results from three decades of investigation show that CP is considerably more established than CCI. According to the overlay visualization, the term CCI gained more relevance over the past decade. However, the research suggests that there exists an ample space for further investigation in this area. For example, CP sometimes appears as "consumer participation", so our data collection did not capture those works. The same applies to replacing the keyword "customer" with "consumer" in the term CCI. Furthermore, we considered only the Scopus database, so other databases (e.g., Web of Science) could also be explored. Moreover, emerging fields such as digital or online services can be considered for the future work. Finally, measuring and validating the impacts of CP and CCI on service quality and customer satisfaction deserves further investigations.

Acknowledgment

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Original Scientific Article

Promotion of Wine Tourism in the South Moravian Region: Predominant Use of Printed Materials?

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Abstract: *In today's world, the online environment is used every day. As online advertising comes to the fore in the tourism sector, all those who produce printed materials should also adapt to this form of materials and build a bridge to this new form of advertising. This is an important prerequisite for the development between promoters and recipients. The aim of this article is to define the importance of printed promotional materials for wine tourism from the point of view of the creators of these materials, that is, from the point of view of the suppliers in the wine tourism sector. A qualitative method with semi-structured interviews was chosen for the research. Representatives of the National Wine Centre, Wine Fund, CzechTourism, and other institutions that promote and develop wine tourism in the Czech Republic were selected for this study. The analysis of the answers showed that printed promotional materials are still relevant in wine tourism and the supply side still considers this form of advertising important and necessary. Even in this current „online era", the printed form has a segment that still prefers it in comparison to the online form.*

Keywords: *Printed promotional materials, Czech Republic, South Moravian Region, Wine tourism, National Wine Centre.*

JEL Classification Z32 · L83

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1. INTRODUCTION

Although the world has been affected by the COVID-19 pandemic, tourism is recovering and the number of visitors to the Czech Republic after lockdowns during the pandemic is on the almost same level if we compare second quarters of 2019 and 2023 there is a difference only of 5.885 guests arrived at mass accommodation establishments (CzechTourism, 2023). Tourism has many forms and one of the most important for the Czech Republic nowadays is the wine tourism. The Czech Republic has ideal (desirable) conditions for vine growing, especially southern Moravia area (National Wine Centre, 2023). Wine tourism is already an essential part of tourism in the Czech Republic. It includes wine education, wine consumption and wine exploration (Dixit, 2023; Hall et al., 2000). Wineries as such are still developing in this country and there is a great interest in winemaking. For this reason, every year there are many wine events and competitions connected with wine tourism (Kubát & Kerma, 2022). What inherently belongs to wine tourism is cycling, which is in connection with wine inseparably (Nadace Partnerství, 2023). There are no fewer than 11 wine cycling routes through the Moravia wine region (National Wine Centre, 2023). But how to get all the information to as many potential customers as possible? This is what promotion is for. Every event, product or destination, for example, needs quality and effective promotion. This is designed to boost sales and there are numerous tools that can be used to achieve this (Alebaki & Iakovidou, 2011; Getz & Brown, 2006; Sigala & Robinson, 2019). The main stakeholders in the promotion of wine tourism in the Czech Republic are Wine Fund and National Wine Centre. Part of the Wine Fund is the 'Wines from Moravia and Bohemia' campaign, which promotes wines from these regions (Kubát et al., 2023a).

Karlíček (2018) states that the printed form of promotion is one of the most used forms used in destinations. However, nowadays we mainly notice advertisements on social media and television, i.e., through online tools. Online propagation is therefore predominant. Kemp (2022) states that up to 9.66 million people in the Czech Republic use the internet as of 2022, which is about 90% of the total population in the Czech Republic. But what about the printed form, is it not losing its relevance? This paper explores the propagation of wine tourism through printed promotional materials through the lens of creators and promoters in this sector. The analysis of the collected data will provide an insight into new printed promotional materials, whether they remain the same or whether new ones are being created constantly. This topic is still not widely researched, as already pointed out by Frochot (2003) and Cohen and Ben-Nun (2009).

