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How does the ICT affect human development? Evidence from developing vs. developed countries*

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Abstract

This study aims to assess the impact of information and communication technology (ICT) on human development (measured with the human development index – HDI). The authors have analyzed the countries with different development levels in order to identify the possible differences in these impacts when observing the level of income (development of the country). The paper uses a static panel data regression analysis, while a fixed-effects estimator (FE) is used for estimation. To address the possible endogeneity problem caused by reverse causality, we also perform a dynamic panel data regression using the Generalized Methods of Moments (GMM) estimator. The results support our hypothesis and show that ICT use and tertiary education positively affect human development, although the results vary by estimator. While in the case of the FE estimator, the effects are significant and positive across all observed countries, the results with the GMM estimators show a significant impact of ICT only in the case of upper-middle-income countries. However, it also implies that the lagged value of the HDI has significant and positive effects on the observed HDI. For economic policy, the results pinpoint the importance of ICT as a relevant instrument that can positively influence people's lives directly or indirectly.

Key words: *ICT, human development, tertiary education, SDGs, panel data analysis, fixed effects, GMM*

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1. Introduction

Human capital is often seen as wealth that can create further wealth at the micro and macro levels (Barro, 2001; Oluwatobi & Olurinola, 2015), so the determinants of human development are topical issues in the economic literature. Decent work, productive employment, and sustainable growth are one of the UN Sustainable Development Goals (SDGs). To achieve these goals, it is essential to understand the factors that influence human development. It is well known that the use of technology, especially information and communication technology (ICT), benefits human development by facilitating access to knowledge and education, access to information, access to healthcare, social interaction, finding better and higher-paying jobs while creating new business opportunities, etc.

Since the 1980s, endogenous growth theories have considered technological development (including ICT) and human capital as engines of economic growth as an alternative to neoclassical growth theory (Romer, 1986; Lucas, 1988; Grossman & Helpman, 1991). According to endogenous growth theories, knowledge-based businesses, especially information technologies and other high-tech industries, are becoming increasingly important in developed and emerging economies (Hayes, 2021). Considering that most private and business activities today are highly dependent on ICT, various applications and software, there is good reason to believe that ICT is one of the most important determinants of economic and human development.

In the past, it took much more time for the ICT impact to become visible such as the effects of PCs only reflected in productivity after about a ten-year period. However, nowadays, the influence of ICT is developing rapidly and is visible, especially so during the Covid 19 pandemic lockdown, which physically blocked the world but has increased the role of ICT. Today, ICT technology is fundamentally changing the economy and people's lives, and a world without technology is no longer imaginable. ICT technology expands human freedoms (Sen, 2010) and leads to more efficient human actions, activities, work, and personal development. Information and communication technologies (ICTs) facilitate dissemination and easy accessibility of information and communication. Personal computers, mobile devices, and the Internet can be used to describe these technologies.

Given the current development of the importance of ICT technology and the speed of digitization of the world, it is to be expected that ICT will take an even more important place in people's lives. Despite the obvious importance and dominant position of ICT in daily life, there is a gap in the literature on the relationship between ICT technology and human development from the perspective of countries with different levels of development.

In our analysis, we use the Human Development Index (HDI) as a proxy variable for human development, which is the most complete indicator of human development to date. The Human Development Index is a composite index

composed of three indices: life expectancy index, education index, and GNI index. The life expectancy index represents the health dimension, which is assessed by life expectancy at birth. The education index represents the education dimension and is measured by the average number of years of schooling for adults aged 25 and older and the expected number of years of schooling for children of school entry age. The GNI index stands for the standard of living dimension and is measured by gross national income per capita (UNDP, 2022). ICT technology and education should be at the forefront of every country's development strategies, as they can indirectly contribute to the achievement of the Sustainable Development Goals (SDGs). The Arksey and O'Malley (2005) approach was used for the literature review.

Thus, the objective of this study is to examine the role of ICT on human development in countries with different levels of development. The level of development is classified according to the World Bank's GNI 2020 classification, which divides countries into high-income countries, upper-middle-income countries, lower-middle-income countries, and low-income countries. This analysis builds on that of Karaman Aksetijević et al. (2021), but in addition, the variables of the enrolment in higher education and political stability are included in the analysis to control for factors that might influence human development in countries at different levels of development. In addition, both static and dynamic regression analyses are performed in this paper to compare differences in the coefficients of the elasticities. The main hypothesis of this paper is that ICTs have positive effects on human development, but that these effects differ for countries at different levels of development.

The paper is divided into six parts. After the introduction, the second part of the paper contains a literature review on ICT technology and human development. The third part of the paper presents the research methodology, while the fourth part describes the research data and variables. The fifth part of the paper presents the results of the analysis. The sixth part discusses the main findings and concludes the paper.

2. Literature review

The role of ICT technology deployment in human and, by extension, economic growth and development has received considerable attention from economists, researchers, and policymakers. However, there is still relatively little empirical literature establishing a link between ICT technology and human development. Moreover, there is no standard measure of ICT technology use and human development, so different papers use different measures. Table 1 provides information on the relevant empirical literature on the relationship between information and communication technology and human development. The literature review is based on Arksey & O'Malley's (2005) framework, which includes identifying relevant studies by selecting, organizing, and summarizing them by presenting findings. The Web of Science Core Collection database (2022) was the source for data for the literature review.

Table 1: Summarized literature on ICT and human development relationship

Author/Year	Methodology	Data & variables	Findings
Oyerinde & Bankole (2019)	Data Envelopment Analysis (DEA)	All countries in Sub-Saharan Africa, Northern Africa, and selected countries in Europe and Northern America; 2010 – 2016; time series data; educational attainments; literacy rates; individuals with computers, internet and mobile phones	ICT infrastructure has a strong impact on educational attainment and adult literacy rates.
Oluwatobi et al. (2016)	SGMM, panel data	32 Sub-Saharan Africa (SSA) countries; 2001-2012; Human capital, GDP, Government Education Expenditure, ICT	ICT has a more significant role in facilitating school enrolment at the secondary and tertiary levels of education. There is a statistically significant and direct relationship between ICT infrastructure and usage and school enrolment in SSA.
Asongu et al. (2017)	GMM, panel data	44 Sub-Saharan African countries; 2000-2012; Inclusive human development, ICT (internet penetration and mobile phone penetration), four main CO2 emission variables	ICT can be used to dampen the potentially negative effect of environmental pollution on human development.
Alfaro Cortes & Alfaro Navarro (2011)	Factor analysis, cluster analysis, Analysis of variance (ANOVA)	European Union 27; 15 most relevant variables for the research objective (9 structural indicators and 6 policy indicators)	ICT has a strong influence on economic and human development. Results show the existence of four clearly distinct groups of countries that register significant differences.
Petrić et al. (2020)	Dynamic panel model	European Union countries; HDI and Digital Economy and Society Index (DESI)	ICT variable influences the HDI of EU countries. Broadband Internet usage, individual-level of Internet use and e-commerce use positively contribute to the EU economic development. The use of e-government services and the increase number of the ICT professionals employed have a negative impact.
Perez-Castro et al. (2021)	Descriptive analysis and regression analysis	Mediterranean countries; 2010-2015; HDI, ICT Development index (IDI)	Increased technological development has a positive impact on human development. The increase in the IDI was much greater than in the HDI. Variation rates were greater in less developed countries. The increase in technological infrastructure, access to ICT, and improvement in their use level improve the quality of life of a population.

Author/Year	Methodology	Data & variables	Findings
Karaman Aksetijević et al. (2021)	Dynamic panel data regression analysis with GMM estimator	130 world countries; HDI, ICT use GINI coefficient, Rule of law	HDI has statistically significant and positive effects on contemporary human development. ICT is important for human development and has a positive impact on the HDI in the case of developing countries (middle- and low-income countries). In the case of developed countries, the results are ambiguous and not significant.
Ibrahim R. L. et al. (2022)	Two-step system GMM and Panel Fixed Effects (FE)	Panel of 43 Sub-Saharan African countries; 1990-2019; non-renewable energy consumption, technology proxy (ICT service exports), and quality of life (HDI, life expectancy at birth, education, GDP per capita)	The indicators of non-renewable energy are statistically significant and negatively signed when HDI, life expectancy, and GDP per capita are the outcome variables but positive for education. Technology proves to enhance the quality of life.
Machfud & Kartiwi (2018)	Pearson Correlation analysis	Six major islands of Indonesia; 2012-2016; HDI, expected years of schooling and mean years of schooling, expenditure per capita, percentage of poor people	The better the human development of a region, the better the development of ICT in that region; the worse the poverty level, the lower the ICT development.
Samoilenko & Osei-Bryson (2013)	MR analysis	Group of transition economies; the Leaders (have some characteristics of developed economies) and the Followers (have some characteristics of less-developed economies); GDP, ICT Labour, ICT revenues, ICT capital, HDI, TFP (total factor productivity)	HDI has a statistically significant impact on GDP and TFP only in the case of the Leaders. In the case of the Leaders, the levels of telecom labour and HDI serve as statistically significant predictors of GDP. In the case of the Followers, the levels of capital investment and the labour have statistically significant impacts on GDP.
Khan et al. (2019)	Autoregressive distributed lag (ARDL) and vector error correction model (VECM)	1990 -2014; ICT, economic growth (GDP), HDI, FDI, trade, urbanization	ICT stimulates the human development process, and trade declines human development with both Internet and mobile penetrations. Urbanization has a positive impact on human development with mobile penetration and does not contribute with Internet penetration.

Author/Year	Methodology	Data & variables	Findings
De la Hoz-Rosales et al. (2019)	Data panel technique, fixed effects regression, panel corrected standard errors (PCSE)	145 countries; HDI, SPI (Social Progress Index), Total entrepreneurial activity rate of innovation, Network Readiness Index, Individual use of ICT, Business use of ICT, Government use of ICT, Economic Freedom Index, Pillar Political and Regulatory Environment, Development Level	Regardless of a country's level of development, the individual use of ICT has a positive impact on human development; especially on dimensions measured by HDI. The use of ICTs for commercial purposes has a positive impact on human development at the global level, but considering only developed countries, the relationship of this variable with human development is no longer significant. The impact of government use of ICT on human development is significant on developed countries.
Njoh (2018)	Multiple regression, double logarithmic form	HDI, cellular phone subscription, broadband subscription, fixed phone subscription, and internet access	There is a strong positive link between the examined ICTs and HDI. Cellular phone subscription and Internet access are associated with HDI in a statistically significant manner while holding the other ICTs in the model constant. However, fixed phone and broadband subscription are not linked to HDI in a statistically significant manner in Africa for the period studied.
Miranda & Lima (2012)	Multi-logistic analytical procedure for evolutionary time series	Internet hosts, the Internet penetration index, the ICT development index and the software/ protocols development	The number of countries in the low range of HDI values decreased from 2002 to 2007, at the same time the number of countries entering high range increased. There is a group of countries whose improvements in their operational ICT index are disconnected from their corresponding improvements in the human development, whereas for countries with top medium and high human development levels there is a close correlation between the two indices.
Zelenkov & Lashkevich (2020)	ANOVA, fuzzy regression, Possibilistic Linear Regression combined with the Least Squares	Four groups of countries (112) with different levels of GDP per capita ; HDI, Network Readiness Index, Global Innovation Index	For developed countries, the positive and balanced impact of innovation and ICT on living standards has been confirmed. For two groups of developing countries (upper and lower middle income), the GII coefficient is negative. In the group of developing countries with upper middle income, ICT has a much more significant impact on human development.
Remeikiene et al. (2021)	Second generation panel cointegration and causality tests regarding the cross-sectional dependence	11 post-transition EU members; 1996-2015; shadow economy size (% of GDP), mobile cellular subscriptions, individuals using the internet, HDI	ICT indicators and human development had significant effects on the size of shadow economy in both short and long run. Growing ICTs lead to reduction on the size of the shadow economy.

Author/Year	Methodology	Data & variables	Findings
Martin et al. (2013)	Regression, ANOVA	SMEs in Romania; the proportion of employees who use ICT during activity, variable levels of ICT adoption	The adoption of ICT in the enterprise will generate economic growth, which in turn will lead to an increasing complexity of the production process. The proportion of employees who use ICT during activity score explain the variation in the level of ICT adoption.
Ahmed (2017)	Cobb-Douglas production function estimation	(ASEAN5), Malaysia, Indonesia, Philippines, Singapore, and Thailand; three East Asian Countries (China, Japan, and South Korea) no. of telephone lines/1000 persons, proxy for ICT, expenditure in education proxy for human capital	ICT and human capital contribution to the ASEAN-5 productivity
Ramlan & Ahmed (2009)	Stationarity, cointegration and structural break tests	Malaysia, Time series data 1965 to 2005, relationship between telecommunications investment and aggregate output	ICT in a long-run equilibrium relationship with GDP, capital and employment Human capital is significant in the development of the ICT and long-run economic growth
Orji et al. (2020)	Classical Linear Regression Model	1981 – 2016; school enrolment, telephone subscriptions, electricity consumption, infant mortality, population growth	ICT, power supply and population affect positively on human capital development, while infant mortality has a negative impact on human capital development in Nigeria.
Acheampong et al. (2021)	Lewbel two-stage least squares	79 energy-poor countries from South Asia, sub-Saharan Africa, and Caribbean-Latin America for the period 1990–2018; HDI, human capital, life expectancy, maternal mortality, under-five mortality, access to electricity, access to clean energy, trade openness, urbanisation, foreign direct investment, financial development, remittance, gender empowerment, ICT, employment, industrialisation	Employment, industrialisation, economic growth, ICT, and gender empowerment are some of the important channels through which energy accessibility influence human development.
Asongu (2021)	Tobit regressions	49 sub-Saharan African countries; 2000-2012; inclusive development (IHDI), mobile phone, education quality, innovation, Internet, GDP per capita, private credit, remittances, foreign investment	Mobile phone penetration and associated innovation in SSA improve inclusive human development irrespective of the country's level of income, legal origins, religious orientation and the state of the nation.

Source: Author's elaboration

To some extent, previous studies have already identified the connection between ICT and human development using many different approaches, methods and variables. However, the findings regarding the link between country's level of development and ICT are ambiguous which indicates there is a need for further research to clarify that connection. Since it has been proven that ICT stimulates the human development process it is necessary to investigate in which countries, considering the different income groups, this link is more significant and in which countries it can be enhanced through different policies. The given literature overview identifies tertiary education and ICT as factors which positively affect human development, which is why we have decided to build upon these findings and contribute to the field's literature.

3. Methodology

The aim of this paper is to estimate the impact of information and communication technology on human development. The empirical analysis is based on a regression analysis of panel data. To assess these impacts, the paper estimates the following econometric model:

$$humdev_{it} = \beta_0 + \beta_1 ICT_{it} + \beta_2 higheduc_{it} + \beta_3 polstab_{it} + \\ + \beta_4 incomegroup_{it} + u_{it} \quad (1)$$

where the $humdev_{it}$ is a dependent variable and represents human development. i stands for specific country and t stands for specific year. ICT_{it} is an independent variable which represent the use of ICT technology (aggregate indicator that includes the development of Internet users, Broadband Internet subscriptions, Internet bandwidth, Mobile broadband subscriptions, Mobile telephone subscriptions, Fixed telephone lines) in each country i in year t. $higheduc_{it}$ is also independent variable that represents the enrolment in higher (tertiary) education in country i in time t. $polstab_{it}$ is an independent variable that represents political stability of the country i in time t. In the model are included four dummy variables $incomegroup_{it}$ which have value 1 if the country belongs to specific income group of countries. The dummy variables stand for high, upper-middle, lower-middle and low-income countries and are included in the empirical model to control for the level of development of the country. β_0 is constant while β_1, β_2 and β_3 are parameters of independent variables. u_{it}, represents error term.

In static panel data analysis, the standard and most common estimators are Pooled Ordinary Least Square (POLS), Fixed Effects (FE), and Random Effects (RE). In such data, the variance at the panel unit level is mainly not homogeneous, which makes POLS a bad estimator that often provide biased and overestimated results. Therefore, a fixed or random effect estimator should be used instead. To choose

which estimator to use, in the first step, we performed the Hausman test, a common test used to decide which estimator, FE or RE, is better for panel data analysis. According to the results of the Hausman test, zero hypothesis (H_0) is rejected, which means that FE is a better estimator for the analysis (Greene, 2008). Fixed effects (FE) are used when evaluating the effects of variables that vary over time. FE explores the relationship between independent and dependent variables within an entity (in our case, within a particular country), which is why they are also called Within Estimator. Each entity, in our case a country, has its characteristics that have become fixed over time, such as language, and these characteristics may affect the dependent variable. FE takes these characteristics into account, i.e. eliminates characteristics that are fixed over time to estimate the net effects of independent variables on the dependent variable. To address the possible source of endogeneity due to reverse causality or omitted variables, we use a dynamic regression analysis (Wooldridge, 2009) with a Generalized Method of Moments (GMM) estimator (Arellano & Bond, 1991) as a robustness check of the original model. The GMM estimator uses differentials and lags of the regressand and regressors as instruments and yearly fixed effects and in this way provides unbiased and consistent results (Wang et al., 2019).

4. Empirical data and analysis

The data for the analysis comes from various sources. Dependent variable Human Development Index is obtained from UN Human Development Report, while independent variables ICT use and enrolment in tertiary education (in %) are obtained from World Economic Forum, Global Competitiveness Report. ICT variable represents aggregate indicator composed of various indicators (Internet users, Broadband, Internet subscriptions, Internet bandwidth, Mobile broadband subscriptions, Mobile telephone subscriptions, Fixed telephone lines) where 1 stands for not developed at all and 7 for extremely well developed. Since there was not available data for the years 2018 and 2019, we extrapolated ICT use for those years using linear extrapolation. The analysis is based on the country level data.

The variable Political Stability and Accountability is obtained from the Worldwide Governance Indicators (WGI). The database covers the period from 2007 to 2019 for 130 world countries divided into four groups classified based on the World Bank's GNI Classification 2020, presented in the Table 2. The analysis is based on panel data covering 13 years. Although a period of more than 10 years is generally sufficient to capture certain effects when analysing panel data, we must acknowledge that effects may extend over longer periods before being proliferated, as Kondratieff cycle theory states (Wilenius, 2014).

Table 2: GNI Classification 2020 (income group)

Country group	GNI/PC
High-income	> USD 12,535
Upper-middle-income	> USD 4,046 < = 12,535
Lower-middle-income	> USD 1,036 < = 4,045
Low-income countries	< $1,036

Source: World Bank, 2020

Table 3 presents summary statistics of all variables. Since we are working with panel data, in the summary statistics are presented variations between panel units (country) and within each panel unit (country). Since we have heterogeneous countries in the dataset, the higher standard deviation can be seen between panel units than within, that is especially visible in the variable enrolment in tertiary education (*higheduc*).

Table 3: Summary Statistics

Variables		Average	Standard deviation	Minimum	Maximum	Observations
humdev	overall	.6874468	.1629223	.262	.957	N = 3,198 n = 164 T = 19.5
	between		.159506	.32805	.93755	
	within		.0333507	.5647468	.7764968	
ICT	overall	3.333955	1.744304	1	6.9882	N = 1,032 n = 137 T = 7.53285
	between		1.661597	1.038263	6.677641	
	within		.5307836	1.788089	5.349432	
higheduc	overall	38.2476	26.58405	0	116.6216	N = 1,333 n = 131 T = 10.1756
	between		25.85016	.575594	98.19245	
	within		6.524298	2.814188	86.93794	
polstab	overall	-.0079106	.9876491	-3.314937	1.965062	N = 3,536 n = 189 T = 18.709
	between		.9432671	-2.686243	1.868903	
	within		.3246228	-1.752202	1.68854	

Source: Authors' calculation

In this section are presented the results of the estimations with POLS estimator, FE estimator and GMM estimator. Since the POLS usually provides biased and overestimated results we use it just as a benchmark for the comparison with other estimators. Table 4 presents the results of the estimation with POLS, while Table 5 presents the results of the estimation with FE estimator.

Table 4: Results of the regression with POLS estimator

	(1)	(2)	(3)	(4)
	High-income countries	Upper-middle-income countries	Lower-middle-income countries	Low-income countries
Variables	*humdev*	*humdev*	*humdev*	*humdev*
ICT	0.0111***	0.0107***	0.0113***	0.0261***
	(0.000669)	(0.00119)	(0.00289)	(0.00829)
higheduc	0.000306***	0.000983***	0.00280***	0.00330***
	(6.27e-05)	(0.000100)	(0.000298)	(0.000649)
polstab	0.00675**	0.0110***	0.00327	0.000605
	(0.00272)	(0.00269)	(0.00302)	(0.00372)
Constant	0.793***	0.679***	0.533***	0.414***
	(0.00540)	(0.00589)	(0.0116)	(0.0173)
Observations	373	257	202	94
Number of panel	48	35	27	13

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' calculation

The results of the estimation with POLS show that ICT has significant positive effects on human development, and the coefficients are even higher the lower the country's income group. Enrolment in tertiary education also has positive and significant impact on human development, i.e., the higher the percentage of students enrolled in tertiary education, the higher the human development, and the coefficient is higher in the case of middle-income and high- income country group. Political stability and accountability seem to be significant only for upper-middle income and high-income countries. However, as mentioned in the methodology section, POLS often provides overestimated and biased results. Therefore, we focus on the results of the FE estimation and the GMM estimation.

Table 5: Results of the regression with FE estimator

	(1)	(2)	(3)	(4)
	High-income countries	Upper-middle-income countries	Lower-middle-income countries	Low-income countries
Variables	*humdev*	*humdev*	*humdev*	*humdev*
ICT	0.0106***	0.0106***	0.0115**	0.0250**
	(0.00102)	(0.00224)	(0.00525)	(0.00852)
higheduc	0.000216**	0.000797***	0.00264***	0.00297**
	(0.000107)	(0.000221)	(0.000370)	(0.00126)
polstab	0.00292	0.0132**	0.00328	-0.000264
	(0.00464)	(0.00550)	(0.00404)	(0.00532)
Constant	0.804***	0.687***	0.536***	0.419***
	(0.00762)	(0.00802)	(0.0119)	(0.00894)
Observations	373	257	202	94
R-squared	0.593	0.555	0.494	0.315
Number of panel	48	35	27	13

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' calculation

In the fixed-effects estimation, the coefficients of results are lower than in POLS, but still significant and positive, suggesting that ICT plays an important role in human development, especially for the lower-middle income and low-income countries. Enrolment in tertiary education has positive significant effects on human development across all income groups of countries, but the effects are higher in upper-middle income countries. Considering that some low-income countries struggle with enrolment in primary education, it is clear that tertiary education is above their means. Political stability and accountability appear to be significant only for human development in upper- middle income countries. These results support previous findings on the determinants of human development, particularly with regard to ICT technology and its significant impact on human development in developing countries. Table 6 below shows the results of the robustness check with the GMM estimator.

Table 6: Results of the regression with GMM estimator

	(1)	(2)	(3)	(4)
	High-income countries	Upper-middle-income countries	Lower-middle-income countries	Low-income countries
Variables	*humdev*	*humdev*	*humdev*	*humdev*
HDI lag.	0.884***	0.825***	0.929***	0.369
	(0.110)	(0.0911)	(0.0758)	(0.723)
ICT	0.00112	0.00500***	-0.000908	0.0156
	(0.00102)	(0.00139)	(0.00249)	(0.0317)
higheduc	-2.17e-05	0.000165	-1.10e-05	0.00195
	(9.20e-05)	(0.000217)	(0.000176)	(0.00163)
polstab	0.00312	0.00734	0.00541*	0.000605
	(0.00450)	(0.00511)	(0.00296)	(0.0115)
Constant	0.0980	0.117**	0.0531	0.264
	(0.0910)	(0.0587)	(0.0440)	(0.288)
Observations	373	257	202	94
Number of panel	48	35	27	13
Number of instruments	51	51	51	51
AR (1) p-value	0.001	0.013	0.002	0.236
AR (2) p-value	0.314	0.356	0.259	0.148
Hansen statistics	0.158	0.158	0.158	0.158
Hansen p-value	1	1	1	1

Robust standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' calculation

The results of the dynamic panel data regression with the GMM estimator show that the lagged value of dependent variable, i.e., human development (HDI), has significant positive effects on human development, which means that human development in the previous period has significant and positive effects on human development in the present. However, ICT is significant and positive only in the case of upper-middle income countries, while it is not significant in the case of other income groups. Political stability and accountability also have much weaker effects and are significant and positive only in the case of lower- middle-income countries. The diagnostic tests for autocorrelation in different residuals, that is, it tests whether the idiosyncratic error term is serially correlated. The test rejects the null hypothesis that there is no first-order serial correlation in the first differences - AR (1) but does not reject it in the case of low-income countries. The AR (2) does not reject the null hypothesis that there is no second-order serial correlation.

The Hansen test validates our instruments. If the Hansen test for over identifying restrictions does not reject the null hypothesis at any conventional significance level (p-value =1), this is an indication that the model has valid instrumentation, although we must concede that Hansen p=1 is suspiciously good.

5. Results and discussion

The results of this research support our original hypothesis that ICT has a positive and significant impact on human development, but the impact varies for countries at different levels of development. Our results also show that tertiary education has a significant impact on human development. Although the outcome coefficient varies across estimates with different estimators, we can draw several conclusions. First, ICT is significant for human development in all countries, but it has stronger effects on less developed countries. The upper-middle-income countries could benefit most from the adoption of ICT technologies. Therefore, economic policies should focus on supporting the adoption of ICTs in business, education, and all other public and private sectors, which can lead to a better quality of life, easier access to education, jobs, information, public services, etc. In terms of education, the upper-middle-income countries could benefit most from higher enrolment rates in tertiary education.

This research contributes to the current literature on human development by supporting previous findings in the field and also offering new insights into the dynamic relationship between ICT and human development from the perspective of countries at different levels of development. The findings suggest that upper middle-income countries could rethink their economic policies by investing more in ICT and its implementation and enrolling more students in tertiary education to achieve higher levels of human development.

6. Conclusion

This research addresses the relationship between ICT, enrolment in tertiary education, and human development in countries belonging to the different income groups. In order to do the analysis, we performed the static panel regression analysis with the FE estimator. As a robustness check of the original model, we also performed a dynamic regression analysis with the GMM estimator. This study's static analysis results show significant and positive effects of ICT and enrolment in tertiary education on human development across all income group countries. As for the dynamic analysis results with the GMM estimator, they show significant and positive ICT effects only for the upper-middle-income countries. In addition, the results show significant effects of the lagged value of the human development

index on the present human development index. This research contributes to understanding the role of information and communication technologies in human development. Despite the fact that the data reveals that ICT technology has strong and positive effects in all four income groups of countries, these effects are significantly much more outstanding in poorer countries. The findings highlight the importance of investing in ICT and education to reach higher levels of human development. ICT technology and education should be at the forefront of each country's development strategies, as they can help accomplish the Sustainable Development Goals.

The main limitations of this research are reflected in the use of aggregated data, where some information is sometimes lost through the aggregation itself. Due to available data, the analysis is based on a time span of 13 years. The longer time period could help to explore the long-term effects of ICT and to have more accurate insight into the real effects of ICT on human development. However, the rest of the empirical literature on this topic is mainly based the analysis on the macroeconomic level. Future research might be oriented towards microeconomic analysis based on the survey on firm level and focus on the relationship between ICT and employer development.

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Kako IKT utječe na ljudski razvoj? Dokaz zemalja u razvoju naspram razvijenih zemalja

Zoran Ježić[1], *Petra Adelajda Zaninović*[2], *Renee Škulić*[3]

Sažetak

Cilj ovog istraživanja je procijeniti utjecaj informacijske i komunikacijske tehnologije (IKT) na ljudski razvoj (mjerene indeksom ljudskog razvoja). Utjecaj se proučava za zemlje s različitim razinama razvoja kako bi se identificirale moguće razlike u tim utjecajima kada se uzme u obzir razina dohotka (razvijenost zemlje). Istraživanje se temelji na statičkoj regresijskoj analizi panel podataka s procjenom fiksnih učinaka (FE). Kako bismo riješili mogući problem endogenosti zbog obrnute uzročnosti, također izvodimo dinamičku regresiju panel podataka koristeći procjenitelj Generalizirana metoda momenata (GMM). Rezultati podupiru naše pretpostavke i pokazuju kako i tercijarno obrazovanje i korištenje IKT-a imaju pozitivne učinke na ljudski razvoj, iako rezultati variraju ovisno o procjeniteljima. Dok su u slučaju FE procjenitelja učinci značajni i pozitivni u svim promatranim zemljama, rezultati s GMM procjeniteljem pokazuju značajne učinke IKT-a samo u slučaju zemalja s višim srednjim dohotkom, ali također impliciraju da vrijednost HDI s vremenskim pomakom ima značajne i pozitivne učinke na promatrani HDI. Za ekonomsku politiku rezultati znače da IKT treba uzeti u obzir kao relevantan instrument koji može izravno ili neizravno pozitivno utjecati na živote ljudi.

Ključne riječi: *IKT, ljudski razvoj, tercijarno obrazovanje, SDGs, panel analiza, fiksni efekti, GMM*

JEL klasifikacija: *O11, O15, O33*

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Economic growth in the Central East European Union and the Western Balkan countries in the course of Stability and Growth Pact and COVID-19*

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Abstract

This research aims to provide an empirical assessment of the relationship between fiscal policy sustainability factors, like fiscal deficit and economic growth in the Western Balkan countries and East European Union Countries, using panel-level data for the yearly time span from 2000-2021. The empirical model provides the impact of fiscal deficit, alongside other control variables like inflation, schooling, total investments, trade openness, and output gap on economic growth in the selected group of countries. For the purpose of research, we employed Static and dynamic panel estimation techniques like Fixed Effects with Driscol and Kraay standard errors and system GMM. The findings confirm that fiscal deficit has significantly affected the growth level in both groups of countries. In addition, when the fiscal deficit has interacted with the COVID-19 dummy, it appears as a growth-enhancing factor. However, when the fiscal deficit interacts with the Eurozone debt crisis period, it becomes a growth-deteriorating factor. Other control variables like inflation, trade openness, total investments, and the output gap are found important factors in explaining the growth performance of the Central East European and Western Balkan countries.

Key words: *growth, fiscal policy, GDP, Western Balkan countries, public finances*

JEL classification: *H3, H6*

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1. Introduction

Fiscal policy influences the country's economic activity through efficient use of public spending, taxation, and borrowing, affecting at the same time both aggregate demand and aggregate supply. The Keynesian approach views fiscal policy as a management tool for boosting economic growth by the increase of aggregate demand, output, and employment. On the other hand, the monetarist approach views fiscal policy as a temporary tool for boosting economic growth in the short run, leaving more room for the monetary policy as the main anchor for growth enhancement. Expansionary (Contractionary) fiscal policy through increase (decrease) of public spending is manifested in the case of economic decline (recovery). While the target of expansionary fiscal policy is to increase the aggregate demand and stimulate consumption and investments during recessions, the target of contractionary fiscal policy is to reduce the aggregate demand during the booms when the economic cycle shows signs of overheating (Mara, 2012; Cashin et al., 2018).

The heterogeneous framework of the fiscal policy in the Western Balkan (WB, hereafter) and Central East European Union (CE-EU, hereafter) countries has been subject to many considerations of institutional bodies due to the constant threats that the fiscal policy has experienced from a different crisis, the latest one being the pandemic COVID-19. Concerning the so-called preventive arm of the Stability and Growth Pact (SGP hereafter), the European Union countries that do not achieve the medium-term budgetary objectives, of keeping a reasonable level of the debt ratio, must adjust their budgetary rules in line with the requirements of the SGP[3]. By the end of 2019 and the beginning of 2020, due to the disturbing effect of COVID-19 on the European economic cycle, the EU member states were subject to a preventive arm, by activating for the first time, since 2011, the SGP general escape clause[4] (Hauptmeier and Leiner-Killinger, 2020).

The WB countries, which follow the EU approximation path concerning the EU integration agenda, are constantly facing economic challenges concerning the sustainability of the fiscal policy in line with the framework of the SGP performance. In this paper, we analyze the fiscal policy sustainability factor in the WB countries[5] in the course of the Stability and Growth Pact (SGP) framework, subordinated from the Maastricht treaty and see its impact on economic growth.

[3] This means replacing the application of the SGP's debt rule, introduced with the six-pack and two-pack regulations in 2011.

[4] The EU member states were permitted to diverge from the fiscal adjustment requirements that would normally apply under the normal conditions, by allowing the coordination of fiscal and monetary policy to counter-act the negative effects of the pandemic.

[5] The Western Balkan countries include the following sample of the countries: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Kosovo and Serbia.

The descriptive part of the paper outlines the evolution of fiscal policy sustainability factors starting from 2000 onward to reveal the governmental policy factors in the WB countries concerning debt and fiscal deficit criteria, having regard that fiscal rules of the Western Balkan countries are heterogeneous in nature. In addition, the impact of the pandemic COVID-19 is captured in the analysis by outlining the consequences of the deficits and the necessity of financing these deficits through public indebtedness to address possible solutions for the fiscal discipline in the WB countries, required by the European Union. The findings suggest growth enhancement effect fiscal deficit for the WB and CE-EU countries. In addition, the growth enhancement effect of fiscal deficit is confirmed for both groups of countries, WB and CE-EU, during the COVID-19 era also, and the growth-deteriorating effect of fiscal deficit is confirmed during the Eurozone debt crisis period. Concerning control variables, total investments, trade openness and output gap appear to be positively related to economic growth, whereas the inflation rate is negatively related to economic growth. By applying different estimation methodologies associated with panel data of the WB and CE-EU region for e yearly period: 2000-2021, the paper contributes to the literature on economic growth affected by fiscal sustainability factors in the transition countries. In this regard, this research fills the gap in the growth literature, which explains fiscal sustainability behavior with the growth performance of the transition countries of the WB region. The paper is organized as follows. The next section proceeds with empirical studies concerning the relationship between fiscal sustainability factors and economic growth. Section three describes the methodology, econometric assessment, and hypothesis. Section four presents the empirical data and analysis by relying on the descriptive nature of the research. Section five discusses the results obtained by estimating the empirical model framework. The last section concludes the research.

2. Literature review

The empirical literature on the relationship between fiscal sustainability factors and economic growth is rich for developing countries but is missing considerably for the developing and emerging countries, especially for the Western Balkan countries, being in general only of a descriptive nature. This paper aims to add value to the missing part of the empirical contribution on the relationship between fiscal deficits and economic growth for the panel of WB and CE-EU countries.

Lau and Yip (2019) in the study of the relationship between fiscal deficits and economic growth for the ASEAN countries, using data from 2001 to 2015, mainly capturing the global financial crisis period, found that fiscal deficits were growth deteriorated in the pre-crisis period and growth-enhancing in the post-crisis period. Concerning emerging countries, Rana and Wahid (2017), in the study of fiscal deficit and economic growth in Bangladesh, relying on a time series analysis, using

vector error correction model and granger – causality analysis, found a negative impact of government budget deficit on economic growth. Genevieve (2020) in a study assessing the impact of fiscal deficit on economic growth for Morocco, using cointegration analysis, found that fiscal deficit affects economic growth in the Moroccan economy in the long run, while the equilibrium correction was found to be significantly quicker. Aragaw (2021) in a study of twin deficits and economic growth in the selected panel of 27 African countries, using a dynamic panel threshold model found that a budget deficit of less than 0.152% is growth-enhancing.

The theoretical literature identifies three schools of thought on the impact of fiscal policy on economic growth, mainly the Classical school, Keynesian and Ricardian school. The classical school, based on a free-market economy with no need for governmental intervention, is characterized by significant market failures due to the incapability of the markets on income distribution on an equitable basis among the economic agents, leading to the great depression in the years of 1930 (Paul, 1994; Samuelson, 2015). The classical school uses the concept of tax reduction as a necessary stimulus for economic growth (Friedman, 1978; Buchanan and Wagner, 1978; Keho, 2010). The neoclassical school considers fiscal deficit as a factor for enhancing public investment, leading to crowding out of the private investment and thereby growth[6]. If the external debt is serviced mainly through foreign capital, there is little room left for the enhancement effect of investments on growth in the second cycle of the economic activity. In this case, the cost of servicing the public debt via external debt, which for the Western Balkan countries is a severe case, can *crowd out* public investment expenditures, thus, reducing the total investments and complementing the private investment (Karagol, 2012). Keynesian school, which promotes governmental intervention in the economic life of the society, considers the fiscal deficit and enhancement factor of domestic production, generated from the boost of private investment as a crucial factor for enhancing the positive cycle of public investment, thus, encouraging economic growth in the short and long run (Zuze, 2016). The Ricardian School views public spending as an irrelevant factor for the tax rate. The budget deficit has no influence on private investments due to the irrelevant impact of taxes on consumption and thereby on the growth enhancement (Krajewski and Mackiewicz, 2007).

On the grounds of the relationship between government debt and economic growth, the empirical literature is twofold with respect to growth enhancement associated with the increase of public debt. Public debt is the amount of domestic and external

[6] The increase of public spending generated from tax revenues, will increase fiscal deficits and hence raise consumption, on the second run. Via third round effects of the economic cycle, this scenario will lower savings and therefore private investment, resulting on the increase of interest rate of the capital market, above the equilibrium level, which thereafter will crowd private investments and thus reduce the economic growth.

debt. External debt is likely to happen in the emerging economies because of the insufficient funds of the respective economy for financing the initial investments. Low-income countries are exposed to external debt, to finance productive investment, which thereafter leads to macroeconomic instability (Akram, 2011). However, high indebted countries are likely to be exposed to unproductive investment and hence end up with a low level of economic growth. In line with this, Casares (2015), when analyzing an endogenous growth model with two goods from the tradable (manufacturing) and non-tradable (non-manufacturing) sectors found an inverted U-shaped non-linear relationship between external public debt to GDP ratio and the growth rate. Çiftçioğlu and Sokhanvar (2018), on the study of external debt – economic growth nexus in the selected CEE countries provide evidence of adverse effects of external debt on the long-run economic growth in a sample of twelve emerging economies of Central and Eastern Europe (CEE). However, Schclarek (2005) found that for developing countries, lower external debt is positively related to higher growth rates, which is mainly triggered by the public external debt and not by the private external debt, whereas for the industrial countries there is no significant evidence for the relationship of gross government debt and economic growth. Chaudhry et al. (2017) in a study of the relationship between Foreign Direct Investment, external debt, and economic growth in the selected developing countries found a positive and significant impact of external debt on economic growth, where the growth rate is upgraded by 2.13 units, per unit rise of external debt. As concern to the relationship between public spending and economic growth, the empirical literature is rather scant especially for the transition countries, being in general only of a descriptive nature. Considering a sample of 23 developed countries, Cashin (1995) in the study of governmental spending, taxes, and economic growth, covering the period from 1971 to 1988, found the growth-enhancing effects of investments in the public sector, originated from the discretionary taxes that are used to fund such public spending. However, despite the huge empirical literature investigating empirically the relationship between fiscal policy and the growth performance of both developed and less developed countries, the effects of public spending on economic growth are missing to a large extent, especially for transition countries. The paper will add empirical value to the tested hypothesis related to the impact of fiscal deficit on the economic growth for the WB and CE-EU countries in line with the SGP framework and hence contribute to maintaining a healthy fiscal convergence policy for the EU integration agenda of the WB countries.

3. Methodology

The paper will try to shed light on the impact of fiscal deficit on economic growth of the CE-EU and WB countries, relying on a yearly panel data set for the period 2000-2021. The reduced form of the growth equation for the estimation purpose is as follows:

$$g_{it} = \beta_1 x_{it} + \beta_2 y_{it} + \beta_3 x \times d_i + d_i + \theta_i + \gamma_t + u_{it} \quad (1)$$

Where g_{it} is the dependent variable denoting the growth level of the CE-EU and WB countries, x_{it} is the vector of the fiscal sustainability variable, y_{it} is the vector of control variables, d_i is the dummy variables denoting the covid-19, WB countries, financial crisis dummy and Eurozone debt crisis dummy. θ_i is country dummy and γ_t is year dummy. u_{it} is the usual standard error. Extending the approach of Mara (2012), the equation for estimating the impact of fiscal deficit factors on economic growth in the selected countries is the following:

$$g_{it} = \beta_1 y_{(it-1)} + \beta_2 gsb_{it} + \beta_3 inv_{it} + \beta_4 sch_{it} + \beta_5 to_{it} + \beta_6 inf_{it} + \beta_7 og_{it} + \\ + \beta_8 gsb_{it} \times d_1 + \beta_9 gsb_{it} \times d_2 + \beta_{10} gsb_{it} \times d_3 + \beta_{11} gsb_{it} \times d_4 + \theta_i + \gamma_t + u_{it} \quad (2)$$

Where the $i = 1, 2, ..., n$ is the country index, $t = 1, 2, ..., t$ is the time index, denoting the years from 2000 to 2021. The empirical model assumes that growth level of the WB countries is a function of fiscal sustainability factor[7], namely general structural balance and the control variables[8] like total investment, schooling, trade openness, inflation, output gap, as well as the interaction terms between fiscal deficit with COVID dummy (d_1), WB dummy (d_2), financial crisis dummy (d_3) and Eurozone debt crisis dummy (d_4). Based on the interaction between structural balance and the dummy variables, d_1 and d_2 the aim of the study is to differentiate the impact of fiscal deficit on economic growth across two periods, the pandemic period and the non-pandemic period and two group of countries, WB countries[9] and CE-EU countries[10]. On the grounds of the interactions between structural balance and the dummy variables, d_3 and d_4 the study will distinguish growth related factor of fiscal variable, during the financial crisis period and Eurozone debt crisis period, respectively.

3.1. Econometric framework

Static panel analysis: Fixed effects with Driscoll and Kraay standard errors

Driscoll and Kraay standard errors (FEDK) are asymptotically efficient in the panel samples where time series, 'T' exceeds the number of panels 'N' (Hoechle,

[7] This variable constitutes the main interest of the study.

[8] The control (regime) variables are included in the model to augment the regression model of the growth equation, which explain the variation of growth level of the WB countries, due to changes in the fiscal sustainability factor, with other standard variables that may affect the relationship between growth and the fiscal sustainability variable.

[9] Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia.

[10] Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia.

2007). By relying on large T asymptotic, FEDK estimates assumes that the standard nonparametric time-series covariance matrix estimator is robust to general forms of cross-sectional as well as temporal dependence (Hoechle, 2007). Driscoll and Kraay's estimates are robust to heteroscedasticity and autocorrelation. To control for the presence of cross – sectional dependence we apply the Driscoll and Kray standard errors in the fixed regression model, using the stata command *xtscc, fe,* accounting for two time lags. We also control for time and country fixed effects in the FEDK estimates. Assuming the linear regression of a model.

$$y_{it} = x'_{it}\,\theta + \varepsilon_{it},\ i = 1, 2,..., N;\ t = 1, 2,..., N \tag{3}$$

Where, the dependent variable is y_{it} is a scalar, x'_{it} is a vector of independent variables, θ represent the vector of unknown coefficients, i denotes the cross-sectional units and t denotes time dimension of the sample and ε_{it} represent the scalar disturbance term. It is assumed that the regressors x'_{it} to be uncorrelated with the scalar disturbance term ε_{it}. However, since in the standard pooled OLS the disturbance term ε_{it} are allowed to be auto correlated, heteroscedastic and cross-sectional dependent, Driscoll and Kraay standard errors for the coefficient estimates are then obtained as the square roots of the diagonal elements of the asymptotic (robust) covariance matrix.

$$V(\hat{\theta})=(X'X)^{-1}\,\hat{S}_T\,(X'X)^{-1} \tag{4}$$

Where $\hat{S}_T$ is defined as in Newey and West (1987), allowing the Driscoll and Kraay's covariance matrix estimator to be equal to the heteroscedasticity and autocorrelation consistent covariance matrix estimator of Newey and West (1987) applied to the time series of cross-sectional averages.

Dynamic panel analysis: System GMM

To check for the robustness of our results obtained using the static panel data techniques, we run dynamic panel data regression using Arrellano-Bover/Blundell/Bond estimation procedure (Arrellano and Bover, 1995; Blundell and Bond, 1998). The basic dynamic panel model to be estimated is as follows:

$$y_{it} = \sum_{j=1}^{p} a_j\, y_{i,t\text{-}1} + x_{it}\,\beta_1 + c_{it}\,\beta_2 + v_i + \varepsilon_{it} \tag{5}$$

Where a_j and p are the parameters to be estimated, x_{it} is a column vector of exogenous regressors, c_{it} is the column vector of endogenous regressors, while β_1 and β_2 are row vectors enclosing parameters to be estimated. v_i is the individual panel level effect and ε_{it} is the disturbance term. Model (5) assumes that v_i and ε_{it} are independent for each i over all t. The benefits of system GMM is that it

exploits more instruments.[11] In all cases, the dependent variable and output gap are endogenous and other explanatory variables are treated as exogenous. Following Roodman (2008), we keep the dummy variables in the model to allow for interaction term between the specified dummy variables and our variable of interest, namely fiscal sustainability factor of general structure balance as a percentage of GDP. We utilize lag limit of the dependent variable and other endogenous component and collapse the instruments, in order to treat the instruments eruption.

Data description and hypothesis[12]

The dependent variable g_{ti} denotes the economic growth of WB countries, calculated as a percentage change of real GDP growth, and sourced from IMF, world economic outlook (WEO) database of January 2021. Lagged dependent variable, g_{ti-1} is included in the GMM model to control for the initial level of growth, capturing the convergence effect of growth and potential endogeneity problem.