2. DATA AND METHODS

The aim of this paper is to define the relevance of printed promotional materials in wine tourism in the South Moravian Region in the Czech Republic. It has been chosen because this area has the highest percentage of vineyards (app. 96%), and wine production is typical for this region. This makes it the main wine-producing region of the Czech Republic (Kubát et al., 2023b; National Wine Centre, 2023). The research chosen for this paper was qualitative research, which was carried out using semi-structured interviews. Qualitative research leads to a deeper understanding of the problem under study and is descriptive in nature. Semi-structured interviews allow flexibility and the opportunity to elaborate on certain issues in greater depth, leading to interactions (Mišovič, 2019). To obtain data for the study, representatives of (wine) tourism stakeholders were contacted. The respondents were chosen based on their participation in developing and promoting wine tourism in the Czech Republic. Data was collected from a total of ten stakeholders in the (wine) tourism sector (Novotná, 2023). The offer of several (types of) wine tourism printed materials were collected and explored (Křůpala et al., 2007). The list of the individual respondents, thus representatives of each tourism stakeholder that agreed to be interviewed:

- Respondent No. 1 (RNo.1) – CzechTourism
- Respondent No. 2 (RNo.2) – Tourist Authority – South Moravia
- Respondent No. 3 (RNo.3) – South Moravian Regional Authority
- Respondent No. 4 (RNo.4) – Wine Fund
- Respondent No. 5 (RNo.5) – Partnership organization
- Respondent No. 6 (RNo.6) – National Wine Centre
- Respondent No. 7 (RNo.7) – Slovácko Tourist Association
- Respondent No. 8 (RNo.8) – DMO Brno Region
- Respondent No. 9 (RNo.9) – ZnojmoRegion
- Respondent No. 10 (RNo.10) – Znovín Znojmo (winery)

3. RESULTS

3.1. Necessity of Preparing Promotional Materials

It is necessary to create new printed promotional material on wine tourism all the time, given this „online age"? This was followed by the question if it is about the habit of holding something tangible in your hands. Most answered the same. A total of eight respondents said that creating printed promotional materials on wine tourism is still needed. An example is the preparation of the guide for the Land of Wine edition (edice Krajem vína), in which Wine Fund with National Wine Centre (2021) cooperates with winemakers and wine event actors. It has been commented on by RNo.6:

> *...every year I try to contact all the TICs* [Tourist Information Centres] *in the region that we cooperate with, that are in the Land of Wine edition, I think there are 35 of them, plus the destination management, for each region we contact them to go through their parts and check if we have current objectives, if they have any news, if some of those destinations or routes have disappeared, so, again, it depends on their activity, how they are willing to put the time in and generally somebody just, you see it as a person, somebody is more skillful, somebody just goes through the email, says „yeah, our region's good", that some people write some analysis on it....*

The majority tended to say that the printed form is mainly used by the older generation. This generation is used to the printed form rather than the online one. They often do not know how to use the online versions and cannot do without paper. RNo.2 stated that until recently was a proponent of more online but stated that if there is no signal or Wi-Fi connection somewhere, you can have the printed material with you. For example, about the gastronomy guide called GOURMET of South Moravian Region that is being created by the Tourist Authority – South Moravia, people really use it as a guide and go to the businesses that are mentioned there with the guide. However, as RNo.6 indicated, they should target the campaign for the younger generation, but it is difficult because they are not such big wine consumers. RNo.5 stated: *„I guess there will be some pressure to have less and less* [of printed materials]*, but again, they are finding their place."* So the need is certainly there, but as time goes on, the printed form will be on the wane. In the words of some representatives of tourism stakeholders, online and print forms should complement each other. People take the leaflet for perusal and then proceed online. The materials also serve in a way as a souvenir. As RNo.4 noted tourists also want to take something away from their travels to show where they have been and what it was like. But there is a question of sustainability, ecology and economy. RNo.9 stated that only maps and handy tip sheets (guides) should remain in paper form. *„It's about habit...gradually everything is being transferred to online, it's more economical,"* commented RNo.8. Some of the prints aren't entirely eco-friendly, and that could be one of

the reasons why printing would be cut back. Among the less eco-friendly papers are the waxed ones found in the Calendar of Events as part of the Land of Wine edition. But there is a reason for this. If a tourist spills wine on ordinary paper, it is unusable. Waxed paper is more durable for such cases and does not get wet right away.

In terms of what should not be missing in any printed wine tourism material, the answers were quite varied. One might expect maps to be among the most common responses. Among the most frequently mentioned were so-called awareness-raising or also educational information. According to RNo.5, it is important to keep presenting this kind of information because younger generations are gradually getting into wine tourism and this information needs to be shown to them. According to what other respondents said, the text should be interesting, it should not be lengthy and it should also carry practical information. Photos were the next most frequently mentioned aspect that should not be missing. They catch the tourist's attention and thus tempt them to take the material and have the desire to visit the place in the photo. Finally, a link to the website or a QR code to get to the website was also mentioned. The website can be updated continuously with information as mentioned in the previous chapter. Therefore, a link to the website should be included in any printed material. Other responses were related to maps and tourist wine offerings. For example, a map was mentioned by RNo.4. This was linked to the fact that healthy lifestyles have been developing in recent years and people want to move and live healthily. So, due to the maps, they can take trips either cycling or walking to different wineries, along wine trails or go on hikes in the countryside. RNo.9 mentioned that the link to the gastronomy business should not be missing in the material, as this is an international trend that is linked to wine tourism. Figure 1 shows what respondents think printed promotional material should contain.

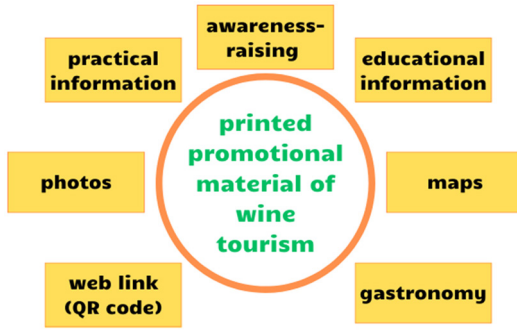

Figure 1. The points that should be included in printed promotional material about wine tourism
Source: Own research

3.2. The Land of Wine Edition as a Perfect Guide

The Land of Wine edition is part of the eponymous edition that promotes the wine regions of Moravia and Bohemia. It is a rather extensive publication. The guide was evaluated very positively and every respondent was familiar with it. The fact is that it was known to everyone is also since many people collaborated on its preparation. For the wine tourist, it contains all the information they need to know. The guide is very attractive to the eye. RNo.4 stated that what is missing are wine events and maps. The calendar and maps are published separately because of the size of the whole edition. The guide is already large by itself, and if the maps and calendar were added, it would already be too thick and therefore an impractical publication. According to RNo.5, it is a representative top material. Another positive point is that it is also published in English. RNo.2 stated that the promotional material lacks a cycling page. However, it is not correct to link

alcohol and cycling, at least in the Czech Republic. This coupling needs to be presented carefully to still comply with the law. The material does not directly mention the cycling aspect so as not to encourage illegal behaviour such as cycling while under the influence of alcohol. Therefore, cycling is the focus of other materials where cycling is not associated with alcohol consumption. RNo.2 added:

> *Well, you have to treat it as a gentle thing. Of course, it's always up to the discretion of the people who are riding but we're careful about that too. Like we know you have to drink responsibly. Fortunately, South Moravia is not known for having a lot of traffic accidents (laughs), drunk cyclist collisions, etc.*

RNo.1 made notes from the perspective of a foreign tourist. She stated that there is too much detailed information for the foreign tourist, e.g., on history, in parts there is irrelevant information for the tourist, more material should be devoted to gastronomy as this is an international trend in connection with wine tourism. More attention should be given to large-format photographs, given how extensive the brochure is. As RNo.6 stated, *„...it is up to the tourists what kind of tourism they come to consume."* They reach out to many types of tourism in the guidebook, but they still cannot include all of them. We can find offers less related to wine tourism, but the main thing for the wine tourist is included there. RNo.6 also stated, *„... somehow though it's not comprehensive in a way that we cannot put in there for example the offer of all some kind of relaxation or spa facilities or all water parks, it's always just that crux...."* Another benefit of the material is that it's not a one-off. It can be drawn upon on an ongoing basis and educated at the same time. RNo.7 added to the guide:

> *In addition to the events, the information in it has long-term validity and can serve for several years to keep the tourists coming back for wine experiences. As I said above, we want to be a region for cultivated experiences, not a region that only tempts for a mass bourbon march, from which the tourist then remembers only the first half hour.*

This material is therefore considered somewhat significant in wine tourism in the Czech Republic.