Fiscal deficit variable gsb_{ti} is the general government structural balance as a percentage of GDP. This variable measures the general government cyclicality adjusted balance for nonstructural elements, beyond the economic cycle. Data is sourced from World Economic Outlook, IMF. The fiscal deficit is expected to have a significant impact on economic growth in the WB countries. The growth enhancement (deteriorating) effect of the fiscal deficit variable is expected in case of a positive (negative) sign of the fiscal deficit variable. The growth enhancement effect of fiscal deficit is financed by the increase of capital accumulation and public investments, crowding out future private investments. The deteriorating effect of fiscal deficit causes an increase in interest rates, making the government deficit financing activity costly, which in turn crowds out private investments as capital investments drop, leading to the joblessness of the low-skilled sectors (Genevieve, 2020).

Inflation rate variable inf_{it} is the percentage change of the average consumer prices, sourced from WEO. The inflation rate is the first control (regime) variable employed in the model[13]. The empirical literature supports the growth-deteriorating

[11] System GMM is more persistent than difference GMM particularly with a higher persistence of the dependent variable and a lower time dimension (Blundell and Bond, 1998). The improvement in efficiency is enhanced by the ability of system GMM to use more information by generating more instruments not only for the lagged dependent variable, but for other regressors as well, which might themselves exhibit high inertia.

[12] Descriptive statistics, correlation matrix, the source and measurement unit of the data is given in the appendix.

[13] Control variables are included for increasing the explanatory power of the model and choosing the best fit of the data that minimizes the error sum of a square as mentioned by Hansen (2000).

effect of the inflation rate (Fisher, 1993; Barro, 1995; Bullard and Keating, 1995; Alexander, 1997; Bruno and Easterly, 1998; Faria and Carneiro, 2001), the growth enhancement effect of inflation rate (Lucas, 1973; Mallik and Chowdhury, 2001; Gillman and Nakov, 2004) and non-linear relationship[14] between inflation and economic growth (Khan and Senhadji, 2001). Following the rich empirical literature regarding the nexus between inflation and economic growth, it is expected that a high inflation rate will be negatively associated with growth.

Total investments inv_{it}, denoted by the total value of gross fixed capital formation and changes in inventories and acquisitions less disposal of valuable for a unit or sector, as a percent of GDP[15], data sourced from the World Bank, World Development Indicator. The Gross Fixed Capital Formation (GFCF) consists of the investment components, which mainly come from the private, public, and government sectors. The empirical evidence regarding the impact of each investment category within GFCF on economic growth is mostly positive. Private investment is considered to have a growth enhancement effect due to the increase in productivity from the technology spillover effect. In addition, public investment increases the productivity of the private sector, which in turn raises economic growth. Public investments applied by governments may enhance growth in the long run through positive spillover effects provided by the value-added activity from the public goods, in terms of positive externalities that public investments in education, physical infrastructure, and research and development contribute to growth. Following the empirical evidence regarding the nexus between investments and growth, we expect the growth enhancement effect of investments. Accordingly, we develop the hypothesis of a growth enhancement effect of total investments.

Trade openness; to_{it} denote trade openness measured by the sum of exports and imports over GDP, data sourced from UNCTAD. This variable is included in the model to capture de jure trade liberalization progress and foreign exchange transactions in the WB countries. The empirical literature supports a positive association between trade liberalization and economic growth, mainly due to the gains that trade liberalization provides to economic growth, like providing a steady-state level of income, reduction of corruption and smuggling, greater economies of scale and scope, knowledge and technology spillovers and stimulation of export

[14] Nonlinear relationship between inflation and economic growth is supported in the models with two thresholds. Existence of a double threshold divides the inflation into three categories i.e. low inflation, moderate inflation and high inflation. Inflation, below the first threshold (6 percent), has positively, but insignificant impact on economic growth; inflation rate at high level (above 11 percent), has significantly negative impact on economic growth. Moderate inflation rate, (in between two thresholds, 6 and 11 percent), has significantly negative effect on economic growth, and the impact is marginal (Iqbal and Nawaz, 2009).

[15] More specifically, Gross fixed capital formation is a flow value who measures net investments resulting from the difference of acquisition and disposals in fixed capital assets by enterprises, government and households within the domestic economy, during an accounting period.

platform FDI (Lee, 1995; Falvey et al., 2012). In this case, we test the hypothesis of a positive association between trade openness and economic growth.

Schooling, sch_{it}, measured in terms of the percentage of the total working-age population with advanced education data sourced from the World Bank. The schooling variable is included in the model to account for the impact of human capital development on the economic growth of the WB countries (Barro, 1992). There is growing empirical literature related to the positive association of human capital with the economic growth, mainly supported by the hypothesis that human capital development through raising the marginal product of physical capital induces further accumulation of human capital, influencing the rise of output (Barro, 1992; Qayyum, 2007). Both the microeconomic and macroeconomic research approaches on the relations between education and productivity appear consistent with each other and strongly recall a causal interpretation of Barro's finding of a positive effect of educational investments on economic growth. Therefore, human capital developments in the WB countries are expected to be positively related to economic growth. On the grounds of the relationship between schooling and economic growth, we test the hypothesis that schooling has a positive impact on economic growth.

Output gap, og_{it}, is measured as a percentage difference of actual GDP (aggregated demand) from trend – potential GDP, (aggregate supply), as calculated with the Hodrick-Prescott filter. Theoretically, the underlying expansion in economic growth is explained through the increase in the output gap, meaning that actual GDP (aggregate demand) converges to potential GDP (aggregate supply), by introducing demand pressures in the goods market, thus, forcing inflation pressures, when actual GDP is higher than potential GDP (Fischer et al., 1997). This creates a space for an economy to operate above its sustainable capacity, hence, increasing the likelihood to generate inflation. Therefore, on the grounds of the relationship between the output gap and economic growth, we test the hypothesis of a positive association between these two variables.

Dummy variables, d_1 denotes the dummy variable capturing the outlier effect of the pandemic covid-19, where $d_1 = 1$ stands for the pandemic year of 2020 and $d_1 = 0$ captures the benchmark category of the normal years without pandemic. d_2 denotes the WB dummy variable, where, $d_2 = 1$ stands for the WB Countries and $d_2 = 0$, captures the benchmark category of the CE-EU member states. On the grounds of the relationship between the interaction terms and economic growth, the developed hypothesis is that economic growth may, to a certain extent, be independent of the country-specific determinants. Therefore, it may be related to the WB countries' geographical region plagued by political instability in the near past during the observed period. Following, d_3 captures the differential impact of financial crisis on economic growth, where $d_3 = 1$ stands for the global financial turmoil for the year 2008 and $d_3 = 0$ stands for the rest years. Additionally, d_4 is a dummy variable employed in the model to distinguish the differential impact of

fiscal deficit on economic growth between two periods, the Eurozone debt crisis period, $d_4 = 1$ considering the years from 2009 to 2012 and the benchmark category of the years without such crisis, $d_4 = 0$.

4. Empirical data and analysis

4.1. Data description

Assessment of fiscal sustainability performance of the Western Balkan countries

The Stability and Growth Pact (SGP) preventive arm matrix controls countries' fiscal adjustment requirements for the next year according to the output gap, i.e. the difference between real GDP and potential output, and whether the government debt-to GDP ratio is above or below the Maastricht Treaty's reference value of 60% of GDP.

Table 1: Stability and Growth arm matrix

		Required fiscal adjustments in percentage points of GDP	
	Condition	Debt < 60 of GDP and no sustainability risk	Debt > 60 of GDP and sustainability risk
Exceptionally bad times	Real Growth <0 or Output gap < -4	No adjustment needed	No adjustment needed
Very bad times	Real Growth < -4 or Output gap < -3	0	0.25
Bad times	Real Growth < -3 or Output gap ≤ -1.5	0 if growth below potential, 0.25 if growth above potential	0.25 if growth below potential, 0.5 if growth above potential
Normal times	Real Growth < -1.5 or Output Gap < 1.5	0.5	> 0.5 [0.6]
Good times	Output Gap ≥ 1.5	≥ 0.5 if growth below potential, ≥ 0.75 if growth above potential	≥ 0.75 if growth below potential, ≥ 1 if above potential

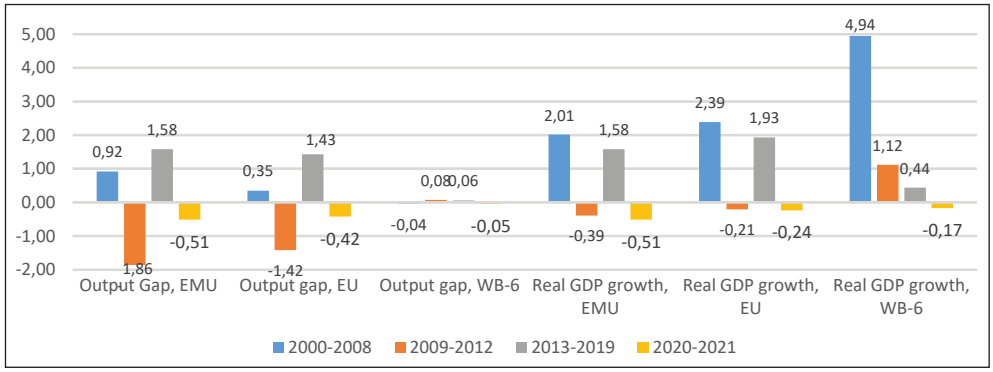
Notes: Real Growth refers to growth of real GDP.

Source: Stability and Growth Pact, Code of Conduct and Killinger and Hauptmeier (2020)

The partitioning of the business cycle and the output gap as well as the resulting adjustment needs for the structural balance are extremely marginal (Hauptmeier and Killinger, 2020). As a result, small decimal-point changes in output gap estimates is complemented with a difference in a country's annual structural adjustment requirement of a quarter-percentage point of GDP (Hauptmeier and Killinger, 2020).

The navigation of countries' fiscal position in the EU's fiscal background based on the unobservable output gap – which represent a crucial component of the SGP preventive arm matrix – is persuaded to making policy mistakes in real time (Hauptmeier and Kamps, 2020). In satisfactory (fragile) economic situations, the unobservable output gap has a propensity to be glorified (underrated). Therefore, in case of a larger (smaller) fiscal adjustment risks, in relation to the limit of the preventive arm matrix, economic cycles are likely to occur in respect of deviations from the normal position.

Figure 1: Output gap and Real GDP growth in the EU, EMU and WB-6 countries



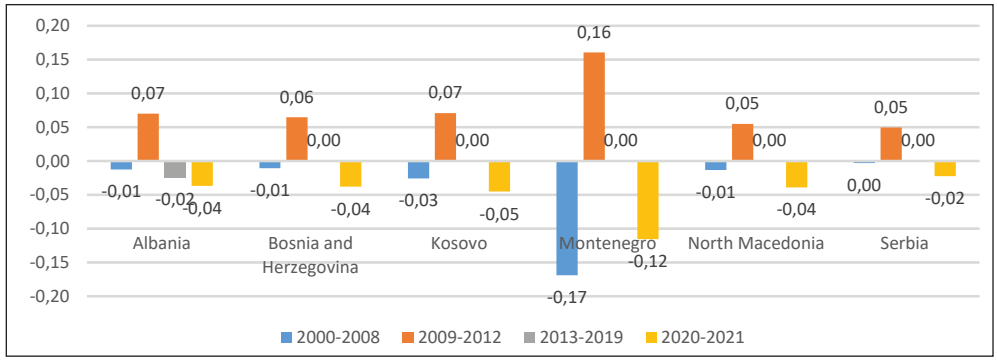
Notes: Output gap is defined as a percentage deviation of actual from trend GDP as calculated with Hodrick-Prescott filter.

Source: International Monetary Fund, World Economic Outlook Database, April 2022 and author's calculations.

Referring to Figure 1, during the observed pre-financial crisis period 2000-2008, the output gap, on average, recorded a positive value for both EU and EMU countries with respective percentage deviations of actual to potential GDP by 0.92 and 0.93 percentage change, representing a favorable economic situation. During the observed period, 2009-2012, which outlines the Eurozone debt crisis period, the output gap in the EU and EMU, on average, recorded negative values reaching the levels of -1.86 and -1.42 percentage change, respectively, for both EU and EMU countries, which represent a downturn economic situation. During the pre-COVID-19 crisis period, covering mainly the years 2013-2019 the respective values of the output gap were positive for both EU and EMU countries, reaching the respective levels of 1.58 and 1.43 percentage change. During the COVID-19 era covering the yearly period 2019-2021 the output gap was negative, reaching the respective levels for the EU and EMU countries by -0.51 and -0.42 percentage changes. The real growth of GDP in the EU and EMU countries followed the same trajectory with output gap cyclical changes during the observed periods. However, the GDP growth in the WB-6 countries, on average, as outlined in Figure 1, exhibit a decreasing trend during the observed periods, recording negative values during

the covid era (2019-2021), by -0.17 percentage change. The Western Balkan Countries, as viewed in Figures 1 and 2, went through contrary cyclical movements of the output gap in relation to EU and EMU countries, during the pre-financial crisis period (2000-2008) and sovereign debt Eurozone crisis (2009-2012), possibly due to the reasons that both crises were not a case for the WB-6 countries.

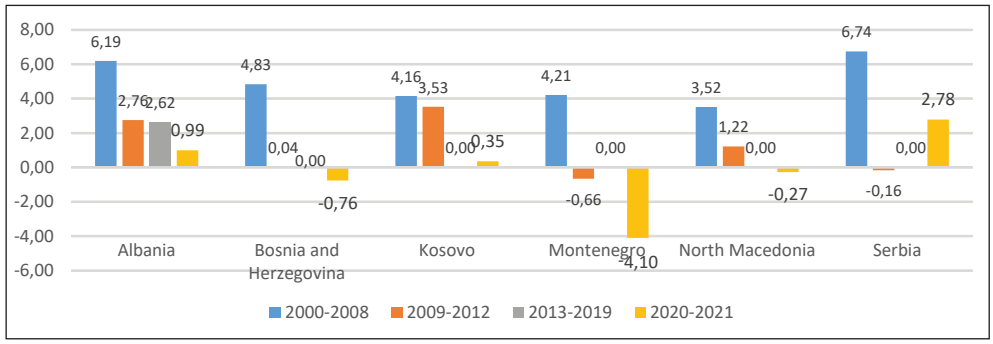
Figure 2: Output gap in the individual WB-6 countries



Source: International Monetary Fund, World Economic Outlook Database, April 2022 and author's calculations.

On the other hand, during the pre-COVID era (2013-2019), the output gap in the WB-6 countries was positive, and during the COVID period, in the economic sense considered a hard time, the output gap was negative. The smallest value of GDP growth among the WB countries, as viewed in Figure 3, during the pandemic period was recorded in Montenegro (-4.10 percent), followed by Bosnia and Herzegovina (-0.76 percent) and North Macedonia (-0.4 percent).

Figure 3: Real GDP growth in the individual WB-6 countries

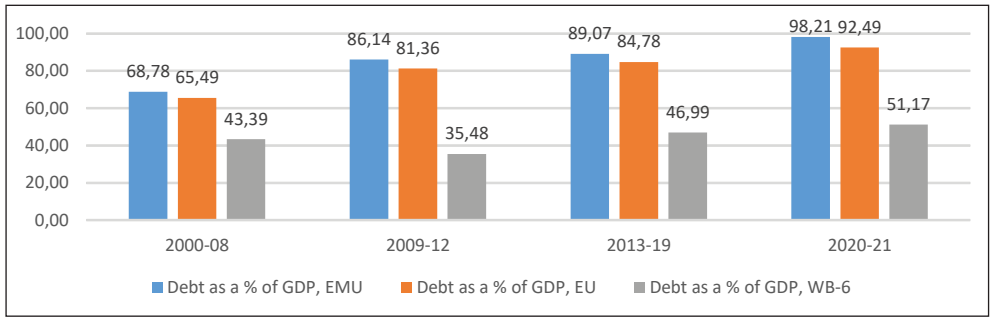


Source: International Monetary Fund, World Economic Outlook Database, April 2022 and author's calculations.

Fiscal challenges in the Western Balkan countries in the light of SGP performance

The Stability and Growth Pact (SGP) contributes to accomplishing macroeconomic stability in the European Union (EU) and plays a key role in securing low inflation and low-interest rate, which on the other hand, adds value to sustainable economic growth and job creation (Heipertz and Verdun, 2003). The main motivation of the Stability and Growth Pact is to guarantee sound budgetary policies permanently, thus, creating a space for the Fiscal Policy in the European Union for the long-term stability of public finances of the EU countries. The economic reason for endorsing the creation of SGP is to provide a policy tool for the member states for maintaining a budgetary discipline, in line with the normal cyclical fluctuations of debt and deficit level, according to excessive debt procedures (EDP)[16] (Dauti, 2021). The EDP procedures allow countries to deal with fiscal rules, subordinated to the Maastricht Treaty, which specify normal cyclical fluctuations of debt and deficit level about the reference value specified by the Maastricht criteria (Dauti and Herzog, 2009). EDP is activated by the debt or deficit criterion. *The debt criterion* is activated if the general government debt is higher than the reference value of 60 percent of GDP and the annual debt reduction target of one-twentieth of the debt over the 60 percent threshold has not been achieved over the last three years (European Central Bank: Convergence Report, 2020). *The deficit criterion* is activated if the general government deficit is higher than the reference value of 3 percent of GDP at market prices[17].

Figure 4: General government gross debt as a percentage of GDP in the EU, EMU and WB-6 group countries.



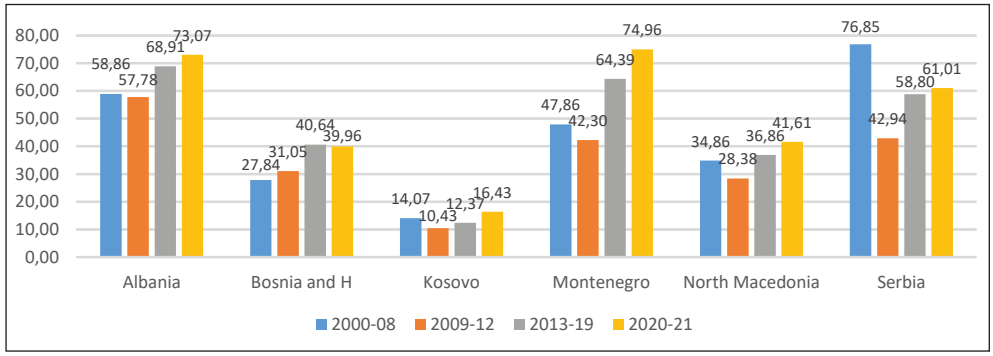
Source: WEO database, April 2022 and own calculations.

[16] The conditions for applying the excessive deficit procedure (EDP) are governed by Article 126 of the Treaty of the Functioning of the European Union (TFEU). Based on protocol No 12 of the TFEU (2012), the Council Regulation (EC) No 1467/97 (1997) and the Regulation (EU) No 1173/2011 (2011).

[17] Based on Article 126 (11) of the TFEU, the EDP also provides sanctions in cases of non-compliance using a fine, consisting of a fixed component (0.2 per cent of GDP) and a variable component (up to a maximum of 0.5 per cent of GDP for both components taken together) (European Central Bank: Convergence Report, 2020). The maximum fine may not exceed 0.5 per cent of GDP.

With respect to the debt criterion, the results shown in Figure 4 outline a worsening trend for the EU and EMU countries, which show excess values of the debt/GDP ratio above the tolerated limit of 60%, a case that does not constitute for the WB-6 countries. Viewing the data on the grounds of crisis periods, the results outline a worsening trend of debt to GDP ratio during the Eurozone crisis period (2009-2012) and COVID era (2020-2021), in relation to the period up until the global economic crisis in 2008. During the normal years of the pre-COVID period (2013-2019) debt to GDP data were also recording an excess value above the specified limit of 60%.

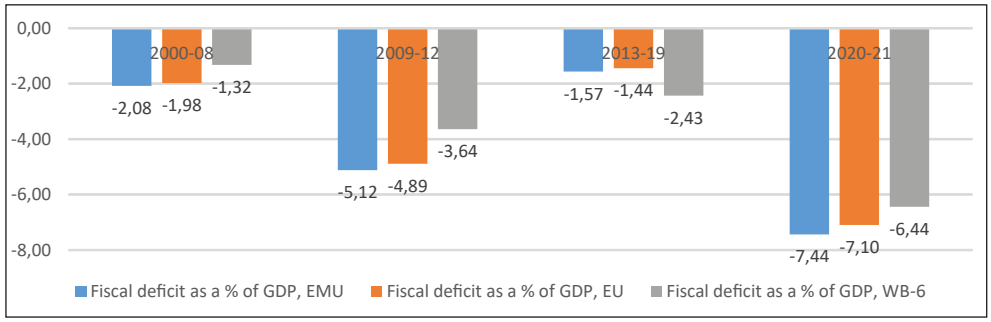
Figure 5: General government gross debt as a percentage of GDP in the individual WB-6 countries



Source: WEO database, April 2022 and author's calculations.

For the debt criterion, the viewed results in Figure 5 confirm a worsening case scenario for Montenegro and Albania during the years 2020 and 2021, recording the excess value of the debt/GDP ratio significantly higher than the tolerated limit of 60% concerning GDP. As viewed from Figure 5, Kosovo, on the other hand, proved to show a success story regarding the sustainability of public finances at the debt level, recording almost two times lower values of debt to GDP ratio than the reference level of 40 percent, (Figure 5), as specified from the Kosovo debt limit rule (see Table 2).

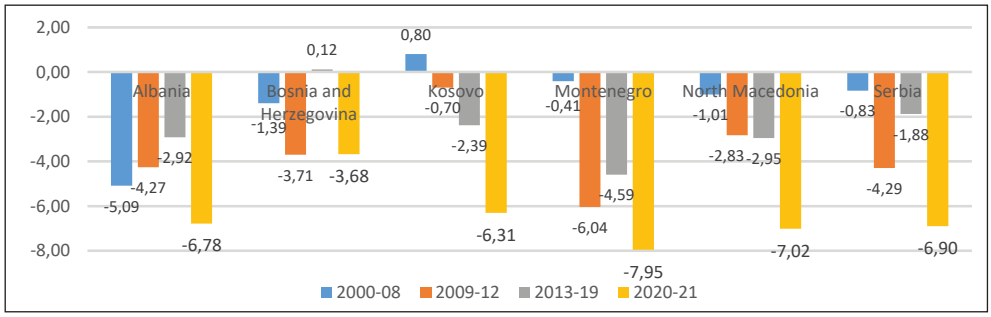
Figure 6: Fiscal deficit as a percentage of GDP in the EU, EMU and WB-6 group countries



Source: WEO database, April 2022 and author's calculations.

On the grounds of fiscal deficit, as viewed from Figure 6, again EU and EMU countries are showing worsening results, reaching the minimum point in the pandemic COVID years of 2020 and 2021, although during the Eurozone crisis period (2009-2012), the worsening trend of fiscal deficit in the EU and EMU is not negligible. This scenario confirms a sensitive case concerning the sustainability of the European public finances, mainly provoked by the pandemic COVID-19 crisis and Eurozone crisis, due to the cyclical effect of fiscal policy in Europe, subordinated from the increase of government spending, financing the economic consequences of both crises.

Figure 7: Fiscal deficit as a percentage of GDP in the individual WB-6 group countries



Source: WEO database, April 2022 and author's calculations.

Observing the fiscal sustainability performance of individual WB-6 countries, from Figures 6 and 7, concerning fiscal deficit criteria, we outline significant evidence of excessive deficits above the tolerated limit of 2-3 percent of GDP for all individual WB countries. This evidence is more severe during the pandemic years of 2020

and 2021 for the WB countries, recording an average value of fiscal deficit of -6.44 percent (see Figure 6). The following table outlines the fiscal rules in the individual WB-6 countries. However, viewing the fiscal performance of the Western Balkan countries with regard to the sustainability of the public finance concerning EDP procedures at the deficit and debt criterion would be highly hypothetical since the individual WB – 6 countries are neither members of the EU nor are to become members of the European Monetary Union in a near future.

Table 2: Fiscal rules in the WB-6 countries

Countries	Debt limit, in relation to GDP	Deficit limit, in relation to GDP
Albania	45 %	2% if g > 5%
Bosnia and Herzegovina		
Federation of Bosnia and Hercegovina	60%	
Republic Srpska	45%	3%
Kosovo	40%	2%
North Macedonia	Considering adaption of the EU fiscal rules	3%
Montenegro	60%	3%
Serbia	45	$1.9 + 0.7dt - 1 - 0.4gt$

Notes: *g* denotes growth rate of real GDP, $dt-1$ is the last year fiscal deficit

Source: Kikoni et al., 2019

The WB-6 countries are heterogeneous in relation to the EU accession status[18], exchange rate regimes[19] and the size of public expenditures. Therefore, each country must face its own decisions with respect to the specified fiscal rules, since fiscal policy consist the only major instrument for the economic stabilization and therefore needs to be controlled during economic booms, but flexible enough to allow deficit spending during economic downturns (Kikoni et al., 2019). Fiscal policy in the Western Balkan countries is a pivotal element for the sustainability of public finances, which within the different WB-6 countries is manifested through proficient use of taxation in the course of preserving a reasonable level of fiscal deficit and national debt (Dauti, 2021). The importance of the fiscal policy is also

[18] Albania, North Macedonia, Montenegro and Serbia are candidate countries for EU membership, while Bosnia and Herzegovina and Kosovo are still considered as potential candidate countries for EU membership.

[19] Kosovo and Montenegro both use the euro, while Bosnia and Herzegovina has a currency board and North Macedonia has a de facto euro peg. Albania and Serbia have flexible exchange rates, allowing some of the burden of stabilization to be borne by monetary policy and the exchange rate.

crucial for endorsing economic growth in the WB-6 countries enlightened through the transmission channel of fiscal policy. The expansion of fiscal policy through investment stimulation will improve the economic growth of the WB countries via the enhancement effect of investment on disposable incomes and therefore on consumption, which leads to economic welfare, triggering new jobs and new incomes for households (Dauti, 2021). This scenario will lead to an increase in tax receipts for the budget, which in turn stimulates public spending.

4.2. Empirical analysis

We discuss the economic interpretation of the Fixed Effects with Driscoll and Kraay's standard errors. To distinguish the effect of fiscal deficit on economic growth, concerning the pandemic COVID-19, WB countries, global financial turmoil period, and Eurozone debt crisis period, we have included the interaction terms between the respective dummy variables and the continuous variable of fiscal deficit[20]. By these interactions, we test the hypothesis that the effect of fiscal deficit on the economic growth is different among different periods distinguished with crisis factors and countries. The interaction term of fiscal deficit with the COVID dummy (d1) is statistically significant at 5 percent level of significance (column 2). Regarding this interaction term, the estimated coefficient of fiscal deficit for the COVID year of 2020, is 0.227(0.067 + 0.160 × 1) percent, whereas, for the non-pandemic years, this coefficient is 0.067(0.067 + 0.160 × 0) percent. The statistically significant difference of 0.067 percentage points in favor of COVID years means that the size of economic growth between two periods (pandemic and non-pandemic period), vary on the grounds of its magnitude, with respect to changes in the level of government structural balance. Hence 10 percent increase in the level of deficit component of a government structural balance, enhances economic growth in the pandemic and non-pandemic period, on average by 2.2 and 0.6 percent, ceteris paribus. Expansionist short run fiscal policies applied due to the pandemic COVID-19, in all the sample countries lead to increase of public expenditures and therefore maintain the economic growth at e reasonable level. The interaction term of fiscal deficit with Eurozone debt crisis is positive and statistically significant at 5 percent level of significance (column 5).The estimated coefficient of fiscal deficit for the Eurozone crisis period is -0.186(0.321 – 0.507 × 1), whereas

[20] The presence of a significant interaction indicates that the effect of one predictor variable on the response variable is different at different values of the other predictor variable. It is tested by adding a term to the model in which the two-predictor variables are multiplied. Adding an interaction term to a model drastically changes the interpretation of all of the coefficients. If there were no interaction term B_1 would be interpreted as the unique effect of fiscal deficit on economic growth at the whole sample countries. Since the interaction indicates that the effect of fiscal deficit on economic growth is different for different values of COVID dummy *(d1),* WB dummy *(d2),* financial crisis dummy *(d3)* and Eurozone debt crisis dummy *(d4),* the unique effect of fiscal deficit is not limited to B_1, but also depends on the values of the dummy variables.

for the benchmark category of years without such crisis, the growth enhancement effect of fiscal deficit is estimated to be 0.321(0.321 – 0.507 × 0) percent. Hence, 10 increase of the fiscal deficit, decreases (increases) economic growth in the debt crisis period (normal period) on average, by 1.8 (3.2) percent, respectively.

Table 3: Results from static panel estimation: Fixed effects with Driscoll and Kraay standard errors

Dep variable g_{it}	(1) Regular variables	(2) Covid-19 interaction	(3) WB interaction	(4) Financial crisis interactions	(5) Eurozone debt crisis interactions
gsb_{it}	0.0747***	0.0678***	0.145**	0.0796***	0.0586**
	(0.0212)	(0.0226)	(0.0547)	(0.0229)	(0.0229)
inv_{it}	0.226***	0.227***	0.219***	0.226***	0.229***
	(0.0657)	(0.0654)	(0.0639)	(0.0651)	(0.0664)
sch_{it}	0.0194	0.0182	0.0255	0.0201	0.0150
	(0.0260)	(0.0251)	(0.0257)	(0.0266)	(0.0246)
to_{it}	0.0359**	0.0366**	0.0350**	0.0362**	0.0343*
	(0.0168)	(0.0172)	(0.0164)	(0.0171)	(0.0166)
inf_{it}	-0.0425***	-0.0431***	-0.0428***	-0.0425***	-0.0421***
	(0.0117)	(0.0119)	(0.0120)	(0.0117)	(0.0116)
og_{it}	5.724***	5.753***	5.599***	5.798***	5.451***
	(1.513)	(1.530)	(1.478)	(1.513)	(1.467)
$gsb_{it}\times d_1$		0.160**			
		(0.0634)			
$gsb_{it}\times d_2$			-0.175		
			(0.142)		
$gsb_{it}\times d_3$				-0.0925	
				(0.0868)	
$gsb_{it}\times d_4$					0.179**
					(0.0680)
Observations	374	374	374	374	374
R-squared	0.693	0.694	0.696	0.694	0.695
Number of groups	17	17	17	17	17

Notes: Dependent variable is economic growth. Driscoll and Kraay standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 indicate significance level at 1, 5 and 10 percent level of significance. d_1 stands for covid-19 dummy, d_2 is the regional dummy variable capturing the WB countries, d_3 is the financial crisis dummy and d_4 stands for Eurozone debt crisis dummy.

Source: Author's calculation

The growth-declining effect of fiscal deficit in the debt crisis period can be attributed to the low fiscal space of the EU and EMU countries, once having regard the significant increase of public debt in these countries in the late years, especially during the Eurozone debt crisis (2009-2012) and the COVID era (2020-2021) (see Figure 5). On the other hand, the growth enhancement effect of fiscal deficit can be attributed to the high fiscal space of the respective countries to finance their economic activity from the deficit component of fiscal policy. This result indicates that the Keynesian approach of fiscal policy for governmental intervention in the real sector should be encouraged in the CE-EU and WB group of countries. For WB countries, the growth enhancement effect of public debt is an indication that WB countries, due to insufficient level of domestic capital, at the early stages of development rely pretty much on foreign resources to finance the domestic production activities, mainly via external debt, which for the transition countries constitute a significant component of the debt component. This finding coincides with the research which claims that public debt in the developing countries should be about half of that in developed countries (Mencinger et al., 2015). The insignificant coefficient of the interaction terms between fiscal deficit and WB countries (column 3) and financial crisis dummy (column 4), means that the size of economic growth between two group countries (WB and CE-EU countries) and two periods (financial crisis period and normal period), respectively, does not vary with respect to changes in the level of fiscal deficit. Therefore based on the country and financial crisis difference, we interpret the results with regular variables (column 1), which outline a growth enhancement effect of fiscal deficit. The positive relationship of the structural balance variable on economic growth is an indication that the Central East European Union and Western Balkan countries do rely on a debt component of the fiscal policy to finance the domestic production activities.

Considering the control variables, gross fixed capital investments are confirmed as growth enhancing factor, in all estimates, influencing growth level by 2 percent, per 10 percent increase on investment potentials in the sample of WB and CE-EU countries, other things being equal. The coefficient of trade openness is significant at 1 percent level of significance and its impact on growth magnitude is found to be marginal. Growth enhancement impact of trade openness is estimated to be only 0.3 percent, per considerable increase of the openness level of trade by 10 percent cent. This result can be attributed to low profile of applied EU integration policies of the WB countries, especially, once having regard that many of the WB countries are still facing EU integration challenges on the grounds of economic and political circumstances, making the EU approximation path still difficult for this group of countries. Inflation rate is confirmed to rely on a significantly negative association with the level of economic growth, in all the relevant estimates, although its size in economic terms is very small. Hence, a considerable level of 10 percent increase of inflation rate decreases average growth by 0.3 percent, ceteris paribus. On the other hand, the other coefficient, which in addition to cyclical component of

the economic activity proxy the potential inflation pressures, namely, output gap variable, is found to be statistically significant in all estimates, at 1 percent level of significance. All relevant estimates from table 3, confirm growth enhancement effect of output gap, as expected, although in economic sense, following Keynesian approach this potentially may instinct inflation pressures, which arises due to demand components of the economy. Table 4 show the system GMM estimates. These estimates report robust two - step GMM estimates which offers standard errors that are robust to heteroscedasticity and serial correlation (Roodman, 2006). The downward bias of standard errors is addressed in the two-step GMM by using the proposed correction term by Windmeijer (2005), which is implemented by the *xtabond2* stata command. Following Roodman (2008) suggestion for choosing appropriate system GMM specification, based on the p-value[21] of 0.25 obtained from Sargan test[22], we can choose the appropriate model of the robust system GMM estimates, for interpreting the results (Bowsher, 2002).

Table 4: Results from the dynamic panel estimation: System GMM

g_{it}	(1) Regular variables	(2) Covid-19 interaction	(3) WB interaction	(4) Financial crisis interactions	(5) Eurozone debt crisis interactions
g_{it-1}	0.328***	0.240**	0.315**	0.320***	0.277**
	(0.0988)	(0.109)	(0.108)	(0.102)	(0.101)
og_{it}	-15.72	-15.32	-13.90	-15.65	-10.000
	(9.344)	(9.209)	(9.712)	(9.434)	(8.531)
gsb_{it}	0.0904	0.143	0.0532	0.101	-0.0158
	(0.118)	(0.111)	(0.128)	(0.122)	(0.0907)
inv_{it}	0.195***	0.210**	0.197**	0.191***	0.164***
	(0.0647)	(0.0830)	(0.0684)	(0.0645)	(0.0549)
sch_{it}	0.0110	0.0348	0.00352	0.0126	0.007 02
	(0.0858)	(0.0851)	(0.0962)	(0.0841)	(0.0963)
to_{it}	0.00816	0.0105	0.00698	0.00761	0.00253
	(0.0084)	(0.00909)	(0.00893)	(0.00805)	(0.00731)

[21] The Bowsher results suggest that merely keeping the instrument count below N does not safeguard the Sargan-test, The danger is compounded by a tendency among researchers to view p-values on specification tests above 'conventional significance levels of 0.05 or 0.10 with complacency. Those thresholds, thought to be conservative when deciding on the significance of a coefficient estimate, are liberal when trying to rule out correlation between instruments and the error term. A p-value as high as, say, 0.25 should be viewed with concern (Roodman, 2008).

[22] The Sargan test is used for testing the validity of instruments, extremely large and small p - values of this test weakens the validity of instruments. As much instruments we include in the regression model, the Sargan test becomes sufficiently powerful to reject Ho for the validity of instruments.

g_{it}	(1) Regular variables	(2) Covid-19 interaction	(3) WB interaction	(4) Financial crisis interactions	(5) Eurozone debt crisis interactions
inf_{it}	-0.00712 (0.0063)	-0.00191 (0.00778)	-0.00444 (0.00608)	-0.00741 (0.00652)	-0.00842 (0.00729)
$gsb_{it}\times d_1$		1.391*** (0.262)			
$gsb_{it}\times d_2$			0.247* (0.120)		
$gsb_{it}\times d_3$				-0.0666 (0.220)	
$gsb_{it}\times d_4$					0.530** (0.240)
Constant	-3.197 (7.055)	-5.539 (6.906)	-2.697 (8.075)	-3.084 (6.922)	-1.165 (8.192)
Observations	357	357	357	357	357
Nrof groups	17	17	17	17	17
AR test (1) in 1st difference	0.001	0.003	0.001	0.001	0.001
AR test (2) in 1st difference	0.053	0.048	0.062	0.042	0.039
No of instruments	12	12	12	12	12
F statistics, p value	0.000	0.000	0.000	0.000	0.000
Sargan test overd.rest, p	0.000	0.000	0.000	0.000	0.000
Hansen test overd.rest. p	0.058	0.057	0.039	0.061	0.063
Diff. in Hans test for ex. of instr.					
Hans test for excluding groups	0.059	0.041	0.053	0.058	0.240
Difference	0.177	0.251	0.121	0.191	0.048
Gmm (g_{it-1}, col (1,2))					
Hans test for excluding groups	0.021	0.024	0.024	0.019	0.054
Difference	0.278	0.253	0.172	0.318	0.157
Gmm (og_{it}, col(2,3))					
Hans test for excluding groups	0.095	0.847	0.091	0.120	0.071
Difference	0.096	0.028	0.065	0.087	0.128

Notes: Dependent variable is economic growth. Z-statistics in brackets, ***, ** and * indicate significance of coefficients at 1, 5 and 10 per cent, respectively. Internal instruments are used for endogenous variables (lagged dependent variable and output gap). Lag limits are 1/2 for the lagged dependent variable and 2/3 for endogenous regressors. The collapse option is always used.

Source: Author's calculation

Moreover, based on the Hansen test of over-identifying restrictions and the Hansen test of the exogeneity of GMM instruments, the diagnostic tests provide evidence of the instruments' validity. The validity of instruments for endogenous components and the GMM system is applied for estimation purposes. The p-value of 0.00 of the F test in all specifications suggests rejection of the null hypothesis that the independent variables are jointly zero. The dynamics are important in the estimates in order to capture the convergence process of the selected WB and CE-EMU countries. All system GMM estimates are confirming the theoretically expected result that current growth is subject to persistence effects. The results have proved that the increase of agglomeration effect is by 10 percent, resulting in an increase in the current growth level in the WB and CE-EU countries, by 3 percent, on average, ceteris paribus. The fact that some of the significant explanatory variables reported in the static panel models become insignificant in the system GMM specification, with the exception of the lagged dependent variable, suggests that some of the explanatory power of the lagged dependent variable is misleadingly attributed to the other variables in the static specification. Therefore, the empirical results of the model imply that some lost dynamics exist in the static panel models, thus endorsing that the empirical findings of the static models should be recognized with vigilance.

5. Results and discussion

The results of the research confirm that the fiscal sustainability factor, which constitutes the main interest of the study, like fiscal deficit measured by general government structural balance, as a share of GDP, appears vital element in explaining growth behavior of the WB countries. The magnitude of the estimated coefficients denoting the size of the impact, the significance level, and the estimated sign of the coefficients are robust to different specifications of the growth model (columns 1-5) concerning the financial performance of the WB countries. Highlighting the details, we outline a growth enhancement effect of fiscal deficit in the WB and CE-EU countries, which is an indication that the Keynesian approach of fiscal policy for governmental intervention in the real sector should be encouraged in both groups of countries. The practical implication of this argument is that fiscal deficit rises domestic production due to the increase of public capital expenditures, which in the second cycle influence private investments. Therefore, the involvement of the governments in the economic life of the WB countries is recommended, to boost private investments and encourage growth in the short and long run. When interacting with COVID-dummy, the fiscal deficit is found to be in a positive relationship with growth. The explanation of the growth enhancement effect of fiscal deficit in the pandemic COVID-19 years can be attributed to the fact that public spending during the COVID-19 crisis went through a rapid restructuring in all the WB and CE-EU countries. The intention was to finance the liquidity in the

private sector, mainly the service sector to save jobs and manage the sustainability of economic development. In addition, all the WB countries during COVID received significant IMF support in the name of the Macro-Financial Assistance program from the EU, being credited 1.5 billion euros (World Bank, 2021). Albania, North Macedonia, Kosovo, and Bosnia and Herzegovina, also received support from the World Bank to disburse emergency COVID -19 operations in response to the pandemic (World Bank, 2021, Elezi, 2020). Based on a World Bank Report on subdued and greening the recovery, the region of the WB countries in 2020, on average recorded 6% of GDP higher public expenditures than the previous year. In Albania, Bosnia and Herzegovina, and Serbia, capital expenditures increased, while in the other (three) countries in the region they decreased, due to the transfer priorities and costs for social transfers and subsidizing the economy with anti – COVID measures (World Bank, 2021). In addition, the growth enhancement effect of the cyclical component of fiscal deficit is an indication that transition countries were financing their investment needs, during the late 90th and early 20th years, from external debt, once, outlining the fact that public debt in the transition countries was mainly composed of the external debt, rather than domestic debt, during the observed period. However, public debt in the WB countries is not sufficiently large to offset potential investments (Dauti, 2021). Low public debt increases the ability to implement procyclical fiscal policy, resulting in lower volatility and higher growth, which is usually evident in the electoral years, once pointed out that WB countries during the near past went through many cyclical electoral campaigns, due to turbulent political circumstances they went through. However, when interacting with the yearly period capturing the Eurozone debt crisis, a growth declining effect of fiscal deficit is confirmed, which can be attributed to the low fiscal space of the Central East EU and EMU countries. With respect to regular variables, the results of the study outline a growth enhancement effect of investments, trade openness and the output gap, and the growth-declining effect of the inflation rate, as expected. The negative impact of inflation on economic growth is due to the inherent effects of inflation and the inflation rate, which was running high, especially, during the observed different crisis periods like the global financial turmoil crisis, Eurozone debt crisis, and post-COVID-19 economic crisis (World Bank, 2021). The results claim that Trade openness also induces growth, potentially due to the gains that trade liberalization may provide for the increase of economies of scale and scope and the increase of the income level in the CE-EU and the WB countries, although in terms of the economic impact the effect is marginal. This result is an indication that trade liberalization policies in the WB region should be encouraged furthermore, for enhancing growth, by providing greater economies of scale and scope, technology spillover, and stimulation of the export platform of FDI in the second stage (Dauti, 2016). The growth enhancement effect of total investments verifies the theoretical basis of investments on growth, which is mainly driven by different factors affecting the demand and supply side of the economy. Moreover, the confirmed evidence of a positive impact of the output gap on economic growth, on a theoretical basis means

a convergence of actual GDP to its potential level, which is explained through the expansion of the demand components of the economy, like consumption, investment, government expenditures or net exports. In addition, economic policy reforms that the WB countries have gone through in the near past, for reaching a suitable level of EU approximation path have pushed forward an increasing trend of the actual levels of GDP over the trend level, mainly via the increase in the demand components of the growth. The insignificant coefficient of schooling, which is a proxy for human capital development in the WB and CE-EU countries, suggests that developments in the human capital in both country groups are likely to be heterogeneous in nature, making the case an empirical matter for each country. This indicates that the potential growth enhancement effect of human capital in each country can produce an understanding for the policymakers of these countries to build an appropriate public policy for education and training programs.

6. Conclusion

The presented results of our analysis proved the hypothesis that the fiscal sustainability factor of a fiscal deficit has a significant effect on growth level. Growth-heightening effect of fiscal deficit for the selected WB and CE-EU countries is grounded on the productive use of public investments, indicating that initial development stages in the transition countries are mainly financed by foreign capital through borrowings via external debt during the early development stage. On the other hand, the growth-declining effect of the fiscal deficit during the Eurozone debt crisis period is explained through the low-fiscal space of public investments due to high debt limits reached by the CE-EMU countries during the observed period. The control variables help explain the economic growth in the WB countries and find that trade openness positively influences the growth, although its effect is marginal in terms of economic size. Total investments and the output gap are confirmed as growth-enhancing factors, whereas the inflation rate is a growth-declining factor. This research contributes to the growth literature, by examining empirically the effects of fiscal deficit on economic growth in the WB and CE-EU region, having regard to the fiscal performance of the WB region, especially in terms of fiscal deficit and public debt subject to the Stability and Growth Pact, are crucial factors for economic EU adherence criteria of the WB region. The limitations of the research are pertaining to the institutional factors at a governance level, which are missing as control variables in the research, which on the other hand can be considered as deep forces behind managing the financial performance of the WB region. Therefore, a fruitful direction for future research would be to treat the impact of the interactions between the governance factors and the fiscal sustainability performance of the WB region, especially, on economic growth, once having regard that the WB region went through institutional challenges associated with conflicts and wars in the near past.

From the forward-looking perspective, the Western Balkan countries face extensive structural challenges as they struggle to adjust their national fiscal policies in coherence with the EU agenda in order to make their economies adaptable to EU standards. Efforts in the WB countries directed at sustaining deficit and debt levels at realistic highnesses, aggravated by different factors like population aging and shortage of labor supply due to migration, may be unproductive. This situation leads to a potential increase in expenditure pressure, provoking new borrowings and hence an increase in debt and deficit levels. The WB countries are persistently exposed to the need for fiscal consolidation as their approximation paths to the EU integration process reach a suitable level. In terms of fiscal consolidation, from the viewpoint of the supply-side economics, the recommendation for the sample countries would be to concentrate the capital and public investments on productive economic sectors, during normal times, which contain competitive advantages at a national and regional level that expectedly will result on lower inflation and higher output. From the viewpoint of demand-side economics, the recommendation for the sample countries would be to stimulate aggregate demand through consumption and investment increase, during recessions, in bad times.