3.3. The Materials Have Another Purpose than Promotional

Since seven respondents answered that in addition to the promotional meaning, the printed materials also have an educational or informational meaning, we can see why this is the case. Words such as educational and awareness-raising or informational came up the most. Specifically, the Land of Wine edition was described by RNo.6 as something that both high school and college students work with. As RNo.7 stated:

> *...this too has a promotional dimension, but at the same time it cultivates the wine tourist. And we are not looking for a wine tourist who drinks as much as possible and then rolls around in the grass, but one who is able and willing to 'soak up' the wine atmosphere."*

Another opinion was expressed by RNo.2 from the Tourist Authority – South Moravia:

> *The sense is that you, as someone who brings the information together, have the opportunity to actually summarize it in a way that no one else, whether it be a private entity or a museum, for example, can put it together because by bringing together the whole of South Moravia, we have an idea of what is on offer, and we keep it up to date and find out.*

Due to the information, which is obtained from legislation, winemakers' statistics, or data on varieties or wine certification, the material can be considered educational in some part. One can therefore gain something from such materials and can profit from them on an ongoing basis. Basic information, such as the history of winemaking in the Czech Republic, is repeated in some materials because it is considered an important part of what tourists should know. In terms of intentions other than promotional, the materials are intended to reinforce the company's brand, can function as a gift, or even have an inviting character. Finally, they also have a mediating function, because, as RNo.4 stated, *„...they provide wine tourists with contacts to winemakers in different areas through printed materials."* According to this, wine tourism should be the main purpose. That is, to combine wine consumption with excursions and thus make tourists stay longer in the South Moravian Region. And what is the purpose of the materials in the form of an online version? Why are some materials created both in printed and online form? In this respect, the answers differed somewhat. It is taken as another information channel with more information, it is more convenient in terms of searching. Another factor of the online form is its interactivity and, for those who know how to use electronics, its simplicity. It is a fact that in most places we can find an internet connection. But there are also places where we can't find a signal or Wi-Fi connection, so we could only work with printed material. The concise opinion was that the online version is up to date. RNo.2 described this in more detail:

> *The online environment is very significant in its timeliness. We see that various data about monuments, cellars or wineries change. If opening hours are printed in the material and they change in two months' time, this leads to a lack of information for tourists later on, and it is unrealistic to simply rewrite such information everywhere. That's why online is important because here the information can be changed all the time."* A follow-up question was asked, *„So, for example, if you find out that you have something in the brochure that is no longer the case, do you post it on the website?*

The answer of the RNo.2 was:

> *Exactly. Or we're changing the link actually, we're updating it, that was, at the beginning when we started doing the printed materials. So, then we change that in the online environment where we try to drive those people with a QR code, and we don't even drive it to very specific destinations most of the time.*

This is followed up by the fact that the online medium is another source of information, where even more of it can be found than in the print version. Similar opinions have been shared by the others. The materials in the online version can be easily updated, it is a sustainable way, and this form is preferred by younger generations. From an ecological point of view, it was mentioned that people do not want to collect papers or multiple versions of a publication, so they prefer to download it. Regarding some tourist and navigation apps, RNo.9 mentioned the disadvantage that not all of them are adapted to online use.

3.4. The Most Popular Materials Are the Maps

There are several printed promotional materials in different forms and materials of production (Křůpala et al., 2007). Everyone prefers something different, but in the interviews, respondents were asked if there is a type that tourists take the most. Obviously, the most convenient format of materials for tourists is the stackable format, as they will not be carrying a book or other impractical tourist materials with them. The free-of-charge aspect also plays a significant role. Generally, people will prefer a free good to a paid one. However, maps were mentioned most by respondents.