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Gospodarski rast u Srednjoistočnoj Europskoj uniji i zemljama Zapadnog Balkana tijekom Pakta o stabilnosti i rastu i COVID-19

Bardhyl Dauti[1], *Shiret Elezi*[2]

Sažetak

Ovo istraživanje ima za cilj utvrditi empirijsku procjenu odnosa između čimbenika održivosti fiskalne politike, poput fiskalnog deficita i gospodarskog rasta u zemljama zapadnog Balkana i zemljama Istočne Europske unije koristeći panel baze podataka za godišnji vremenski raspon od 2000. do 2021. godine. Empirijski model istražuje utjecaj fiskalnog deficita, uz ostale kontrolne varijable poput inflacije, školovanja, ukupnih ulaganja, otvorenosti trgovine i proizvodnog jaza na gospodarski rast u odabranoj skupini zemalja. Za potrebe istraživanja koristili smo statičku i dinamičku panel procjenu tehnike poput fiksnih učinaka s Driscol i Kraay standardnim greškama i sustav GMM. Nalazi potvrđuju da je fiskalni deficit značajno utjecao na razinu rasta u obje skupine zemalja. Osim toga, kada se fiskalne varijable dovedu u interakciju s COVID-19 dummy varijablama, fiskalni deficit rezultira značajnim i pozitivnim učinkom na gospodarski rast. Međutim, kada je fiskalni deficit u interakciji s razdobljem dužničke krize u Euro-zoni, on postaje čimbenik koji pogoršava rast. Ostale kontrolne varijable poput inflacije, otvorenosti trgovine, ukupnih ulaganja i proizvodnog jaza smatraju se važnim čimbenicima u objašnjavanju uspješnost rasta zemalja srednje i istočne Europe i zapadnog Balkana.

Ključne riječi: *fiskalna politika, BDP, zemlje Zapadnog Balkana, javne financije*

JEL klasifikacija: *H3, H6*

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Appendices

A – Table 5: Descriptive statistics

Variables	Observations	Mean	Standard deviations	Min	Max
g_{it}	374	3.175	3.813	-15.2	11.965
gsb_{it}	374	-2.408	2.824	-12.798	7.557
inv_{it}	374	23.955	4.832	12.201	39.215
sch_{it}	374	77.321	4.792	62.12	86.32
to_{it}	374	107.63	32.037	22.49218	190.6986
inf_{it}	374	108.154	47.399	31.97	313.248
og_{it}	374	-.0047	.1014	-1.106	.432
d_1	374	.0454	.2085	0	1
d_2	374	.3529	.4785	0	1
d_3	374	.0454	.2085	0	1
d_4	374	.1818	.3862	0	1

Source: Author's calculation

B – Table 6: Correlation Matrix

	g_{it}	gsb_{it}	inv_{it}	sch_{it}	to_{it}	inf_{it}	og_{it}
g_{it}	1						
gsb_{it}	0.255	1					
inv_{it}	0.229	0.067	1				
sch_{it}	0.051	-0.073	0.124	1			
to_{it}	-0.030	0.008	-0.081	0.194	1		
inf_{it}	-0.158	-0.005	-0.219	-0.072	0.026	1	
og_{it}	0.0278	-0.152	0.271	0.024	0.103	0.062	1

Source: Author's calculation

C – Table 7: Variable description

Variables	Definition	Source
g_{it}	Economic growth, calculated as a percentage change of real GDP growth, IMF, world economic outlook (WEO) database of January 2021	IMF, world economic outlook (WEO)
gsb_{it}	Fiscal deficit, government structural balance as a percentage of potential GDP, general government cyclicality adjusted balance for nonstructural elements, beyond the economic cycle.	IMF, world economic outlook (WEO)
inv_{it}	Investments, gross fixed capital formation and changes in inventories and acquisitions less disposal of valuavble for a unit or sector, as a percent of GDP	World Bank, World Development Indicator
sch_{it}	Schooling, percentage of total working-age population with advanced education	World Bank
to_{it}	Trade openness, The sum of exports and imports over GDP	UNCTAD
inf_{it}	Inflation, percentage change of the average consumer prices	IMF, world economic outlook (WEO)
og_{it}	Output gap, percentage difference of actual GDP from trend GDP, as calculated with Hodrick-Prescott filter	IMF, world economic outlook (WEO) and author's calculation
d_1	$d_1 = 1$ stands for the pandemic year of 2020 and $d_1 = 0$ captures the benchmark category of the normal years without pandemic	Own knowledge
d_2	$d_2 = 1$ stands for the WB Countries and $d_2 = 0$, captures the benchmark category of the CE-EU member states	Own knowledge
d_3	$d_3 = 1$ stands for the global financial turmoil year of 2008 and $d_3 = 0$ is for the rest years	Own knowledge
d_4	$d_4 = 1$ stands for Eurozone debt crisis period, considering the years from 2009 to 2012 and $d_4 = 0$ is the benchmark category of the years without such crisis.	Own knowledge

Source: Author's calculation

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The dynamics of crowdfunding campaigns in the Middle East: Does social capital matter?*

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Abstract

The purpose of this study is to analyze the dynamics of crowdfunding campaigns in the Middle East and raise the question of "does social capital matter" in this respect? The study uses the Zoomaal.com platform as a case study for 2019 and 2020. Required data was collected from Zoomaal.com and conducted online semi-structured interviews with key people in control to further explore the crowdfunding practice in the selected Middle Eastern countries (i.e., Turkey, Egypt, Oman, Saudi Arabia, Bahrain, Kuwait, and UAE). The OLS robust standard error regression and logistic regression techniques were both utilized to test the study model. The findings reveal that social capital in the Middle East countries is very coherent and both structural dimension (DS) as measured by entrepreneurs' interaction with the social media (such as Facebook and Instagram) and cognitive dimension (DC) as measured by the number of words that are composed by entrepreneurs in the Zoomaal.com platform has significant positive impacts on the crowdfunding campaign success. Moreover, we confirm our results to Zoomaal.com and conclude the main factors that influence the success or failure of a crowdfunding campaign in the Middle East.

Key words: *Social capital, crowdfunding, crowdfunding campaign, social capital theory, Middle East*

JEL classification: *G11, G19, G21, M13, O16, O52*

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1. Introduction

Crowdfunding is a new and developing peculiarity in entrepreneurial finance that permits project proprietors to demand financing from a possibly huge pool of financial backers. Researchers order it into four models dependent on the advantages procured from the patrons: donation, reward, lending, and equity (Arshad and Berndt, 2021). Many literature reviews on crowdfunding sort crowdfunding research into alternate points of view yet give restricted hypothesis improvement. Social capital writing offers a promising focal point for comprehension crowdfunding. The social capital theory has gotten expanding consideration in crowdfunding research and may work with hypothesis improvement and theory development in this field (Cai et al., 2021).

Moreover, a quickly expanding number of innovative drives by the two people and firms get capital through crowdfunding campaigns. These campaigns include "an open call, for the most part through the Internet, for giving monetary assets either as a gift or in return for the future item or some type of remuneration" (Abdeldayem and Aldulaimi, 2021a). Hence, a promising exploration strand has started to investigate the determinants of the achievement of crowdfunding campaigns. Achievement in "go big or go home" models of crowdfunding is arrived at when an undertaking gathers capital equivalent to or more prominent than the objective sum. Recounted and enlightening proof proposes that getting commitments following the beginning of a project to a great extent expects the campaign accomplishment (e.g., Aprilia and Wibowo, 2017). Comparative examples have been accounted for in other web-based settings, for example, peer-to-peer lending (Zhang et al., 2014) and web auctions (Colombo et al., 2015). Regardless, there has been no far-reaching conversation of the instruments that make early commitments so significant for the crowdfunding campaigns' accomplishments. All the more significantly, we realize minimal regarding what prompts the fascination of early commitments. The current paper expects to add to filling both of those gaps.

Based on the above, and in light of the increasing importance of crowdfunding platforms and their role in providing the necessary financing to support economic projects and thus enhance financial inclusion. This study aims to shed more light on crowdfunding platforms as one of the most important financing channels that have emerged in the context of the growing role of modern financial technologies. In this study, the main hypothesis can be stated in the null form as follows: "Social Capital has no statistically significant impact on the dynamics of crowdfunding campaigns in the Middle East".

This study will make a valuable and important contribution to the literature at both the theoretical and practical levels. At the theoretical level, the results of this research will provide empirically based information on the impact of social capital on the dynamics of crowdfunding campaigns in the Middle East. This study

also contributes to the larger area of economic and behavioral finance theories by highlighting the effect of social capital on the dynamics of crowdfunding campaigns in the Middle East. At a practical level, this research may also contribute to the evaluation of the effectiveness of crowdfunding campaigns made by Middle Eastern policymakers and entrepreneurs. Additionally, it may be contributing to the improvement of crowdfunding practices in the Middle East. After all, the results of this study will have implications for improvements in practices of economic and finance and may be used as a guide towards advancing the management and performance of the crowdfunding campaigns in the Middle East.

The remaining structure of this paper is as follows: Section 2 presents the literature review. Section 3 introduces the methodology. Section 4 discusses the empirical data and analysis, Section 5 explains the statistical analysis results, and Section 6 deals with the conclusions.

2. Literature review

It is difficult to include social capital in economic analysis because it is an abstract concept that cannot be measured directly or easily. One proposed method for measuring social capital is the Pro-Social Valuation (PSV). This tool has the advantage of being: neutral; transparent; based on data from primary research; Global? As it provides a universally understood unit of impact to measure social capital; Effective as a tool that improves effectiveness and efficiency.

On the other hand, some important aspects such as innovation, for example, cannot be measured, which leads to a preference for risk-avoiding initiatives that are rarely the most effective way to solve major social problems. Social capital plays a vital role in sustainable development and supporting institutions, networks, and their supporting norms and values, for the success of development interventions (Grootaert et al., 2002; Abdeldayem et al., 2021)

Nahapiet and Ghoshal (1998) characterized social capital with three particular dimensions or measurements: structural, relational and cognitive. The structural component of social capital incorporates social association that catches the degree of interconnectedness among the individuals from an organization. Such social capital concretes itself as a fundamental segment to entrepreneurship success in deciding the nature of systems administration openings (Abdeldayem and Aldulaimi, 2020a, b, and c).

The concept of social capital refers to “features of social organization, such as networks, norms and trust, which facilitate coordination and cooperation to achieve mutual benefit”. Putnam (1993) emphasized that social capital

is one of the most important factors in achieving economic development. Studies conducted on the fast-growing economies in East Asia have always emphasized the importance of dense social networks. They also presented a new concept in this field, which he called "network capitalism." Moreover, the crowdfunding market consists of different subtypes of platforms, including Crowdfunding platforms dedicated to fundraising, Funding platforms Reward-based crowdfunding, and crowdfunding platforms dedicated to lending peer to peer platforms; crowdfunding based platforms Contribution to ownership through investment in shares.

Most crowdfunding studies conducted at the micro-level, zeroing in on financial backers or crowdfunding campaign execution. At the large scale (macro) level, very few studies examined social capital as a kind of casual establishment that can replace formal organizations to fairly ensure crowdfunding financial backers. Past proposed that in areas where formal establishments were lacking, social capital assumed a more significant part in the advancement of firms (Peng and Heath, 1996), monetary business sectors (Allen et al., 2005; Guiso et al., 2004) and economies (Allen et al., 2005) than in places with more grounded legitimate securities. Fehr et al. (2020) believe social capital to be a casual foundation, which positively influences public crowdfunding volume. Nonetheless, Fehr et al. (2020) do not make the connection between social capital and legitimate foundations into thought. Hence, there is no single study investigating the impact of social capital on the dynamics of crowdfunding campaign in the Middle East. At the theoretical level, this study's findings provide empirically- based results on the impact of social capital on the success or failure of Crowdfunding campaigns. At a practical level, this research may also contribute to the policymakers in the Middle East in the assessment and evaluation of the effectiveness of the different models of building attractive and successful crowdfunding campaigns, contributing to the advancement of management and corporate governance practices of crowdfunding campaigns. We hope that our study will help cement the importance of networks in online platforms and initiate more research into this underexplored domain. Several studies propose that social capital assumes a positive effect in crowdfunding campaign execution; notwithstanding, past research has tracked down some 'dull sides' of social capital in entrepreneurial finance. Future research may investigate the negative parts of social capital.

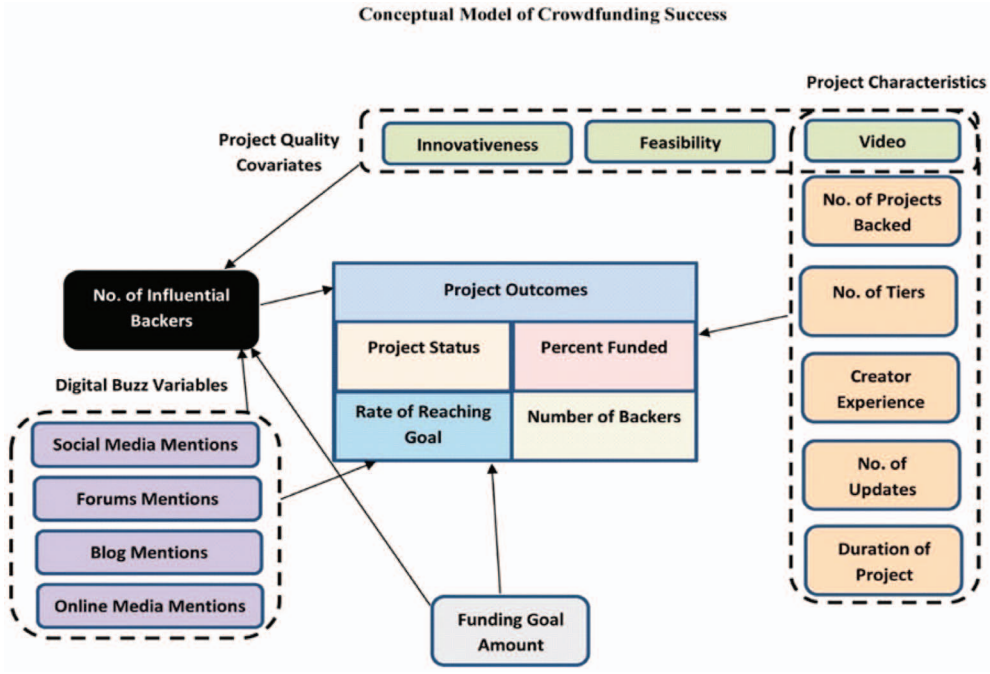
3. Methodology

The purpose of this study is to analyze the power of social capital (SC) i.e. structural demission (DS), relational demission (DR), and cognitive demission (DC) on the dynamic of CF campaign in the Middle East using Zoomaal.com as a case study for 2019 and 2020. We collect the required data straightforwardly

from Zoomaal.com and conducted online semi-structured interviews with key people in control to explore further crowdfunding practices in the selected Middle Eastern countries (i.e., Turkey, Egypt, Oman, Saudi Arabia, Bahrain, Kuwait, and UAE). In the Middle East, there are three common crowdfunding (CF) platforms for funding projects namely: Zoomaal, Eureeca, and Yomken. Zoomaal "is the leading crowdfunding platform in the Middle East for creative, social and youth projects". Eureeca is an equity-based platform and Yomken is "a platform for collaborative innovation and support for innovative ideas in the Middle East". This study is confined to the Zoomaal.com platform as a major platform for funding entrepreneurs in the Middle East.

To achieve the objectives of this study, we follow Zhang et al. (2014) and Aprilia and Wibowo's (2017) constructs of crowdfunding performance. To measure the social capital, we use three dimensions as follows: 1) structural "measured by entrepreneur interaction with social network", 2) relational, "measured by the obligation of reciprocation perceived", and 3) cognitive "measured by the ability to make the perception among investors". Figure 1 summarizes the model of crowdfunding success.

Figure 1: Model of Crowdfunding Success



Source: Tan and Reddy (2021)

The population covered by the study is all Middle Eastern crowdfunding projects on "Zoomaal.com". The samples chosen are dependent on a few measures. They are as follows:

(1) Crowdfunding projects have begun since Zoomaal.com was set up, and these projects finished their campaigns by January 1, 2021;

(2) Crowdfunding projects have one gift or investment of at least BD 1 (around USD 2.65), as indicated by the least administrative gift of Zoomaal.com; and

(3) The proprietor of that crowdfunding project should have web-based media Facebook or Instagram.

The study uses crowdfunding project length/ duration and measure of gifts expected to subsidize a crowdfunding project. We use a few control factors: the beginning year of the project, crowdfunding project classification, and the Middle Eastern country where the crowdfunding project is carried out (i.e. Turkey, Egypt, Saudi Arabia, Bahrain, Kuwait, UAE, and Oman). "OLS robust standard errors regression" was utilized for testing the study model. This model is used to see whether the three dimensions studied influence the success percentage of a crowdfunding campaign:

$$CP_{per,i} = a_0 + a_1 DS_i + a_2 DR_i + a_3 DK_i + a_4 lnCG_i + a_5 CD_i + \boxed{DCIT_i} + \sum_{i=1}^{2} \beta_i DY_i + \sum_{i=1}^{9} \gamma_i DC_i + \sum_{i=1}^{7} \delta_i DY_i + \varepsilon_i \quad (1)$$

Where:

$CP_{per,i}$ is "the Comparison between actual funds that were achieved in the crowdfunding project with the expected goals for project I"

DS_i is "The number of Facebook friends (or Instagram followers) of crowdfunding project owner I"

DR_i is "The number of other projects financed by the project owner on the same platform for project I"

DK_i is "The number of words in the project narrative considered where investors could perceive the ability of the project owners to make the same perception for project I"

CG_i is "The amount of funding needed to make crowdfunding projects i a success"

CD_i is "Crowdfunding project duration for project i (starting date until the expiry date of a project when campaigned on Zoomaal.com"

DY_i "Dummy for year of commencement crowdfunding project i, dummy would be divided into year 2019 and 2020"

DC_i is "Dummy is divided into 9 groups: home inventions, health & wellbeing, sporting industry, educational industry, food industry, Fintech & innovation, social events, entertainment industry and emergency & crisis"

$DCIT_i$ "Dummy for area where crowdfunding project implemented. Dummy is divided into 7 groups according to the seven Middle Eastern countries included in this study i.e. Turkey, Egypt, Saudi Arabia, Bahrain, Kuwait, UAE and Oman".

ε_i is "the residual errors".

Furthermore, Cronbach's alpha was used to determine the research tools' reliability. This method is utilized for calculating the internal consistency of measurement tools that measure different features (see Abdeldayem and Sedeek, 2018; Abdeldayem and Aldulaimi, 2021a and b). We used the Kuder and Richardson 20 tests for reliability analysis. This test verifies the internal consistency of measurements using dichotomous selection. It is equivalent to applying the split-half method for all combinations of questions and applies where each question is correct or incorrect. A correct and incorrect question scores 1 and 0 respectively. The test statistic is:

$$\sigma_{KR20} = \frac{k}{k-1}\left(1 - \frac{\sum_{j=1}^{k} p_j q_j}{\sigma^2}\right) \quad (2)$$

Where:

k = number of questions

p_j = Number of individuals in the sample that responded correctly to question j.

q_j = Number of individuals in the sample who failed to correctly answer question j.

σ^2 = variance of the total scores of all the people taking the test = VARP (R1) where R1 = array containing the total scores of all the people taking the test.

The alpha value for the entire questionnaire is 0.81 that is greater than 0.70, hence, the questionnaire is found to be stable.

4. Empirical data and analysis

We gathered the required data straightforwardly from Zoomaal.com, and we conducted online semi-structured interviews with key people in control to explore further crowdfunding practices in the Middle East. To begin with, the robustness of the data was checked using the "Breusch-Agnostic test" for "heteroscedasticity". The Breusch-Agnostic test includes utilizing a variance function and utilizing a $\chi 2$-test to test the null hypothesis (H0) that heteroskedasticity is absent (for example homoskedastic) against the alternative hypothesis (H1) that heteroskedasticity is available. The model outcomes demonstrate the likelihood of $\chi 2$ at 0.000, which

implies that there is "heteroscedasticity". (Abdeldayem and Aldulaimi, 2021a). To stay away from the issue, we do a treatment with "OLS Robust" to eliminate "heteroscedasticity". The "heteroscedasticity" is taken out by weighting fluctuation with robust standard errors.

Our sample covers the period of September 2019 to October 2020. The sample includes all real-account that have been followed at least once by the owners of real-account in the Zoomal.com platform. We exclude platforms that exist for less than 180days (half a year) and execute fewer than 3 trades in the sample period. After the trimming process, our sample includes 982 real-account in the Zoomal.com platform.

Table 1 presents a correlation matrix to the collected data. The table shows 0.7 in outright terms, which means there is no issue of "multi-collinearity" in independent variables and controls, with the goal that every single autonomous variable and control can be utilized in this study. Table 2 provides descriptive statistics and spellbinding measurements of the crowdfunding campaigns in the Middle East for two years: 2019 and 2020. Successful projects percentage is figured by contrasting the gift/investment accomplished with an underlying gift/investment target, which is set by Middle Eastern entrepreneurs, we refer to it as "*CPper*". Table 2 also reveals that the mean average of *CPper* is 68%, which implies an average success of crowdfunding projects in Zoomaal.com is 68% of the total campaigns in the Middle East. The most noteworthy successful campaign as far as fundraising is almost 10 times the crowdfunding goal (CG). The average number of financial backers (investors) who partook in the project illustrated, i.e. *CPinv* variables, is 133 investors and the most extreme financial backers in a single project was 1228 individuals.

Table 1: Correlation Matrix

	"Structural Dimension" (DS)	"Relational Dimension" (DR)	"Cognitive Dimension" (DK)	"Crowdfunding Goal" (CG)	"Crowdfunding Duration" (CD)
DS	1.000				
DR	0.142	1.000			
DK	0.233	-0.102	1.000		
CG	0.117	0.055	0.376	1.000	
CD	-0.139	-0.0345	-0.114	-0.046	1.000
Observ.	1330	1330	1330	1330	1330

Source: Authors' research

In Table 2, *CPlogit*, which shows the number of successful crowdfunding campaigns, has an average estimation of 36%. It implies that 36% of the samples

figured out how to focus on targeted funding. The number of entrepreneurs' Facebook friends (or Instagram followers) demonstrated by the structural dimension (DS) shows that the average number of entrepreneurs' Facebook friends (or Instagram followers) from the general sample is 11 970 individuals. The most elevated number of Facebook friends (or Instagram followers) is 29 275 companions and the least is 82 companions.

Crowdfunding goal (CG) shows the underlying ostensible objective indicated by the entrepreneur. Since values are regarding a huge number of US Dollars, we change this variable into a log structure. Concerning the underlying ostensible objective, the maximum value is 51.55 and the minimum value is 28.77. Crowdfunding duration (CD) shows crowdfunding project length and is determined regarding hours. Table 2 reveals that the average duration of a crowdfunding project from the general sample added up to 901.05 hours. The longest duration of a project is 2377 hours and the briefest was 2.55 hours. The overall standard deviation for the whole sample is 651.20 hours, showing that the crowdfunding project duration in the Middle East is very fanned out and different.

Table 2: Descriptive Statistics

	Successful projects (%) *CPper*	No. of investors *CPinv*	No. of successful campaigns *CPlogit*	DS	DR	DK	CG	CD
Mean	0.68	133	0.36	11970	0.11	3325	34.12	901
Median	0.3	42	1	10533	0	723	31.22	835
Max.	5.91	1228	3	29275	8.12	5855	51.55	2377
Min.	0	1	0	82	0	168	28.77	2.55
Std. Deviation	0.66	221	0.52	4879	0.61	504	2.8	651
Observations	1330	1330	1330	1330	1330	1330	1330	1330

Source: Authors' research

We add three factors to improve better clarification by the assessed model. To start with, we use a zone where the crowdfunding venture will be assigned or executed. The projects' zone is arranged into seven Middle Eastern countries (i.e., Turkey, Egypt, Saudi Arabia, Bahrain, Kuwait, UAE, and Oman). Second, we use the crowdfunding project class. The project is arranged into 9 classes: home inventions, health & wellbeing, sporting industry, educational industry, food industry, Fintech & innovation, social events, the entertainment industry, and emergency & crisis. Third, for the year wherein the project would start, we specifically use 2019 and 2020.

Moreover, we affirm our results to Zoomaal.com and conclude three main factors that influence crowdfunding campaigns in the Middle East namely: the network impact, the story impact, and the campaign itself. The main factor is the network impact. The impact is generally a venture identified with crises and clinical help. This happens because the project needed earnestness so financial backers feel the venture ought to be subsidized rapidly; though, in this project, a decent story. The last factor is the campaign itself. Entrepreneurs should lobby for their projects, through a correspondence network such as WhatsApp, Facebook, Instagram, and Twitter.

5. Results and discussion

After data collection and analysis both of secondary and primary data, the researchers reject the null hypothesis and accept the alternative hypothesis that "Social Capital has no statistically significant impact on the dynamics of crowdfunding campaigns in the Middle East". The purpose of this study was to analyze the power of social capital (SC) i.e. structural demission (DS), relational demission (DR), and cognitive demission (DC) on the dynamic of CF campaign in the Middle East using Zoomaal.com as a case study for 2019 and 2020. We collect the required data straightforwardly from Zoomaal.com and conducted online semi-structured interviews with key people in control to explore further crowdfunding practices in the selected Middle Eastern countries (i.e., Turkey, Egypt, Oman, Saudi Arabia, Bahrain, Kuwait, and UAE). To achieve the objectives of this study, we follow Zheng et al. (2014) and Aprilia and Wibowo's (2017) constructs of crowdfunding performance. To measure the social capital, we use the three dimensions as follows: 1) structural, "measured by entrepreneur interaction with social network", 2) relational, "measured by the obligation of reciprocation perceived", 3) cognitive, "measured by the ability to make the perception among investors".

Overall, the results of this study reveal that network is a principle feature that decides the success or failure of an undertaking crowdfunding campaign in the Middle East. As far as the agency problem is concerned, entrepreneurs and financial backers or investors who realize each other will fundamentally decrease asymmetric information. The chance of financial backers being frustrated can likewise be limited since this association is set up from a feeling of companionship and right now settled trust of each other. These results are in line with previous studies, particularly the study of Aprilia and Wibowo (2017), Dhanani and Mukherjee, 2017; Hervé and Schwienbacher, 2018).

This study will make a valuable and important contribution to the literature at both the theoretical and practical levels. At the theoretical level, the results

of this research will provide empirically- based information on the impact of social capital on the dynamics of crowdfunding campaigns in the Middle East. This study also contributes to the larger area of economic and behavioral finance theories by highlighting the effect of social capital on the dynamics of crowdfunding campaigns in the Middle East. At a practical level, this research may also contribute to Middle Eastern policymakers' as well as entrepreneurs' evaluation of the effectiveness of the crowdfunding campaigns, as well as contributing to the improvement of crowdfunding practices in the Middle East. After all, the results of this study will have implications for improvements in practices of economic and finance and may be used as a guide towards advancing the management and performance of crowdfunding campaigns in the Middle East.

Furthermore, the findings of this study have a clear economic significance as these results contribute to advancing the accumulated international literature of the social capital and crowdfunding in developing countries in general, and the Middle East in particular. Our study has significant commonsense ramifications for entrepreneurs, SMEs, investors, strategy producers, budgetary controllers, as well as business organizations. Our study additionally adds to the continuous open discussion, which spins around the social capital theory that has received increasing attention in crowdfunding research and may facilitate theory development in this field.

The study examined crowdfunding platforms at the regional level. It pointed to the emergence of crowdfunding platforms as one of the most important project financing mechanisms. Crowdfunding platforms are gaining special importance in developing and Middle Eastern countries. It is expected to bridge the financing gap for micro, small and medium enterprises. In these countries, governments are empowered to meet the material requirements necessary to meet the targets Sustainable development, increasing levels of financial inclusion, and fostering innovation. Associated with crowdfunding platforms is a set of risks, on top of which are security risks (Aldulaimi et al., 2020). The risks of cyber failure and collapse of these platforms, and the risks of fraud. Risks are arising from the potential for crowdfunding platforms to be used for money laundering and financing Terrorism, especially those that involve cross-border transactions and are not regulated.

Thus, choosing to follow other platforms may introduce a selection problem. To address this concern, we follow the empirical framework of Pelster et al.(2019). That is to say, we use a PSM procedure to control the difference between investors, who have followed at least one platform of another user, and those who do not follow any other platform. Then those who perform a difference-in-differences analysis and fixed effect panel regressions by using matched sample and treated investors, respectively.

6. Conclusion

This study, aiming to examine the dynamics of crowdfunding campaigns in the Middle East, focuses on the social capital that proponents develop within a crowdfunding platform by supporting other community members' projects. We use three dimensions, namely structural, relational and cognitive dimensions, to assess the performance of all campaigns on Zoomaal.com between 2019 and 2020. Consistent with our hypothesis, our empirical estimates show that social capital is fundamental to attracting backers and raising capital in the early days of the campaign. In turn, these early contributions are closely associated with the likelihood of a project reaching its target capital, such that a head start fully mediates the effect of social capital on a campaign's success.

The study reveals that there are some risks that these platforms face, including changes anticipated in regulatory frameworks, tax treatment, and political and business risks for equity investment and lending-based crowdfunding. In addition to the risks associated with business models is the likelihood that campaigners will fail to collect Required funding and risks related to the platform's reputation when it fails to provide benefits/rewards to supporters, as well as the risk of not being able to verify impact Social and environmental of the projects to be funded.

We highlight the importance of crowdfunding platforms in promoting access to entrepreneurs, micro companies and small and medium-sized financing to reflect positively financial inclusion and sustainable development highlight the importance of supervisory and regulatory authorities in Middle Eastern countries to support this sector, study its risks, and strengthen regulatory frameworks according to the best international practices.

Social Capital and crowdfunding platforms provide many benefits for studying the effects of social interaction on individual investors' trading behavior and crowdfunding campaigns. However, there are several limitations to the study of social capital and crowdfunding platforms. First, investors self-select into crowdfunding platforms that create concerns regarding whether traders using such platforms are representative. In our case, Zoomal.com is one of the largest platforms in the Middle East, with over 10 million active users. The barrier of entry to Zoomal.com use is very low, and anyone with a Zoomal.com can create an account. Thus far, we do not find evidence that investors on Zoomal.com are different from investors using other platforms or those who do not use social trading platforms. Second, since Zoomal.com does not allow traders to invest directly in other platforms or copy single trades, users may set up virtual platforms for leisure purposes. Thus, virtual platforms may not reflect investors' real preferences and investment behaviors. To address the concern on the investors with a real account in Zoomal.com, we mainly focus on whether the comments made by their followers

affect their behavior. Therefore, not only do investors self-select into crowdfunding platforms but also self-select to follow others.

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Dinamika Crowdfunding kampanja na Bliskom istoku: Je li društveni kapital bitan?

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Sažetak

Svrha ove studije je analizirati dinamiku crowdfunding kampanja na Bliskom istoku i postaviti pitanje "je li društveni kapital važan" u tom pogledu? Studija koristi platformu Zoomaal.com kao studiju slučaja za 2019. i 2020. Potrebni podaci prikupljeni su sa Zoomaal.com i provedeni su polu-strukturirani intervjui on-line s ključnim osobama u kontroli kako bi se dalje istražila praksa crowdfundinga u odabranim zemljama Bliskog istoka (tj. u Turskoj, Egiptu, Omanu, Saudijskoj Arabiji, Bahreinu, Kuvajtu i UAE-u). OLS robusna standardna regresija pogreške i tehnike logističke regresije korištene su za testiranje modela studije. Nalazi otkrivaju da je društveni kapital u zemljama Bliskog istoka vrlo koherentan i da je i strukturna dimenzija (DS) mjerena interakcijom poduzetnika s društvenim mrežama (kao što su Facebook i Instagram) i kognitivna dimenzija (DC) mjerena brojem riječi koje su sastavili poduzetnici na platformi Zoomaal.com imaju značajan pozitivan utjecaj na uspjeh crowdfunding kampanje. Štoviše, potvrđujemo naše rezultate za Zoomaal.com i zaključujemo koji su glavni čimbenici koji utječu na uspjeh ili neuspjeh crowdfunding kampanje na Bliskom istoku.

Ključne riječi: *društveni kapital, Crowdfunding, Crowdfunding kampanja, teorija društvenog kapitala, Bliski istok*

JEL klasifikacija: *G11, G19, G21, M13, O16, O52*

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The influence of demographic, cultural, and educational background in the boardroom on firm performance – The Croatian evidence*

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Abstract

This study investigates the demographic, cultural and educational features of management boards of Croatian manufacturers. The analysis, conducted using static panel analysis, encompasses the period from 2015 to 2019. To the impact of different board characteristics on firm performance expressed with accounting-oriented performance measures such as return on assets (ROA) and return on equity (ROE), this study includes several explanatory variables comprising CEO tenure, age of the board members, the share of foreigners in the boardroom and finance educational background. Additionally, a few firm-specific variables included in the research are firm size, leverage, and firm age. The analysis findings reveal that board composition plays a crucial role when explaining the firm's profitability. Furthermore, the firm's maturity and leverage additionally prove to be significant factors affecting corporate performance.

Key words*: demographic board diversity, cultural board diversity, firm performance, Croatian manufacturers*

JEL classification*: G30, G34, J24, L25*

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1. Introduction

In the last decades, the issue of corporate governance diversity has obtained an increased importance in empirical literature. A significant amount of research focuses on gender diversity (e.g. Campbell and Mínguez-Vera, 2008; Gallego-Álvarez et al., 2010; Martín-Ugedo and Minguez-Vera, 2014), but demographic, cultural and educational features of boards are also widely investigated topic among researchers (e.g. Kim, 2005; Simsek, 2007; Rose, 2007; Horváth and Spirollari, 2012; Kaczmarek et al., 2012; Dikolli et al., 2014; Li and Chen, 2018 etc.).

Since the management board of the firm bears the most responsibility for the firm's operations and for meeting the set objectives and strategic goals, as well as keeping its reputation as a responsible and trustworthy firm, it is of crucial importance to ensure that the management boards of the firms have the necessary competences and resources to conduct their specific duties successfully. These competencies relate primarily to the required knowledge, skills, education, expertise and experience (Annual Report on Corporate Governance 2019, Croatian Financial Services Supervisory Agency and Code of Corporate Governance, Croatian Financial Services Supervisory Agency & Zagreb Stock Exchange). Therefore, the purpose of this study is to examine the demographic, cultural and education features of management boards of Croatian manufacturers that employ two-tier board structure. This is the most common corporate governance structure among Croatian companies and the management board is hereinafter referred to as *the board*.

This research examines the influence of different features of board members, including demographic characteristic such as CEO tenure and age of the board, cultural diversity stemming from a foreign origin of the board member as well as their financial educational background on the performance of Croatian large-sized manufacturers in the period 2015–2019. It contributes to the existing corporate governance literature due to the fact that it relates to the emerging market with legal, economic and socio-cultural setting differing from developed markets which were mainly the subject of the analysis so far. Furthermore, most of the previous papers dealing with board diversity, at least in the Croatian context, focus on gender diversity, whereas this study employs a more extensive range of diversity measures including demographic, cultural and educational diversity.

Thus, the authors aim to test this relation and propose the main hypothesis that demographic, cultural and educational characteristics of the board members have an impact on firm performance.

The remainder of the manuscript is structured as follows. The following part discusses the existing literature relating to the influence of board members' features

relating to demographic, cultural and educational diversity on firm performance. This part includes a discussion of the variables selection and provides empirically-based evidence for the potential impact of individual variables. Section three discusses the methodology, while the fourth section deals with empirical data and results. The fifth section provides discussion, while the last section draws the conclusions.

2. Literature review

Management board composition is a widely investigated topic in research studies as expected to have a crucial impact on the board's decision-making procedures, activities, and outcomes and ultimately on overall firm performance. The demographic feature that has drawn the attention of researchers in recent decades is the gender of the board. Still, several studies dealing with other board characteristics also arise, encompassing other demographic, cultural, and educational background characteristics of board members such as CEO tenure, the average age of the board, the share of foreign nationals, and financial background. Different diversity variables are considered drivers of "firm-level outcomes because of cognition as well as social identity" (Kagzi and Guha, 2018), even though the previous research provides inconclusive findings on this issue. It suggests the importance of gaining deeper insight into board diversity of demographic, cultural, and educational background and its potential effect on firm performance. Several distinguished studies that research the structure of boards are in this paper grouped and investigated according to the board features and presented in the lines below.

Demographic attribute such as CEO tenure is widely employed in the existing research that includes papers, for instance, by Simsek (2007), McKnight and Weir (2009), McCann (2016), and Kaczmarek et al. (2012), to name a few. Regarding tenure, longer CEO tenures are usually associated with benefits such as familiarity with decision-making processes (Walters et al., 2007), cumulated knowledge and experience, and job-specific skills (Simsek, 2007) as well as "comprehensive knowledge and understanding of the company's operating environment" (DeBoskey et al., 2019: 659). The positive impact of CEO tenure on firm performance measured with Tobin's Q is found by e.g. Kaczmarek et al. (2012) while Dikolli et al. (2014) found a positive influence of CEO tenure on past performance in a sample of public US firms in the period from 1996 to 2005. However, the existing empirical research does not provide clear results. Specifically, McCann (2016) states that besides being in a dominant position to impact board decisions, the CEOs become more engrained and less likely to protect and manage shareholders' interests as the tenures lengthen. Longer-serving CEOs can strongly identify with their role but not necessarily aligned with the goals of the board or shareholders (Kaczmarek et al., 2012 citing Hillman et al., 2008). Moreover, Kaczmarek et al. (2012) found that CEO tenure

is detrimental to a company's value creation expressed with Tobin's Q while Chen et al. (2019) found evidence of better corporate social responsibility performance in a CEO's early tenure on a sample of US firms. It is worth noting that Walters et al. (2007) found that low to moderate tenure levels positively influence returns to shareholders that do not hold true if tenure increases to higher levels.

The age of the board presents another demographic characteristic of the board or human capital variable (Kim, 2005). Although the results of prior research on the impact of board age on company performance are inconsistent, it is worth noticing that older and younger executives differ from each other in many segments. Above all, they are different according to their risk propensity. Younger executives usually show more willingness to accept more risk and undertake major structural changes (Horváth and Spirollari, 2012). Moreover, they can be expected to demonstrate their capabilities motivated by reputation concerns and thus, be more aggressive (Arioglu, 2021). Also, often cited in the literature that younger decision-makers tend to be more creative and innovative (Bonn et al., 2004). Nevertheless, Li et al. (2017) also add that, according to the market learning hypothesis, younger executives might be more conservative and avoid risky decisions that might lead to negative consequences which might harm the market perception of their skills. For example, Darmadi (2011) found that the share of young board members is positively associated with market performance. On the other hand, older executives have more experience (Bonn et al., 2004) but, as suggested by Waelchli and Zeller (2013), the cognitive abilities of senior executives deteriorate, and they are less motivated as opposed to their younger colleagues. Horváth and Spirollari (2012), using a sample of 100 large US companies in the period 2005–2009, find that the age of the board negatively influences the price-to-book value ratio. It is also so when controlling time effects, although the variable becomes statistically insignificant. Moreover, Bonn et al. (2004) also found that the age of directors is negatively related to the performance of Japanese firms. On the other hand, Xu et al. (2018) examine the role of board age in the context of committing corporate financial fraud suggesting that older executives are usually more experienced and have more to lose in case they do not succeed in their monitoring roles. Consequently, they are more capable and motivated for monitoring CEOs' activities and are therefore less likely to be involved in corporate financial fraud. Moreover, McIntyre et al. (2007) expected a positive influence on the average age of board of directors' members but found it to be insignificant.

In the context of the cultural diversity of the board, foreigners may reflect it as they might provide fresh worldviews, diverse ways of perception of things and interpreting to the group as well as "different sources of information, communication networks and linguistic resources" (Frijns et al., 2016: 12). Ely and Thomas (2001) also add that different cultural backgrounds could provide different sets of experiences and skills. Foreign directors may contribute with

specific knowledge, especially in case of high levels of foreign sales and foreign operations (Frijns et al., 2016) or in case of acquisitions abroad (Masulis et al., 2012). However, Frijns et al. (2016) find that the share of foreign directors impairs a firm's performance while Rose (2007) does not find support that share of foreigners plays vital role in determining a firm's performance since this variable remains insignificant.

Board diversity can also be observed through educational qualifications with financial backgrounds. It denotes social qualities which directors share (Kaczmarek et al., 2012). Following the same authors, financial expertise and literacy are also increasingly important features of board members. Dal Magro and Klann (2021), referring to Dhaliwal et al. (2010), state that directors with financial expertise should be able to check both financial and non-financial data while monitoring corporate governance mechanisms. They also include effects encompassing financial counselling, knowledge of financial markets' operations, and the ability to detect early warning signs of financial and operational fraud. Also, Dionne and Triki (2005) provide evidence that shareholders are better off with financially educated directors on both their boards and audit committees. Mahadeo et al. (2012) argue that diverse boards, in terms of educational background, are of vital importance in complex and turbulent business environments in which companies operate. Although the emphasis is on the necessity of knowledge in finances, law, tax systems, and environmental and ethical issues, their findings suggest that boards with a broader array of educational backgrounds will experience lower firm performance. Moreover, examining political and financial background in board interlocking, Dal Magro and Klann (2021) find that board interlocking with financial background improves the quality of accounting information, which is beneficial to creditors, managers, investors, etc.

3. Methodology

Since the sample analysed encompasses manufacturing firms, mostly not listed on the stock exchange, the authors opted for the accounting-based performance measures, specifically both ROA and ROE. These measures are, for example, employed by Waelchli and Zeller (2013). Furthermore, Kim (2005: 803) uses ROA as a performance measure since it is a "well-understood measure of firm performance, particularly appropriate for manufacturing firms," while Darmadi (2011) uses ROA together with Tobin's Q. Specifically, we calculate ROA as net profit over total assets while ROE as a net profit over equity, both expressed as a percentage.

Static balanced panel data analysis was used for the purpose of conducting econometric data analysis. Specifically, two static panel analyses were conducted

depending on the dependent variables used, one static panel analysis was done with ROA as a dependent variable and the other one with ROE as a dependent variable.

In order to verify the proposed hypothesis, the following research model was estimated:

$$Y_{it} = c + \sum_{k=1}^{K} \beta_k X_{it}^{k} + \varepsilon_{it}$$
$$\varepsilon_{it} = z_i + u_{it}, \quad (1)$$

where:

Y_{it} is a dependent variable denoting the profitability of firm i at time t, with i = 1,..., N; t = 1,…, T presented with two different measures of performance/profitability, i.e. ROA and ROE,

X_{it} are k independent variables including explanatory variables presented with board oriented characteristics including CEO tenure, average age of the board (AGE_board), proportion of board members with foreign nationality (Foreigners), and board members with financial educational background (FEB) as well as control variables presented with firm size (SIZE), leverage (LEV) and age of the firm (AGE),

ε_{it} is the disturbance with z_i being the unobserved firm-specific effect and u_{it} being the idiosyncratic error.

The presented model is a one-way error component regression model where $z_i \sim IIN(0, \sigma_z^2)$ and independent of $u_{it} \sim IIN(0, \sigma_u^2)$.

Specifically, CEO tenure has been calculated in several years as the difference between the observation year and the year when appointed as CEO. To avoid zero values, one has been added to this difference. The age of the board is calculated as the sum of age of all board members divided by the number of board members. Foreigners' variable relates to the proportion of board members who are not Croatian citizens in order to reflect board cultural diversity and its influence on performance. The financial educational background is employed in the analysis as a proportion of board members that have a financial educational background. With some modifications, this variable is chosen following papers by Rose (2007) and Kaczmarek et al. (2012).

Moreover, several firm-specific variables are employed in the analysis as controls encompassing firm size, leverage and firm age. Firm size (SIZE) is regularly employed variable in the research on determinants of firm performance as well as in those investigating different aspects of board composition (e.g. Rose, 2007; Darmadi, 2011; Cao et al., 2019; Dal Magro and Klann, 2021). It is calculated as the natural logarithmic value of total assets. The findings of the existing research

are mixed. So, Darmadi's (2011) findings show a positive influence of size based on assets on ROA but negative on Tobin's Q. Horváth and Spirollari (2012) find the size to be insignificant when explaining firm performance, whereas, Fernández-Temprano and Tejerina-Gaite (2020) reveal a negative sign of size variable although it is statistically significant in one model only. Specifically, the positive influence of a firm size can be justified by exploitation of economies of scale (Doğan, 2013) and efficiency gains or higher market power (Lee, 2009).

Leverage (LEV) is calculated as the total debts over total assets ratio following Horváth and Spirollari (2012), Waelchli and Zeller (2013), and Cao et al. (2019). The influence of leverage on performance is twofold. Specifically, according to the agency theory, as suggested by Dionne and Triki (2005), the monitoring in case of debt financing diminishes management's attempts to overspend available cash flows that should consequently result in a better performance. However, excessive indebtedness reduces the investment choices of the firm and makes the debt burden heavier. Dionne and Triki (2005) find the positive influence of leverage, whereas Waelchli and Zeller (2013) and Kagzi and Guha (2018) find evidence of its negative impact on performance. Due to theoretical base and empirical findings, we do not expect leverage to take either negative or positive signs.

Firm age (AGE) is calculated as the difference between the observation year and the year of the incorporation. Due to the large range of values, the authors use a natural logarithm of firm age. This variable is included in the analysis following a large number of studies such as Oxelheim and Randøy (2003), Kim (2005), Kaczmarek et al. (2012), Waelchli and Zeller (2013), and Kagzi and Guha (2018). As stated by Coad et al. (2018: 4), firm age affects firm performance through "routinization, accumulated reputation and organizational rigidity". Waelchli and Zeller (2013), citing Loderer et al. (2012), state that firm age might negatively influence performance due to the inability of older firms to create new growth opportunities. Although young firms are often perceived as more innovative compared to the older counterparts, Coad et al. (2018), question this due to the fact that young firms lack experience, capabilities and routines. Oxelheim and Randøy's (2003) findings reveal that in some models firm age has an insignificant impact, whereas in others significantly and negatively influences firm value measured with natural logarithm of the Q ratio. A negative influence of the age of the firm is found by Kim (2005), Kaczmarek et al. (2012), while Kagzi and Guha (2018) find insignificant or positive influence of firm age, whereas Waelchli and Zeller (2013) document its insignificant or negative impact. Therefore, the influence of firm age on ROA and ROE is ambiguous.

The principal data source consists of the companies' annual financial reports, i.e., balance sheets and profit and loss accounts manually collected for each year from the information system of the publicly available Annual Financial Reports Registry provided by the Croatian Financial Agency (FINA). Primarily, the authors identified

the 58 largest Croatian manufacturing companies with a two-tier board system that did not report negative equity. With a special effort to collect data for each board member, the authors combined the scope of different sources for the required data collection. It includes corporate websites, issuers announcements for the firms listed on the stock exchange, and LinkedIn profiles of board members. Despite the efforts, the data collected for 23 companies have a 68% market share, which over a period of 5 years makes a total of 115 observations. The lack of data, especially on age, was also the problem of previous studies as reported, for instance, by Kang et al. (2007) and Mahadeo et al. (2012). The authors performed static panel analysis using STATA statistical software.

4. Empirical Data and Results

Firstly, descriptive statistics for all variables, i.e. dependent, explanatory as well as for control variables, employed in the research are provided in Table 1.

Table 1: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	115	5.6309	7.3305	-25.2831	23.6044
ROE	115	9.9636	14.9422	-67.6850	76.6245
CEO tenure	115	9.0696	11.2193	1	55
AGE_board	115	47.7399	11.2951	21.5	82
Foreigners	115	15.2000	32.9804	0	100
FEB	115	47.6696	37.6234	0	100
SIZE	115	20.0209	2.8146	4.6957	23.8182
LEV	115	44.1007	16.8053	12.3594	85.1386
AGE	115	4.4361	1.4601	1.3863	7.6019

Source: Authors' calculation

Analysis of correlation is performed for independent variables with the aim of finding whether the multicollinearity problem exists. Specifically, for this purpose the matrix of Pearson correlation coefficients was implemented. As it can be seen from Table 2, there was no problem with multicollinearity since there is no absolute value of the Pearson coefficient higher than 0.7 that would indicate a strong correlation between independent variables.

Table 2: Correlation matrix

	CEO tenure	AGE_ board	Foreigners	FEB	SIZE	LEV	Firm_ age
CEO tenure	1.0000						
AGE_board	0.6512	1.0000					
Foreigners	-0.1211	0.0815	1.0000				
FEB	0.0948	-0.0273	0.0977	1.0000			
SIZE	0.0558	0.0270	0.0787	0.0914	1.0000		
LEV	0.0997	-0.0661	0.0469	0.3973	0.1322	1.0000	
FIRM_age	-0.1031	-0.2898	-0.4251	0.1864	0.0169	0.1229	1.0000

Source: Authors' calculation

Furthermore, multicollinearity was additionally tested by implementing the variance inflation factors (VIF). The VIF scores for each variable are presented in Table 3. VIF factor exceeding value of 5 indicates a strong correlation between independent variables but, as it is evident from Table 3, the highest value reported is 1.97. Thus, it was once again confirmed that the analysis is free from problem of multicollinearity between independent variables.

Table 3: Variance inflation factor scores for independent variables (VIF)

Variable	VIF	1/VIF
CEO tenure	1.94	0.514826
Age_board	1.97	0.507632
Foreigners	1.36	0.732765
FEB	1.27	0.786657
SIZE	1.03	0.971828
LEV	1.23	0.809756
FIRM_age	1.42	0.701761

Source: Authors' calculation

To show which panel model was the most appropriate one, F test, Lagrangian multiplier test for random effects and Hausman test were used. Breusch-Pagan test for heteroscedasticity was used in each model. Results of Breusch-Pagan test for heteroscedasticity indicated that the problem of heteroscedasticity was not present. The results of the panel data analysis as well as the results of F test, Lagrangian multiplier test for random effects and Hausman test are presented in Table 4.

Table 4: Parameter estimates of static panel model

Variables	ROA	ROE
CEO tenure	-0.0727801 (0.1048529)	-0.2275305 (0.3800564)
Age_board	0.1383823 (0.0915316)	0.6204294** (0.2652749)
Foreigners	0.0130911 (0.0317320)	-0.2344703* (0.1310541)
FEB	-0.0313672 (0.0231169)	0.0227821 (0.0787812)
SIZE	-0.0403083 (0.2711759)	0.2415199 (0.7890391)
LEV	-0.1251595** (0.0493852	-0.0174498 (0.1527447)
FIRM_age	-0.7985219 (0.8281784)	27.96489* (16.62146)
cons	10.84984 (8.149775)	-143.2351 (78.64045)
R2 within	0.0870	0.1520
R2 between	0.3241	0.0585
R2 overall	0.2322	0.0214
Model p value	0.0141	0,0443
Lagrangian multiplier test for random effects	chi = 24.38	chi = 11.12
	p value = 0.0000	p value = 0.0009
Hausman test	chi = 8.49	chi = 16.04
	p value = 0.2917	p value = 0.0247
Breusch-Pagan test for heteroskedasticity	chi2 = 0.51	chi2 = 0.09
	p-value = 0.4738	p-value = 0.7698
F test	p value = 0.0000	p value =0.0000

*, **, *** Statistically significant at 10%, 5%, 1% level, respectively. Standard errors are between parentheses.

Source: authors' calculation

In model in which ROA stands in as dependent variable, results showed that model with random effect (RE) was the most appropriate one while in model with ROE as dependent variable results showed that model with fixed effects (FE) was the most appropriate one.

In summary, that leverage significantly and negatively determines the profitability of Croatian manufacturers. Furthermore, the age of the board and firm age are crucial factors in explaining the firm's profitability measured with ROE. Specifically, the firm's age, as well as the age of the board, enhances the firm's profitability, whereas the share of foreigners has a negative and statistically significant impact on ROE.

5. Results and Discussion

The results of the empirical analysis reveal that in the model in which ROA served as a dependent variable, leverage is a key t factor in determining firm performance. Specifically, its negative influence suggests that high corporate indebtedness impairs performance. Such findings supported by empirical research conducted, for instance, by Waelchli and Zeller (2013) and Kagzi and Guha (2018), suggest that the cause might be frictions induced by financial constraints (Waelchli and Zeller, 2013). Other firm-specific variables such as size, firm age and board composition remain insignificant.

However, in the model where performance is expressed with the ROE variable, firm age significantly and positively affects performance. Such finding explained by Coad (2018) states that young firms lack routines, social capital, being networked and stable ties to customers. Furthermore, the same author provides further reasons that speak in favour of older firms in terms of performance stating that older firms are more disciplined and have better-established routines, a clearer strategic perspective, better business processes and market knowledge due to the experience etc.

Two other variables relating to board composition also play a crucial role in defining corporate performance: namely, the age of the board, and the share of foreigners on the board. This supports McIntyre et al. (2007) who claim that the construction of a team is an important factor in effective team dynamics and performance. Demographic variable age of the board positively affects performance of analysed companies since older directors are frequently more experienced as suggested by Kim and Lim (2010) and Xu et al. (2018) with experience being essential for better decision making (Kagzi and Guha, 2018). Kim and Lim (2010) also state that experience in a particular industry allows independent outside directors to approach tacit knowledge of the competitive conditions, threats, opportunities, technology and regulations while Kagzi and Guha (2018: 1037) note that older boards members have connections with senior associates in well-established firms that "enable the firm to have wider networks for suppliers to reduce the uncertainties." The positive impact of older chairmen on the performance of Chinese firms is found by Cheng et al. (2010) and Kim and Lim (2010), while Korniotis and Kumar (2011), for example, find that experienced and older investors possess greater investment knowledge. Furthermore, the paper by Platt and Platt (2012), as cited by Fernández-

Temprano and Tejerina-Gaite (2020), indicates that firms with older directors are less likely to become insolvent. Another board structure variable that plays an important role when explaining firm performance is the share of foreigners in the boardroom that stands for the cultural and national composition of the board which takes a negative sign. Darmadi (2011), while citing Lehman and Dufrene (2008) and Cox Jr. (1991), adds that nationality and cultural diversity in the boardroom might increase the likelihood of cross-cultural communication problems as well as interpersonal conflicts. Moreover, Cao et al. (2019), who investigate the impact of cultural and nationality diversity on cross-border M&As, find the negative role of proportion of foreign directors on strategic decision-making activities explaining it with cultural differences between foreign and domestic directors that obstruct collaboration and communication within boards.

Board composition variable of CEO tenure is insignificant in both models. This variable also has an insignificant influence on Tobin's Q introduced in the analysis by McKnight and Weir (2009) as a dummy variable with the value of 1 if the corporate Tobin's Q is lower than the sample median. Moreover, the financial background is also insignificant as found by Rose (2007), suggesting that the specific educational background is not required for the activities performed in the corporate boardroom. As stated by Rose (2007: 412), if "board members have a university degree/or equivalent skills, board members have sufficient human capital in order to understand information that is provided by the board of managing directors." Moreover, our finding confirms the claim of Mahadeo et al. (2012: 378) that one must have in mind that "prior educational background does not completely reflect a board member's attitudes, expertise and experience."

6. Conclusion

Corporate governance and board composition have gained importance over time especially in terms of their influence on corporate performance. Therefore, we wanted to test several board characteristics including its demographic, cultural and educational dimensions on firm profitability using the setting of Croatian manufacturers.

The research findings indicate that the composition of the board is an essential factor in determining corporate performance. This is especially true for the average age of the board and proportion of foreigners in the boardroom, where the average age of the board members positively influence performance and foreigners have a negative impact.

In this context, this research contributes to the existing literature on board composition and corporate performance, especially in emerging markets such as Croatian. It might be helpful for firms, policymakers, and other stakeholders as it

provides resourceful information on board compositions that enhance corporate performance. However, the authors are aware of its limitations: a relatively small number of companies entered the sample due to the data unavailability in spite of their very high percentage of market share. Moreover, since the relationship between board composition and corporate performance may be affected by many aspects, the authors suggest that future researchers investigate some additional corporate governance characteristics and evaluate the findings in other institutional settings and for a longer time span.

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Utjecaj demografskih i kulturoloških karakteristika te obrazovanja uprave na performanse poduzeća – Slučaj Hrvatske

Tomislava Pavić Kramarić[1], *Marko Miletić*[2]

Sažetak

Istraživanje se bavi demografskim i kulturološkim karakteristikama te obrazovanjem članova uprava poduzeća iz hrvatske prerađivačke industrije. Analiza, provedena korištenjem statičke panel analize, obuhvaća razdoblje od 2015. do 2019. godine. S ciljem utvrđivanja utjecaja različitih karakteristika uprava na uspješnost poduzeća izraženih računovodstvenim mjerama uspješnosti kao što su povrat na imovinu (ROA) i povrat na kapital (ROE), obuhvaćeno je i nekoliko varijabli kao što su godine djelovanja predsjednika uprave na toj poziciji, prosječna dob članova uprave, udio stranih državljana u upravi te financijsko obrazovanje. Poduzeću-svojstvene varijable su također obuhvaćene analizom uključujući veličinu poduzeća, zaduženost i godine djelovanja poduzeća. Rezultati analize otkrivaju da struktura uprave igra ključnu ulogu kod objašnjavanja profitabilnosti poduzeća. Nadalje, dokazano je da su zaduženost kao i godine djelovanja poduzeća također značajni čimbenici koji utječu na performanse poduzeća.

Ključne riječi*: demografska raznolikost uprave, kulturološka raznolikost uprave, performanse poduzeća, hrvatska prerađivačka industrija*

JEL klasifikacija*: G30, G34, J24, L25*

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The Big Five personality traits and co-production behaviour of Vietnamese tourists: An extension of the theory of planned behaviour*

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Abstract

In the framework of Ajzen's theory of planned behaviour (TPB), the study is conducted to evaluate the association between The Big Five personality traits and the three types of tourists' co-production behaviour: co-production behaviour before the trip, co-production behaviour during the trip, and co-production behaviour after the trip. The mediating type of co-production attitude is also clarified in this TPB model. The online and in-person survey methodologies have been used from January to May 2021. The study's survey subjects are Vietnamese tourists who live and work in Vietnam and have travelled within the last two years. The research results reveal that all three personalities: Extraversion, Openness, and Agreeableness, positively affect the three categories of co-production behaviours, whereas Consciousness and Neuroticism only influence production behaviour during the trip. Two types of mediation: complementary and indirect-only effect of co-production attitude, is clarified. This study contributes to broader TPB theory by analyzing Big Five personality traits in tourist co-production behaviour. Our findings assist tourism businesses in better understanding how visitors' personalities impact their co-production and assist them in building effective co-production methods. Tourism practitioners should develop different approaches for groups of customers with distinguished characteristics in each stage of their co-production processes.

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JEL classification: *M3, M10, M31*

1. Introduction

In the service industry, tourism is characterized by high levels of engagement with tourists, and co-production becomes an important engagement in the tourist-enterprises relationship. The key concern is, thus, how to encourage customers to engage *actively* in the co-production process, as it is a conscious decision. The topic of customer behaviour, especially tourist behaviour, is highly attractive and widely studied by experts. Nevertheless, most research focused on studying tourists' behaviour on destination choice or visit intention. There is a need for a deeper understanding of tourists' behaviour in co-production, especially when developing a co-production plan with customers' engagement in the tourism sector becomes difficult in today's diverse and turbulent market environment (Arica & Kozak, 2019).

Although TPB has shown to be a valuable framework for examining human behaviour, some researchers argue that the theory should be expanded further, either by including additional relevant factors or by determining how to adjust causality based on specific conditions (e.g. Ajzen, 1991; Han, 2015; Meng & Choi, 2017; Cheung & To, 2016; Meng & Cui, 2020). Furthermore, Ajzen (1988) also demonstrated a substantial association between an individual's personality and attitude and behaviour.

The Big five personality qualities are a set of five personality qualities: extraversion, openness, agreeableness, consciousness, and neuroticism, widely known and utilized in psychology and tourism research (Ying & Norman, 2014; Wu & Mursid, 2019). Many studies have demonstrated that the big five personality traits influence people's attitudes and behaviours: for example, personality affects work performance (LePine & Van Dyne, 2001), business status (Zhao & Seibert, 2006), psychological resilience (Fayombo, 2010), and counterproductive behaviour (Salgado, 2002). In tourism, studies related to personality are also quite diverse. Prior studies examined the relationship between these five personalities with information seeking and sharing behaviour (Tan & Tang, 2013; Jani, 2014), scuba diving participation behaviour (Ong & Musa, 2012), social network structure (Ying & Norman, 2014), eco-friendly travel behaviour (Kvasova, 2015), choice of entertainment types (Tran et al., 2015), achieving sales records (Kuo et al., 2016), customer engagement (Wu & Mursid, 2019), choice of travel software usage (Akhrani & Najib, 2020).

In the light of Ajzen's TPB framework (1991), our study was among the first to explore the connection between The Big five personality traits and tourists' co-production behaviour. Each quality of the Big five personalities influences tourists'

coproduction behaviour at each stage: before, during, and after the trip. At the same time, the study examined tourist co-production behaviour based on each stage of their travel consumption: *co-production behaviour before the trip* (information seeking and information sharing), *co-production behaviour during the trip* (personal interaction, helping, and tolerance), and *co-production behaviour after the trip* (feedback and advocacy) based on prior validated scales (Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019).

The findings reveal that all three personality qualities, *Extraversion, Openness*, and *Agreeableness,* positively influence co-production behaviours in the three stages as listed above, which is consistent with prior research (Ong & Musa, 2012; Wu & Mursid, 2019), whereas Consciousness and Neuroticism only have an effect on co-production behaviour during the trip. Our study also examined the mediation effect of Co-production attitude in two different types: complimentary indirect effect and indirect-only effect in this model.

Our study contributed to the literature by investigating tourists' personalities affecting tourists' co-production behaviour and the mediating role of co-production attitude in these relationships of TPB theory. Tourists' co-production behaviour is categorized into three different types, reflecting three stages of travel consumption. The research results help tourism enterprises better understand how tourists' personalities affect their co-production and benefit them in developing effective co-production strategies.

This paper consists of four main sections. The first part introduced the theory base and research model, the second section explained the applied methodology, and the third section described the research results. The discussion, limitation, contributions, and conclusion is at the end.

2. Literature review

Tourism is a service industry that involves tourists in every stage of travel their experience. Customers co-producing tourism products have a decades-long history of research in the marketing field as the shift in thinking pattern to the role of tourists from passive to active engagement and involvement. This part provides a literature review and the theory base that explains the co-production behaviour of tourists.

2.1. Tourists' Co-production behaviour

Dellaert (2018) separated the customer decision-making phases of a typical product into four categories: (1) search, (2) purchase, (3) experience, and (4) reflect. Concerning tourism products, Mathieson & Wall (1982) stated that the purchasing

decision of the tourists is a sequential process that begins when the tourists have the desire or demand. They look for information, evaluate the information and decide to travel. Caldito et al. (2015) divided the process from when tourists decide to travel till they come back home into three stages. Each stage contains behaviours that contribute to the whole journey experience of visitors. The options in the three stages are Pre-consumption (Searching, Planning, Expectations, Decisions, Buying, Anticipation, Preparation), Consumption (Experiencing, Enjoying, Navigating, Searching, Short-term decisions, On-site buying, On-site evaluation), and Post-consumption (Sharing, Memories, Evaluation, Loyalty building, Advocating). Zhang et al. (2018) claim that value creation or co-creation is the ultimate consequence of the customer consuming process; hence, service consumption happens predominantly in the interaction process between the buyer and supplier. The authors classified the role of value co-creation in economic sharing into three phases: (1) Pre-consumption stage (communications, interactions, and transactions among users, service providers, and other stakeholders), (2) Mid-consumption stage (social interaction, perceive functional values), and (3) Post-consumption stage (subjective or emotional feedback). Furthermore, based on service-dominant logic developed by Vargo & Lusch (2004), a customer is not only a passive receiver but also an active participant in the determination of value. Service providers and customers cooperate in the value creation process based on the customer's position as a partner (Vargo & Lusch, 2008). The changing position of the customer in the production process from passive to active also differentiates consumer-oriented roles. Urban (2014: 27) said that *"since the customers are considered a component of the production process, they can contribute to all phases of the production process and, therefore, get the co-producer role"*. Tourists can be involved in all stages of the tourism product creation process provided by agencies, from planning to evaluating the travel experience (Arica & Kozak, 2019). Therefore, the customers participate in co-production in various forms and degrees. The type and extent of customer involvement in co-production influence their engagement behaviour (Flores & Vasquez-Parraga, 2015).

According to Lusch & Vargo (2006), value co-creation consists of two components: co-creation of value and co-production. As a result, co-production research frequently stems from value co-creation behaviour. Yi & Gong (2013) defined value co-creation behaviour as having two components: (1) customer participation behaviour (including information seeking, information sharing, responsible behaviour, and personal interaction) and (2) customer participation behaviour (including feedback, advocacy, helping, and tolerance). In the field of tourism, Xie et al. (2020) expanded the research of Yi & Gong (2013) to explain the value co-creation behaviour of tourists through two main groups of behaviours: 1) Tourists' physical behaviour (personal interaction, responsible behaviour, feedback, and tolerance), (2) Tourists' mental co-creation behaviour (personal interests in the experience reflect the mental co-creation). The research of Arica & Kozak (2019) on the co-production behaviour of tourists with travel agencies was also expanded

from the study of Yi & Gong (2013), which included two major types of behaviours: (1) customer participation behaviour (personal interaction, information sharing and information seeking), (2) customer citizenship behaviour (advocacy, helping, adaptation and feedback). Antón et al. (2017) considered the experience price of tourists when visiting the museum as a co-creation process. It is separated into three particular stages: (1) Co-creation before the visit (planning and knowledge), (2) Co-creation during the visit (participation and interpersonal interaction), and (3) Co-creation after the visit (intensification of the experience and content generation).

Although of the survival of several studies on value co-creation and co-production behaviour, there is still a scarcity of research concentrating on consumer behaviour at each step of co-production, particularly in tourism products. Based on the prior research, tourists' co-production behaviour in this study will consist of three major types of actions, which are co-production behaviour before the trip (information seeking and information sharing), co-production behaviour during the trip (personal interaction, helping, and tolerance), co-production behaviour after the trip (feedback and advocacy).

Co-production behaviour before the trip

Information seeking is the behaviour of tourists, searching for useful information from friends, other travellers, and service providers for planning and designing their travel. Customers may also seek information to clarify service requests and satisfy other perceived needs (Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019). According to Yi & Gong (2013), they can obtain information from the company through various methods, such as directly asking others for information or observing the behaviour of experienced employees to gather information.

Information sharing is known as the behaviour of tourists, providing and sharing their information and demands with service providers to obtain satisfactory tourism products. If the customer fails to provide the necessary information, the employee will be unable to begin or finalize their tasks. Customers can ensure that employees provide services that satisfy their specific needs by sharing information (Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019). In the context of the development of social media, tourists can share information indirectly with service providers through social media instead of the direct method**.**

Co-production behaviour during the trip

Personal interaction refers to the relationship between customers and customers or employees, including many aspects of interaction such as politeness, friendliness,

and respect that are required for successful co-product (Ennew & Binks, 1999; Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019).

Helping refers to customer behaviour that is performed to assist other customers. Furthermore, during co-production, customers frequently tend to support other customers rather than employees (Groth et al., 2004; Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019).

Tolerance refers to a customer's patient when service delivery does not fulfil their expectations, such as a delay or a lack of equipment (Lengnick-Hall et al., 2000; Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019)

Co-production behaviour after the trip

Feedback is the evaluation of products and employee attitudes arising from customer co-production results to provide better service (Groth, Mertens, & Murphy, 2004; Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019).

Advocacy explains customers' consent attitude and behaviour towards successful co-production activities. Advocacy customers tend to introduce service providers to other people, such as friends or family (Groth et al., 2004; Zolfagharian & Sheng, 2012; Yi & Gong, 2013; Vega-Vázquez et al., 2015; Arica & Kozak, 2019; Roy et al., 2019).

2.2. The extended theory of planned behaviour (TPB)

According to TPB, behavioural intention is determined by three important predictors: attitude towards behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). Although TPB has proven a useful framework for forecasting human behaviour, some scholars insist that the theory needs to be extended further. Much prior research by sociologists or psychologists predicted and explained human behaviour by proposing concepts referring to behavioural tendencies, such as social attitudes and personality traits (Ajzen, 1988; Campbell, 1963; Sherman & Fazio, 1983). This study is developed from the TPB framework and supplemented personality traits to verify the relationship between personality traits and specific behaviour, which is the co-production behaviour of tourists.

The Big Five personality traits

Ying & Norman (2014) investigated that the Big Five personality traits have been recognized and widely used in psychology and tourism research. There

have been many studies demonstrating that the big five personality traits affect attitudes and behaviours of people; for example, personality affects job performance (LePine & Van Dyne, 2001), entrepreneurial status (Zhao & Seibert, 2006), psychological resilience (Fayombo, 2010), counterproductive behaviours (Salgado, 2002). Moreover, in tourism, the studies related to personality are also quite diverse because employees must have direct contact with customers when providing services to understand the customer's personality and have appropriate behaviours. Studies have focused on examining the relationship between Big Five and information behaviour (Jani, 2014), SCUBA divers' underwater behaviour (Ong & Musa, 2012), tourism information search and feedback behaviour (Tan & Tang, 2013), social network structure (Ying & Norman, 2014), eco-friendly tourist behaviour (Kvasova, 2015), recreation types (Tran et al., 2015), strong sales records (Kuo et al., 2016), customer participation (Wu & Mursid, 2019), soft-adventure travelling type (Akhrani & Najib, 2020).

Based on Wu & Mursid's study (2019), this research uses The Big Five personality traits, including five personality types: extraversion, openness, agreeableness, consciousness, and neuroticism.

Extraversion refers to open-minded people who like to communicate with others (Wu & Mursid, 2019). Another study describes this personality as the degree of an individual's confidence, prominence, energy, talkativeness, and passion for innovation (Zhao & Seibert, 2006). LePine & Van Dyne (2001) found that extroverts like to be the centre of attention.

Openness is the characteristic of people who are always curious to improve knowledge, enjoy new challenges and present innovative ideas (Zhao & Seibert, 2006). They are innovative, imaginative, inquisitive and original (Zhao & Seibert, 2006; Wu & Mursid, 2019; Kvasova, 2015; Kuo et al., 2016; Costa & McCrae, 1992).

According to Kuo et al. (2016), *agreeableness refers to reliable, harmonious, generous, and kind people*. People with a high degree of agreeableness tend to be trusting, sympathetic, kind, tolerant and cooperative (Wu & Mursid, 2019; Jani, 2011). In contrast, people with low agreeableness tend to be egotistical, distrustful, and hostile (Costa & McCrae, 1992).

Consciousness refers to people who are detail-oriented, well-organized, and prone to regulatory compliance, consistency, and accountability (Fayombo, 2010). This type of person prefers to arrange a systematic, planned scheme rather than perform impulsive actions (Wu & Mursid, 2019; Zhao & Seibert, 2006; Kvasova, 2015).

Neuroticism is a negative emotion representing emotional instability (Wu & Mursid, 2019). People with high neuroticism tend to experience several negative emotions, including anxiety, hostility, depression, impulsivity and vulnerability

(Zhao & Seibert, 2006), have negative, uncomfortable behaviours and are less socially integrated (LePine & Van Dyne, 2001).

With qualitative research, Malone et al. (2017) explored how emotions play a part in customer value co-creation in the tourist sector. Taheri et al. (2017) also claim that mood monitoring and repair directly impact customer participation. (Chen et al., 2016) discovered and highlighted that distinct consumer *personality* factors influenced customer *engagement behaviour* positively or negatively.

Recently, Wu & Mursid (2019) also demonstrated that The Big Five personality traits influence the participation behaviour of tourists (Information seeking, Information sharing, Personal interaction, and Responsible behaviour).

Hence, following hypotheses are set:

H1(a); (b); (c): Extraversion positively affects tourists' co-production behaviour.

H2 (a); (b); (c): Openness positively affects tourists' co-production behaviour.

H3 (a); (b); (c): Agreeableness positively affects tourists' co-production behaviour.

H4 (a); (b); (c): Consciousness positively tourists' co-production behaviour.

H5(a); (b); (c): Neuroticism negatively affects tourists' co-production behaviour.

Components of TPB

The general premise of TPB is that an individual has many possibilities to perform a behaviour (such as co-production) when they have a favourable attitude towards the behaviour, realize that important people think they should perform the behaviour, and control more than expected barriers (Ajzen, 1991). Attitude towards behaviour is defined as how the individual positively assesses the mentioned behaviour. According to TPB (Ajzen, 1991; Fishbein & Ajzen, 1975), an individual's attitude towards a particular behaviour is one of the most important predictors of the intention to engage in behaviour and their actual behaviour. Fishbein & Ajzen (1975) identified two other important factors that influence behaviour: subjective norms or perceived social pressure on the individual to engage in a perceived behavioural control regarding an individual's perception of the ease of engaging in a particular behaviour. All three elements of the TPB model, which are individual attitudes toward value co-production, subjective norms, and perceived behavioural control, have positive effects on co-creation or co-production behaviours (Cheung & To, 2016; Shamim et al., 2017; Chen, 2020). Furthermore, Ajzen (1991) also demonstrated that subjective norms and perceived behavioural control indirectly influence behaviour through attitude towards that behaviour.

Perceived behavioural control: According to Ajzen (1991), perceived behavioural control is defined as the resources and opportunities available to a person that can determine the likelihood of a behaviour being achieved. Cheung & To (2016) suggested that consumers' perception of the ease of service co-production, including low cost, sufficient time, ease and free access to social media, may promote consumer co-creation service with providers. And consumers consider it as a means of customizing the service for themselves. Therefore, we explore the following hypothesis:

H6 (a); (b); (c) Perceived behavioural control positively affects tourists' co-production behaviour.

Subjective norms: Subjective norms are the perceived social pressures from important people of an individual, such as family, friends, and co-workers, whose approval of decisions is important (Chen, 2020). Bai et al. (2014) and Cheung & To (2016) also emphasized that subjective norms have a strong influence on an individual's intention to engage in a specific behaviour (like co-production behaviour). The following hypotheses are formulated:

H7 (a); (b); (c): Subjective norms positively affect tourists' co-production behaviour.

Co-production attitude of tourists: Value co-creation or co-production, according to service logic (SL), occurs when the customer and the service provider engage in direct interaction (Grönroos, 2011; Grönroos et al., 2015), and the customer can decide whether to perform the interaction or not. According to the constructive theory of attitude on attitude formation, customers' attitude towards engaging in interaction for value co-creation/co-production is spontaneous rather than performed from customers' memory (Shamim et al., 2017). Therefore, the customers' value co-creation/ co-production attitude is the willingness to interact directly with the company to co-create value or product. In the studies of Cheung & To (2016); Shamim et al. (2017); Khrystoforova & Siemieniako (2019); Ahn et al. (2019), all the authors propose a co-creation attitude/co-production attitude consisting of three components, namely (1) Interaction Attitude, (2) Knowledge Sharing Attitude Service, and (3) Responsive Attitude. For this study, the co-production attitude of tourists also includes the above three components, in which, *Interaction Attitude* refers to the willingness of customers to engage in interactions with service providers to facilitate co-production. *Knowledge sharing attitude* is the customer's willingness to share knowledge with service providers during co-production interactions. *Responsive Attitude* is the tendency of customers to effectively respond to the requests of company to engage in dialogue for co-production.

As a general rule, the more favourable the attitude and subjective norm, and the greater the perceived behavioural control, the stronger should be an individual's

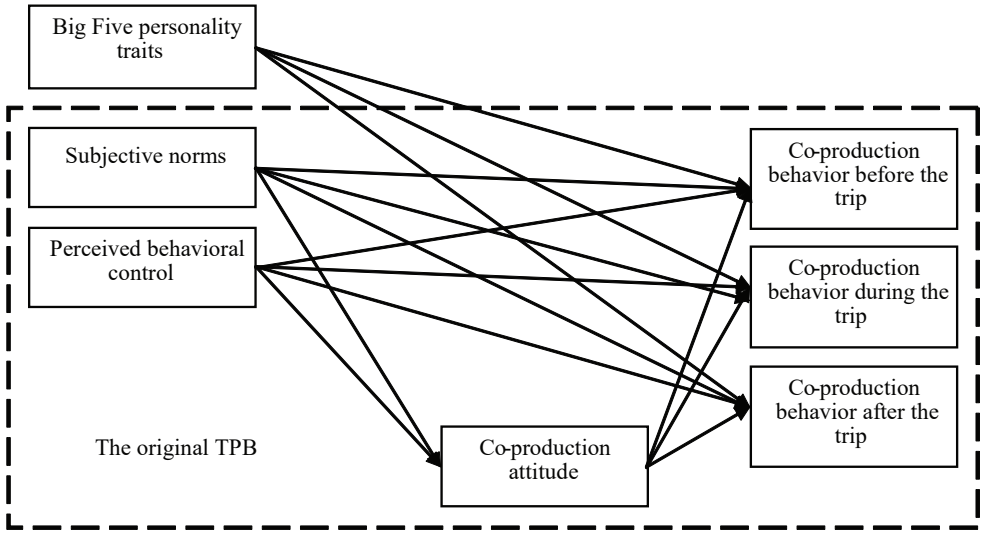
intention to perform the behaviour under consideration (Ajzen, 1991). Consumer attitudes toward value co-creation are impacted by the business's brand experience (Shamim et al., 2016), resulting in customer value co-creation. Customers' attitudes about value co-creation greatly impact their value co-creation behaviour (Khrystoforova & Siemieniako, 2019). In this light of literature, (Ahn et al., 2019) confirmed that co-creation/co-production attitudes, including interaction, information sharing, and responsive attitudes, impact co-creation/co-production behaviour. Based on the reasons mentioned above, these hypotheses are developed as follows:

H8 (a); (b); (c): Co-production attitude positively mediates the relationship between Perceived behavioural control and tourists' co-production behaviour**.**

H9 (a); (b); (c) Co-production attitude positively mediates the relationship between subjective norms and tourists' co-production behaviour.

The proposed research model (Figure 1) is as follows.

Figure 1: The theoretical model of the study



Source: Authors' concept

3. Research methodology

3.1. Sample of the study

The study sample was selected according to the nonprobability convenience sampling technique, a popular sampling method in tourist behaviour research because the population is too large (Meng & Choi, 2016). The study applied online and in-person survey methods because of some objective factors during Covid 19 outbreaks in the world and Vietnam. The entire survey period is from January to May 2021. The survey respondents are Vietnamese tourists currently living and working in Vietnam and have participated in travelling in the past two years. After the questionnaire was completed, a pilot test was conducted with a small sample of n = 30 to evaluate the clarity of the questions. The total number of survey samples in online and offline forms is 632 responses (250 are offline surveys and 382 are online surveys). The data was processed by excluding missing data (n=23), outliers (n=32, z-score>1.96) and multivariate normality (n=24, according to Mahalanobis distance value). Hence, the data used for the formal study with a sample size of 553. This study applied Structural Equation Modeling, also known as SEM (Structural Equation Modeling), a second-generation statistical analysis system developed to analyze multidimensional relationships between variables in a model (Haenlein & Kaplan, 2004). Since the model of this study is complicated with many different relationships, therefore, PLS-SEM selection method is suitable.

3.2. Measures for study variables

The measures for the concepts in the research model synthesized from previous studies will be adjusted to suit the current research context.

The Big Five personality traits used from the research of Wu & Mursid (2019) are extraversion (EXTR), including three items; openness (OPEN), including three items; agreeableness (AGR), including three items; consciousness (CONS), consisting of three items; neuroticism (NEUR) consisting of three items.

Co-production attitude in the study is a second-order measurement, which consists of three components: Interaction Attitude (INAT), Knowledge Sharing attitude (KSAT), Responsive Attitude (REAT) synthesized from studies of Cheung & To (2016), Shamim et al. (2017), Khrystoforova & Siemieniako (2019), Ahn et al. (2019). Subjective norms (SUNO) are used in the study of Shamim et al., 2016. Perceived behavioural control (PBCO) is synthesized from the studies of Han (2015), Cheung & To (2016), and Meng & Choi (2017).

Co-production behaviour of tourists is three second-order measurements, including co-production before the trip, explained by two concepts: information seeking (INSE) and information sharing (INSH); Co-production behaviour during the trip

includes three concepts, which are Personal interaction (PEIN), Helping (HELP), Tolerance (TOLE); Co-production behaviour after the trip includes two concepts: Feedback (FEBA) and Advocacy (ADVO). Measures for these concepts are summarized from studies by Yi & Gong (2013); Vega-Vázquez et al., 2015; Ahmad (2016); Shamim et al. (2017); Merz et al. (2018); Roy et al. (2019); Assiouras et al. (2019); Arıca & Kozak (2019).

All items were measured with a scale of Likert 7, ranging from 1 = very strongly disagree to 7 = very strongly agree. At the same time, the research sample was also analyzed for demographic characteristics such as age, gender, education level, income, occupation, and the number of travels per year.

4. Empirical data and results

4.1. Descriptive statistics

The detailed sociodemographic profile of respondents, including gender, age, educational level, living area, occupation, income and frequency of travel, are shown in Table 1 below:

Table 1: Sociodemographic profile of survey participants

Feature	Category	N	%	Feature	Category	N	%
Gender	Male	263	47.6	Income	Under 7,000,000 VND	313	56.6
	Female	287	51.9		7,000,000 - 15,000,000 VND	144	26.0
	Others	3	0.5		16,000,000 – 20,000,000 VND	52	9.4
Age	18 – 21 years	218	39.4		21,000,000 VND and over	44	8.0
	22 – 28 years	120	21.7	Frequency of travel	Once time per year	232	42.0
	29 – 40 years	117	21.2		Twice times per year	157	28.4
	41 – 50 years	86	15.6		Three times per year	96	17.4
	< 50 years	12	2.2		Four times and over	68	12.3
Occupation	Student	156	28.2	Educational level	Higher Secondary	234	42.0
	Public sector employees	84	15.2		Undergraduate	251	45.0
	Private sector employees	111	20.1		Postgraduate	68	13.0
	Public sector management	34	6.1	Living area	Northern	149	26.9
	Private sector management	47	8.5		Southern	313	56.6
	Own business	28	5.1		Central	91	16.5
	Others	93	16.8				

Source: Authors' calculation

Females made up the majority of respondents (51.9%), and the main age group 22-28 and 29-40 years old. Many participants have the educational level of higher secondary (42%) and Undergraduate (45%). More than half of the participants, 56.6%, have a low income of less than 7 million VND per month.

4.2. Measurement model

The data were processed and analyzed by Smart PLS 3.3.3 software. The study used partial least squares structural equation modelling (PLS-SEM) to test the research model.

The reliability and validity of constructs using factor loadings, composite reliability (CR), average variance extracted (AVE), and correlation among constructs were tested (see Table 2 and Table 3). The results of the test of the indicators are satisfactory, in which the loading factor of each item is greater than 0.7; composite reliability (CR) is all greater than 0.6; average variance extracted (AVE) is all greater than 0.5 (Chin, 2010). The VIF (Variance Inflation Factor) values of each observed variable are less than 5. Furthermore, discriminant validity was evaluated by comparing the square root of AVE and correlations among the latent variables (see Table 3). So this can be concluded with exact discriminant validity (Fornell & Larcker, 1981) (Table 3). The HTMT criterion shows that all HTMT coefficients reach the threshold below 0.85, with confidence intervals of 95% (table 4), indicating discriminant validity of research variables (Hair et al., 2013).

4.3. Hypotheses testing

Results of the structural path model with the direct effects

For testing the hypotheses (with the direct effects), bootstrapping using Smart PLS, which is recommended by (Chin, 2010; Hair et al., 2011), was employed. In this approach, we have considered 5,000 resamples with 553 cases (Henseler et al., 2009). Table 5 shows the entire results.

The inner model suggests that The Big Five personality traits have three characteristics: Extraversion, Openness, and Agreeableness that have a lucrative influence on all three groups of Tourists' co-production behaviour (co-production behaviour before the trip, co-production behaviour during the trip, and co-production behaviour after the trip) with positive impact coefficients statistic, p-value < 0.05 and t values > 1.96 (detailed in Table 4). Consciousness only had a positive effect on co-production behavior during the trip (H4b: $\beta = 0.11$, p-value = 0.00, $t = 2.83$), the remaining two groups of co-production behavior before the trip (H4a: $\beta = 0.07$, p-value = 0.08, $t = 1.70$) and co-production behavior after the trip (H4c: $\beta = 0.03$, p-value = 0.39, $t = 0.87$) had no effect.

Similarly, Neuroticism only negatively affects co-production behavior during the trip (H5b: β = -0.05, p-value = 0.04, t = 1.99), remaining two groups of co-production behavior before the trip (H5a: β = 0.00, p-value = 0.93, t = 0.09) and co-production behavior after the trip (H5c: β = -0.05, p-value = 0.07, t = 1.81) had no effect. The remaining hypotheses in the research model from H6a, H6b, H6c effect coefficients are all positive (p-value < 0.05, t > 1.96). However, all hypotheses from H7a, H7b, H7c had no effect (seen Table 5).

Results of the structural path model with the mediation effects

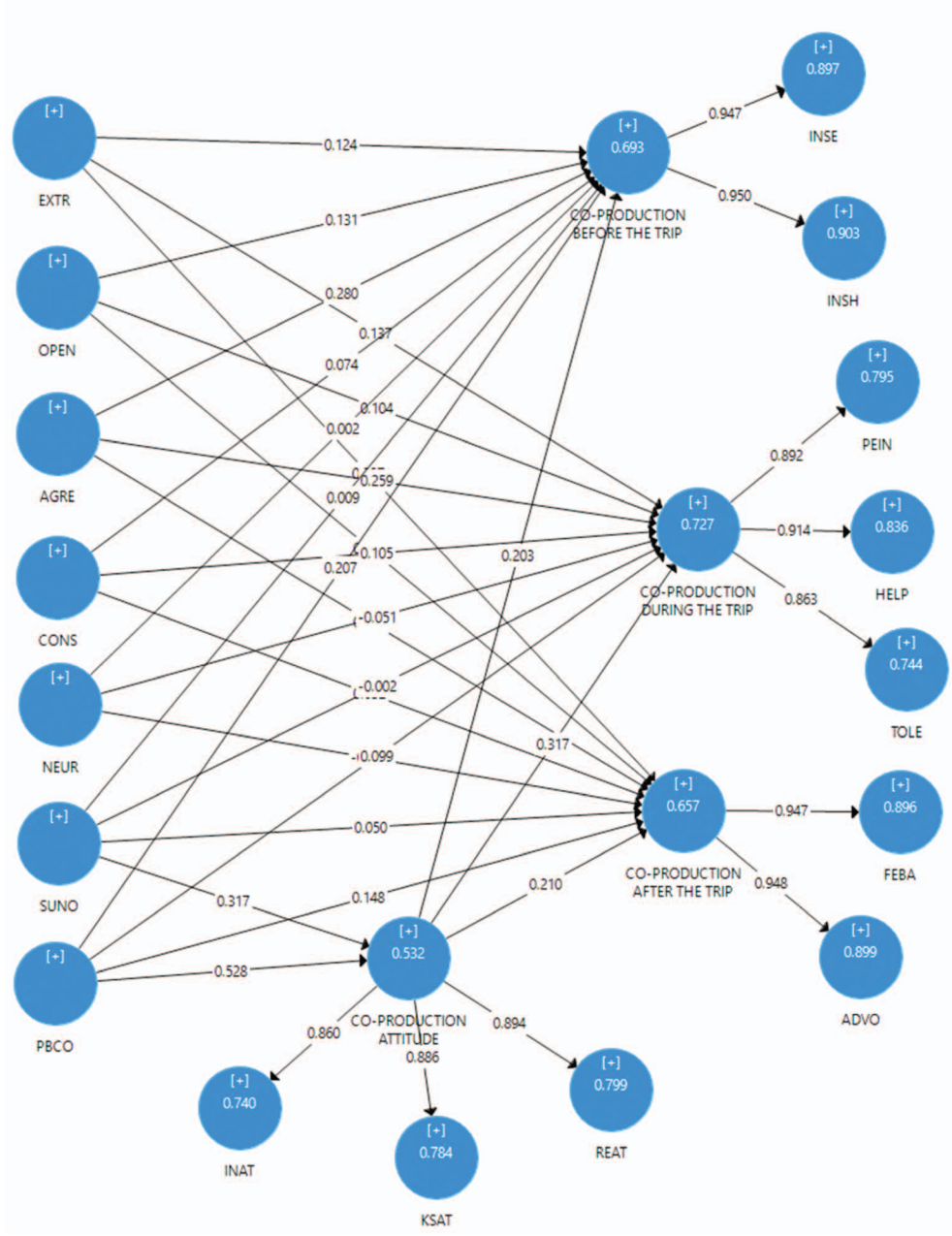
For the direct effect, the confidence interval is [0.064; 0.231], meaning that the direct effect's population value will be somewhere between 0.064 and 0.231 with a 95% probability. As this confidence interval does not include the value zero, the direct effect of H8a is significant (Hair et al., 2013).

For the indirect effect, the confidence interval is [0.053; 0.170], meaning that the direct effect's population value will be somewhere between 0.053 and 0.170 with a 95% probability. The indirect effect of H8a is also confirmed. The same results of significant direct and indirect effects for hypotheses H8b and H8c are also confirmed, indicating a complementary type of mediation effect (Hair et al., 2013).

For hypotheses H9a, H9b, and H9c, the results for indirect effects are also confirmed for the indirect-only types of mediation effects. However, the direct effects are not significant as they have confidence interval include the value zero (confidence interval [-0.054; 0.068], [-0.062; 0.058], [-0.009; 0.105]). All are illustrated in table 6.

Furthermore, the R^2 coefficients are very high (Figure 2) in terms of coefficients of determinants, EXTR, OPEN, AGRE, CONS, NEUR, and PBCON can explain co-production behaviour during the trip to the extent of 72.7% (R^2 = 0.727). Co-production behaviour before the trip can be explained by EXTR, OPEN, AGRE, and PBCO to the tune of 69.3% (R^2 = 0.693). Besides, EXTR, OPEN, AGRE, and PBCON can explain co-production behaviour after the trip to the tune of 65.6% (R^2 = 0.656). It also appears that SUNO and PBCON can explain INAT to the tune of 53.2% (R^2 = 0.532).