Maps are a very important part of wine tourism, so it is not surprising that tourists also take them the most often. According to RNo.5, local maps are very popular: *"There is a strong tradition of very high-quality maps in Czechia, really the best quality maps for the general public, it has its historical reasons, people are used to it and it is very popular that they want maps."* Another popular format is folded booklets. They are small, practical and easy to store. They also have necessary and concise information in them. Just what a tourist needs. But as mentioned at the beginning, the needs of tourists are very individual. As far as specific materials are concerned, the Calendar of Events is disappearing very quickly. RNo.4 mentioned:

> *...even people call and email us to ask when it's about to be released. They write in January when it's going to be, so I have to respond that some organizers still don't know about the event, if they do it in the fall, please wait until February/March.*

Those people who are familiar with this material wait for it every year. Another very popular one is the Moravian wine region maps. The advantage of this material is its complexity. It covers all the wine (sub)regions in one. Tourists who don't want to have the whole portfolio of the Land of Wine edition use the Calendar of Events and the map of the Moravian wine region. The Wine Fund has seen a big increase in the purchase of maps of the Velkopavlovická Wine Sub-region. Reportedly, the maps vary in purchase, for example, last year the map of the Znojemská Wine Sub-region was the most purchased. The most recent specific material is also „Sommelier Circles." They are smaller in size, easy to store and include information on pairing wine with food, and their popularity is supported by the fact that they are also interactive. They are also popular at fairs, as RNo.6 reported. No research has been done on this information, but providers see what disappears at fairs or from their stocks.

3.5. Ideal Promotional Material and Its Comprehensiveness

In most materials about wine tourism, there is a combination of several pieces of information. There are several topics from history to maps and information about wine. The material contains a history of winemaking in the country and about winemaking in the present. The material also gives information on what regions and sub-regions the Czech Republic is divided into and what varieties of wine are grown and what are the most common. There is also information about the wine-producing regions, a map and recommendations on where to go for wine related tourism. Why is this the case and are the materials published separately? Two answers were most often given to this question. In terms of comprehensiveness and targeting the mass of tourists. The materials are therefore produced in such a way that the tourist is partly educated about the area or the wine industry in general and also has practical information. With so much information in one booklet, there is no need to publish one brochure on each topic. This is from both an economic and an environmental point of view. If materials were printed separately for each topic, it would cost extra money and print more paper than it needs to. There would therefore be more waste. Since they target many people, they cannot focus on one topic. A smaller segment interested in e.g. history can then look up detailed information on the internet or more thematically focused literature. RNo.2 added:

> *I think that's exactly the reason why one has to look for detailed information online. Just so that it doesn't create material for material, because if someone wants to know the history of winemaking then there are certainly publications both online and offline in printed form available for purchase, where someone has done like even academic work and put it together for example and if they are classic tourist promotional materials then actually they are supposed to inform everybody, but so that the basis is there.*

RNo.6 stated the reason why the materials are created in this way, *„We are actually trying to reach the mainstream a bit as if we are not looking for those marginally interested in some deeper information, but it actually serves to attract the masses."* It was also confirmed that the printed promotional materials for wine tourism that the respondents publish should also have an educational as well as awareness-raising character. In doing so, they both inform and educate their consumers. As for the opinion on the ideal promotional material, almost everyone answered differently. Some respondents answered that *„it depends on the individual."* So it also depends on whether the material is to promote just a specific event or a tourist area. This is perhaps followed by the answer that there is no ideal promotional material for wine tourism. But what was also repeated was that the ideal material should not lack a link to a website with more information to keep the material concise. For tourists, the material should be simpler and contain good-quality photographs. If they are staying in the area longer, the material should have information that the tourist can draw from it on an ongoing basis.

3.6. Subscriptions of Printed Wine Tourism Materials from Tourists Are Dropping

In regard to this era, the question about the development of the purchase of printed promotional materials is quite important. As mentioned by RNo.9, the slight decline is due to the gradual digitalization and the emergence of younger generations who are more likely to use digital platforms. Not everyone agreed clearly on the decline, but this answer was rather prevalent. The number of purchases of printed wine tourism materials is declining but follows the same reason everywhere – digitalization. No respondents answered that they thought the number of materials purchased was increasing. With the rise of mobile apps and online information, there is no reason for the volume to rise. However, if we look at this from an ecological perspective, this is a positive matter. For some tourists, ecology is the main reason why they reject printed promotional materials. Since there is some waste associated with the materials they take, a lot of paper is saved. RNo.6 has also seen a decrease in materials taken at fairs. However, printed promotional materials for wine tourism will always find a segment. This segment is the already mentioned older generation, as they are not used to the digital way. The future of wine tourism is of course on the younger generation. However, that generation is used to the digitalized world, which is why they are seeing a decline in purchases. However, not everyone mentioned that the purchase of printed promotional materials is declining. Some said that tourists' taking of materials has been about the same in recent years. However, the aforementioned digitalization has had a major impact on the consumption of materials. RNo.6 summarized it as follows:

> *Because there is still, I don't know how to put it in percentage terms, a section as wine tourism consumers who like to work with it, and hold that paper in their hand rather than their mobile phone, and maybe it's a question of the older generation as well, but that's actually what we've also found now with the last Wine Fund survey, that the population that used to drink wine when they were in their 30s, that group, they just keep drinking wine, they're just in their 40s now and the younger people are not as interested, or the young people don't drink wine as much, and we should actually target the campaign at the younger consumers.*

It's hard to track because sometimes fewer maps are printed because there are left over from the previous year and sometimes more, so it then distorts the view. That they are holding at the same level they have traced from previous years. In terms of ecology and efficiency, RNo.4 further stated that they keep track of what needs to be printed so that there is not too much paper left over. It should be mentioned that the collection of materials stopped and distorted even during COVID-19 when everything was closed. What emerges from the interviews is that the number of materials taken and produced will not grow.

3.7. The Relevance and Future of Printed Promotional Materials in Wine Tourism

As the interviews were conducted with the creators of the materials, they themselves have insight into whether tourists are still collecting the materials and therefore their relevance. Almost all agreed that they are relevant. RNo.8 responded that they were not. It was mentioned that they are outdated, therefore, the online materials will replace them. Related to relevancy is RNo.2's response that if something changes, e.g., winery hours, it can be changed online, but not on the handouts. That is why the website does not forget to mention itself in the printed material. Another issue that was mentioned is the segment of these materials. It is mainly the older generation that uses them, so the materials will always find their clientele. Therefore, printed promotional materials for wine tourism are still considered relevant by the majority. But this does not exclude the fact that the materials will be restricted in some way. According to the answers, they will probably never disappear, but they will exist alongside online materials and on a smaller scale. Whether in terms of economy or ecology. An intriguing observation was that *„...if they disappear, what would they actually offer in the Tourist Information Centre?"* Another factor is that progressively online materials are becoming more popular and with it, the younger generation are using online more. RNo.6 stated that they also want to target this clientele to increase interest in wine tourism. RNo.1 added that *„...it is important to focus on a quality presentation on destination websites or to have updated brochures available in PDF format."*

4. FUTURE RESEARCH DIRECTIONS

As the study revealed some aspects and the situation of printed wine tourism materials, some points were noted that can be useful for the further development of wine tourism in the Czech Republic as well as in some other wine tourism regions. The issues are as follows:

a) Determine the status of printed and online wine tourism propagation materials in other wine regions.
b) Ascertain the state of play from the demand side as well, as tourists may infer general findings on this topic.
c) The primary segment for printed and for online promotional materials differs as shown in the study. This can be further investigated and actually confirmed or refuted.
d) Practical and educational information, photos and links (QR code) to websites should not be missing in wine tourism materials.

5. CONCLUSION

In order to achieve the objective and obtain the necessary data, a qualitative method was chosen using semi-structured interviews with representatives of wine tourism stakeholders. The majority of respondents still consider the printed form to be relevant. The printed form will not be eliminated easily and therefore the relevance of printed promotional materials for wine tourism cannot be rejected. Even in this current „online era", the printed form has a segment that still prefers it to the online form. At the same time, there is still a need for their production. Even though there has been a slight decline in the purchase of printed wine tourism promotional materials, they are still being used and the decline is not extreme. However, the preparation of printed wine tourism promotional material should be adapted to the current times and both printed and online forms should be created at the same time. This will also reach the segment that prefers the digital form. Some have significantly reduced the production of printed promotional materials and focus exclusively on the online form of materials. Interviews with respondents suggest that online materials should also be created to promote wine tourism, as the younger generation represents the future of

this area. However, most respondents agreed that printed materials have their place and will never completely disappear but will be printed less. Thus, printed materials continue to be a relevant way to promote wine tourism, at least in the Czech Republic.

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