Figure 2: Validated research model



Source: Authors' calculation

5. Results and discussion

The study accredited the relationship between The Big Five personality traits and three groups of Tourists' co-production behaviour, namely co-production behaviour before the trip, co-production behaviour during the trip, and co-production behaviour after the trip, developed from TPB theory. The Extraversion, Openness, and Agreeableness of the personality traits (H1, H2, H3) positively influence the three stages of co-production behaviours. This result is consistent with the previous studies (Ong & Musa, 2012; Wu & Mursid, 2019) and somewhat with the study of Kvasova (2015) on eco-friendly tourists' behaviour, where Kvasova's study did not support the "Openness" effect. Extraversion personality has the strongest influence on co-production behaviour (at all three stages), followed by Agreeableness and Openness personality. The research of Ying & Norman (2014) on personality in social relationships also concluded that individuals with a high degree of openness may be more open to different networking opportunities and are more likely to create new social relationships. Open-minded tourists who are always curious to improve their knowledge, imaginative, and eager to experience will be very active in finding and sharing. Thus, it also reinforces the view that openness, agreeableness and conscientiousness directly influence customer co-product behaviour, especially in tourism services.

Hypothesis H4 and H5 are not accepted. Consciousness and Neuroticism only affect co-production behaviour during the trip, but not for two other stages of travel consumption. Neuroticism has a detrimental effect on co-production behaviour during the trip, which was also partially consistent with the study by Wu & Mursid (2019). Thus, it reveals that Consciousness and Neuroticism customers are very reluctant to interact and exchange information and provide feedback to service providers unless they are required to participate during the trip. Thus, their willingness to interact, help and tolerate when the service provided has not met the expectations partly explains their respectful and responsible personality (Wu & Mursid et al., 2019; Zhao & Seibert, 2006; Kvasova, 2015). Ying & Norman (2014) stated that conscientious people are very attentive to strong and lasting relationships. Thus, a conscientious traveller is interested in responding to feedback on his experience with the trip and recommending to others to the service provider they feel satisfied and connected. Consciousness person exhibits anxiety, impulsiveness, and vulnerability, or behaves negatively, uncomfortable, and socially poorly. Therefore, it is understandable that when customers have sensitive personalities, it is difficult to participate in product co-creation. While the behaviours of participating in tourism product co-creation require a high level of interaction, such as friendly communication, expressiveness, creativity, imagination, and dynamism, these are completely absent in people with the following characteristics: personality is sensitive (Wu & Mursid, 2019).

Subjective norms, attitude, perceived behavioural control, and co-production attitude achieve the expected relationship as the original TPB model. Thus, hypotheses H6 and H7 are accepted. These research results re-confirm the positive role of attitude towards co-productive behaviour, behavioural control, and subjective norm in explaining co-productive behaviour in a specific context is tourism. These are consistent with the relationships in the TPB model (Ajzen, 1991). Hence, the tourists with specific resources or opportunities, such as travel information and knowledge, will be willing to participate in the co-product.. Generally, the more favourable the attitude, subjective norms, and perceived behavioural control are, the stronger the individual's intention to perform the considered behaviour. The relative importance of attitudes, subjective norms, and perceived behavioural control in predicting expected intention varies across behaviours and situations. The subjective norm in this research only indirectly influences co-production behaviour through attitude. Therefore, when tourists have specific resources or opportunities, such as travel information and knowledge, they will be willing to participate in product co-creation. Furthermore, our study also examined the mediation effect of Co-production attitude in two different types: complimentary indirect effect (perceived behaviour control and co-production behaviour) and indirect-only effect (subjective norm and co-production behaviour). As a complementary effect, the co-production attitude mediates the relationship between two variables and increases the total effect of this relationship. On the other hand, co-production attitude as mediation creates an indirect relationship between subjective norms and co-production behaviour. Thus, directly and indirectly, perceived behavioural control affects tourists' co-productive behaviour (all groups of behaviours before, during, and after the trip). And subjective norm does not directly relate to tourists' co-production behaviour, but only indirect relationship through the attitude to co-production behaviour. Thus, in the tourism context, the influence of relatives, friends, and other stakeholders leading to co-production occurs only through attitudes towards this behaviour.

6. Conclusion

This study aims to evaluate the relationship between The Big Five personality traits and the three types of tourists' co-production behaviour in different stages of tourists' consumption. In light of this research trend, this study has inherited and developed the concept of Tourists' Co-Production Behavior for a broader view of the tourism industry by reclassifying these behavioural groups according to each stage of tourists' co-creation process: Pre-Trip Co-Production, During the Trip Co-Production, and Post-Trip Co-Production Behavior. The study also further extends the original model of the theory of Planned Behavior (TPB) by the five personality characteristics of tourists. Our study results revealed that tourists' Big Five

personality traits influence their co-production behaviour in each stage of tourism consumption. However, each of these traits will affect or not affect co-production behaviour in each specific stage separately.

Apart from the mediating role of attitude in the relationship between subjective norms, the perceived behavioural control and tourism co-production behaviour in three stages of tourism consumption was also tested.. Attitudes toward co-production behaviour indirectly mediate the relationship between subjective norms and tourists' co-production behaviour. Tourists with a co-production attitude tend to have co-production behaviour. On the other hand, attitude toward co-production behaviour works as complimentary mediation between perceived behavioural control and co-production behaviour. In general, the more favourable the attitudes and subjective norms towards behaviour, and the greater the perceived behavioural control, the stronger the individual's co-production behavioural intention.

This section will present the theoretical and practical contributions to developing marketing strategies.

6.1. Theoretical implications

Based on the co-production behaviour groups of tourists in previous studies the study has reclassified these behavioural groups according to each stage of tourist engagement with co-production, thereby found a new concept of measurement for tourists' co-production behaviour which includes three groups of behaviours, namely co-production behaviour before the trip, co-production behavior during the trip, and co-production behavior after the trip. This result provides a broader view of the co-production behavior of tourists because tourism products are experiential products.

Our research has further developed the original TPB theory model, which includes three main components: subjective norms, perceived behavioural control, and co-production attitude by adding The Big Five personality traits. Thus, it develops new components for TBP theory, namely *co-production behaviour*. Moreover, this paper also tested the mediation role of co-production attitude towards subjective norms, perceived behaviour control, and co-production behaviour and identified the different mediating effects by applying Smartpls SEM. This study contributes as a theoretical foundation to clarify specific types of mediation for co-production behaviour incorporating the TPB model in a tourism context.

6.2. Managerial implications

Tourists' involvement in the co-production process is vital to managers, especially in the tourism business. As mentioned above, tourists' consumption behaviour

does not stop only when they decide to travel, but throughout the three-stage process, they participate in co-production (before, during and after). Moreover, the researchers discovered that tourists' personalities influence their behaviour during these co-production stages. From the obtained research results, some managerial implications for tourism business managers are proposed as follows:

There should be different approaches and interactions for each group of customers with different personality characteristics to stimulate customers to participate the most in all co-production processes (before, during, and after). Thus, tourism business managers should have development orientations, marketing and services based on their products on each customer's personality group. Once suitable products and services are provided for each customer group, customer satisfaction will also be.

Marketing managers should strive to improve the relationship between customers and companies and develop appropriate marketing strategies for each customer co-production stage to enhance co-production activities further. Accordingly, many new products will be developed, improving the competitiveness of their businesses.

6.3. Limitations and opportunities for future research

This study has achieved some important results, but some limitations open suggestions for future research:

First, the survey participants in the study are Vietnamese tourists; the next research can choose the subjects as international and domestic tourists to increase the representativeness of the research sample. Second, tourists' co-production behaviour in the study is not specific to any tourism product that can be tackled in future research, such as smart tourism and green tourism. Third, it was recently proved how opinions expressed on social media shape travel expectations before embarking on a trip and their feedback after. These findings confirm that social media empowers consumers to be active collaborators in the interactive value creation process. Future studies may focus on looking at changes in customer co-production behaviour in the evolving context of social media.

Moreover, the moderator role of social media on the relationship between tourists' Big five personality traits and co-production behaviour can be examined in future. Last, this study focuses on co-production behaviour from the customer's point of view. However, co-creating a product is a collaborative work between customers and employees, and further research can examine co-production behaviour from the employee's point of view.

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Petofaktorski model ličnosti i koprodukcijsko ponašanje vijetnamskih turista: proširenje teorije planiranog ponašanja

Truong Thi Xuan Dao[1], *Pham Huong Trang*[2], *Tran Duc Thanh*[3]

Sažetak

U okviru Ajzenove teorije planiranog ponašanja, studija se provodi kako bi se procijenila povezanost petofaktorskog modela ličnosti i tri tipa koprodukcijskog ponašanja turista: koprodukcijsko ponašanje prije putovanja, koprodukcijsko ponašanje tijekom putovanja, te koprodukcijsko ponašanje nakon putovanja. U modelu teorije planiranog ponašanja pojašnjava se i medijacijski utjecaj koproduckijskog stava. Istraživanje je provedeno pomoću online i osobnog istraživanja u periodu od siječnja do svibnja 2021.Subjekti istraživanja su vijetnamski turisti koji žive i rade u Vijetnamu te su putovali u posljednje dvije godine. Rezultati istraživanja otkrivaju da sve tri osobine ličnosti: Ekstraverzija, Otvorenost i Ugodnost pozitivno utječu na tri kategorije koprodukcijskog ponašanja, dok Savjesnost i Neuroticizam utječu samo na koprodukcijsko ponašanje tijekom putovanja. Pojašnjeni su komplementarni i neizravni medijacijski učinak koprodukcijskog stava. Ova studija pridonosi proširenju teorije planiranog ponašanja analizom petofaktorskog modela ličnosti u koprodukcijskom ponašanju turista. Nalazi istraživanja pomažu turističkim tvrtkama da bolje razumiju kako osobine ličnosti posjetitelja utječu na njihovu koprodukciju i pomažu im u izgradnji učinkovitih metoda koprodukcije. Osobe zaposlene u turizmu trebaju razviti različite pristupe za skupine kupaca s prepoznatljivim karakteristikama u svakoj fazi koprodukcijskog procesa.

Ključne riječi: *koprodukcijsko ponašanje, teorija TPB-a, osobine ličnosti Big Five*

JEL klasifikacija: *M3, M10, M31*

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Appendices

Table 2: Measurement properties

Construct/Items	Loading Factor (>0.7)	Cronbach's alpha (>0.7)	Composite Reliability (>0.6)	Average Variance Extracted (>0.5)	Variance Inflation Factor (<5)
Extraversion (EXTR)		0.81	0.88	0.72	
EXTR1	0.84				1.75
EXTR2	0.85				1.76
EXTR3	0.85				1.78
Openness (OPEN)		0.79	0.88	0.71	
OPEN1	0.87				2.20
OPEN2	0.74				1.36
OPEN3	0.90				2.42
Agreeableness (AGRE)		0.74	0.85	0.65	
AGRE1	0.81				1.52
AGRE2	0.80				1.41
AGRE3	0.81				1.47
Consciousness (CONS)		0.89	0.93	0.82	
CONS1	0.88				2.33
CONS2	0.91				2.86
CONS3	0.91				3.05
Neuroticism (NEUR)		0.77	0.85	0.67	
NEUR1	0.71				1.54
NEUR2	0.91				1.73
NEUR3	0.81				1.54
Subjective Norms (SUNO)		0.83	0.90	0.75	
SUNO1	0.79				1.52
SUNO2	0.91				2.71
SUNO3	0.88				2.58
Perceived Behavioral Control (PBCO)		0.78	0.87	0.69	
PBCO1	0.79				1.46
PBCO2	0.87				1.88
PBCO3	0.83				1.71
Co-Production Attitude		0.92	0.93	0.59	
Interaction Attitude (INAT)		0.83	0.88	0.66	
INAT1	0.74				1.50
INAT2	0.81				2.20
INAT3	0.83				2.05
INAT4	0.86				2.79
Knowledge Sharing Attitude (KSAT)		0.90	0.93	0.83	
KSAT1	0.90				2.70

Construct/Items	Loading Factor (>0.7)	Cronbach's alpha (>0.7)	Composite Reliability (>0.6)	Average Variance Extracted (>0.5)	Variance Inflation Factor (<5)
KSAT2	0.93				3.60
KSAT3	0.90				2.62
Responsive Attitude (REAT)		0.92	0.95	0.86	
REAT1	0.92				3.28
REAT2	0.94				4.23
REAT3	0.93				3.48
Co-Production Behavior Before the Trip		0.93	0.95	0.76	
Information Seeking (INSE)		0.90	0.94	0.84	
INSE1	0.92				3.15
INSE2	0.93				3.55
INSE3	0.89				2.51
Information Sharing (INSH)		0.9	0.95	0.86	
INSH1	0.916				3.04
INSH2	0.945				4.23
INSH3	0.928				3.44
Co-Production Behavior During the Trip		0.93	0.94	0.67	
Personal Interaction (PEIN)		0.93	0.95	0.87	
PEIN1	0.92				3.08
PEIN2	0.94				4.61
PEIN3	0.94				4.26
Helping (HELP)		0.91	0.94	0.84	
HELP1	0.91				2.86
HELP2	0.93				3.51
HELP3	0.91				2.98
Tolerance (TOLE)		0.88	0.93	0.81	
TOLE1	0.86				2.00
TOLE2	0.93				3.63
TOLE3	0.91				3.31
Co-Production Behavior After the Trip		0.94	0.95	0.77	
Feedback (FEBA)		0.91	0.94	0.85	
FEBA1	0.91				2.91
FEBA2	0.93				3.43
FEBA3	0.92				3.15
Advocacy (ADVO)		0.92	0.95	0.87	
ADVO1	0.93				3.57
ADVO2	0.94				3.87
ADVO3	0.93				3.54

Source: Authors' calculation

Table 5: Results of the structural path model with the direct effects

Hypo.	Path	Estimate	t-value	P-value	Results
H1a	Extraversion → co-production behavior before the trip	0.28	6.93	0.00	Supported
H1b	Extraversion → co-production behavior during the trip	0.26	6.62	0.00	Supported
H1c	Extraversion → co-production behavior after the trip	0.23	5.13	0.00	Supported
H2a	Openness → co-production behavior before the trip	0.13	3.17	0.00	Supported
H2b	Openness → co-production behavior during the trip	0.10	2.68	0.00	Supported
H2c	Openness → co-production behavior after the trip	0.13	3.09	0.00	Supported
H3a	Agreeableness → co-production behavior before the trip	0.28	6.93	0.00	Supported
H3b	Agreeableness → co-production behavior during the trip	0.26	6.62	0.00	Supported
H3c	Agreeableness → co-production behavior after the trip	0.19	4.99	0.00	Supported
H4a	Consciousness → co-production behavior before the trip	0.07	1.66	0.09	*Not Supported*
H4b	Consciousness → co-production behavior during the trip	0.11	2.83	0.00	Supported
H4c	Consciousness → co-production behavior after the trip	0.03	0.87	0.39	*Not supported*
H5a	Neuroticism → co-production behavior before the trip	0.00	0.09	0.93	*Not supported*
H5b	Neuroticism → co-production behavior during the trip	-0.05	1.99	0.04	Supported
H5c	Neuroticism → co-production behavior after the trip	-0.05	1.81	0.07	*Not Supported*
H6a	Perceived behavioral control → co-production behavior before the trip	0.21	5.36	0.00	Supported
H6b	Perceived behavioral control → co-production behavior during the trip	0.10	2.44	0.02	Supported
H6c	Perceived behavior control → co-production behavior after the trip	0.15	3.432	0.00	Supported
H7a	Subjective norms → co-production behavior before the trip	0.01	0.276	0.78	*Not Supported*
H7b	Subjective norms → co-production behavior during the trip	-0.00	0.077	0.94	*Not Supported*
H7c	Subjective norms → co-production behavior after the trip	0.05	1.737	0.08	*Not Supported*

Source: Authors' calculation

Table 3: Discriminant validity test (Fornell and Larcker Criterion)

	ADVO	AGRE	CONS	EXTR	FEBA	HELP	INAT	INSE	INSH	KSAT	NEUR	OPEN	PBCO	PEIN	REAT	SUNO	TOLE
ADVO	0.935																
AGRE	0.628	0.811															
CONS	0.528	0.519	0.908														
EXTR	0.602	0.589	0.486	0.851													
FEBA	0.796	0.631	0.549	0.637	0.923												
HELP	0.714	0.669	0.59	0.605	0.738	0.921											
INAT	0.563	0.584	0.522	0.558	0.598	0.636	0.815										
INSE	0.672	0.667	0.538	0.58	0.68	0.708	0.666	0.917									
INSH	0.707	0.675	0.599	0.577	0.693	0.697	0.615	0.801	0.93								
KSAT	0.516	0.447	0.605	0.508	0.574	0.594	0.635	0.531	0.566	0.913							
NEUR	-0.225	-0.194	-0.237	-0.288	-0.255	-0.254	-0.206	-0.204	-0.167	-0.119	0.819						
OPEN	0.626	0.678	0.572	0.595	0.643	0.651	0.603	0.642	0.664	0.541	-0.216	0.843					
PBCO	0.548	0.488	0.514	0.421	0.587	0.571	0.536	0.612	0.614	0.627	-0.137	0.55	0.835				
PEIN	0.609	0.615	0.572	0.585	0.655	0.736	0.609	0.698	0.701	0.548	-0.217	0.609	0.534	0.936			
REAT	0.625	0.555	0.632	0.447	0.625	0.659	0.633	0.627	0.611	0.717	-0.091	0.604	0.617	0.631	0.932		
SUNO	0.466	0.459	0.426	0.423	0.477	0.434	0.497	0.438	0.481	0.517	-0.155	0.421	0.46	0.459	0.464	0.867	
TOLE	0.654	0.621	0.542	0.515	0.68	0.695	0.554	0.697	0.646	0.542	-0.199	0.599	0.534	0.631	0.598	0.425	0.904

Source: Authors' calculation

Table 4: Discriminant validity test (HTMT value)

	ADVO	AGRE	CONS	EXTR	FEBA	HELP	INAT	INSE	INSH	KSAT	NEUR	OPEN	PBCO	PEIN	REAT	SUNO	TOLE
ADVO																	
AGRE	0.756																
CONS	0.579	0.641															
EXTR	0.695	0.76	0.572														
FEBA	0.844	0.767	0.606	0.74													
HELP	0.777	0.814	0.654	0.704	0.809												
INAT	0.639	0.74	0.6	0.676	0.685	0.729											
INSE	0.733	0.815	0.596	0.675	0.748	0.78	0.766										
INSH	0.765	0.817	0.659	0.668	0.756	0.761	0.699	0.876									
KSAT	0.565	0.548	0.675	0.594	0.633	0.656	0.731	0.587	0.622								
NEUR	0.243	0.248	0.266	0.327	0.262	0.269	0.218	0.213	0.169	0.125							
OPEN	0.725	0.849	0.682	0.736	0.754	0.763	0.74	0.758	0.776	0.645	0.232						
PBCO	0.645	0.642	0.617	0.526	0.693	0.676	0.666	0.728	0.722	0.746	0.157	0.709					
PEIN	0.655	0.741	0.627	0.674	0.711	0.8	0.691	0.761	0.756	0.598	0.222	0.708	0.625				
REAT	0.675	0.672	0.695	0.516	0.681	0.719	0.719	0.685	0.662	0.785	0.099	0.71	0.727	0.68			
SUNO	0.53	0.581	0.498	0.512	0.546	0.496	0.592	0.504	0.549	0.591	0.176	0.512	0.56	0.52	0.526		
TOLE	0.721	0.766	0.607	0.607	0.756	0.773	0.643	0.778	0.714	0.607	0.203	0.718	0.642	0.694	0.66	0.492	

Source: Authors' calculation

Table 6: Results of the structural path model with the mediation effects

Hypo.	Path	Type of effect	Estimate	Percentile 95% confidence interval	t-value (>1.96)	p-value (<0.05)	Remark	Result
H8a	Perceived behavioral control → co-production before the trip	Direct	0.21	[0.064; 0.231]	5.36	0.00	Yes	*Complimentary mediation*
	Perceived behavioral control → co-production attitude →co-production before the trip	Total indirect	0.06	[0.053; 0.170]	3.15	0.00	Yes	
H8b	Perceived behavioral control → co-production during the trip	Direct	0.10	[0.024; 0.180]	2.44	0.02	Yes	*Complimentary mediation*
	Perceived behavioral control → co-production attitude → co-production during the trip	Total indirect	0.10	[0.119; 0.225]	5.05	0.00	Yes	
H8c	Perceived behavioral control → co-production after the trip	Direct	0.15	[0.135; 0.287]	3.43	0.00	Yes	*Complimentary mediation*
	Perceived behavioral control → co-production attitude → co-production after the trip	Total indirect	0.07	[0.057; 0.169]	3.37	0.00	Yes	
H9a	Subjective norms → co-production before the trip	Direct	0.01	[-0.054; 0.068]	0.28	0.78	No	*Indirect-only mediation*
	Subjective norms → co-production attitude → co-production before the trip	Total indirect	0.064	[0.028; 0.108]	3.147	0.002	Yes	
H9b	Subjective norms → co-production during the trip	Direct	-0.00	[-0.062; 0.058]	0.08	0.94	No	Indirect-only mediation
	Subjective norms → co-production attitude → co-production during the trip	Total indirect	0.17	[0.064; 0.142]	6.14	0.00	Yes	
H9c	Subjective norms → co-production after the trip	Direct	0.05	[-0.009; 0.105]	1.74	0.08	No	*Indirect-only mediation*
	Subjective norms → co-production attitude → co-production after the trip	Total indirect	0.11	[0.032; 0.109]	3.89	0.00	Yes	

Source: Authors' calculation

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The intra-industry trade dynamics in CEE countries: The role of trade agreements*

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Abstract

This paper investigates the impact of regional trade agreements (RTAs) on the development of intra-industry trade (IIT) for eight Central and Eastern Europe countries (CEE) from 1997 to 2019. The aim of the paper is to compare and explain the possible heterogeneous impact of different RTAs on IIT across countries while controlling for differences in development levels between economic integration member states. Our analysis is based on country-product level data obtained from UN Comtrade. The main hypothesis of the paper is that the CEFTA and EU integration agreements have a highly positive effect on IIT in comparison with other RTAs. However, the scope of the impact varies across countries, primarily depending on the economic development asymmetries that are in this paper proxied by the GDP per capita. We developed and estimated an augmented structural gravity model using Pseudo-Poisson Maximum Likelihood Estimator. The main contribution of our paper is the inclusion of the FTA-economic development gap interaction term, which enabled us to enrich the empirical findings of the research. Our results show that the main hypothesis holds, but also that an increase in economic asymmetries between integration members negatively affects IIT, thus indicating potentially increasing trade adjustment costs for new member states of an integration. These results go in favor of EU pre-integration and post-integration policies that have the goal of diminishing the economic development gap between future and present integration members.

Key words: *intra-industry trade, regional trade agreements, CEE countries, development asymmetries*

JEL classification: *F10, F14, F15*

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1. Introduction

Intra-industry trade (IIT) is an international trade phenomenon brought to the spotlight by Grubel & Lloyd (1971), the concept unknown before Verdoorn (1960) noticed that trade specialization between members of the Benelux Union was happening within different trade categories rather than between them. In that period, the prevalent idea was that bilateral trade with similar goods could not be explained by classical models of international trade, which helped increase the appeal of the researchers on this topic (see Krugman, 1979; Lancaster, 1980). A decade later, Davis (1995) showed that we could explain intra-industry trade between countries by combining classical – Ricardian trade theory with neoclassical – Heckscher-Ohlin trade theory. Moreover, he showed that the assumption of increasing returns to scale considered a prerequisite for intra-industry trade development, in fact, is not necessary for intra-industry trade to happen.

Concurrent with the rise of interest in IIT, the inquiries into the effects of economic integrations, regional trade agreements (RTA) in particular, on international trade also rose. The seminal paper on this topic is that of Viner (1951) and Balassa (1961). Subsequently, papers connecting IIT and RTA began to emerge, with the paper of Marvel & Ray (1987: 1279) noting the need to focus on "…the role of trade liberalization in creating larger markets with increased opportunities for specialization…" when empirically investigating determinants of IIT. The connection between IIT and RTA is a natural one since RTA removes artificial trade barriers made by governments, which in turn should influence trade flows between member states. This paper is focused on the type of these trade flows. The importance of exploring changes in trade flows that correspond to IIT is in the observation that a rise in bilateral trade of IIT type will cause lower adjustment costs in the RTA-joining economies because these costs are internal to industry (Menon & Dixon, 1996). Apart from RTA, one of the main determinants of IIT is the demand structure of national economies, thus, when investigating determinants of bilateral IIT, the similarity between the demand structure of trading partners should be controlled for. A seminal paper/Ph.D. dissertation where demand structure is the main determinant of international trade, and which is directly related to IIT is that of Linder (1961).

This paper especially emphasizes the importance of relatively high ratio IIT as opposed to inter-industry trade for mitigating risks to economies of the member states of the economic integration of higher-order, like the European Union (EU), due to asymmetric shocks, as well as the effects of economic integration-induced trade liberalization that incurs adjustment costs to firms and industries in general. These adjustment costs can be substantial in the case of the economic integration of countries with a significant difference in the economic development level, as is the case with CEE countries that entered the EU in the 2004-2013 period. Researching

the size of adjustment costs is not only important for the ex-post analysis of economic integration outcomes on trade, but also for future expansions of the EU, which will include countries that are less developed than countries that joined the EU in the 21st century.

The paper is developed around the issues mentioned above while investigating the changes in trade patterns attributed to the growth of IIT due to trade agreements in Europe for the case of Central and Eastern Europe countries (CEE), namely, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovenia, Slovakia, and Romania. The selected countries share similar social, political, and economic backgrounds. After the Second World War, they had adopted centrally-planned economies that lasted until the end of the 1980s. After the economic reforms in the 1990s, all countries had set a goal to become EU members. Indeed, it happened in the 2000s and 2010s.

This paper aims to upgrade and develop empirical investigations of IIT and RTA linkages and test them on the sample of the countries mentioned above by controlling for interaction between regional trade agreements and the difference between demand-side conditions (à la Linder). On bilateral trade panel data spanning from 1997 to 2019, and for each country, we distinguish between three different RTA dummies and RTA-Linder interactions, namely (1) European Union integration (EU), (2) Central European Free Trade Agreement (CEFTA), as well as (3) all other RTA that those countries joined throughout the observed period and that are represented by one dummy variable in our dataset. The main hypothesis of the paper is that the EU and CEFTA integration have a stronger (positive) impact effect on IIT in comparison with other RTAs, but the size of the impact varies across countries, depending on the difference between the demand size conditions, measured as the absolute difference in gross domestic product based on purchasing power parity by capita between trading partners. Our methodological approach adds a new twist to the story about the impact of RTA on IIT because we measure for the probable heterogeneous impact of RTA after accounting for the different demand structures between trading partners, that is, when accounting for the differences in the economic development levels. Moreover, there is a clear gap in the literature dealing with IIT in the case of CEE countries that places these countries in the research focus. These countries had experienced the transition period from a planned to a market economy. Afterward followed a process of stabilization and association with the EU (most of them in the late 1990s) and finally, accession to the EU (most of them in 2004). The last 30 years have been unstable from an economic perspective, which has severely affected trade patterns; starting with the end of the Cold War, China's economic rise and WTO entry in 2001, Global Financial Crisis, and the increasing trade protectionism that followed. In this paper, we aim to assess the IIT dynamics during this period and the role of RTA, and economic development differences between trading partners.

The rest of the paper consists of four sections. The second section provides a theoretical background related to the IIT and RTA, while the third deals with methodology and data. The fourth section obtains and discusses the empirical results, and the fifth section contains the conclusions

2. Literature review

Intra-industry trade (IIT) generally refers to the simultaneous import and export of the same product group (or within the same industry) between trading partners. IIT typically takes place between rich countries with similar economic structures and levels of development that are geographically close to each other (OECD, 2010). In addition, as multinational enterprises establish subsidiaries in multiple countries and exchange goods and services with the parent firm, IIT is frequently accompanied by foreign direct investment (FDI), which indicates the importance of monitoring changes in trade patterns and trade structure. The basis for IIT trade theory can be found in the work of Verdoorn (1960) and Balassa (1965), but the most important theoretical and methodological contribution to the measurement of IIT was made by Grubel and Lloyd (1971; 1975). The authors note that trading partners do not exchange identical products, but different variations of that product. To measure IIT, Grubel and Lloyd (1975) developed the Grubel-Lloyd index, which measures the size of IIT in an industry. Although the classic Grubel-Lloyd index has its drawbacks, it is still extensively used in the empirical literature on IIT. The strain of literature in international trade that in empirical research heavily relies on IIT is that connected with the research of Staffan Linder. In 1961, in his Ph.D. thesis, Linder starts with the notion that international differences in demand structure for various goods create differences in production functions across countries. Accordingly, the "the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries" (Linder, 1961: 94). This is usually called the Linder hypothesis. Thus, high IIT between countries is usually used as an indicator of the similarity of the demand structures. We use the difference between GDP per capita as a proxy variable for the similarity/dissimilarity of the demand structures of trading partners.

When it comes to economic integration theory, one of the seminal authors was Balassa, who in his paper from 1961, defined economic integration as "the abolition of discrimination within an area". Also, Balassa defined and classified different stages of economic integration: Free Trade Agreement, Customs Union, Common Market, and Economic Union. Free Trade Agreements are the most common form of economic integration because they allow each signatory keeps its tariff and non-tariff barriers to trade with the Rest of the World (ROW). Within the economic integration theories, the early focus was on the static effects of the economic integration within integration members and between members and ROW countries,

namely trade creation and trade diversion. From the 1960s, the importance of dynamic effects of economic integration was acknowledged, especially effects on economies of scale, technological advancement, productivity growth, market structure, and competition, as well as investment activity (Hosny, 2013). Bergstrand (1990), for example, examines the relationships between the share of intra-industry trade between trading partners and the average level of inequality between their GDPs, GDP per capita, capital-labor ratios, and tariffs. The analysis was conducted against the background of the theoretical framework of international trade such as the Heckscher-Ohlin-Samuelson theory and Linder's hypothesis. The model found that greater similarity in per capita income between two countries is associated with greater intra-industry trade, for both supply and demand reasons. Discussion about economic and especially trade integration usually starts with defining the main drivers of it. In the literature, we can find both inter and intra-industry trade considered to be one of the drivers. One usually finds that intra-industry is the predominant driver of the two, as shown by Menon & Dixon (1996). Their results underpinned the theoretical propositions and findings of early economic integration researchers like Verdoorn (1960), Drèze (1960), and Balassa (1965). One of the reasons for conducting our research is that the IIT-RTA relationship has not been thoroughly explored, especially using product-level data and controlling for the economic development differences as we do in this paper.

Clark and Stanley (1999) examine the determinants of IIT between the United States and developing countries at the country and industry levels. Their results show that the size of the economy and the trade orientation of the developing country has a positive effect on IIT and that IIT occurs in "nonstandard, made-to-order, vertically differentiated, labor-intensive products produced by large, globally integrated industries." Zhang et al. (2005) analyzed the determinants of Chinese IIT, comparing the effects on vertical and horizontal IIT. They used data at the 4-digit SITC level for the period from 1992 to 2001 for Chinese trade with its 50 trading partners. The estimation results show that vertical and horizontal IIT are determined differently, but trade liberalization and FDI inflows had positive effects on both. Trade openness was also found to drive IIT, as did economic size and trade composition. Chemsripong et al. (2009) investigate the impact of regional integration on intra-industry trade, proxied by the Gruber-Lloyd index in manufacturing between Thailand and other APEC economies. The analysis is based on the 3-digit SITC level and the results show that after integration, intra-industry trade increased, but at the same time trade with third countries, especially America, decreased, indicating ambiguous overall effects of trade liberalization.

Foster & Stehrer (2011) examine the impact of preferential trade agreements on IIT between members of preferential trade agreements on a panel of members over the period from 1962 to 2000. The results suggest that preferential trade

agreements are associated with the growth of intra-industry trade between members of preferential trade agreements and that the impact is higher in the case of developed member countries than for IIT between developing countries. Akram & Mahmod (2012) examine the determinants of IIT in the case of Pakistan's trade with its SAARC trading partners, taking into account country- and industry-specific determinants. The results of their panel data analysis show that country-specific determinants are significantly associated with IIT trade compared to industry-specific determinants. In addition, their results show that a relative increase in the supply of skilled labor in the reporting country compared to the partner country increases the supply of vertically differentiated goods for export, leading to an increase in IIT.

Macphee & Sattayanuwat (2014) examine the impact of major regional trade agreements on intra- and extra-regional trade flows in developing countries that are members of RTAs over the period from 1981 to 2008. In contrast to previous findings, their results suggest that regional integration does not appear to be a viable option as a substitute for multilateral trade liberalization and that this may be due to non-tariff barriers and trade policy implementation, particularly in the case of developing countries. In general, the growth of intra-industry trade dominates inter-industry trade (Baier et al., 2014), and trade agreements are considered an important trade policy tool. From an economic and trade policy perspective, studying the impact of RTAs on the further economic development of countries is crucial. Considering that most empirical studies do not focus specifically on CEE countries and do not use this type of disaggregated trade data, this study fills the gap in the current literature on the RTAs-IIT nexus.

3. Methodology

When calculating IIT, there are three major decisions to make: (1) which IIT formula to choose, (2) which classification of goods to choose, and (3) which level of aggregation to use.

Although over the years a multitude of different formulas for measuring IIT was developed, we choose original Grubel & Lloyd (1975) version, to have comparable results with the bulk of research results in this research field. So, we calculate IIT for trade between country *i* and *j* with good *k* in time *t* using the following formula:

$$iit_{ijkt} = 1 - \frac{|x_{ijkt} - m_{ijkt}|}{x_{ijkt} + m_{ijkt}} \quad (1)$$

where x_{ijkt} denotes the exports of product *k* from country *i* to country *j* in time *t*, while m_{ijkt} denotes imports of product *k* of country *i* from country *j* in time *t*.

When choosing classification, one usually chooses between Harmonized System (HS) or Standard Industrial Trade Classification (SITC). We choose HS at the tariff line level (6-digits). The reason we choose HS is the same as with the IIT formula, namely, getting in line one part of our methodology with similar research in this field. After deciding on the shape of the left-hand side of the future econometric model, we focused on determinants of IIT, where we decided to control for standard (gravity model) variables that are used in this research field, but with a special emphasis on the impact of RTA, that is, the impact of the interaction of RTA with the difference between the demand structure between countries, proxied by the difference between GDP per capita based on the purchasing power parity in current USD.

Due to the fact that trade policy is not an exogenous variable, our RTA variable can be a source of potential endogeneity issues. As argued in Baier and Bergstand (2007) it is important to account for such bias using panel analysis techniques. Therefore, to deal with the endogeneity issue in this analysis we include in the estimation importer and exporter fixed effects, time fixed effect, and country-pair fixed effect. Although this technique does not solve the problem entirely it for sure is plausible in gravity model estimation.

We present our econometric model by Equation (2).

To test our hypotheses, we develop the following econometric models:

$$\begin{aligned} iit_{ijt} = {} & \beta_0 + \beta_1\, linder_{jt} + \beta_4\, eu_{jt} + \beta_5\, eu_{jt} \times linder_{jt} + \beta_6\, cefta_{jt} + \\ & + \beta_7\, cefta_{jt} \times linder_{jt} + \beta_7\, rta_{jt} + \beta_8\, rta_{jt} \times linder_{jt} + \lambda_t + \\ & + \alpha_i + \gamma_j + u_{ijt} \end{aligned} \tag{2}$$

where iit_{ijt} is the value of Grubel-Lloyd IIT index for product i in the bilateral trade of particular CEE country with partner country j in year t. Since we have dyadic data, where one member of the dyad is always the same (one of CEE countries), we leave out the subindex denoting reporter country. Therefore, our panel unit is commodity defined at HS6 level and a partner country. $linder_{jt}$ is log-transformed absolute difference in GDP per capita based on the purchasing power parity in current USD between particular CEE country and the partner country j in time t. eu_{jt} is a dummy variable with value one if both trading partners are EU member states, zero if not. $cefta_{jt}$ is a dummy variable with value one if both trading partners are CEFTA member states, zero if not. rta_{jt} is a dummy variable with value one if both trading partners are members of the same regional trade agreement, zero if not, λ_t represents time fixed effects that are included in all estimations, α_i are product fixed effects, γ_j are partner country fixed effects, while u_{ijt} is the regression error term at the panel unit level. It should be noted that standard variables in the gravity models, apart from GDP are distance and contiguity, which are not included in Equation (2). The reason for omission of these variables is that by inclusion of partner country fixed effects and product fixed effects (i.e. multilateral resistance terms), the

other time invariant variables such as aforementioned variables are automatically omitted from the equation because of perfect collinearity. The reason why we used this approach and included multilateral resistance terms is to estimate structural gravity model, which has strong micro-foundations. For the sake of completeness, we also tested Equation (2) without country and product fixed effects just to check whether the signs and sizes of the distance and contiguity variables are in line with expectations based on previous research. As a benchmark for the estimation results, we used the results of meta-analysis done by Head & Mayer (2014), and the results for in line with expectations (coefficient for distance around minus 1 and for contiguity around 0.5, exact results are available upon request). Table 1 shows selected results for structural gravity estimates of RTA and EU, that are in the focus of interest of this paper.

Table 1: Estimates of selected structural gravity variables

Estimates	Median	Mean	St. deviation	No. of papers
RTA/FTA	0.28	0.36	0.42	108
EU	0.19	0.16	0.50	26

Notes: (1) Adapted from Handbook of International Trade, Chapter 3 by Head & Mayer (2014: 160)
Source: Authors' calculations

We estimate Equation (2) for each of the eight CEE countries separately using Poisson Pseudo Maximum Likelihood (PPML) estimator. PPML is usually used in estimating gravity and gravity-like models such as proposed here. The reason for its usage is ability to easily incorporate zero observations that are dominating trade data, particularly when analyzing IIT at disaggregated level, such as in this paper (HS6 level). It also handles well heteroscedasticity through usage of robust covariance matrix, resulting in consistent estimates even if the data at hand is not distributed following Poisson distribution.

4. Empirical data and analysis

4.1. Data

We gathered data from two sources. Bilateral trade data from 1997 to 2019 at a 6-digit HS level was obtained from UN Comtrade, while the rest of the data, including GDP per capita, distance, contiguity, EU and RTA dummies were obtained from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), while CEFTA definition was obtained from official CEFTA webpage. For each one of the CEE countries, we merged the aforementioned datasets using

the HS6 product-partner key, obtaining from around 1.6 million observations for Croatia to more than 3.2 million observations for the Czech Republic (the exact number of observations, together with descriptive statistics is shown in Table 1).

We start with the statistical analysis of the datasets (we have one dataset for each country). Table 2 shows average trade flows between a particular CEE country and all partner countries over the observed period. Apart from the exports and imports dependent on the size of the country, all other variables show that the selected group of CEE countries is relatively homogenous, which justifies the selection of these groups of countries for the analysis. (i.e., trading partners' average GDP PPP per capita, trading partners' average distance, the average number of traded products with trading partners in the same regional trade agreement). The statistics shown in Table 2 are mean and standard deviation (in parentheses). For example, contiguity of 0.13 (or 13%) for Croatia informs us that out of all bilateral trade flows at the HS6 level, 13% is with countries with which Croatia shares a common border, a value of 0.39 (39%) for FTA informs us that out of all bilateral trade flows, 39% was with countries with which Croatia has signed FTA (other than EU and CEFTA).

The results in Table 3 show that, except for the case of Bulgaria, the Linder hypothesis does not hold. The average Linder coefficient across all eight countries is 0.08, suggesting that an increase in the absolute difference in GDP per capita between trading partners increases bilateral IIT on average. For example, in the case of Croatia, the size of the Linder coefficient is 0.07, which is interpreted as the percentage increase of the IIT index if the difference in GDP per capita between Croatia and its trading partner increases by 1%.

Furthermore, the negative effect is also observed when we control for regional trade agreements signed with Third countries (predominantly outside the European continent; RTA-Linder interaction coefficient), but the size of the coefficient is quite smaller, the possible reason being the fact that such RTAs are shallower as opposed to EU and CEFTA trade agreements. For the case of CEFTA-Linder interaction, there is an outlier in the sign of the coefficient for Croatia (positive), which can be explained by the idiosyncrasies of Croatian economies in the 2000s, with the opening to international trade after the war period in the 1990s and WTO membership in the year 2000. Overall, the average effect of the RTA-Linder dummy is -0.14, -0.8, and -0.03, for EU, CEFTA, and other RTA respectively[2].

We also tested whether our results are robust to changes in aggregation level, so we aggregated the data at 2-digit HS and rerun the estimations. The Linder coefficients

[2] Calculated by simple average of row value of the respective interaction coefficients shown in Table 3. The CEFTA-Linder coefficient could not be calculated for Romania due to collinearity between EU, EU-Linder, CEFTA and CEFTA-Linder dummy variables, so only EU-Linder interaction coefficient is shown.

Table 2: Descriptive statistics of the data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Croatia	Slovakia	Slovenia	Hungary	Poland	Bulgaria	Romania	Czech R.
IIT	0.07	0.09	0.08	0.10	0.10	0.07	0.07	0.11
	(0.190)	(0.210)	(0.209)	(0.225)	(0.221)	(0.193)	(0.188)	(0.234)
exports	1.4e+05	6.2e+05	2.3e+05	7.9e+05	9.8e+05	2.2e+05	5.1e+05	7.8e+05
	(2,429,395.0)	(11,581,230.5)	(3,511,445.7)	(13,143,210.1)	(11,546,178.6)	(4,109,020.4)	(7,498,432.7)	(12,392,873.4)
imports	2.6e+05	5.6e+05	2.4e+05	7.6e+05	1.1e+06	2.8e+05	2.8e+05	7.3e+05
	(5,101,147.6)	(13,953,951.7)	(3,837,912.6)	(15,377,032.4)	(28,972,706.2)	(9,695,232.0)	(9,655,754.5)	(1,479,1543.7)
GDPpc	28.30	28.21	26.81	28.02	28.34	27.05	28.29	26.77
	(16.40)	(16.82)	(16.95)	(17.21)	(18.62)	(16.58)	(17.09)	(18.26)
Distance	2,481.72	2,802.44	2,771.37	2,697.59	3,263.11	2,715.76	2,714.45	3,310.98
	(3,304.6)	(3,437.7)	(3,508.0)	(3,342.7)	(3,521.8)	(3,074.8)	(3,051.2)	(3,704.3)
contiguity	0.13	0.18	0.15	0.17	0.16	0.13	0.15	0.12
	(0.334)	(0.388)	(0.360)	(0.376)	(0.366)	(0.340)	(0.360)	(0.327)
EU	0.19	0.40	0.36	0.37	0.39	0.32	0.35	0.34
	(0.395)	(0.490)	(0.479)	(0.483)	(0.487)	(0.465)	(0.477)	(0.474)
CEFTA	0.05	0.05	0.03	0.04	0.01	0.02	0.03	0.04
	(0.208)	(0.209)	(0.172)	(0.203)	(0.111)	(0.154)	(0.162)	(0.185)
RTA	0.39	0.26	0.32	0.32	0.25	0.36	0.38	0.28
	(0.488)	(0.440)	(0.465)	(0.466)	(0.435)	(0.480)	(0.485)	(0.451)
N	1,672,542	1,915,208	2,207,987	2,249,906	3,107,688	1,851,856	1,867,042	3,243,945

Notes: (1) mean coefficients; standard deviation in parentheses

Source: Authors' calculations

Table 3: Estimation results of the gravity model (Equation 2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Croatia	Slovakia	Slovenia	Hungary	Poland	Bulgaria	Romania	Czech R.
Linder	0.051***	0.259***	0.109***	0.052***	0.085***	-0.079***	0.002	0.183***
	(0.010)	(0.017)	(0.013)	(0.007)	(0.008)	(0.007)	(0.030)	(0.008)
EU	0.818***	0.414***	0.225***	-0.065*	0.052	0.005	0.000	0.493***
	(0.037)	(0.056)	(0.035)	(0.026)	(0.034)	(0.044)	(.)	(0.031)
EU#Linder	-0.275***	-0.289***	-0.165***	-0.052***	-0.084***	-0.020	-0.004	-0.231***
	(0.013)	(0.018)	(0.013)	(0.008)	(0.009)	(0.015)	(0.034)	(0.009)
CEFTA	-0.207***	0.527***	0.187***	0.024	0.512***	-0.176		0.342***
	(0.048)	(0.044)	(0.033)	(0.028)	(0.043)	(0.112)		(0.024)
CEFTA#Linder	0.160***	-0.099***	-0.183***	-0.102***	-0.156***	0.022		-0.224***
	(0.023)	(0.018)	(0.017)	(0.012)	(0.024)	(0.057)		(0.014)
RTA	0.407***	0.178**	0.071*	-0.005	0.033	-0.122***	0.019	0.282***
	(0.026)	(0.058)	(0.034)	(0.029)	(0.034)	(0.027)	(0.125)	(0.029)
RTA#Linder	-0.118***	-0.083***	-0.053***	0.042***	0.064***	0.072***	-0.019	-0.111***
	(0.009)	(0.020)	(0.013)	(0.011)	(0.012)	(0.011)	(0.035)	(0.009)
Const.	-2.284***	-2.355***	-2.061***	-1.869***	-1.949***	-1.947***	-1.584***	-2.112***
	(0.027)	(0.052)	(0.033)	(0.020)	(0.027)	(0.025)	(0.037)	(0.027)
N	1,615,525	1,837,197	2,116,312	2,149,595	3,004,631	1,761,501	206,228	3,166,821
Pseudo R2	0.177	0.176	0.167	0.153	0.170	0.148	0.145	0.168

Notes: (1) Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' calculations

were still positive and significant for Croatia, Czech Republic, Hungary, Poland, and Slovakia, while for Bulgaria, Romania and Slovenia were positive and non-significant (results available upon request).

To check validity of our results, namely, size of the coefficients related to the three different economic integration dummies (EU, CEFTA, RTA respectively) we compared our results with those gathered by Head & Mayer (2014) and that are shown in Table 1. Mean value for EU dummy coefficient in our case is 0.24 (vs 0.16 in Table 1), 0.17 for CEFTA and 0.11 for other RTAs (vs 0.36 in Table 1) which is well within one standard deviation of the results reported in Table 1 in both cases and shows that our results are comparable with the bulk of the results in this field of research. It also indicates that, although we cannot compare them directly with similar studies, because to the best of our knowledge this type of methodological approach, combining RTA and Linder hypothesis, has not been done elsewhere, our interaction terms coefficients can be trusted.

What is outstanding in our results is the "EU-IIT switch" and "CEFTA-IIT switch", that is, the situation where for bilateral trade between CEE countries and other EU member states, the interaction between a regional trade agreement and Linder variable is (for most countries) negative and significant. We can see that when controlling for economic integration and the Linder variable, IIT gives place to inter-industry trade, indicating potentially increasing trade adjustment costs for new member states of integration and higher vulnerability to asymmetric shocks. An increase in the difference between tastes and/or supply-side factors like capital per labor ratio, proxied by the Linder variable and within EU integration, will have significant negative effects on IIT, and therefore trade adjustment costs. This result adds one justification to within-EU financial transfers predominantly aimed at EU candidate countries and new member states in the form of structural and cohesion funds.

5. Results and discussion

Our results, even though not directly comparable due to different methodological approaches, are close to the findings of Ramakrishnan & Varma (2014). In their paper, they examined the impact of FTA on IIT in the case of India. Their results also indicated that FTAs have a significant and positive impact on IIT. However, in their case, the Linder hypothesis was in line with Linder's original predictions, which is not surprising given the dataset they gathered: bilateral trade of India with Southeast Asian countries. Here we again stress the advantages of our approach. By using an interaction term between FTA and GDP per capita difference we can test and expand the empirical understanding of the relationship between these two variables. Our results show that the effect of FTA is biased if

we fail to account for the difference in the economic development level of the integration members.

Our findings also fit in with the research findings of Urata and Okabe (2009) as well as that of Foster and Stehrer (2011). Later mentioned paper investigated the impact of the RTAs on the structure of trade, where among different indicators of the structure of trade, they choose Grubel-Lloyd index. Their findings showed that the effects of RTA on IIT are generally positive, although there are differences that can be attributed to the differences in per capita GDPs between the trading partners, and that they "tend to suggest that the formation of RTAs between dissimilar countries has a negative effect on IIT" (Foster and Stehrer, 2011: 407). Urata and Okabe (2009) on the other hand focused more on explanation of trade flows and with that in mind, they used income gap, defined as the log of the absolute value of the difference in GDP per capita, as one of the determinants of the change in trade flows. They expected that relatively large income gap increases inter-industry trade, while relatively small income gap increases IIT, which is line with our predictions. Their results on the product groups showed that IIT is indeed sensitive to differences in GDP per capita of trading partners. Our results unifies and upgrades methodological approaches, as well as the findings of these papers and clearly shows the advantages of using product-level data and interaction term between FTA and income gap.

Overall, in our paper we showed how income gap between trading partners need to be considered jointly with trade liberalizing policies. We showed that two most important economic integration agreements on European continent caused positive, but less than optimal economic consequences, since it caused significant adjustment costs to economies joining already established economic integrations, such as EU and CEFTA.

6. Conclusion

From the beginning of its inclusion in international trade research, the simultaneous export and import of similar but slightly differentiated commodities – intra-industry trade – was often regarded merely as a statistical phenomenon arising from the chosen level of a particular trade classification, i.e., not as something worthy of a separate study. These views gradually changed, with the real starting point being Linder's theory of overlapping demand. On the other hand, the theory of economic integration was early recognized as one of the pillars of the theories of international trade. The status of IIT theory arose in the 1980s and 1990s as a result of the evolution of trade theory toward market imperfections and trade adjustment costs, the latter bringing IIT and economic integration (especially FTA) theories closer together.

The aim of this paper was to test IIT-RTA interaction within the scope of Linder's hypothesis, that is, we hypothesized that deeper economic integrations

like EU and CEFTA will have a stronger effect on IIT, but also, that economic development differences matter and can attenuate the positive impact of RTA on trade. To test the hypothesis, we developed an appropriately adjusted structural gravity model, that was estimated using the PPML estimator. Our results, robust to the different aggregation levels of the HS classification, have shown that for CEE countries that are part of EU economic integration, the Linder hypothesis by itself does not hold, but holds when taking into consideration interaction between the economic development differences and RTA status, namely, the impact of RTA on IIT is sensitive to the degree of asymmetry of economic integration, where the degree of asymmetry is measured by the difference in GDP per capita of integration members. On average, the negative effect of RTA on IIT was strongest for EU integration, followed by the CEFTA integration and then all other RTAs that CEE countries signed with Third countries. Including the RTA-Linder interaction, the term deepened the level of analysis in this particular level of research and brought closer together two fields of research, economic development, and economic integration.

Our results highlight the importance of considering development imbalances during the economic integration process and indicates that even with pre-accession and post-accession funds that the EU uses to tackle these imbalances, more effort was required to lower the costs of the integration process. Future research should focus more on the economic development integration with international trade and economic integration studies on the industry-product level.

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Dinamika intraindustrijske trgovine u zemljama SIE: uloga sporazuma o slobodnoj trgovini

Vinko Zaninović[1]

Sažetak

U ovom se radu istražuje utjecaj regionalnih trgovinskih sporazuma (RTS) na razvoj intra-industrijske trgovine (IIT) za slučaj osam zemlja Srednje i istočne Europe (SIE) od 1997. do 2019. godine. Cilj rada je usporediti i objasniti mogući heterogeni utjecaj različitih RTS na IIT, kontrolirajući za razliku u ekonomskoj razvijenosti između zemalja partnera. Analiza se temelji na razini podataka zemlja-proizvod, a izvor podataka su UN Comtrade i CEPII baza podataka koja sadrži varijable gravitacijskog modela. Hipoteza rada je da CEFTA i EU ekonomske integracije imaju snažniji (pozitivni) učinak na IIT u usporedbi s ostalim RTS, ali snaga utjecaja varira između zemalja, s obzirom na razvojne nejednakosti zemalja, koje su u ovom radu mjerene kroz razliku u BDP po glavi stanovnika. U radu je razvijen i procijenjen model koristeći PPML procjenitelj. Doprinos rada jest uključivanje interakcijske varijable između RTS i razvojne nejednakosti. Rezultati rada su ukazali da je hipoteza rada validna, kao i da razvojne nejednakosti između zemalja članica integracije imaju negativan učinak na IIT, što potencijalno znači povećanje troškova prilagodbe zbog ekonomskog integriranja. Rezultati podupiru EU pred-pristupne i post-pristupne politike koje imaju za cilj smanjiti razvojne nejednakosti između zemalja članica integracije.

Ključne riječi: *intraindustrijska trgovina, regionalni trgovinski sporazumi, SIE zemlje, asimetrije razvoja*

JEL klasifikacija: *F10, F14, F15*

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Long-run effects of human development and public governance on economic welfare: New evidence from transition economies*

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Abstract

The study attempts to gauge the impact of human development and public governance quality on economic welfare in the long term. The basic proposal of the analysis is that economic growth and/or development cannot be the measurement of the value of economic performance. For this reason, the Economic Prosperity Index, developed by the "Legatum Institute" is the dependent variable of the linear logarithmic model estimated in the paper. Besides, the measurement of economic welfare, (public) governance quality, which neoclassical economics ignored for a certain period, is considered an important input to human development. By taking these two variables into the research center, the study sights the rise in the prosperity (welfare) of 31 transition economies that achieved intense development after the 2000s from 2007 to 2020. Transition economies are selected owing to the rapid development and strong welfare effects they have reached with the millennium. So, the main hypothesis of the research is that transition economies have high human development and good governance that creates economic prosperity. By applying this research question, cross-sectional dependence and slope homogeneity tests, unit root tests, and co-integration tests, the author has conducted the lag length selection before the long-run relationship. Comprehensive analysis findings reveal that both indicators enhance economic prosperity by positively affecting them in the long run and that some of the deviations are improved.

Key words: *economic welfare, human development, governance, transition economies, panel data*

JEL classification: *I31, O15, O16, P31, C23*

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1. Introduction

The issue of economic growth and development is one of the basic research areas of *public economics*. The main goal of the countries is to ensure stable growth regardless of their development level. However, the approach to the possibility of achieving economic growth and/or development and welfare increase is a controversial issue. It is not an appropriate assessment to consider a country as developed or underdeveloped by focusing only on its economic growth/development performance. Criticisms of this approach, which identifies development and economic growth, are centered around the view that economic growth does not reduce poverty sufficiently and does not contribute adequately to the solution of various emerging social problems. It confers that the dilemmas regarding social welfare are still not resolved in many countries that exhibit an economically- efficient growth performance. It was observed that some countries' rapid economic growth in the 1970s faced problems such as political instability, rising unemployment rates, and injustice in income distribution. In addition, the costs of the structural adjustment reforms implemented in most of the developing countries in the 1980s under the supervision of the International Monetary Fund (IMF) and the World Bank (WB) were also quite heavy. These negativities have paved the way for the formation of hesitations regarding the nature, quality, and results of economic development models. Despite the negative developments in issues such as crime rates and environmental pollution in some countries with high economic growth performance, it was quite remarkable that other countries with lower incomes were in a better position in terms of human welfare. Based on these results, the international community stated that in the 1980s, it would not be possible to get rid of poverty or improve the quality of life by simply increasing the income level or increasing the economic growth rates. Haq (1995) states that high income does not mean high quality of life and getting rid of poverty. Along with income redistribution policies, a human-centered development policy that considers the quality of life of the lowest strata of the society should be implemented (Haq, 1995: 3).

With respect to economic performance, more inclusive indicators other than economic growth and income are necessary to evaluate the level of welfare. In this context, the United Nations Development Program (UNDP) published its first Human Development Report in 1990. The Development Report published by UNDP in 1990 reflects the basis of this approach. The definition based on the capability approach formulated by Sen (1979, 1982, 1985) and on a widely known human development concept emphasizes that people, not income, should be at the center of development policies. The report pointed out that human development can be explained by the combination of education and health apart from income level. According to this report, human development means leading a long, healthy, and qualified life for an individual. Ensuring human development increases the welfare,

education level, and health of individuals, allowing individuals to make more rational decisions.

According to Anand and Sen (1994), the goal of all activities is individuals, and development should be based on individual achievements, freedoms, and capabilities. The significant point is not the goods or income of individuals, but their living conditions (Anand and Sen, 1994: 1). According to Sen's approach, development is an increase in the number of things that individuals can do. Being healthy, feeding well, being knowledgeable, and being a well part of society are examples of what can be done. It is stated that owing to these achievements, economic gains will be obtained in the long term together with human development. From Sen's point of view, development means removing the obstacles in front of what individuals can do (Fukuda-Par, 2003: 302). Doryan (2001) signified that if governments provide better education and health services to their citizens, the human capital accumulation of citizens will increase, and this will positively affect economic growth in the long run. According to Ramirez et al. (1997), who acknowledge that there is a strong connection between economic growth and human development; i) Economic growth provides resources to allow for continuous improvements in human development. ii) Improvements in employment quality contribute to the economic growth process.

It brings to the fore the fact that socio-economic development cannot be expressed only with economic growth and development, and the improvement in economic performance cannot be explained by human development alone. The fact that economic indicators will not be the sole determinant of economic development/ welfare/performance has brought along new and current debates on economic growth and development. One of these debates is the relationship between institutional quality and economic performance. This relationship has become an important focus of attention in economics since the first half of the 1990s, and this interest continues. There are three developments behind this revival of interest.

The first is the institutional vacuum left behind by the collapsing Soviet system and the economic disasters that this vacuum has brought along with haul and corruption. As Coase (1992: 714) points out, the transition period in Russia and Eastern Europe has revealed that the inclusion of institutional factors in the analysis of orthodox economic theory has now become an irredeemable necessity. The second development is the persistence of income inequality between the low-income and the rich countries, and even the gap widening. This situation, which is the opposite of the income convergence prediction of neo-classical economics, has led the World Bank to prioritize institutional quality. In World Development Report (2002), the World Bank stated that the biggest problem of the 21st century is to create the necessary demand for "effective market institutions" and to meet this demand. The third development is that the relationship between national income growth and intra-country income inequalities begins to follow a U-curve, in contrast to the

Kuznets curve. That is to say, after a certain level of national income, intra-country inequality increases rather than decreases. On top of that, after 1995, regardless of average income, in-country income inequalities have increased from time to time. In addition, there is a relationship between income inequality and the decrease in the labor share in the national income, and their relationship is subject to debate.

The concept of institutional quality includes a discussion that goes back to ancient times. Today, this debate shows itself in the literature as public governance. Many ancient philosophers have often debated issues such as the state, institutions, and management. Niccolò Machiavelli would describe human nature as evil and selfish. Machiavelli also argued that every way and every means must be used to achieve success. Machiavelli believed that a statesman should act by accepting this fact in his political attitudes, and even the statesman has to act pragmatist and selfish with this reality. According to Machiavelli, an unselfish leader in a society of selfish people cannot successfully pursue his cause. Machiavelli stated that politics also has its own autonomous rules; states that politics is not a field that operates within the framework of traditional moral rules. Machiavelli argued that political thought should be secularized and scientificity. However, although Machiavelli, who was against the church, was a person who defended secularism, he stated that the ruler should also use religion as a tool when necessary. In Plato's ideal understanding of the state, human beings and the state are considered one. According to Plato, the mechanism called the state is the enlarged human. Plato divided the human soul into three parts desires, mind, and will. Plato's understanding of the state is also divided into three parts. The rulers correspond to the mind, the warriors-persons responsible for protecting the state to the will, and the professional class to the desires part of the soul. According to Plato, if these three parts of the state live healthily without conflicting with each other with their minds, wills, and wishes, the ideal state will occur. According to him, the ideal state should be governed by aristocrats.

Public governance, which has received lots of attention since ancient times, is also frequently on the agenda in our age. The search for efficiency/productivity, valid only in the private sector before the 1980s, started to show itself in the public sector with the governance approach, which is the New Public Management model that emerged as a result of the change in the public sector in recent years. The multidimensional dynamics of change accelerated with globalization led to important transformations of all societies in the socio-economic and cultural life. Concepts and values of both public administration and public organizations are also closely affected by these dynamics. On the other hand, the increase in the share of public expenditures in total economic activities with the Wagner Law results in the problems arising in the financial system, and the rapid change in information and communication technologies in every aspect of social life necessitates changes in public administration. The basis of this approach is the concept of efficiency. The phenomena that ensure efficiency within the approach framework include

the concepts of accountability, participation, participation of citizens in decision-making processes, transparency, auditing, and the rule of law. Citizen-orientedness, joint decision-making, and the widespread understanding of total quality in the public sector oblige participation at different levels and ensure citizen satisfaction in public services. The concept entered the public administration discipline with the New Public Management and Public Choice Theory towards the end of the 1980s. As a result of the new public administration or public management movements based on an efficient and productive public governance approach have caused the implementation of the reforms of adapting to the new world order in public administration. In this process, governance began to dominate almost all the public administration. Values such as joint decision-making, widespread understanding of total quality, democratic management, and individual responsibility necessitate participation at different levels. This governance approach has gained meaning and strengthened as a result of the spread of such thoughts (Kaufmann et al., 1999a: 12-18; Kaufmann et al., 1999b: 5-8; Ahrens and Meurers, 2000; Kaufmann, 2003: 2; Zak and Knack, 2001: 297). The European Union (2001) defines governance as the processes, rules, and behavior that influence the aspect of the authorizations implemented at the European level, particularly on participation, accountability, openness, effectiveness, coherence, and participation. Even the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) defines some norms for good governance, such as equity, effectiveness, rule of law, accountability, and participation (UNESCAP, 2003). The World Bank used this concept for the first time in its 1989 report (World Bank, 1989). The concept appearing in the Organization for Economic Cooperation and Development (OECD) reports in the following years has also been the subject of many empirical studies through measurable indices.

One of the arguments used to justify the exclusion of institutions from the economic analysis is the difficulty of measuring institutional quality as neoclassical economics does. Today, there are different and numerous data that can give an idea about institutional quality. Some of those are (i) Political Risk Services published by the International Country Risk Guide (ii) World Bank's Worldwide Governance Indicators (iii) Corruption Perception Index published by Transparency International. Apart from these, there are also smaller-scale datasets. For example, the regime characteristics data of Polity V Project, Business Environment Risk Intelligence's investment risk indicators, Economist Intelligence Unit's democracy index, etc. Although there are problems such as subjectivity, endogeneity, and biases, these data now allow obtaining objective measurements and analyzes of the effect of institutionalism (governance) on economic performance.

First, the concept of the institution has a different meaning than that used in everyday speech. In everyday language, the institution is closer to the concept of the existing organization with its building, management, hierarchy, and statute.

However, in economics and other social sciences, the concept of institution, which refers to when it comes to institutional quality, is a concept that affects all organizations and individuals (in this sense, it has a meta-analytic dimension). Secondly, institutions are elements of the social contract between economic actors, and in this sense, they are the results of the endogenous (internal) balance that emerges from the interaction of different interests and forces. Because of these characteristics, they may not be optimal in terms of both efficiency and equity. On the other side, the institutional quality measure measures how far is the optimal the institutional framework in society or how close to that desired point. The endogenous nature of institutions and their relationship to the optimal one is a question discussed until today. This problem was addressed by Marx in political economy and by social scientists and non-Marxist economists such as Von Misses (1949), Hayek (1960), Olson (1965, 1982), Buchanan, and Tullock (1962), Stigler (1971), and North (1990). More recently, Acemoglu (2004, 2006a, 2006b, 2008, 2010) has also contributed to this discussion and indicated why institutions might not be optimal and, on the other side, why non-optimal institutions survive, and how institutions relate to economic development.

Based on the theoretical arguments, it is a fact that the measurement of economic performance is *socio-economic development* rather than economic growth and/or development. *Human development* and *institutional quality (good governance)* are two primary concepts that will provide and maintain *economic welfare* and constitute the *research question* of the study. The *hypothesis* of the study can be expressed as "*high human development and good governance are major factors for economic welfare*". This study aims to *contribute to the literature* by testing the related hypothesis. In addition, it aims to gauge *the impacts of human development and good governance on economic welfare* for the transition economies and the 2007-2020 period, based on the gap caused by economic growth and development-oriented analyzes in the previous literature. *The reason* why transition economies are preferred in the analysis is due to the potential for future growth and welfare of transition economies. There is *more detailed knowledge* in the data and method section. In this context, a *linear logarithmic model* is created between the United Nations Development Programme's *Human Development Index (HDI)* and the data obtained from the World Bank's *Worldwide Governance Indicators (WGI)* and *the Economic Prosperity Index (EPI)* compiled by the Legatum Institute's Prosperity Index. The period of 2007-2020 is chosen under the data constraint because *the EPI index begins to be calculated in 2007.* The rest of the study consists of the following sections. Section 2 includes a theoretical and empirical literature review. Section 3 demonstrates the research methodology. Section 4 represents the empirical data and analysis. Section 5 contains the analysis results and discussion. Section 6 makes a conclusion and provides recommendations for policymakers and further research.

2. Literature review

This section examines the effects of human development and governance on economic welfare in two parts. Firstly, studies focus on the relationship between *human development* and *economic performance*, and secondly, studies that analyze the relationship between *governance* and *economic performance* are scrutinized.

With the advantage of industrialization after 1980, economic growth and development have shown a great increase in opportunities and a decrease in poverty levels with the living conditions improvement. In this direction, economic growth provides resources that will allow human development to improve. However, the improvement in the quality of labor also contributes to economic growth. In this context, there is a strong connection between economic growth and human development (Ranis et al., 2000: 198-199). The realization of more improvements in human development causes the economic growth of a country to be sustainable, while in response to economic growth, it strengthens the human development process and ensures its continuity. Therefore, human development is conferred as both an input and a result of economic growth (Boozer et al., 2003: 2; Suri et al., 2011: 506).

One of the pioneering studies has examined the links from economic growth to human development and from human development to economic growth for 67 countries over the period 1970-1992. In the study, it is stated that there is a strong link between economic growth and human development and that growth should be sustained to achieve development plan goals such as improving the quality of human life (Ramirez et al., 1997: 1). Ranis et al. (2000) have conducted an analysis specific to developing and developed countries for the period 1960-1992 and determined a strong and positive relationship between economic growth and human development (Ranis et al., 2000: 204). Ranis and Stewart (2002) have performed several analyzes for a sample of 83 developed and developing countries for the period 1960-2000, 22 Latin American countries, and the period 1960-2001. It has been concluded that human development leads to economic growth, and although it is not systematic, economic growth also contributes to human development (Ranis and Stewart, 2002: 21-22). Suri et al. (2010) have determined a bidirectional relationship between human development and economic growth for the period 1960-2001 and for 108 developed and developing countries (Suri et al., 2010: 24-25) In the study conducted by Bundala (2012), it has been found that there is a strong relationship between human development and economic growth in a total of 40 countries (Bundala, 2012: 1). Grubaugh (2015) analyzes the relationship between economic growth and human development for 83 countries using the data from 1980 to 2010 with the dynamic panel data method and states that there is a positive relationship between the variables (Grubaugh, 2015: 15). In the study

conducted by Ucan and Kocak (2018), it has been deduced that there is a long-term relationship between the variables in the sample of Turkey, Germany, the USA, Norway, and Italy, with the data of the period 1990-2015 and panel data analysis (Ucan and Kocak, 2018: 59).

The relationship between governance quality and economic performance goes back to Adam Smith. Smith stated that trade and manufacturing are unlikely to develop in any country without a certain level of confidence in the fairness of governments. Smith also remarked that in such unfortunate countries, where the violence of the rulers is constantly feared, people can hide their opportunities rather than investing and making efforts. Neoclassical economics has ignored the importance of governance for a long time until the end of the 20th century despite Smith's views and contributions. In addition, economic decisions and actions have always been considered as a "technical" problem. This shortcoming has led economists to believe in the fact that institutionalism also has an economic side and to study in this direction after the middle of the century. A work that can be described as the pioneer of these studies is related to the perspective of "governance", which shaped the work of Williamson (1975: 31-33; 1985: 183-189) but dates to Coase's work in the 1930s. In this definition, institutions are more "governance structures" and the emphasis is on ownership structures, hierarchies, corporate culture, or information asymmetries. The main question addressed in this approach is: how and under what conditions do institutions minimize the problems of "prisoner's dilemma", which are frequently observed in the interaction between economic actors and cause suboptimal results? One way is for institutions to establish a well-defined framework of property rights (Coase, 1937: 388-392). The other way is for institutions to minimize the principal-agent problems and conflicts of interest caused by these problems. North (1994: 362) defines institutions as the "rules of the game" between economic actors. Game rules can be either "formal constraints" (e.g. constitution, law, official rule, etc.) or "informal constraints" (e.g. norms of behavior, consensus principles, voluntary rules of conduct, etc.). This definition states that institutions, societies, or economic systems are "cost and incentive structures". In this context, the main function of institutions is to create rules that outline the interaction between actors. The third definition is related to Axelrod's (1984) analysis of trust. What is essential in this definition is the trust between the actors and whether the institutions contribute to the growth of this trust or not. Internalized (i.e. informal) rules of conduct increase trust, and based on this trust, the cost of realizing contracts between actors is reduced. For this reason, trust-creating institutions both open new areas for economic activity and deepen existing ones. In terms of the relationship between institutional quality and economic performance, the following conclusions can be drawn from these definitions. According to the economic approach, which emphasizes the importance of institutions (*institutional economics*), sustainable economic

growth can only be achieved if institutions encourage and support activities that enable efficiency and output growth. In this sense, the study of North (1990) has been an important breaking point in the literature. In this study, Douglass North has explained how institutions and institutional change affect economic performance over time with an analytical framework. According to North (1990), institutions are the rules of the game and economic performance has a decisive role. Some economies develop inclusive institutions that produce growth and development, while other economies develop exclusionary institutions that produce inefficiency and stagnation. Institutions shape the development of the types of knowledge and skills fostered by the structure of an economy. Effective institutions that are created according to social norms, increase productivity and ensure production incentives accelerate economic growth. Newly established or existing organizations benefit from the opportunities created by the change in the institutional environment. Institutions are in a relationship with the past, present, and future. The impact of institutions created today will emerge in the future. This action leads to effective governance (North, 1990: 73-101). Jessop (1998) lists what is necessary for effective governance, regardless of activity level: i) creation and simplification of realistic, problem-solving models and practices that are aligned with governance objectives, ii) improving the learning capacity of models and applications, iii) establishing methods for coordinating actions, depending on the specific nature of coordination problems, iv) constituting a meta-governance system that allows for a more systematic review of issues and potentials, resource availability and necessities (Jessop, 1998: 50).

Considering these assessments, the relationship between governance and economic performance can be examined from many different perspectives and it is confirmed that the relationship is mostly positive. Many sub-elements are used in the literature to represent governance and institutional structure. At this point, there are five different groups for measuring the quality of public institutions: Institutional quality measures (corruption, bureaucracy quality, the enforceability of contracts, etc.), social capital measures (indicators of civil rights and freedoms), social characteristics (ethnic structure, social development, and capacity measures), political characteristics (quality of democracy, political regime, and duration, etc.), political instability (frequency of government changes, socio-political instabilities, duration of civil wars, etc.). Using political stability from these indicators, Barro (1991) has examined the period of 1960-1985 in 98 countries. According to the findings, growth rates are positively related to political stability measures (Barro, 1991: 407). Knack and Keefer (1995) conclude that the quality of institutions protecting property rights in selected countries for the 1972-1982 period has a positive effect on economic growth (Knack and Keefer, 1995: 224). Mauro (1995) investigated the effects of corruption levels on the economic growth of 67 countries for the period 1980-1983. Findings indicate that corruption negatively affects economic growth by causing low investment rates (Mauro, 1995: 705).

Tanzi and Davoodi (1997) have intensified above corruption. According to the findings, corruption can decelerate economic growth as it decreases the efficiency of public expenditures while increasing public expenditures. Corruption can slacken economic growth by increasing some repetitive operating, maintenance, and wage expenditures. Corruption negatively affects economic growth by reducing the quality of existing infrastructure (Tanzi and Davoodi, 1997: 1). Acemoglu et al. (2004) state that it is difficult to create economic institutions that are compatible with economic growth by working for decision-makers to have more power (Acemoglu et al., 2004: 80). Estrin et al. (2013) demonstrate that higher levels of corruption, weaker property rights, and broader government size reduces economic growth in 42 countries between 2001 and 2006 (Estrin et al., 2013: 578). Erdogan (2016) quests the nexus between institutional structure and economic performance from 1993 to 2012 for developed and developing countries. According to the findings, while there is a positive relationship between institutional structure and economic growth in developed countries, there is no relationship in developing countries (Erdogan, 2016: 102). On the other hand, there are examples of literature examining the relationship between good governance and economic performance in the context of transition economies. These studies have researched governance indicators such as democracy, participation, bureaucracy quality, civil society, rule of law, civil freedom, political right, legal framework, political stability, corruption, efficient judiciary, and security ownership through different periods and analysis methods. Governance indicators have been associated with variables such as economic growth, economic development, foreign direct investments, and macroeconomic stability, and a significant relationship has been determined (Brunetti et al., 1997a; Brunetti, et al., 1997b; Rodrik, 1997; Campos, 2000; Havrylyshyn and Rooden, 2000; Rodrik, 2000; Ahrens and Meurers, 2002).

3. Research methodology

The research method is arrayed as the basic linear logarithmic model, cross-sectional dependence and slope homogeneity test, unit root test, cointegration test, and the test of the long-run relationship. In equation 1, the *linear logarithmic model* of the variables is represented.

$$LNEPI_{it} = \beta_0 + \beta_1 LNHDI_{it} + \beta_2 LNWGI_{it} + \varepsilon_{it} \quad (1)$$

3.1. Cross-sectional dependence and slope homogeneity tests

Firstly, cross-sectional dependence between units is examined using the Breusch and Pagan (1980) *LM* and Pesaran (2004) CD_{LM} tests.

$$\Delta Y_{i,t} = \alpha_i + u_i t + \delta_i Y_{i,t-1} + \sum_{j=1}^{p_i} Y_{ij} \Delta Y_{i,t-j} + \theta_i \overline{Y}_{t-1} + \\ + \sum_{j=0}^{p_i} \vartheta_{ij} \Delta \overline{Y}_{i,t-j} + u_{it} \qquad (2)$$

$t = 1, \ldots, T;\ i = 1, \ldots, N$

It is examined whether the simple correlation coefficients obtained by using the residuals estimated from the model, which is defined as (2), are equal to zero. For this purpose, the autocorrelation in error terms for each cross-section unit is obtained by using the model that also includes the lagged values of $\Delta \overline{Y}_t$ and $\Delta \overline{Y}_{i,t}$ To examine whether there is a dependency between the cross-section units, the hypotheses are:

$H_0 : p_{ij} = cor(u_{it}, u_{jt}) = 0 \quad i \neq j$ *There is no dependency between units.*

$H_\alpha : cor(u_{it}, u_{jt}) \neq 0 \quad i \neq j$ *There is dependency between units.*

Therefore, the test statistic is generated as follows when N and T go to infinity.

$$CD_{LM} = \left(\frac{1}{N(N-1)}\right)^{\frac{1}{2}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (T\hat{p}_{ij}^2 - 1) \qquad (3)$$

Also, slope coefficients may not be homogeneous in panel data analysis. The slope homogeneity test developed by Pesaran and Yamagata (2008) based on Swamy (1970) is also applied to the analysis. Equation (4) presents the model of Swamy (1970).

$$\hat{S} = \sum_{i=1}^{N} (\tilde{\beta} - \tilde{\overline{\beta}}_{WFE}) \frac{x_i' M_T x_i}{\tilde{\alpha}_i^2} (\tilde{\beta} - \tilde{\overline{\beta}}_{WFE}) \qquad (4)$$

M_T shows the identity matrix, $\tilde{\beta}$ and $\tilde{\overline{\beta}}_{WFE}$ presents the parameters of the weighted fixed effect and pooled ordinary least squares. Pesaran (2008) developed this model as follows.

$$\tilde{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{S} - k}{\sqrt{2k}}\right) \qquad (5)$$

$$\tilde{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{S} - E(\tilde{Z}_{it})}{\sqrt{Var(\tilde{Z}_{it})}}\right) \qquad (6)$$

$\tilde{\Delta}_{adj}$ indicates the bias-adjusted result of $\tilde{\Delta}$. k shows the number of regressors and $\tilde{Z}_{ij} = k.\ Var(\tilde{Z}_{it}) = \frac{2k(T-k-1)}{T+1}$

The hypothesis is as follows:

$H_0 : \beta_i = \beta;\ H_\alpha : \beta_i \neq \beta$

3.2. The CADF (Augmented Dickey-Fuller) unit root test

After cross-sectional dependence and slope homogeneity estimation, the unit root test is conducted whether the series is stationary or not. One of the second-generation panel unit root tests is Pesaran's (2007) Augmented Dickey-Fuller (CADF) test. In this test, as a result of the simulations of the panel unit root test, significant results can be obtained both for *N* goes to infinity and for cases where *T* is greater than *N*, and *N* is greater than *T*. Starting from the basic ADF (7) equation, an error term is defined that consists of two different parts that are common for all series and unique to the series defined separately for each series. That is, spatial correlation is also considered under cross-section dependence.

$$\Delta Y_{i,t} = \alpha_i + \beta_i Y_{i,t-1} + \delta_{i,t} + \sum_{j=1}^{p_j} \emptyset_{i,j} \Delta Y_{i,t-j} + u_{i,t} \quad (7)$$

The ADF equation used by the CADF test is represented in equation (8). As *N* goes to infinity, it is decided which sections are stationary or not, by estimating the equation with the least squares.

$$\Delta Y_{i,t} = \alpha_i + \beta_i Y_{i,t-1} + \sum_{j=1}^{p_j} c_{i,j} \Delta Y_{i,t-j} + d_i t + h_i \bar{y}_{t-1} + \\ + \sum_{j=0}^{p_i} \eta_{i,j} \Delta \bar{y}_{i,t-j} + \varepsilon_{i,t} \quad (8)$$

The null and alternative hypotheses of the CADF test are as follows:

$$H_0^i : \beta_i = 0; H_A^i : \beta_i < 0$$

The $\overline{CADF}$ statistics calculated for case $N > T$ are shown in equation (9). This statistic is called the CIPS statistic and does not calculate significant results for $T > N$.

$$\overline{CADF} = CIPS = \sum_{i=1}^{N} \frac{CADF_i}{N} \quad (9)$$

3.3. Cointegration test

Following the unit root test, the cointegration test and long-run relationship are researched by Westerlund and Edgerton (2007), and the panel fully modified ordinary least squares. For robustness check, the dynamic ordinary least squares method is also adopted for the long-run relationship. It has been used by Pedroni (1999: 667) to eliminate the shortcomings of the basic statistical cointegration test statistic based on the error correction model of Westerlund and Edgerton (2007). The error correction model of Westerlund and Edgerton (2007) is as in equation (10).

$$\Delta Y_{i,t} = \delta_i d_t + \alpha_i Y_{i,t-1} \lambda_i x_{i,t-1} + \sum_{j=1}^{p_i} \Delta_{i,j} \Delta Y_{i,t-j} + \sum_{J=0}^{p_i} \lambda_i \Delta x_{i,t-j} + e_{i,t} \quad (10)$$

The null and alternative hypothesis of the test is as follows.

H_0: *There is no cointegration for all cross-sections.*

H_A:*There is cointegration for some cross-sections.*

Then, Westerlund and Edgerton (2007) estimate the error correction equation as in equation (11) with least squares to calculate panel statistics.

$$Y_{i,t} = \delta_i d_t + \lambda_i x_{i,t-1} + \sum_{j=1}^{p_i} \alpha_{i,j} \Delta Y_{i,t-j} + \sum_{j=0}^{p_i} \lambda_i \Delta x_{i,t-j} + e_{i,t} \quad (11)$$

Finally, panel cointegration statistics are calculated as in equations (12) and (13) according to the following null and alternative hypotheses.

$H_0 = \alpha_i = 0$ and $H_A = \alpha_i < 0$

$$P_\tau = \frac{\alpha}{st(\alpha)} \sim N(0,1) \quad (12)$$

$$y_{i,t} = \alpha_i + \beta x_{i,t} + \mu_{i,t} \quad (13)$$

Westerlund and Edgerton (2007) quantify this calculation according to whether the LM statistic is below the critical value. If the calculated value is below the critical value, the null hypothesis is accepted. Critical values are obtained by the bootstrap method to eliminate cross-sectional dependence.

3.4. Estimating the long-run relationship

After applying unit root and cointegration tests, DOLS (Dynamic Ordinary Least Square), and FMOLS (Full Modified Ordinary Least Square) methods have been used, which have been developed by Pedroni (2000, 2001). The methods have been used to estimate the final unbiased coefficients of this relationship, and to test the consistency of their estimators within the framework of expectations. While the FMOLS method corrects deviations in standard fixed-effect estimators (caused by problems such as autocorrelation, and heteroskedasticity), the DOLS method is a method that can eliminate deviations in static regression (especially due to internality problems) by including dynamic elements in the model. Pedroni (2000)'s FMOLS method, which allows for significant heterogeneity between individual cross-sections, considers the existence of a possible correlation between the differences of the constant term, error term, and independent variables. Pedroni (2000) also examined the strength of the FMOLS method in small samples and scaled that the performance of the t statistic in small samples is better with Monte Carlo simulations (Nazlıoglu, 2010: 98). The method improved by Pedroni (2000) is based on the following panel regression model.

$$y_{i,t} = \alpha_i + \beta x_{i,t} + \mu_{i,t} \quad (14)$$

$$x_{i,t} = x_{i,t-1} + e_{i,t} \quad (15)$$

In this equation, it is assumed that $y_{i,t}$ dependent variable, $x_{i,t}$ independent variables and α_i are fixed effects, while there is no dependence between the sections that make up the panel. Since the error terms in equation (14) are a stationary process, if $y_{i,t}$ is integrated in the first order, there is a long-run cointegration relationship between $y_{i,t}$ and $x_{i,t}$. Thus, β indicates the long-run cointegration vector to be predicted. While obtaining the cointegration vector for the panel in the FMOLS estimator, the model in equation (14) is first predicted using the FMOLS estimator for each cross-section. Pedroni (2000) recommends using the Newey-West estimator, which is consistent under the heteroskedasticity problem when procuring the long-run variance-covariance matrix for each cross-section. Then, the coefficients of cointegration acquired from the FMOLS estimation of each cross-section are averaged and the vector of cointegration is computed for the panel (Kocak and Uzay, 2018: 93-94). The panel DOLS estimator proposed by Pedroni (2001) presupposes forecasting of the following regression model.

$$y_{i,t} = \alpha_i + \beta x_{i,t} \sum_{k=-K_i}^{K_i} \gamma_{i,k} \Delta x_{i,t} + \mu_{i,t} \quad (16)$$

$-K_i$ and K_i demonstrate the number of antecedents and lags in the regression model. In this model, where it is presumed that there is no dependence between the cross-sections that make up the panel, the panel cointegration vector is obtained, firstly, the model in equation (15) is estimated for each cross-section. Here, just like the panel FMOLS estimator, the Newey-West method can be used in the panel DOLS estimator. Secondly, the arithmetic average of the cointegration coefficients procured from this DOLS estimation of each cross-section is taken and the panel cointegration coefficient is calculated as follows (Nazlıoglu, 2010: 99).

$$\hat{\beta}_{GD}^{*} = N^{-1} \sum_{i=1}^{N} \beta_{D,i}^{*} \quad (17)$$

where $\hat{\beta}_{GD}^{*}$ shows the coefficient of cointegration gained from the DOLS estimation for each cross-section, while the t-statistics of the panel DOLS estimators are computed as follows (Nazlıoğlu, 2010: 99).

$$t_{\hat{\beta}_{GD}^{*}} = N^{-1/2} \sum_{i=1}^{N} t_{\hat{\beta}_{GD}^{*}} \quad (18)$$

Here $t_{\hat{\beta}_{GD}^{*}}$ denotes the t-statistic for the coefficient of cointegration sourced from the DOLS estimation for each cross-section (Nazlıoglu, 2010: 99).

4. Empirical data and analysis

The study measures the impact of human development and governance on economic welfare for the period 2007-2020 and 31 transition economies[2]. A transition economy is a technical definition given to economies that are transitioning from a state-controlled economy to a free-market economy. Countries with transition economies switch to an environment where the free-market determines prices instead of a central organization in the process of economic liberalization. In this process, trade barriers are removed, public institutions and organizations are privatized, and trade liberalization is realized. Transition economies were in a situation where the phenomenon of poverty and scarcity of consumer goods was experienced. In transition economies before the transition to free-market economies, financial imbalances were high, the productivity of agricultural and industrial goods was low, there was a monopoly structure in the industrial sector, high inflation was experienced, and the rule of law did not apply to everyone in society. The developments such as the fall of the Berlin Wall in 1989, the collapse of the Eastern Bloc, the disintegration of Yugoslavia and Czechoslovakia (Czechia) after 1993, etc. marked the beginning of radical changes in the global economy, and free-market economy became a solution. It is observed that the economies, which started the transition process to a free-market economy, cover a wide geographical area and have a high population density. In the first stage of the transition, economic depressions were experienced in all transition countries. Therefore, negativities emerged in macroeconomic indicators. After the 2000s, the development levels of these states, which became stronger economically, socially, and politically, started to increase. *These energetic and potent matters of the transition economies have been influential in the choice of sample. The reason for choosing the period 2007-2020 is that data on economic prosperity has started to be calculated from 2007.* The economic welfare data *(EPI)* used as the dependent variable has been obtained from the Legatum Institute (2021), the independent variable human development index (HDI) has acquired from the United Nations Human Development Program (2021), and the other control variable governance quality *(WGI)* has been procured from the World Bank Worldwide Governance Indicators (2021).

The Economic Prosperity Index *(EPI)* is developed by Legatum Institute and is ranked on average between 0 and 100. 100 shows the highest economic welfare, and 0 presents the lowest economic welfare. The index is constructed by analyzing 104 variables and has 12 sub-components. These are safety & security, economic quality, education, natural environment, investment environment,

[2] Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Cambodia, Croatia, Czechia, China, Estonia, Georgia, Hungary, Kazakhstan, Laos, Moldova, Montenegro, North Macedonia, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam

personal freedom, health, market access & infrastructure, social capital, enterprise conditions, governance, and living conditions. Human Development Index[3] *(HDI)*, which contains three different sub-components as education, life expectancy, and income per capita according to purchasing power parity, takes a value between 0 and 1. As the index value approaches 1, it indicates a higher level of development. The Worldwide Governance Indicators *(WGI)* consist of data on six basic dimensions of governance: Government Effectiveness, Regulatory Quality, Rule of Law, Political Stability and Lack of Violence, Control of Corruption, and Voice & Accountability. Governance values are standardized for each year with a standard deviation value. Values range from -2.5 to +2.5 points, with higher scores indicating better governance outcomes, while negative scores indicating poor governance. A single governance indicator has been generated by averaging these six basic dimensions and transforming the series between 0 and 100 for the estimation. The reason why the series is reconstructed between 0 and 100 is that the model is logarithmic. Since the logarithm of the negative values cannot be taken, the series has been transformed into positive values. Table 1 represents the summary statistics of the data.Depending on which of the mentioned indicators influence countries' improving their economic performance is one of the substantial research fields of economic theory. Most literature confers that economic growth and development indicators are in performance measurement. Economic growth is an increase in the number of goods and services produced over time, and growth is dependent on an increase in money creation. However, the increase in economic growth may not be parallel to the increase in welfare. In recent years, indicators related to these variables have been ineffective in determining economic performance. Many factors, especially education, health, and income, are used in economic calculations. However, the insistence of mainstream economic theory on its approaches essentially inclines incomplete and misleading results in the general economy. Therefore, various indicators, specifically the Economic Prosperity Index (EPI), have been used recently rather than economic growth and development measurements. Creating environments to provide for the basic needs of society as well as higher-level needs forms the basis of the human development approach. The understanding of development, which espies the improvement of countries in the increase of economic growth (GDP), weakened after the 1980s and left its place to the philosophy of "human development". Human is at the center of this philosophy. Raising the production of wealth is seen as a prerequisite. The foundations of this idea have been laid by Amartya Sen and implemented by a team led by Mahbub-ul Haq with the contributions of the United Nations Development Programme (UNDP). Since 1990, it has become increasingly widespread and accepted in the

[3] Please note that "Human Development Index" is from 2007 to 2019, while the other indicators are from 2007 to 2020.

world. This view, which occurred because only GDP is a development indicator in measuring the level of development, has brought the HDI formula to the theory because of the studies. Although, at first, there was no change at the desired level, the formulas used in the calculations were renewed and made more meaningful over time.

Table 1: Summary statistics of the variables

Variables	Mean	Sta. Dev.	Min.	Max.	Skewness	Kurtosis	Observations
EPI	59.51894	7.602885	44.74506	76.89146	0.362923	4.163824	434
HDI	0.769005	0.0849614	0.481	0.917	0.261051	4.372485	403
GOV_EFE	-0.0011582	0.6645735	-1.603811	1.343336	-0.417202	3.260672	434
RQ	0.0831605	0.8290338	-2.090988	1.698142	0.260174	3.472813	434
RL	-0.3069365	0.6839921	-1.54336	1.61278	-1.306184	2.629593	434
PS	0. .0715253	0.6151921	-2.020833	1.147953	-1.014923	3.372518	434
CC	-0.3069365	0.6839921	-1.54336	1.61278	-0.429301	4.529381	434
VA	-0.259625	1.025823	-2.259159	1.214439	0.325184	3.019372	434
WGI (Ave.)	-0.0953286	0.6949527	-1.431124	1.292524	-0.492421	5.104927	434

Notes: *GOV_EFE* Government Effectiveness, *RQ*: Regulatory Quality, *RL*: Rule of Law, *PS*: Political Stability and Lack of Violence, *CC*: Control of Corruption, *VA:* Voice & Accountability
Source: Edited by the author using Stata 14.2

Table 1 indicates that all variables are convergent, except for the *EPI* variable. This is because the *EPI* variable takes values between 0 and 100. Variables are included in the linear model with their logarithmic forms. The kurtosis range of the distribution is between 2.67 and 5.10. That is, the variables are asymmetrical. Of the skewness values, 4 are positive and 5 are negative. *WGI* variable (average of 6 sub-components) displays negative skewness, and *EPI* and *HDI* variables point to positive skewness.

In the study, firstly, the cross-sectional dependence of the variables is tested. In panel data analysis, to avoid fallacious findings, the subsistence of cross-sectional dependence should be considered. The subsistence of cross-sectional dependence in variables and the error term is analyzed with Breusch and Pagan (1980) *LM* and Pesaran (2004) CD_{LM} tests. The subsistence of cross-sectional dependence attributes to a significant correlation between the errors of a model. The null hypothesis of the tests refers to no cross-sectional dependence exists. The alternative hypothesis of the tests means cross-sectional dependence exists. According to the findings, the probability values are less than 1% and there is a cross-sectional dependence between the series. In addition, it is necessary to determine the slope homogeneity.

Table 2 shows the results of the Swamy S test used to detect whether the estimated model is heterogeneous or not. The homogeneity test studies that started with Swamy (1970) have been expanded with the studies of Pesaran and Yamagata (2008). The test developed two different test statistics for large and small panel datasets. Δ is used to interpret the prediction findings for large panel datasets, while Δ_{adj} is used to interpret small panel datasets. The null hypothesis of the test predicts that the slope coefficients are not heterogeneous, while the alternative hypothesis estimates that the slope coefficients are heterogeneous. The result indicates that the null hypothesis is rejected, the slope coefficients vary between cross-sections, and are heterogeneous.

Table 2: Cross-sectional dependence and slope homogeneity results

Variables	*LM* Test Results		CD_{LM} Test Results	
	Statistic	p-value	Statistic	p-value
EPI	328.47	0.000	73.71	0.000
HDI	273.59	0.000	54.68	0.000
WGI	158.37	0.000	12.01	0.000
Model	302.52	0.000	3.263	0.000
Slope Homogeneity Result				
Model	Δ		Δ_{adj}	
	Statistic	p-value	Statistic	p-value
	8.217	0.000	7.643	0.000

Source: Authors research

It is also examined whether the series is stationary or not to prevent the issues caused by the cross-sectional dependency. Otherwise, spurious regression problems may occur in models established between non-stationary series (Gujarati and Porter 2012: 748). For this reason, Cross-sectionally Augmented Dickey-Fuller (CADF) unit root test which has been generated by Pesaran (2006) is used for the stationarity analysis. This analysis quantifies the cross-sectional dependence on whether the number of observations is greater than the time dimension of a sample or not. Later, cross-sectionally Augmented Dickey-Fuller (CADF) unit root test has been generated by Pesaran (2007) and this analysis quantifies the cross-sectional dependence on whether the number of observations is greater than the time dimension of a sample or not. If the CADF critical value is greater than the CADF statistic, the null hypothesis is rejected, and it is concluded that the series is stationary. The findings indicate that the series have unit roots at level (5%) and become stationary when *the first difference* is taken so the null hypothesis is rejected.

H_0 : *The series includes unit-roots.*

H_1 : *The series does not include unit-roots.*

Table 3: CADF unit root test results

Variables	Level	First Difference	Result
EPI	-4.283	-8.739**	I_1
HDI	-2.175	-5.496**	I_1
WGI	-0.038	-0.263**	I_1

Notes**:** ** presents the rejection of the null hypothesis at 5%. The 5% critical value for the model with a constant is -1.372 while the value with constant and trend is -2.439.

Source: Authors calculation

Table 4 shows the lag lengths determined according to the Akaike, Schwarz, and Hannan-Quinn information criteria. Since the data set consists of annual data, the maximum lag level has been specified as 3. According to the information criteria in Table 4, the most appropriate lag length is 2. Besides, when the lag length is set to 2, it is observed that there are no autocorrelation and heteroskedasticity problems in the error terms obtained from the VAR estimation, and the error terms are normally distributed.

Table 4: Lag length

Length	AIC	SIC	HQ
0	-5.176	-5.531	-5.372
1	-11.428	-9.251	-11.538
2	-13.370*	-12.829*	-14.803*
3	-15.583	-15.729	-16.037

Source: authors calculation

The cointegration test results regarding the lag length determined as 2 are shared in Table 5. The cointegration test has been performed with the analysis of Westerlund and Edgerton (2007). Other tests assume that not all series are stationary. Contrary to other tests, this test calculates with the precondition that only one series is not stationary. The null hypothesis of the test assumes that there is a cointegration relationship between the series, and the alternative hypothesis of the test assumes that there is no cointegration relationship between the series. This test gives efficient results for both large and small panel datasets in response to heteroskedasticity and autocorrelation problems (Westerlund and Edgerton, 2007: 187).

Table 5: Westerlund and Edgerton cointegration test result

LM Statistic	Asymptotic p-value	Bootstrap p-value
8.364	0.000	0.000

Note**:** Bootstrap (10.000) represents the probability value of the repetitive distribution.
Source: authors calculation

The test, which determines the cointegration relationship with the LM (Lagrange Multiplier) bootstrap test statistic, gives two probability value estimations, asymptotic p-value, and bootstrap p-value. Since the cross-section dependency has been determined, the bootstrap p-value estimation findings are used to determine the cointegration relationship. On the other hand, as can be seen in Table 4, there is no cointegration relationship between the series according to the results of both probability values (according to all the significance levels of 1%, 5%, and 10%). This result confirms the existence of a *long-term relationship* between the series.

Table 6: Panel fully modified ordinary least squares (FMOLS) and panel dynamic ordinary least squares (DOLS) estimation results

Dependent Variable: *EPI*	Panel FMOLS Results		Robustness: Panel DOLS Results	
	Coefficient (sta. eror)	p-value	Coefficient (sta. error)	p-value
HDI	0.575 (0.055)	0.000	0.974 (0.102)	0.000
WGI	0.096 (0.012)	0.000	0.075 (0.018)	0.000

Notes: Estimation of long-run covariance has been conducted by using Barlett kernel, Newey-West bandwidth = 6.000 for panel FMOLS. Estimation of long-run covariance has been adapted by using Barlett kernel, Newey-West fixed bandwidth for panel DOLS.
Source: authors calculation

After detecting the subsistence of a long-term relationship between the series, the *long-term coefficients* have been estimated with the panel fully modified ordinary least squares (FMOLS) method and panel dynamic ordinary least squares (DOLS) method for *robustness check*. These methods can be used to estimate the long-term coefficients in series with first-difference stationery and cointegrating relationships. Table 6 presents the long-run effects of the estimated models. The effect of *HDI* on economic welfare (*EPI*) is positive and significant at the 1% level. Accordingly, a 1% increase in human development (*HDI*) enhances economic welfare (*EPI*) by 0.57% and 0.97%, according to both models. The governance variable (*WGI*) also affects economic welfare positively. This effect is statistically significant at the 1% level. A 1% improvement in governance quality increases economic welfare (*EPI*) by 0.09% and 0.07% according to both estimates. These findings are *similar* to the *previous literature*.

Table 7: Vector error correction model

	Coefficient (std. err.)	t-statistic	p-value
D(EPI)(-1))	0.37128 (0.27970)	1.3274	0.825
D(HDI)	0.62930 (0.34271)	1.8362	0.034
D(HDI)(-1))	0.28493 (0.27154)	1.0493	0.078
D(WGI)	0.01059 (0.05746)	0.1843	0.321
D(WGI)(-1))	0.08627 (0.16394)	0.5262	0.042
ECT(-1)	-0.21794 (0.11636)	-1.8729	0.034*

Source: authors calculation

Finally, the vector error correction model has been estimated to determine in how many periods the errors will be *eliminated*, and the variables will come to *equilibrium*. The "ECT (Error Correction Term)" variable shown in Table 7 represents the error terms obtained from the estimations. A prominent principle of cointegrating variables is that deviations occur in the long-run equilibrium over time. For the model to reach its long-run equilibrium again, some of the variables must be able to provide this. In the error correction model, the short-term dynamics of the variables in the system are affected by the deviation in the equilibrium. The error correction model equation includes the first differences of the variables as well as the one-term lag errors of the cointegration regression. One of the advantages of using the error correction model is that it reveals short-term and long-term causality and the other is that it determines and corrects the imbalance between the variables (Enders, 1995: 365-366). According to the results, the sign of the lag value of the error correction term is negative and significant at the 5%* level. Since the error correction model is statistically significant and negative, there will be a tendency towards equilibrium again in the face of divergences from the long-term equilibrium. Approximately 21% of the deviations are corrected.

5. Results and discussion

By beholding empirical results, it is obvious that human development and governance are positively connected with the economic prosperity in transition economies for the period 2007-2020. Moreover, Moreover, according to both models, a 1% increase in human development increases economic welfare (EPI) by 0.57% and 0.97%. A 1% raise in governance quality recovers economic prosperity (EPI) by 0.09% and 0.07%. These findings are compatible with the previous theoretical and empirical literature. Gaining economic prosperity is not only related to the improvement of macroeconomic indicators such as growth or development. Some of the arrangements suggested to implement for a complex welfare-based

economic orientation are: stimulating the economy to be more active, liberalizing prices and markets, reallocating resources accordingly, developing market-based and indirect instruments for macroeconomic stability, implementing a tight budget policy for a certain period of time to increase productivity in the economy, corporate and legal to protect property rights, legal provisions, and transparent market entry regulations is the creation of a framework, creating human development by strengthening the socio-economic components of the future expectations of individuals. On the other hand, good governance established in countries reduce economic vulnerabilities. The positive effect of governance on economic performance hinges upon factors such as ensuring government stability, securing property rights, preventing corruption, improving socio-economic conditions, increasing the rule of law, expanding the environment of freedom, and diminishing the threat of internal and external turmoil. In this context, the main policy recommendations depending on the study can be listed as follows: i) It is advisable to accept that *human development* is a major input that affects this process as well as due to the *economic welfare process*. ii) For the countries to achieve human development in parallel with the level of economic development, it is necessary to develop *not only income policies* but also a development model that *focuses on humans*. iii) For the development of individuals, it is essential to improve the *governance conditions* as well as the economic conditions. iv) Countries should adopt policies aimed at improving *the quality of life of humans and governance*.

6. Conclusions

The aim of this study was to include *31 transition economies* that showed rapid economic development in the 2000s in the *research center*. The annual data for the *2007-2020* period measures the impact of *human development* and *governance quality* on *economic welfare*. The *Human Development Index* (HDI) compiled by UNDP (2021), the *Worldwide Governance Indicators* (WGI) reported by the World Bank, and the *Economic Prosperity Index* (EPI) developed by the Legatum Institute, which has been used frequently in recent years, are included in the *linear logarithmic model*. Before the estimations, the author applied cross-section dependence of the series, slope homogeneity, stationarity analysis, determination of the appropriate lag length to be used in the model, and cointegration tests. Then, the conclusion is that human development and good governance *positively* affect economic welfare in the *long run* through the *panel fully modified ordinary least squares* and *panel dynamic ordinary least squares* methods. The research results show that these findings are *compatible with the previous literature.* A 1% improvement in both indicators increases economic welfare by *0.57*% and *0.97*% (FMOLS), by *0.09*% and by *0.07*% (DOLS). In addition, determined in line with the findings of the *vector error correction model,* they show that 21% of the deviations

are possible to correct in the long term and confirm the hypothesis that "high human development and good governance are major factors for economic welfare". In the light of these evaluations, the author believes that the study contributed to the literature in *two aspects*. i) It is not sufficient to include only economic growth and/or development indicators in the measurement of economic performance, and it is essential to use other variables such as *economic welfare* in the analysis. ii) *Human development* and *quality of governance* are the primary indicators for increasing the economic welfare of rapidly developing transition economies.

The level of development of the societies and the ability to achieve economic growth-development purposes is a multivariate economic goal. With the concept of welfare and social state that emerged after the Second World War, the focus turned to the importance of investments in the human capital development in countries. These goals, listed as preventing poverty, ensuring equality in income distribution, sustaining economic efficiency, providing economic welfare, social balance, and harmony, realizing full employment, and price stability, are necessary for individuals to continue their lives without falling below a certain life level. On the one hand, these goals, founded on the basis of supporting individuals with social and economic rights, so that they can fully benefit from positive rights or electoral rights, contribute to human development. It is advisable to reinforce these supports or targets with a good governance mechanism. Basically, it is necessary to examine the effects of factors such as property rights, rule of law, and the role of the state on economic welfare or development. Societies with good institutions invest more in human capital, technology, and industrialization, and stay one step ahead in achieving economic wealth or welfare. The study substantiates this basic scientific premise that *high human development and good governance positively impact economic well-being in transition economies*. However, the following constraints of the analysis are also essential for future studies.

It is envisioned that the economic prosperity index, which started to be calculated as of 2007, effectuates the *main limitation* of the study. This situation creates a deficiency in what way to explain the relationship before and after the crisis. On the other hand, it is possible to state that having an alternative and comprehensive data set to the economic growth indicator(s) will facilitate researchers in *estimating the long-term effects for future studies*. The measurement of governance is also hotly debated, and it is another major issue to consider for future studies that some indicators, such as *the control of corruption*, are perception indexes. In addition, the phenomenon of economic welfare is an issue for all developed, developing, and underdeveloped countries. Since the sub-components of the variables in the model and some indicators used in the computation of these components are *similar to each other*, *further research* may realize estimations with *alternative econometric methods* and *country samples* by considering issues such as *multicollinearity*. Forecited matters will evolve *the contribution to the research field*.

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Dugoročni učinci ljudskog razvoja i javnog upravljanja na ekonomsko blagostanje: novi dokazi iz tranzicijskih gospodarstava

Emin Efecan Aktas[1]

Sažetak

Studija pokušava procijeniti utjecaj ljudskog razvoja i kvalitete upravljanja na dugoročno ekonomsko blagostanje. Osnovni prijedlog analize je da gospodarski rast i/ili razvoj ne mogu biti mjera vrijednosti ekonomske uspješnosti. Zbog toga je Indeks ekonomskog prosperiteta koji je razvio "Legatum Institute" zavisna varijabla linearnog logaritamskog modela koji se u ovom radu procjenjuje. Osim toga, mjerenje ekonomske dobrobiti, kvalitete (javnog) upravljanja, koje je u određenom razdoblju neoklasična ekonomija ignorirala, smatra se važnim inputom za ljudski razvoj. Uzimajući ove dvije varijable u istraživački centar, studija uočava porast prosperiteta (blagostanja) 31 tranzicijske ekonomije koja je postigla intenzivan razvoj nakon 2000-ih od 2007. do 2020. godine. Tranzicijska gospodarstva odabrana su zbog brzog razvoja i snažnih učinaka na dobrobit koje su postigle tijekom milenija. Dakle, glavna hipoteza istraživanja je da tranzicijska gospodarstva imaju visok ljudski razvoj i kvalitetno javno upravljanje koje stvara ekonomski prosperitet. Primjenom ovog istraživačkog pitanja, testova ovisnosti presjeka i homogenosti nagiba, testova jediničnog korijena i kointegracijskih testova, autor je proveo odabir optimalnog vremenskog pomaka prije utvrđivanja dugoročne međuovisnosti. Nalazi sveobuhvatne analize otkrivaju da oba pokazatelja povećavaju gospodarski prosperitet tako što dugoročno utječu na njih i neka odstupanja su poboljšana.

Ključne riječi: *ekonomsko blagostanje, ljudski razvoj, javno upravljanje, tranzicijska gospodarstva, panel podaci*

JEL klasifikacija: *I31, O15, O16, P31, C23*

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Impact of Covid-19 pandemic on economic performance of European Countries*

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Abstract

Starting from the fact that the rapid spread of the SARS-CoV-2 virus and the implementation of social distancing strategies have dramatically affected all aspects of human lives at global, national, and micro levels, this paper focuses on examining the impact of the COVID-19 pandemic on the economic performance of selected European countries. To perceive and understand this impact, the authors applied a complex research methodology based on the combined application of suitable univariate and multivariate methods of statistical analysis. The classification of 40 European countries into different groups, in terms of the selected set of COVID-19 indicators in 2020, was performed through hierarchical agglomerative cluster analysis, while statistical evaluation of the quality of the obtained solution of a non-hierarchical procedure, based on the k-means method, was implemented. The classification consists of four clusters of countries identified as the "optimal" clustering solution. The authors conducted the analysis and comparison of profiles of the formed clusters of countries in terms of their average GDP growth rates in 2020 using the statistical methods of descriptive analysis and hypothesis testing. This study reveals that a cluster of countries with a relatively "lower" severity of the COVID-19 health consequences recorded a higher average GDP growth rate compared to groups of countries that suffered more serious consequences and vice versa. The obtained results, which indicate the connection between the

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magnitude of the negative health and economic consequences of the COVID-19 pandemic, can serve as additional support to policymakers in making decisions aimed at mitigating pandemic impacts and crisis management.

Key words: *Cluster analysis, COVID-19 indicators, GDP growth rate, European countries*

JEL classification: *C12, C38, I10, O47, O57*

1. Introduction

Every crisis, whether financial, economic, health, environmental, or any other, represents a phenomenon with negative (the short- and/or long-term) consequences in many aspects and levels. At the end of the second decade of the 21st century, the world faced an unexpected and an unprecedented crisis (Clemente-Suarez et al., 2021; Kempa et al., 2021). The corona-virus disease (widely known as COVID-19), caused by the SARS-CoV-2 virus, initially identified in December 2019 in Wuhan city of China (Hubei province), has spread worldwide in a short period of time. With the increase in the infected and laboratory-confirmed cases, this infectious disease was declared a pandemic by the World Health Organization (WHO) in March 2020.

However, the consequences of the pandemic outweigh the impact on public health and health systems. COVID-19 is not only the cause of health but also an economic and social crisis on a global scale, with significant implications for national and international security, which has, consequently, initiated appropriate responses at the international level by relevant organizations, as well as governments and policymakers around the world.

As the degree of impact of the pandemic varies from country to country, different countries have adopted and implemented different measures and strategies of social distancing and "lockdown" to address emerging problems. The undertaken measures (initially primarily focused on the health segment of the crisis and the suppression of the pandemic) have become one of the main causes of the reduction and slowdown of economic activity. In this regard, in many countries, the key negative consequences of these measures relate to a significant reduction in income, rising unemployment, and disruptions, mainly in transport, service, and manufacturing industries. The impact of the COVID-19 pandemic on economic activity is extremely broad: from dramatically diminished consumer discretionary spending to a "freeze" on business activities including capital budgets, hiring, and a reduction in everything but essential operational expenses (International Telecommunication Union, 2020). In other words, the alarming economic consequences are seen on the basis of data related to leading economic indicators on the reduction of production, employment, GDP, and others, at global, country, and micro levels.

Along with the serious consequences for public health and economic performance, perhaps one of the least expected (at first glance side) effects of the COVID-19 pandemic relates to the affirmation of the role of statistics and data. Actually in the current pandemic situation, statistical terms have become part of everyday vocabulary, and data are a key element in the selection and successful implementation of strategies and measures aimed at suppressing the spread of the virus and mitigating/overcoming its consequences. On this occasion, the director of the WHO, Tedros Adhanom Ghebreyesus, stated in one of his television appearances that "fighting a pandemic without data is as unintelligent as fighting blindfolded against fire" (Ljones, 2020). In this regard, in times of crisis, more than usual, reliable and trustworthy data and statistics are needed to make important decisions (Committee for the Coordination of Statistical Activities, 2020) and, in general, for efficient and effective crisis management.

According to the presented considerations, the research in this paper focuses on the negative impact of COVID-19 disease on the economic activity of selected European countries. In this context, the following research objectives were formulated: (1) a clear and thorough demonstration of statistically valid combined application of cluster analysis and hypothesis testing methods in the domain of the defined research subject; (2) classification of selected European countries into internally homogeneous / externally heterogeneous clusters based on the COVID-19 pandemic indicators, and (3) analysis and comparison of the profiles of the formed groups of countries from the perspective of the selected indicator of economic activity in 2020. Therefore, the research presented in the paper will test the following hypothesis: the decline in economic activity (measured by the average GDP growth rate) recorded in the cluster of European countries characterized by a relatively lower severity of health consequences of the COVID-19 pandemic is significantly smaller than the corresponding decrease recorded in the clusters of countries that suffered more serious health COVID-19 consequences. This paper makes several contributions to the literature. First, it provides a popularization of wide-ranging application possibilities of complementary usage of selected multivariate and univariate statistical methods, namely, cluster analysis and statistical hypothesis testing, in research of the economic consequences of the COVID-19 pandemic. Second, the results of this study can serve as a suitable basis for gaining a more complete insight into the COVID-19 pandemic health consequences and a better understanding of their implications on countries' economic activity. Finally, this study adds to the already extensive literature by filling the specific research gap, elaborated within Section 2 – Literature review.

Accordingly, the paper is structured as follows. After the introduction, the authors discuss several works related to the research subject in Section 2. Section 3 includes the used research methodology framework, while the description of the variables, sources, and definition of the spatial-temporal coverage of the data, as well as the

obtained results of applied methodology, are presented in Section 4. Section 5 provides the results of comparison of the COVID-19 clusters of countries' profiles from the perspective of economic performance and discussion. Finally, concluding remarks are presented within the last Section 6.

2. Literature review

Various aspects and impacts of the COVID-19 pandemic have been the subject of numerous studies by the academic community. In this section of the paper, a brief overview of several bibliographic units relevant to the observed research area is presented, with a focus on (a) (macro) economic effects of the pandemic and (b) the role of statistical methods in the analysis of pandemic data, with a special reference to the application of cluster analysis.

Ehnts and Paetz (2021) consider and examine the economic consequences of the pandemic in the Euro Zone from the perspective of key macroeconomic indicators (i.e., real GDP growth rate and unemployment) and point out that without the intervention of governments and central banks around the world, the global economy would probably collapse. However, despite their quick response, compared to the global financial crisis 13 years ago, the short-term negative economic impacts of the pandemic are already stronger than those caused by the financial crisis. Praščević (2020) points out that the pandemic will have short-term and long-term macroeconomic effects and states that the macroeconomic costs and losses caused by the pandemic in the affected countries are related to GDP loss, rising employment rates, and deteriorating other macroeconomic indicators. Considering the alarming consequences that an increase in the unemployment rate has on the increment in poverty, inequality, and crime rates, Su et al. (2021) examine and quantify the impact of the pandemic on unemployment in selected, highly developed European economies, which are, surprisingly, among the top ten most vulnerable countries in the world in terms of the number of COVID-19 infected cases and confirmed deaths. The results of this study in the observed countries confirm the presence of causal relationships between COVID-19 variables and the unemployment rate.

Bhardwaj et al. (2020) consider, through the implementation of descriptive statistical analysis, the impact of the COVID-19 pandemic on GDP and unemployment rate in the world's largest economies (i.e., the United States of America, the People's Republic of China, the Republic of India), which had different strategies in the early stages of the pandemic. Pointing out the negative consequences of this impact, the same authors conclude that strategies of social distancing and a "lockdown" should be applied to fight against the spread of COVID-19 disease since a less negative impact was observed in the countries that have implemented this strategy. Kempa

et al. (2021) examine the impact of the pandemic on macroeconomic activity in selected European countries and, for these purposes, demonstrate the application of different statistical methods. The obtained results confirm the significant impact of the pandemic on GDP, unemployment, and key indicators of the tourism sector. Similarly, in a study conducted by de la Fuente-Mella et al. (2021), statistical models have been developed to assess the effects of the crisis generated by the COVID-19 pandemic on the economic performance of certain countries, with the following variables included for the purpose of model specification: GDP growth rate, as a dependent variable and, COVID-19 cases per million inhabitants, Global Health Security Index (GHSI), risk factors for virus spread, country's membership in the OECD (yes / no) and GDP per capita, as independent variables.

Küçükefe (2020), based on data on the number of deaths per million inhabitants and the GDP growth rate for China and the OECD group of countries, develops a linear regression model and empirically shows the countries with the highest mortality rates experienced the largest economic decline. Also, the same author conducts cluster analysis using the k-means algorithm and finds three clusters of countries according to current account balances, GDP growth rate, and the number of COVID-19 deaths per million inhabitants. The analysis pinpoints that the countries with current account surplus managed to limit economic decline and mortality rates due to COVID-19 disease. Zarikas et al. (2020) present an approach that results in the grouping of countries on the basis of health aspects. It takes into account the following epidemic data: the number of active cases of COVID-19, the number of active cases per population, and the number of active cases per population and per area. These authors emphasize the importance of clustering results in terms of usefulness for experts and decision-makers in various fields, such as physicians and managers of the health sector, economy/finance experts, politicians, and even sociologists. Rizvi et al. (2021) present the application of an unsupervised k-means algorithm for grouping 79 countries based on 18 social, economic, health, and environmental variables (as factors related to the spread of COVID-19 disease) in order to implement the policies to control the widespread of disease. At the same time, in the same paper, using correlation analysis, the strength of the correlation between the selected non-COVID-19 and COVID-19 variables (i.e., the number of confirmed and dead cases) is evaluated.

Undoubtedly, separated research studies indicate that COVID-19 represents the most unusual recession in the modern world. Also, it was confirmed, in the methodological context, that clustering of countries to analyze different variables associated with a pandemic is a special topic of interest for researchers. In addition to the presented bibliographic units, mentioned statements and observations are confirmed by interesting research approaches presented, for example, in: Centre for Economic Policy Research (2020), Nicola et al. (2020), Nayak et al. (2021), Liu et al. (2021), Abdullah et al. (2021).

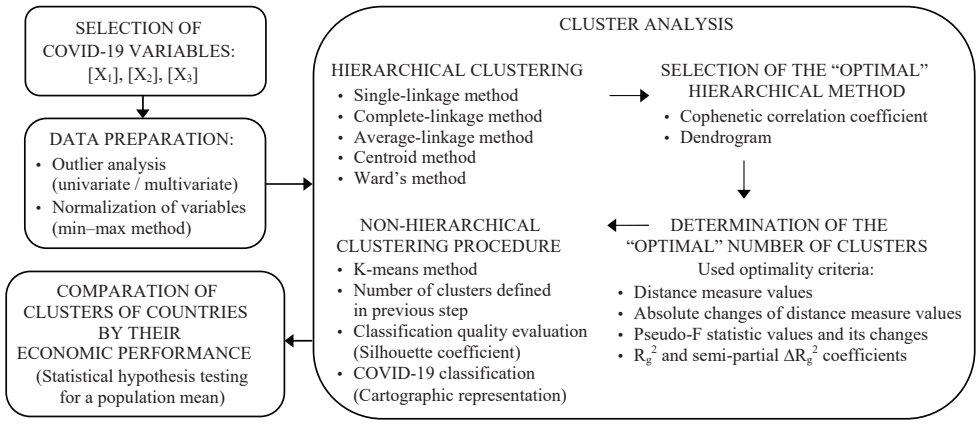
Regardless of the similarity of their research objectives, the common denominator of the previously described studies is the pronounced variability, present in terms of the following analytical issues: spatial-temporal scope of analysis, selection of groups of variables used (both, COVID-19 and economic, social or indicators of other development dimensions), applied statistical methods, and derived conclusions. In accordance with the aforementioned and defined objectives, the current research represents a specific combination of previously listed analytical aspects, which, according to the authors' knowledge, have not yet been exploited in the existing literature. The originality of this paper is reflected in the application of a specific methodological approach, based on the combined usage of cluster analysis and statistical hypothesis testing methods, in the domain of examining the relationship between COVID-19 health consequences and indicators of economic activity in selected European countries in 2020. By filling this research gap, the results of the conducted research, along with the conclusions drawn, will contribute to the enrichment of the literature, either through expansion or additional confirmation of the existing knowledge regarding the seriousness of economic consequences caused by the COVID-19 pandemic. A comparison of combinations of analytical issues emphasized in it. Previously described studies unequivocally confirm the statements regarding the originality of this study and the research niche it addresses.

3. Methodology

For the effective realization of formulated objectives, a complex research methodology is applied presented in Figure 1. The presented research framework is based on combined and complimentary usage of cluster analysis (CA), as the most frequently used method of multivariate statistical analysis, and statistical hypothesis testing about the population mean as a well-known method of statistical inference. More precisely, in the first step, a CA is used to investigate the interdependencies between carefully selected indicators of effects of the COVID-19 pandemic in 2020, and the discovery of a "natural", but hidden, classification structure within the analysed set of multivariate observations.

After statistical quality evaluation of the proposed classification of selected European countries into certain, previously unknown, a number groups, according to the used COVID-19 indicators, a comparison of the formed clusters of countries, in terms of their economic performance in 2020, is conducted using the procedure of statistical hypothesis testing. In accordance with the first research objective, as can be seen in the presented schematic representation, in conducting the described empirical research, special attention is dedicated to the examination of the fulfilment of assumptions on which the valid application of mentioned statistical methods is based.

Figure 1: Schematic representation of the used research methodology framework



Source: Authors' representation

Data analysis and the necessary statistical calculations were done using the statistical software package *IBM SPSS Statistics*, version 20, and *Microsoft Office Excel*. The final interpretation of the research results is complemented by adequate tabular, graphical, and cartographic representations.

4. Empirical data and analysis

In this section aspects of the conducted research in terms of selected COVID-19 variables, sources used as well as the temporal-spatial coverage of pandemic data are presented together with their descriptive statistics. Additionally, following the described two-stage methodological framework, after adequate preparation of input data and based on the use of listed objective statistical criteria of optimality and evaluation, the classification of 40 selected European countries into appropriate COVID-19 clusters, according to the severity of recorded health consequences of the pandemic, has been carried out.

4.1. Variables, sources of data, and temporal-spatial scope of the research

Following the defined objectives, for multivariate classification of selected European countries, daily data on the number of recorded positive cases of COVID-19 and the number of deaths caused by COVID-19 infections in the period from January to December 2020 were collected. The list of formed COVID-19 variables, used in cluster analysis, together with the procedure for determining their values, is given in Table 1. Data related to the health

consequences of the COVID-19 pandemic and the size of the population of the analyzed countries were obtained from the electronic database of the European Centre for Disease Prevention and Control. To neutralize or mitigate the impact of the total demographic mass of individual countries on the outcome of CA and the resulting classification, instead of using absolute values, the values of COVID-19 variables are expressed per 100,000 inhabitants or in the form of an appropriate relative (%) participation. Taking into account the availability of data for the described COVID-19 variables, the following 40 European countries were included in the conducted empirical research, namely: EU-27 countries ([AUT], [BEL], [BGR], [CRO], [CYP], [CZE], [DNA], [EST], [FIN], [FRA], [GER], [GRE], [HUN], [IRL], [ITA], [LVA], [LTU], [LUX], [MLT], [NLD], [POL], [POR], [ROU], [SVK], [SLO], [ESP], [SWE]); candidate and potential candidate countries for EU membership ([SRB], [MKD], [MNE], [ALB], [BIH]), and countries that are not part of the EU by their decision ([ISL], [NOR], [GBR], [CHE], [MDA], [BLR], [UKR], [RUS]).

Table 1: List of the used COVID-19 indicators

Symbols	Variables	Units of measurement
X_1	COVID-19 cases per 100,000 inhabitants, in 2020	Number of cases
X_2	COVID-19 deaths per 100,000 inhabitants, in 2020	Number of deaths
X_3	COVID-19 mortality rate, in 2020	Percentage (%)

Notes related to the method and way of determining the values of individual COVID-19 variables:

– Values of variable X_1 are calculated as ratio of total number of confirmed COVID-19 cases in 2020 and total number of inhabitants for particular country, multiplied by 100,000;
– Values of variable X_2 are calculated as ratio of total number of confirmed COVID-19 deaths in 2020 and total number of inhabitants for particular country, multiplied by 100,000; and
– Values of variable X_3 are calculated as percentage participation of total number of confirmed COVID-19 deaths in total number of confirmed COVID-19 cases in 2020 for particular country;

Source: Authors' tabular representation

After classifying the observed countries into previously unknown clusters according to the severity of medical consequences of the COVID-19 pandemic in 2020, for subsequent analysis of the magnitude of economic consequences of the pandemic in their territories, by selected clusters, data on the recorded GDP growth rate in 2020, for each of the listed 40 countries, were also collected from the *EUROSTAT* electronic database.

4.2. Classification of European countries by COVID-19 variables

According to the described two-stage methodological research framework (Figure 1), using the presented COVID-19 variables, the authors conducted a cluster analysis of 40 European countries for their classification into internally homogeneous / externally heterogeneous COVID19–specific groups. In this sense, determining values of the arithmetic mean ($\bar{x}$), median (m_e), coefficient of variation (v), maximum (*max*) and minimum (*min*) of the used COVID-19 indicators' original values in 2020, are given in Table 2.

Table 2: Descriptive statistical measures of the used COVID-19 indicators

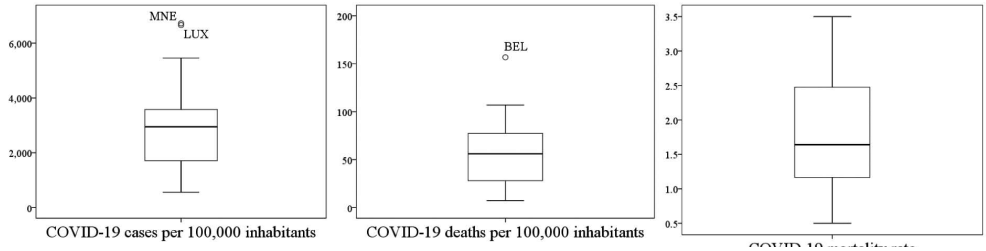
COVID-19 variables		$\bar{x}$	m_e	*min*	*max*	*v*
COVID-19 cases per 100,000 inhabitants	X_1	2,948.28	2,947.73	558.36 [FIN]	6,722.98 [LUX]	49.5%
COVID-19 deaths per 100,000 inhabitants	X_2	54.85	56.07	7.26 [NOR]	156.70 [BEL]	63.9%
COVID-19 mortality rate	X_3	1.83	1.64	0.50 [ISL]	3.50 [ITA]	46.7%

Source: Authors' calculations

Table 2, besides providing the basic description of the sample of countries and visual inspection of the statistical measures, also includes the following observations: (1) Approximate, almost identical values of positional and calculated measures of central tendency indicate, preliminary, the absence of one-dimensional outliers at the level of analyzed variables; and (2) High values of coefficients of variation, suggest the presence of a relatively high degree of heterogeneity of the analyzed countries in terms of values of individual COVID-19 variables, which indirectly meets the primary prerequisite for the justified application of CA. Also, since selected indicators are expressed in different measurement units, their normalization was conducted using the *min-max* method, thus converting original values of COVID-19 variables into normalized values ranging from 1 to 10.

Within the data pre-processing phase, the normalized values of COVID-19 indicators were examined for the possible presence of one-dimensional and/or multivariate non-standard observations, using graphical representations in the form of individual box plots and corresponding values of the Mahalanobis distance measure, respectively. In this sense, the resulting box plots for individual COVID-19 variables (Figure 2) suggest the absence of true one-dimensional outliers, thus confirming the validity of previously presented preliminary observations, made based on descriptive statistical measures.

Figure 2: Box-plots for individual COVID-19 variables



Source: Authors' representations

On the other hand, multivariate observations corresponding to the countries [BEL], [LUX], [IRL], [MNE], and [GRE] have been identified as outliers, as they are characterized by the values of Mahalanobis distance measure (i.e., $MD_{BEL} = 17.352$, $MD_{LUX} = 13.849$, $MD_{IRL} = 12.088$, $MD_{MNE} = 10.235$, $MD_{GRE} = 9.926$, respectively) which are above the defined critical values of the chi-square distribution ($\chi^2_{(3;\ 0.975)} = 9.348$). Precisely some of these countries have been singled out, on box plots, as one-dimensional potential outliers. The exclusion of identified multivariate outliers from the further analysis was not performed due to the importance and significance of taking into account their COVID-19 characteristics, but to see the magnitude of their atypical impact on clustering results, a CA was conducted again without their presence.

For the purpose of objective and statistically justified selection of the "most suitable" approach for classification of analysed countries, on pre-processed multivariate observations, using the squared Euclidean distance as an appropriate distance measure, the following hierarchical agglomerative clustering methods were applied: single-linkage, complete-linkage, average-linkage, centroid-linkage and Ward's method. By comparing the values of cophenetic correlation coefficient, calculated for the results of different clustering methods (Table 3), but also by visual analysis of the extracted dendrograms, the classification of countries obtained by the centroid method was singled out as the most interpretable and of the highest quality.

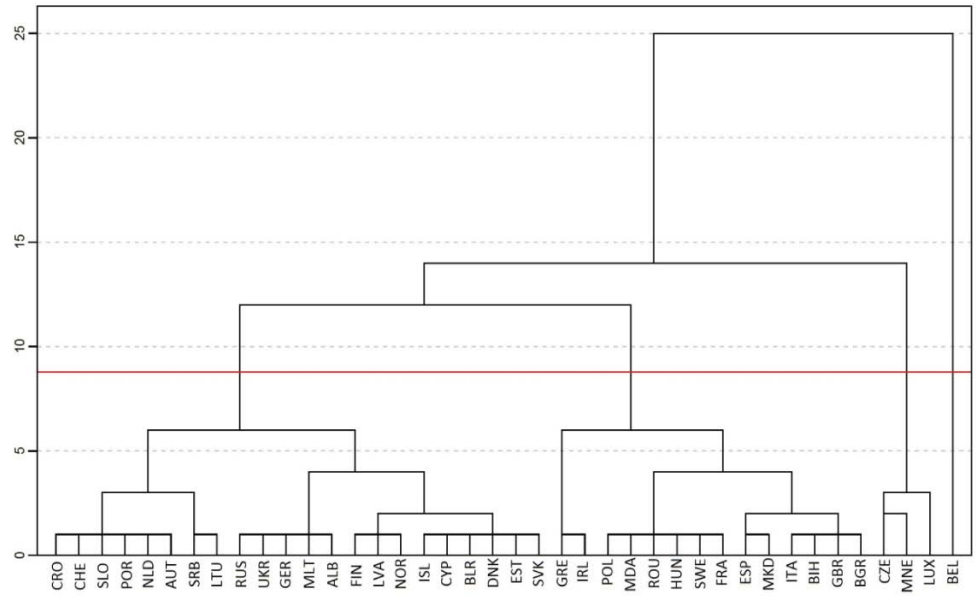
Table 3: Cophenetic correlation coefficient values for different clustering methods

Hierarchical agglomeration methods	single-linkage	complete-linkage	average-linkage	centroid-linkage	Ward's method
Cophenetic coefficient	0.489	0.437	0.609	*0.648*	0.572

Source: Authors' calculations

The complete structure of possible clustering solutions of the conducted hierarchical agglomerative classification of forty European countries, according to selected indicators of the severity of the COVID-19 pandemic consequences in 2020, is presented in Figure 3, in the form of a corresponding tree-diagram, known as a dendrogram.

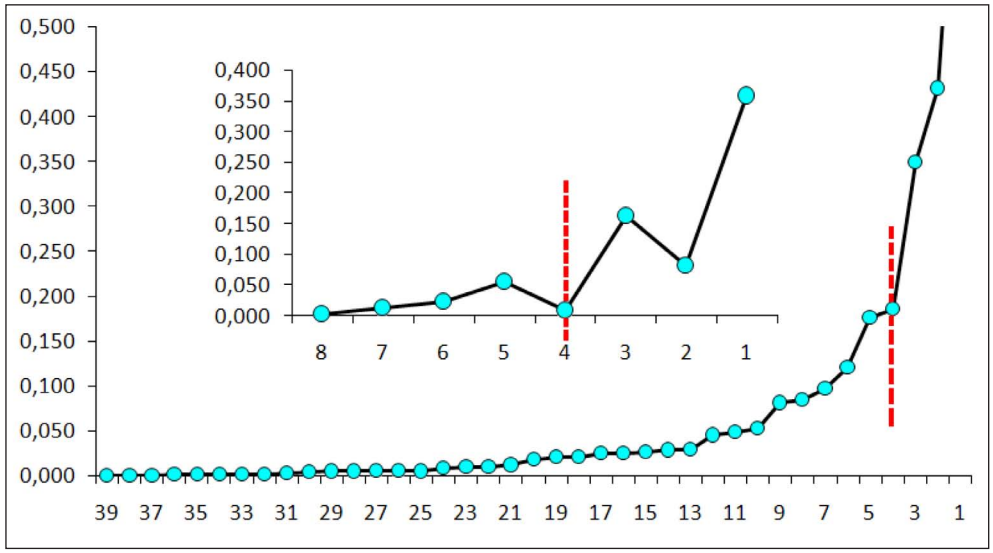
Figure 3: Graphical representation of the hierarchical structure of successively formed clusters



Source: Authors' representation

Since the development of a complete hierarchical tree is not the aim of conducted cluster analysis, already the identification and extraction of "natural" internally homogeneous and externally heterogeneous clusters, the selection of the "optimal" number of clusters within the presented dendrogram was made on the basis of appropriate optimality criteria, highlighted within the methodology framework. For this purpose, graphical representations of distance measure values, pseudo-F statistics and R_g^2 coefficient values, as well as their increments in successive steps of the agglomeration process, are given in Figures 4 and 5, respectively.

Figure 4: Graphical representations of distance measure values and its absolute changes



Source: Authors' representation

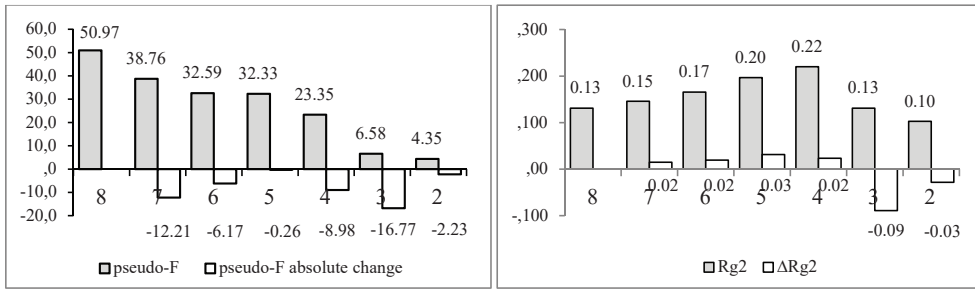
By visual analysis of the values of the used optimality criteria and corresponding graphical representations, the following conclusions can be drawn:

- The gradual but continuous, slight increase of the distance measure values between individual countries and / or groups of countries and, consequently, its absolute changes recorded in successive steps of the agglomeration process was interrupted at the time of forming a hierarchical solution consisting of three clusters (Figure 4). In fact, the value of distance measure at which merging groups of countries was performed in step 37 is 0.349 and is approximately twice the value recorded in the previous, 36th step of the agglomeration process (more precisely, 0.186). The magnitude of the observed increase in the distance value is even more evident if the fact that the increment of the distance value in step 37 (i.e. 0.163) is approximately 16 times higher than the comparable value recorded in step 36 (i.e. 0.010) is taken into account.

- By comparing the presented values of pseudo-F statistics (Figure 5, left), determined for solutions covering 8 to 2 clusters, the 37th step of the agglomeration process, in which a solution with three clusters is formed, was identified as a moment in which a drastic, clearly noticeable, negative change of pseudo-F statistic occurred (i.e. decrease from 23.35 to 6.58), followed, logically, by the largest (negative) increment of –16.77.

- Analogous to the previous conclusion, the first noticeable decrease of R_g^2 coefficient values, i.e., a significant increase of ΔR_g^2 semi-partial coefficient values, in relation to the formed solutions with a larger number of clusters, was recorded in step 37 (Figure 5, right).

Figure 5: Graphical representations of pseudo-F statistics (left) and R_g^2 / ΔR_g^2 values (right)



Source: Authors' representation

Since the described drastic change in the values of the used optimality criteria occurred as a result of merging highly heterogeneous groups, the number of clusters formed in a preceding step of agglomeration process, i.e. the classification consisting of four clusters of countries, is identified as the "optimal" clustering solution. The moment of formation of the "optimal" clustering solution and stopping the further hierarchical agglomeration is marked by a red horizontal line on the dendrogram. The distribution of countries by extracted clusters is presented in Table 4.

Table 4: Distribution of European countries by established clusters

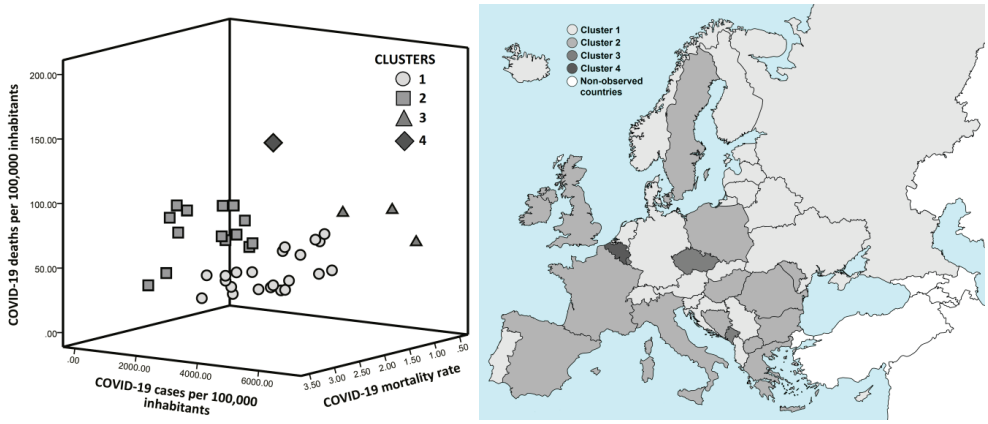
Cluster code	Severity of COVID-19 pandemic consequences	No. of countries	Countries within individual clusters
1	"Lower" level	22	[GER], [DNK], [FIN], [NLD], [POR], [AUT], [MLT], [SVK], [CYP], [LVA], [LTU], [EST], [SLO], [CRO], [NOR], [ISL], [CHE], [RUS], [BLR], [UKR], [SRB], [ALB]
2	Medium level	14	[FRA], [ESP], [ITA], [SWE], [GRE], [IRL], [ROU], [HUN], [POL], [BGR], [MKD], [BIH], [GBR], [MDA]
3	High level	3	[LUX], [CZE], [MNE]
4	Very high level	1	[BEL]

Source: Authors' tabular representation

To assess the magnitude of the impact of, by preliminary analysis identified, real multivariate outliers (i.e., [BEL], [LUX], [IRL], [MNE], and [GRE]) and [CZE], marked as suspected outlier, the hierarchical clustering procedure was re-conducted, without the mentioned observations. By comparing the obtained clustering solutions, no significant differences in the structure of the formed clusters were noticed, since these six multivariate observations were isolated, by the initial solution (Table 4) as members of the so-called outlier clusters (i.e., groups 3 and 4).

Visualization of the COVID-19 classification of 40 European countries, in the form of a 3D scatter diagram and cartographic representation, is given in Figure 6.

Figure 6: Visual representations of COVID-19 classification of selected European countries



Source: Authors' representations

For the purpose of statistical evaluation of quality and validity of hierarchical classification of European countries within four clusters, a non-hierarchical CA was carried out on normalized values of COVID-19 variables, using k-means method, since it, in contrast to hierarchical methods, allows reallocation of observation during the clustering procedure. More precisely, the comparison of hierarchical and non-hierarchical classification results with four clusters was performed based on the corresponding values of silhouette coefficient, calculated for individual clusters and the overall solution (Table 5).

Table 5: Silhouette coefficient values for different clustering solutions

Hierarchical clustering solution			Non-hierarchical clustering solution		
Cluster code	Number of countries	Silhouette coefficient	Cluster code	Number of countries	Silhouette coefficient
Cluster 1	22	0.495	Cluster 1	14	0.672
Cluster 2	14	0.556	Cluster 2	10	0.484
Cluster 3	3	0.839	Cluster 3	9	0.522
Cluster 4	1	1.000	Cluster 4	7	0.552
Overall	40	0.722	Overall	40	0.557

Source: Authors' calculations

The overall value of silhouette coefficient (0.722), as a statistical measure intended for a comprehensive evaluation of the quality of clustering results, calculated for hierarchical classification, is clearly higher than the comparable value of overall non-hierarchical alternative (i.e., 0.557), as a result of which it can be unequivocally concluded that the created hierarchical solution is characterized by better quality. In general, the quality level of the proposed hierarchical classification can be described as high, since the overall silhouette coefficient value (0.722) ranges from 0.70 to 1.00. The previous statement is also confirmed by the results of the comparison of silhouette values determined for individual clusters, since in the hierarchical alternative, in 3 out of 4 clusters, higher coefficient values are present.

5. Results and discussion

This section focuses on the interpretation of the formed COVID-19 clusters of countries, comparison of their profiles from the perspective of corresponding (average) GDP growth rates, and, consequently, discussion of the results of the evaluation process of the initially formulated research hypothesis.

5.1. Interpretation of the COVID-19 classification of European countries

For better insight and understanding of the magnitude of negative medical consequences caused by the COVID-19 pandemic in analyzed countries, in this section, the interpretation of the proposed classification (Table 4 and Figure 6) is performed, in terms of the average values of COVID-19 indicators in 2020 (Table 6). In addition, taking into account the relatively small size of clusters 3 and 4, as well as the fact that countries in their composition were identified as real / suspected multivariate outliers, for interpretation purposes, their integration into one common cluster (with code [3+4]) is done.

Table 6: Comparative review of average values of COVID-19 variables per clusters

Cluster code	Number of countries	COVID-19 cases per 100,000 inhabitants	COVID-19 deaths per 100,000 inhabitants	COVID-19 mortality rate
Cluster 1	22	2,446.24	31.70	1.26 %
Cluster 2	14	2,854.93	77.98	2.75 %
Cluster [3+4]	4	6,036.22	101.24	1.74 %
Overall	40	2,948.28	54.85	1.83 %

Source: Authors' calculations

Presented average values of COVID-19 indicators at the level of individual clusters fully justify the gradation of the severity of COVID-19 pandemic consequences and are used in assigning descriptive names to the formed clusters (Table 4). Specifically, the average number of COVID-19 confirmed cases per 100,000 inhabitants determined for countries in cluster 1 (i.e., "lower" severity of consequences) is smaller than the corresponding average values in cluster 2 (i.e., medium severity of consequences) and cluster [3+4] (i.e., high and very high level of severity) by approximately 14 % and 60 %, respectively. Similarly, the average value of this indicator in cluster 2 is 53 % lower than the comparable average in the cluster [3+4]. Generally, an identical ratio of average values of the considered groups of countries is present in terms of the variable COVID-19 deaths per 100,000 inhabitants, namely: cluster 1 < cluster 2, nearly 59%; cluster 1 < cluster [3+4] by ≈ 69%; and cluster 2 < cluster [3+4] by ≈ 23%. Also, it is important to note that only the average number of COVID-19 deaths per 100,000 inhabitants in cluster 1 is below the corresponding average of variable X2 for 40 European countries, compared to the other two clusters. The scale of the catastrophic consequences of the COVID-19 pandemic, recorded on the territory of countries within the cluster [3+4], is unequivocally evidenced by almost twice the average values of the first two COVID-19 indicators (X1 and X2) compared to the corresponding average values of 40 countries. Finally, viewed from the angle of the COVID-19 mortality rate (X3), the ranks assigned to the clusters based on correspondent average values are slightly different compared to the clusters ranking results in the case of the previous two COVID-19 indicators. More precisely, the average COVID-19 mortality rate of countries in cluster 2 is higher compared to the average values recorded in cluster 1 and [3+4], by approximately 118 % and 58 %, respectively. The mentioned value significantly exceeds the average COVID-19 mortality rate determined for 40 countries, in contrast to the comparable values at the level of the other two clusters.

5.2. COVID-19 pandemic and economic performance of European countries

In order to reveal / confirm the impact of previously described negative medical consequences of COVID-19 pandemic on economic performance of 40 European countries, a comparison of profiles of the formed clusters of countries from the perspective of average values of variable *GDP growth rates in 2020* (Table 7), as a key indicator of national economies' activity, is performed.

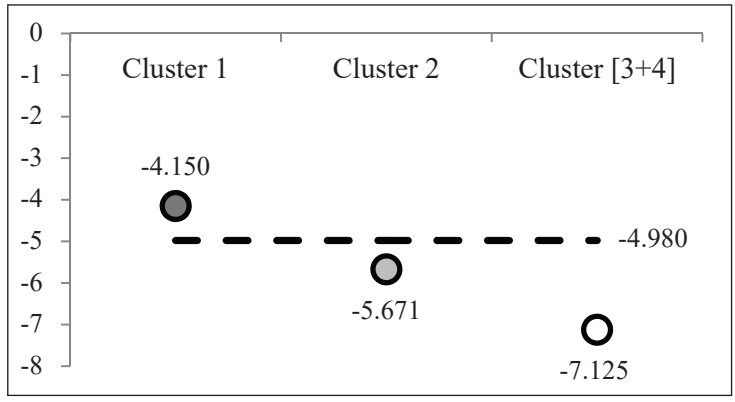
Table 7: Average and min/max values of the used economic indicator per formed clusters

Clusters		Severity of COVID-19 pandemic consequences	GDP growth rates in 2020 (in %)		
code	size		average	min	max
1	22	"Lower" level	–4.150	–9.0	–0.8
2	14	Medium level	–5.671	–11.0	+2.5
[3+4]	4	High and very high level	–7.125	–15.2	–1.3
Overall	40	-	–4.980	–15.2	+2.5

Source: Authors' calculations

A visual representation of the relation between average GDP growth rates per formed clusters and overall average GDP growth rate of 40 European countries is illustrated in Figure 7.

Figure 7: Average GDP growth rates per clusters (circles) and overall average (dashed line)



Source: Authors' representation

By comparing the presented (average) values of selected economic indicator, the following observations can be singled out:

- The average GDP growth rate of 40 observed European countries is a negative value.
- Individual average values of GDP growth rate in all three clusters are also negative.
- The average decline in economic activity in 2020, recorded in the countries within cluster 1, is smaller compared to the recorded size of the recession of the national economies classified within cluster 2, especially cluster [3+4].
- Compared to the average GDP growth rate determined for all 40 countries (–4.98 %), only cluster 1, in terms of corresponding value (–4.15 %) is positioned above (Figure 7), as opposed to cluster 2 and cluster [3+4], which are below the overall average.
- Although below the average growth rate calculated for 40 countries, the average percentage decline of GDP determined at the level of 14 countries in cluster 2 is still about 20% lower than the corresponding average of countries allocated within the cluster [3+4].
- The ranking of the formed clusters according to the achieved average GDP growth rates is completely identical to the results of their ranking conducted in terms of the severity of recorded health consequences of the COVID-19 pandemic, of course, taking into account the nature of the relationship between these two (i.e., medical and economic) phenomena. More precisely, it is evident that countries distributed within cluster 1 (i.e., relatively "lower" degree of severity of the COVID-19 consequences) also recorded the "highest" average GDP growth rate (i.e., the lowest negative value). Also, the highest negative average GDP growth rate is characteristic of countries, which, according to CA results, are allocated within the cluster that suffered the most serious consequences of the COVID-19 pandemic.

In order to examine the statistical significance of previously determined (practical) differences between the average GDP growth rates, at the level of individual clusters of countries, the parametric one-sample t test is applied. The justification of its application was confirmed by the results of testing hypotheses on the normality of distribution of variable GDP growth rate at the level of individual clusters (Table 8). In fact, in the case of all three groups of countries, the results suggest that the null hypothesis, which claims that distribution of GDP growth rates at the population level of specific (COVID-19) categories of countries is normal, cannot be rejected, as the resulting p-values are less than test significance level, $\alpha = 0.05$.

Table 8: Results of one-dimensional distribution normality testing

Economic variable	Clusters		Anderson-Darling normality test			
	code	size	statistic	p-value	α	decision
GDP growth rate in 2020	1	22	0.332	0.485	0.05	H_o
	2	14	0.290	0.558	0.05	H_o
	[3+4]	4	0.307	0.347	0.05	H_o

Source: Authors' calculations

The results of one-sample t test in the context of a defined research question, together with the corresponding statistical hypotheses and the logic of their formulation, are given in Table 9.

Table 9: Statistical hypotheses and results of one-sample t test

Research problem definition			One-sample t test			
Clusters compared	Alternative hypothesis	Hypothetical value (μ_0)	statistic	p-value	α	decision
cluster 1 vs. cluster 2	H_1: $\mu_1 > \mu_0$	–5.671	4.357	0.00014	0.05	H_1
cluster 1 vs. cluster [3+4]	H_1: $\mu_1 > \mu_0$	–7.125	8.523	0.00001	0.05	H_1
cluster 2 vs. cluster [3+4]	H_1: $\mu_2 > \mu_0$	–7.125	1.827	0.04537	0.05	H_1

Note: Parameter hypothetical values were determined on the basis of corresponding values of sample statistics.

Source: Authors' calculations

Since the obtained p-values are less than the selected type I error rate ($\alpha = 0.05$), the presented results of conducted procedure of testing hypotheses about the population mean unequivocally suggest the acceptance of the following (alternative) statistical assumptions:

- The average GDP growth rate of countries in which a relatively "lower" degree of severity of consequences of the COVID-19 pandemic in 2020 was recorded is statistically significantly higher than $\mu_0 = –5.671$, and $\mu_0 = –7.125$, and thus, indirectly, than the average GDP growth rate determined for countries with medium, i.e., high and very high severity of COVID-19 health consequences.
- The average GDP growth rate of countries in which a medium level of severity of consequences of the COVID-19 pandemic in 2020 was recorded is statistically significantly higher than $\mu_0 = –7.125$, and thus, indirectly, than the average GDP growth rate determined for countries with recorded high and very high level of severity of COVID-19 consequences.

Although there are numerous studies dealing with the analysis of economic consequences of the COVID-19 pandemic, regardless of the similarity of the objectives, their results are not comparable to those presented in this study, primarily due to pronounced methodological differences, used combinations of COVID-19 and economic indicators, and, finally, the temporal-spatial coverage of data. In other words, due to the listed differences, a concrete comparison of empirical results would not be valid. Nevertheless, the obtained results confirm the well-known fact about the negative impacts of the COVID-19 pandemic on the economic activity of national economies (e.g. Praščević, 2020; Su et al., 2021; Bhardwaj et al., 2020; Wren-Lewis, 2020; Nicola et al., 2020), but also complement it by confirming the presence of statistically significant direct relationship, in terms of the magnitude of those impacts, that is a higher degree of severity of COVID-19 pandemic (health) consequences → higher negative economic consequences, measured by GDP growth rate. Küçükefe (2020) came to similar findings, but examined the relationship only between the number of confirmed deaths per million inhabitants and GDP growth rate in the example of China and the OECD group of countries, using a non-hierarchical clustering procedure and regression analysis. In addition to the above, the specific combination of statistical methods applied to carefully selected indicators further emphasizes the originality of the conducted research.

6. Conclusions

The current COVID-19 pandemic, in parallel with the implications of unprecedented proportions on public health, has also caused serious economic consequences. Following the defined subject and formulated objectives of the research, a two-stage statistical analysis was conducted (based on the combined application of hierarchical agglomerative clustering procedure and statistical hypotheses testing for population mean), aimed at examination of the relationship and magnitude of health and economic consequences of the COVID-19 pandemic on the example of 40 selected European countries. In this sense, the results of a hierarchical classification of observed countries, obtained using carefully selected pandemic indicators that quantify different health aspects of the crisis, reveal/confirm the presence of pronounced differences between the formed clusters of countries in terms of COVID-19 consequences, since the solution includes four clusters singled out as optimal. Descriptive names assigned to each of them reflect the observed rank of the degree of severity of the consequences caused by the pandemic.

Finally, the results of the second stage of conducted empirical research unequivocally confirm the presence of a direct relationship between the magnitude of the health and economic consequences of the COVID-19 pandemic at the level of analysed European countries. More precisely, countries with a relatively “lower” severity of the COVID-19 pandemic consequences recorded the “highest” (i.e.,

lowest negative) average GDP growth rate in relation to the clusters of countries that suffered more serious consequences of the COVID-19 pandemic, i.e., countries characterized by medium and high / very high degree of severity of COVID-19 pandemic (health) consequences. The statistical significance of the previous finding was confirmed by the results of statistical hypotheses testing.

Generally, the obtained results can serve as an additional support to policymakers in making decisions aimed at mitigating pandemic impacts and crisis management. In other words, the empirically confirmed direct association between the severity of health and economic consequences of the COVID-19 pandemic may suggest the official state institutions conduct a subsequent analysis of the capacity of the healthcare system (including available medical equipment and trained medical personnel), as well as the speed and manner of its response in pandemic conditions. Corrective measures aimed at reducing the mortality rate and slowing the spread of the infection, according to the findings of this research, will indirectly contribute to mitigating the negative economic consequences caused by this and some new, future pandemics. With the presented overview of related research studies, this paper s main contribution is applying an innovative methodological framework designed to examine the relationship between economic and COVID-19 indicators. In addition, the advantage of the applied methodological framework, from the perspective of ensuring objectivity and scientific verification of results, is reflected in the use of statistically based criteria in choosing the optimal hierarchical agglomerative method and best quality clustering solution, in contrast to the approach based on the researcher's subjective choice. The practical significance of the conducted analysis and applied methodology contributes to changing the spatial and temporal scope of the research in the context of future research. The obtained results can serve as a suitable basis for gaining a complete insight into the COVID-19 pandemic and its economic implications. For future research, not only updating and expanding the existing database are necessary by including new variables and new statistical methods. Additionally, one of the key limitations of this research is the omission of the economic effects of implemented anti-pandemic measures and measures supporting economic activity in the conducted analysis. Since the mentioned measures, in the context of the COVID-19 pandemic, can significantly affect the economic performance of countries, considering their effects can represent one of the possible directions of future research efforts, too.

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Utjecaj pandemije Covid-19 na gospodarski učinak Europskih zemalja

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Sažetak

Polazeći od činjenice da su brzo širenje virusa SARS-CoV-2 i provedba strategija socijalnog distanciranja dramatično utjecali na sve aspekte života ljudi na globalnoj, nacionalnoj i mikro razini, ovaj rad se fokusira na ispitivanje utjecaja pandemije COVID-19 na gospodarski učinak odabranih europskih zemalja. Kako bi se uočio i razumio ovaj utjecaj, korištena je složena metodologija istraživanja koja se temelji na kombiniranoj primjeni prikladnih univarijatnih i multivarijatnih metoda statističke analize. Klasifikacija 40 europskih zemalja u različite grupe u pogledu odabranog seta COVID-19 pokazatelja u 2020. godini izvršena je primjenom hijerarhijske aglomerativne klaster analize, dok je za statističku ocjenu kvalitete dobivenog rješenja korišten ne-hijerarhijski postupak baziran na k-means metodi. Klasifikacija koja se sastoji od četiri klastera zemalja identificirana je kao "optimalno" rješenje. Analiza i usporedba profila formiranih klastera zemalja s obzirom na njihove prosječne stope rasta BDP-a u 2020. godini provodi se statističkim metodama deskriptivne analize i testiranja hipoteza. Provedeno istraživanje otkriva da je klaster zemalja s relativno "manjom" ozbiljnošću COVID-19 zdravstvenih posljedica zabilježio višu prosječnu stopu rasta BDP-a u usporedbi s klasterima zemalja koje su pretrpjele teže posljedice, i obratno. Dobiveni rezultati koji upućuju na povezanost veličine negativnih zdravstvenih i gospodarskih posljedica COVID-19 pandemije mogu poslužiti kao dodatna potpora kreatorima politike u donošenju odluka usmjerenih na ublažavanje posljedica pandemije i suzbijanje krize.

Ključne riječi: *klaster analiza, COVID-19 pokazatelji, stopa rasta BDP-a, europske države*

JEL klasifikacija*: C12, C38, I10, O47, O57*

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Modelling framework of the Tandem Supply Chain Efficiency and Sustainable Financial Performance in the Automotive Industry*

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Abstract

The research examines the causal relationship between supply chain efficiency and sustainable financial performance based on the evidence from the literature dealing with a transition from financial decision-making based on the financial outcome, including financial rationale in supply chain design, operations, and management. The case study has included 100 companies selected from the automotive production sector over ten years, from 2010 to 2019. Methodologically, the study includes statistically fixed and random effects models, considering within

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the model parameters as dependent variables asset and efficiency-based ratios and as independent variables financial performance ratios related to returns on assets, equity, capital expenses, and sales. The selection of the fixed or random-effects model is accomplished by performing the Hausman test. The results of panel analysis indicate a causal relationship for the proposed models, highlighting the importance of efficiency ratios such as Fixed Assets Turnover Ratio, Total Assets Turnover Ratio, and Fixed Assets Turnover. From practitioners` perspective, the models` construction and the paper's results gain insight into strategic supply chain areas that can be prioritised for increased efficiency and corporate competitiveness, promoting sustainable financial performance through asset structure, asset efficiency, and inventory management.

***Key words**: supply chain, sustainable financial performance, corporate competitiveness*

***JEL classification:** G30, F63, G39*

1. Introduction

The paper aims to research the causal relationship between supply chain efficiency and sustainable financial performance. In the context of the fourth industrial revolution, which implies high-speed digitalisation and virtualisation, companies in the automotive sector are faced with the challenge of balancing order qualifying and winning criteria. As the current context implies transitioning from clearly defined lean and agile practices to a 'leagile' set-up, the company can balance supply chain efficiency and sustainable financial performance. Based on an extensive panel data set, the present research outcome is an overview of what factors to focus on, targeting diverse stakeholders, researchers and practitioners. The research includes 100 multinational companies with a global presence from the automotive and industrial sector, selected from 13 different countries and across all major sub-sectors that supply the original equipment market for car manufacturers and the replacement markets worldwide. Based on a reliable data set for top performers across the industry, the resulting analysis provides a valuable insight into what strategic directions must be focused on from a supply chain perspective to promote a company's sustainable financial performance. Based on a substantial literature review (Qi et al., 2016; Gligor et al., 2015; Lee, 2004; Chan et al., 2017; Naim and Gosling, 2011; Maropoulos et al., 2008; Hartini and Ciptomulyono, 2015) that puts together theoretical and empirical analyses from a modern perspective on the supply chain, the research is based on a 'leagile' concept rather than strictly 'lean' or 'agile' ones. The study is anchored in the full-scale approach to lean supply chain management, following Moyano-Fuentes et al. (2021). Starting from DeSmet's (2018) theory on the three cornerstones of supply chain performance – service, cost, and cash – the paper uses the learnings of recent research that emphasise the importance of supply chain for the company's long-term sustainable financial performance.

The paper hypothesis is that there is a causal relationship between supply chain efficiency (assessed by employing ratios based on assets' structure and efficiency ratios: Fixed Assets to Net Worth Ratio (FATA), Fixed Assets Turnover Ratio (SAFA), Inventory to Assets Ratio (ITA), Inventory Turnover Ratio (ITO), Total Assets Turnover Ratio (TATO), Fixed Assets Turnover (FATO) and Accumulated Depreciation to Fixed Assets Ratio (FADE)) and sustainable financial performance (assessed through return-based ratios: Return on Assets (ROA), Return on Total Assets (ROTA), Return on Capital Employed (ROCE), Return on Equity (ROE), and Return on Sales (ROS)).

Elgazzar et al. (2012) and Wagner et al. (2012) approach provides an overview of assets' structure and efficiency, aiming to consolidate the selected focus of the 10-year data analysis. The empirical case study, tailored to use ratios derived from the assets structure, can be used in conjunction with turnover and sales-based indicators to provide proxies for supply chain efficiency. Our case study has selected financial performance indicators that are accessible to both internal and external stakeholders. All the data used is publicly available for the listed companies. Return on assets ratios is our approach to connecting supply chain relevant figures (total assets, fixed assets, inventory, depreciation) with financial performance. Return on capital and equity includes the stakeholder's critical approach to analysing performance. And last but not least, return on sales is a financial indicator that most stock exchange websites display already calculated for interested parties, as it is a commonly used approach.

Moreover, the dependent variables in our case study represent various approaches to investigating asset structure and turnover, including a depreciation-based indicator as well. By calculating ratios – such as Fixed Assets to Net Worth Ratio (calculated as the ratio between fixed assets and total assets), Fixed Assets Turnover Ratio (calculated as the ratio between sales and fixed assets), Inventory to Assets Ratio (calculated as the ratio between inventories and total assets), Inventory Turnover Ratio (calculated as the ratio between inventory and turnover), Total Assets and Fixed Assets Turnover Ratio (calculated as the ratio between total aspects, respectively fixed assets, and turnover) and Accumulated Depreciation to Fixed Assets Ratio (calculated as the ratio between fixed assets and depreciation) – the authors attempt to touch on the importance of asset structure in industrial companies. The selected ratios and their use described in the methodology section of the paper are rather innovative in the field, frequently used by practitioners, but not until recently identified in the literature review.

Operational and strategic implications can be assessed based on the case study results, from insight derived from indicators related to assets structure, assets efficiency, warehousing and distribution efficiency, and inventory management. The analysis results are relevant for the automotive and industrial sectors and can support an objective assessment of supply chain opportunities. However,

the prioritisation of lean and agile practices, high or low inventory levels, and investment in plant and equipment must be analysed concerning the company's current data, indicators that are only available to internal stakeholders.

The current research attempts to contribute empirical evidence that practitioners could consider in elaborating efficient supply chain management that promotes sustainable financial performance through asset structure, asset efficiency, and inventory management. Therefore, our findings demonstrate our hypothesis that there is a positive causal relationship, by considering efficiency factors and applying the fixed and random effects models to estimate the causal link with financial performance. Overall, the research is a significant empirical assessment of the importance of supply chain efficiency in the context of current market expectations, focusing on accessible areas that can be further broken down into more area-specific assessments.

The paper is structured into six sections; the introduction, followed by the literature review, including the current state of the art, and the empirical study section. The remainder is outlined in four separate sections: material, methods, empirical data and analysis, results and discussion, followed by the conclusion and references.

2. Literature review

The literature review lays the foundation for our case study, starting by outlining the importance of assessing efficiency and performance. The authors identify key issues to address in the case study based on previous research that pinpoints currently relevant supply chain efficiency and financial performance aspects. Furthermore, a starting point for the econometrical study is the review of studies that have previously connected supply chain and financial aspects. Finally, theoretical studies that emphasise the evolving dynamics of the two fields complete the review.

Cook and Hagey (2003) conclude, from the analysis of 160 US-based companies, that 'over 85% of senior executives of companies declare that increasing performance in the supply chain is one of the top priorities but less than 10% of companies properly monitor performance'. Myerson (2012) highlights the importance of supply chain performance and efficiency indicators for increasing competitiveness and enhancing financial performance. The author's hypothesis for the cost-focused analysis is that efficiency in the supply chain is conducive to increased profitability, proper use of resources, and long-term cost reduction.

Son et al. (2016) have analysed reporting from 145 Fortune 500 companies to evaluate to what extent supply chain information is included. The empirical investigation reveals that nearly 60% of the reports on companies include supply chain information related to inbound and outbound aspects, most of them outlining

industry effects. The study demonstrates that companies with positive supply chain information tend to influence the analyst recommendations for buying, selling, or holding the stock. Based on this overview, the current paper attempts to find how supply chain efficiency and financial performance indicators already widely used by both internal and external stakeholders can be employed to reflect the positive correlation.

Research from the past decade signals the companies' transition from a purely lean or agile supply chain towards a balanced 'leagile' approach. Whether a company is leagile is harder to narrow down through supply chain efficiency or financial performance indicators as the strategy can look different at different points in time: a combination of lean and agile across the supply chain or an alternating lean and agile approach. The choice is dictated by the market requirements and their rapid evolution, requiring companies to either adapt cost-wise or efficiency-wise. Based on this need, our empirical work attempts to introduce several ratios for supply chain efficiency and financial performance and establish their relationship. We hypothesise that efficiency in the supply chain is a crucial driver for sustainable financial performance within companies in the automotive industry.

Qi et al. (2016) distinguish between 'order winner,' as the differentiator, the value creation that wins the customer, and 'order qualifier,' as the primary market entry criteria are met. Regarding the widely spread knowledge that cost increase is one of the implications of supply chain flexibility and agility, the authors argue that cost reduction is not confined to lean supply chains. Agile supply chains can also reduce costs through flexible processes in the framework and economies of scale. Gligor (2015) demonstrates that agile practices can mitigate environmental uncertainty's negative effect on 'supply chain fit.' While lean practices are notoriously associated with cost efficiency in academic literature, a link that is tested in most empirical research, Gligor et al. (2015) demonstrate that agility can also be positively associated with cost efficiency. Agile supply chains have as a prerequisite the focus on meeting customers' continuously changing needs. Empirical evidence indicates that cost-efficiency can be achieved in 'munificent, dynamic, and complex environments'.

Lee (2004) signals that a purely lean supply chain is in peril of not delivering what the customer wants today or will not adjust for what the customer wants tomorrow. While economies of scale and centralised distribution are consecrated ways to cut costs and, consequently, lower the price for the end customer, the end customer has modified his order winner criteria in today's fast-paced environment. Supply chain efficiency – a lean supply chain – is essential, but most often than not, it proves to be insufficient in securing a competitive advantage against rivals. The author argues that companies such as Wal-Mart, Dell, or Amazon have not thrived due to becoming increasingly efficient, but due to their differentiating factors: agility, adaptability, and alignment. According to the author, 'the best supply chains are

not just fast and cost-efficient, and they are also agile and adaptable, and they ensure that all their companies' interests stay aligned.' Chan et al. (2017) assess the effects of supply chain agility in fashion manufacturers from several countries and demonstrate benefits to the firm performance drawn from flexibility in strategy and manufacturing processes.

'Leagility' is a concept established in 1999 as combining lean and agile practices in SC's functions. The study of Naim and Gosling (2011) on the origin of the notion underlines that the work on the initial concept is highly quoted research as more and more researchers and managers are attempting to leverage the benefits of the two approaches. Maropoulos et al. (2008) also approach 'leagile' as a potentially functional combination of lean and agile that can work alternatively in the company's lifespan. Considering that supply and demand circumstances are dynamic, the company may have changing needs drawn from lean or agile supply chain management. Therefore, ensuring the supply chain strategy's overall flexibility is a prerequisite.

Hartini and Ciptomulyono (2015) have an extensive literature review focused on lean and sustainable manufacturing impact on company performance. The paper stands out as a collection of criteria and indicators for analysing supply chain leanness and sustainability and company performance from various perspectives. Key learning from the extensive literature is that companies that integrate lean and sustainable models can improve performance as evaluated through several indicators related to flexibility, sustainability, financial performance, order fulfilment, etc.

Elgazzar et al. (2012) link supply chain performance to financial strategy by introducing the 'Supply Chain Financial Link Index' (SCFLI), which assesses the efficiency of supply chain management and identifies improvements in supply chain operations that can, bottom-line, impact the strategic financial goals of the company. The authors have selected the Return on Assets (ROA) and Return on Equity (ROE) ratios for their financial performance assessment. Moreover, when outlining supply chain performance for the SCFL index, the research employs cost of goods sold, inventory cycle times, and fixed assets, among other indicators oriented towards service level (e.g., perfect order fulfilment, supply chain flexibility, supply chain adaptability, etc.). This research selects supply chain efficiency indicators anchored in the same area as the goal for assessing efficiency is centred around development, rather than management, due to the data availability. Since it is challenging to collect full-disclosure qualitative data for many companies related to flexibility, adaptability or order performance, the paper's case study focuses on measures that assess inventory management and investment in the overall supply chain assets. This approach allows our paper to base the analysis on 100 companies which is an empirical feat that sets us apart from similar studies in the field, which work with limited quantitative data.

Wagner et al. (2012) assess financial performance through ROA ratio, starting from the operational aspects of the supply chain. The authors define 'supply chain fit' as 'strategic consistencies between the products' supply and demand uncertainty and the underlying supply chain design.' The empirical research confirms that companies with better responsiveness in the supply chain yield higher financial performance. The case study is developed across industries and considers self-constructed scales for supply and demand uncertainty, supply chain responsiveness, and competitive intensity.

Myerson's (2012) empirical analysis estimates that 50 to 80 per cent of the sales cost is represented by supply chain costs. The author indicates the following Cost and asset management indicators that can be analysed regarding the supply chain: total costs in the supply chain and logistics (as percentages of income), costs for warehousing, distribution, and transport, costs with warranties and returns, the 'cash-to-cash' cycle, inventories, and assets turnover. Considering these specific costs, the transport infrastructure could also be considered relevant to the supply-chain efficiency, by its means of supporting economic activities, depending on the regional growth (Gherghina et al., 2018).

DeSmet (2018) brings forward a theoretical framework for the supply chain that includes service, cost, and cash. These three dimensions are the prerequisites of the author's hypothesis that companies can make financial, operational, and strategic decisions based on a bi-dimensional fundamental performance indicators approach. This approach implies that the remaining two can be employed for each dimension analysed to identify potential compromises that can be implemented. In this work, the indicators analysed and exemplified are Return on Capital Employed (ROCE), Earnings Before Interest and Taxes (EBIT), Return on Assets (ROA), Return on Equity (ROE), Return on Investment (ROI), fixed assets and inventory ratios. The author focuses on the Return on Capital Employed (ROCE) as a financial performance indicator that operational and financial departments can analyse to decide on strategic directions. The principle proposed is to analyse the possible compromises and select what leads to the company's optimal performance. It is empirically exemplified by compromising maintaining a high inventory level, associated with higher Earnings Before Interest and Taxes (EBIT). Return on capital employed in conjunction with Return on Assets and Return on Equity can provide a clear view of the company's sustainable performance. However, it is strongly recommended to compare this indicator within the same industry sector, as there are high variances from one to another based on the business's particularities and market expectations.

Kim (2018) classifies supply chain inventory into raw material inventory, work-in-process inventory, and finished goods inventory. The author identifies factors that can determine keeping the inventories' levels high or low, based on the expectations for expenses, earnings, and service level. Some of the outlined benefits

of maintaining a higher level of inventories are increasing the quality of customer service by minimising the risk of losing potential sales, avoiding disrupting the planned production process due to missing materials, saving costs associated with the delayed order processing, and increasing the ability to deal with fluctuating price increases for materials.

Feng et al. (2015) evaluate how the supply chains of retail and manufacturing companies behave under budgetary constraints. The case study implies that costs in the supply chain can be managed by revenue-sharing-and-buy-back, revenue-sharing, or buy-back types of contracts. The outcome of the empirical research is that profit allocation can be steered by the three approaches in supply chain contracting, mainly if limitations to a budget are in question. The analysis accounts for administrative costs and economic efficiency in deciding upon a contract in the supply chain, hence an operational approach.

Chan et al. (2017) assess how manufacturing flexibility and supply chain agility influence company performance as evaluated through financial performance, operational excellence, revenue growth, and customer relationship. The case study is based on 141 manufacturing companies from the fashion industry, 95% of the selection being garment manufacturers and not suppliers or buyers in the industry. The outcome of the studies shows that strategic and manufacturing flexibility are critical components that cannot be missed in manufacturing companies within this industry. Moreover, a diversified resource allocation approach to product development, sales, and marketing strengthen flexibility, agility, and financial outcome. Based on this research, the current paper understands the importance of collecting and assessing data in the specific sense of the industry selected – automotive – to capture the most relevant conclusions. The bottom line is that flexibility, agility, and performance are results that differ across industries, based on customisations from the market and stakeholder expectations.

Ramezani et al. (2014) propose an evolutionary shift from an operational approach in designing the supply chain to a financial one. While most research considers financial aspects as outcomes, the authors highlight how these aspects can be considered exogenous variables. The case study concludes that decision-makers, both internal and external, can benefit from this approach and yield overall better financial outcomes for the company. Although the analysis is limited to only three companies, the paper makes a valuable contribution to shifting the design of the supply chain towards a more proactive one. The present research adopts this approach by including in the supply chain efficiency variables ratios based on current, fixed, and total assets and turnover-based indicators. The forward-looking perspective is that considering current capabilities in designing operations and strategies, both internal and external stakeholders can adopt a financial perspective already in the construction phase instead of treating it as an analytical outcome.

Wuttke et al. (2013) evaluate how financial aspects in the supply chain can be employed by management in decision-making early in the process. Fundamental in operations management and finance, the paper also approaches a proactive attitude that implies that financial aspects can already be discussed in the supply chain design and operational phase. The study suggests that by introducing a financial perspective in managing the supply chain, the company's working capital and cost structure can be proactively optimised. This study is also an indicator of the shift in perspective: financial decision-making is not limited to analysing financial outcomes but rather a tool that can be implemented already in the operations – supply chain specifically in this assessment – to get a head start in efficiency and performance.

Based on the literature review, the case study hypothesis is represented by the existence of a causal relationship between supply chain efficiency and sustainable financial performance. The empirical study assesses supply chain efficiency by employing ratios based on assets' structure and efficiency ratios: Fixed Assets to Net Worth Ratio (FATA), Fixed Assets Turnover Ratio (SAFA), Inventory to Assets Ratio (ITA), Inventory Turnover Ratio (ITO), Total Assets Turnover Ratio (TATO), Fixed Assets Turnover (FATO) and Accumulated Depreciation to Fixed Assets Ratio (FADE). Financial performance is assessed through return-based ratios: Return on Assets (ROA), Return on Total Assets (ROTA), Return on Capital Employed (ROCE), Return on Equity (ROE), and Return on Sales (ROS).

3. Methods

The case study aims to empirically assess supply chain factors' impact on companies' financial performance. The analysis employs ratios based on assets structure, inventories, and turnover to evaluate supply chain efficiency and ratios based on return on assets, equity, capital, and sales to assess the financial performance of companies. The seven independent variables include references to the assets, inventories, and depreciation values of the selected companies used in ratios that underline the value-added generated in the supply chain. The indicators we have selected are the following: Fixed Assets to Net Worth Ratio (FATA), Fixed Assets Turnover Ratio (SAFA), Inventory to Assets Ratio (ITA), Inventory Turnover Ratio (ITO), Total Assets Turnover Ratio (TATO), Fixed Assets Turnover (FATO) and Accumulated Depreciation to Fixed Assets Ratio (FADE). As the literature review has outlined, performance in the supply chain has shifted from being an `order qualifier` to being an 'order winner' criterion, as market expectations have evolved to reflect the need for a supply chain that is 'leagile.' Therefore, Cost is not the ultimate metric to decide performance. The ability to adapt – using the supply chain assets to meet market requirements – can be equally important. Through the selection of independent variables, the case study includes the following perspectives: the use of supply chain assets such as plants, equipment,

inventory (FATA, ITA, FADE), the efficiency of such assets in generating sales (SAFA, TATO, FATO) and the efficiency of warehousing and distribution of the company's products (ITO). The case study hypothesis is that we can link these factors to the financial performance of companies, which is assessed through return-based ratios: Return on Assets (ROA), Return on Total Assets (ROTA), Return on Capital Employed (ROCE), Return on Equity (ROE) and Return on Sales (ROS).

As the literature review section evidenced, we witnessed a shift from treating financial decision-making as based on the financial outcome to including financial rationale in the supply chain design, operations, and management over the past decade. Since the present research anchors assessing supply chain efficiency in ratios based on asset structure, inventory management and turnover, the outcome of the case study is more suited for being used by both internal and external stakeholders, who can access the public data from the annual reports.

Table 1: Independent and dependent variables

Variable	Unit of Measure	Definition	Data Source
ROA	%	Return on Assets, calculated as a ratio between fixed assets and returns	Annual reports and financial statements annexes published by the selected companies
ROTA	%	Return on Total Assets, calculated as a ratio between total assets and returns	
ROCE	%	Return on Capital Employed, calculated as a ratio between capital expenses and returns	
ROE	%	Return on equity, calculated as a ratio between equity and returns	
ROS	%	Return on Sales, calculated as a ratio between sales and returns	
FATA	%	Fixed assets to net worth ratio, calculated as a ratio between fixed assets and total assets	
SAFA	%	Fixed Assets Turnover Ratio, calculated as a ratio between sales and fixed assets	
ITA	%	Inventory to Assets Ratio, calculated as a ratio between inventories and total assets	
ITO	%	Inventory Turnover Ratio, calculated as a ratio between inventories and turnover	
TATO	%	Total Assets Turnover Ratio, calculated as a ratio between total assets and turnover	
FATO	%	Fixed Assets Turnover Ratio, calculated as a ratio between fixed assets and turnover	
FADE	%	Accumulated Depreciation to Fixed Assets Ratio, calculated as a ratio between fixed assets and depreciation	

Source: authors` processing

The panel data collected for our 100 companies has been processed in the software Stata to construct Fixed Effects (FE) and Random Effects (RE) models. Starting from the summary of data and confirmation of the data integrity for our companies, years, and variables, FE and RE models have been constructed for each of the five dependent variables. The equations of the models are as follows:

$$\text{FE model: } Y_{company,time} = \alpha_{company} + \beta_1 X_{company,time} + u_{company,time} \quad (1)$$

$$\text{RE model: } Y_{company,time} = \alpha_{company} + \beta_1 X_{company,time} + u_{company,time} + \varepsilon_{country,time} \quad (2)$$

where $\alpha_{company}$ is the constant for each of the 100 companies included; $Y_{company, time}$ represents the dependent variable (5 different models for each dependent variable, including ROA, ROTA, ROCE, ROE, ROS); $X_{company}$, time represents the independent variables (the seven variables in the analysis are the following: FATA, ITA, SAFA, ITO, TATO, FATO, FADE); β_1 represents the coefficient for the independent variable; $u_{company, time}$ is the error term and $\varepsilon_{country, time}$ is the within-entity error term of RE models.

An OLS linear regression and a random-effects regression are applied, followed by the Breusch and Pagan Lagrange multiplier test for random effects to decide between the OLS linear regression and the random effects one. Besides, the following regressions have been modeled for the data: GEE Population-average regression, regression (on group means), Fixed-effects – FE (within) regression, and Random-effects – RE GLS regression. The authors apply the Hausman test to correctly select between FE and RE models, whose null hypothesis is that the preferred model is the RE one. The test checks if the unique errors ($u_{country, time}$) are correlated with the regressors, the null hypothesis is that they are not.

4. Empirical data and analysis

The case study's data set includes 100 multinational corporations with a global presence in the industrial automotive sector. The companies are based in 13 countries (United States, Canada, China, South Korea, France, Germany, Hong Kong, India, Italy, Japan, United Kingdom, Netherlands, Sweden), and over half of them are based in the United States. Moreover, the selection includes a multitude of automotive sub-sectors (tires, chemicals, interior components, electric components, mechanical components, glass components, wheels, engines, steel, audio systems, fuel systems, cabling systems, lighting systems, safety systems, thermic systems), including top performers from each area of the industry. All companies that have been included are listed on the stock exchange market and therefore are frequently under the scrutiny of many stakeholders that are looking at the same indicators as our research. The automotive industry is among the sectors most oriented towards

manufacturing and supply chain excellence, considering the high complexity that must be brought together for the final product – an automobile. While the first three industrial revolutions praised companies like Ford or Volkswagen for mechanisation, mass production, and automatisation, the fourth industrial revolution is focused on technological advances. Hence, a reactive approach to financial performance is passed on for a proactive approach that promotes financial decision-making as early on as possible in the manufacturing and supply chain. To compete in the continuously evolving automotive sector, the companies selected for the present research have to display supply chain efficiency that allows cost reduction and flexibility, and long-term sustainable financial performance.

The data collected has an annual frequency of ten years, between 2010 and 2019, and it is expressed in percentage values — table 1 displays the data selection, calculation method, and sources for our dependent and independent variables. The annual reports have been collected and processed during the year 2021 from the official companies' websites or the stock exchange website where they are listed, and most of them include these ratios already calculated. When the ratios were not available, they were calculated based on other financial information available in the Balance Sheets or Profit and Loss Statement. The study includes companies with a net income of up to 22,5 million euros and, considering the period of 10 years, we have companies that have registered losses in the period. All companies have a multinational presence, with at least 1000 employees globally, most of the data collected being for large corporations employing over 50000 people worldwide.

In this section, the results of the analysis are introduced on a structure based on the independent variable used for constructing the model, having, therefore, an outlook on the financial performance as expressed through Return on Assets (ROA), Return on Total Assets (ROTA), Return on Capital Employed (ROCE), Return on Equity (ROE) and Return on Sales (ROS). Practitioners and scholars can identify relevant areas of improvement in the supply chain that can boost financial performance. Starting from the OLS, GEE, and between regressions model, the FE and RE regressions results are analysed, concluding with selecting the most appropriate model based on the results of the Hausman test. Tables 2 and 3 present the data set's median values, standard deviations, and minimum and maximum values.

Table 2: Descriptive statistics for independent variables

Independent variable	Obs.	Mean	Std. dev.	Min	Max
FATA	1000	0.503	0.145	0.05	1
ITA	1000	0.130	0.072	0	0.51
SAFA	1000	2.599	1.894	0.02	27.17
ITO	1000	0.102	0.080	0	1.70
TATO	1000	1.139	0.610	0.01	12.19
FATO	1000	0.311	0.073	-0.08	2.27
FADE	1000	0.096	0.075	0	1.29

Source: authors` calculations

Table 3: Descriptive statistics for dependent variables

Dependent variable	Obs.	Mean	Std. dev.	Min	Max
ROA	1000	-0.012	0.966	-20	0.49
ROTA	1000	0.039	0.743	-15	0.98
ROCE	1000	0.186	3.043	-53.57	74.19
ROE	1000	-0.014	0.642	-6	14.04
ROS	1000	0.179	3.093	57.14	0.77

Source: authors` calculations

The analysis confirms a homogenous set of companies, as assumed in selecting critical players in the automotive sector. We consider the broad spectrum of sub-sectors representing either a large part of the original automotive equipment and replacement production or a less significant one; we have, as expected, some discrepancy between the minimum and maximum values.

Table 4 presents the results of the regression models applied for Return on Assets (ROA). Fixed and random effects yield similar R squared values and have similarly relevant coefficients, the Hausman test confirming the relevance of the Fixed Effects model. The Fixed Effects model highlights assets through ITA and FADE and the efficient use of assets through SAFA and FATO. The OLS regression for ROA has relevant R squared values, and the F test results confirm that all coefficients except for SAFA are different from zero. The associated regression coefficients and t statistics indicate ITA, ITO, TATO, and FADE. The population-averaged GEE model is confirmed by the null value of the probability, and the z-test marks relevant values for variables from the same ratios, including FATO. Overall, the statistically significant and robust results, regardless of the regression model employed, indicate that return on assets is affected by the inventory management (ITA, ITO) and fixed assets management in terms of their

Table 4: Regression results for the models with ROA as the dependent variable

	Random Effects		Fixed Effects		OLS		Between		GEE	
	Coef.	z-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	z-values
FATA	0.534**	-1.81	-0.479	-1.48	0.706*	-2.61	-1.132	-1.44	-0.534**	-1.81
ITA	-2.556*	-4.07	-1.698*	-2.23	-3.471*	7.00	-3.773*	-3.00	-2.551*	-4.07
SAFA	0.057	1.38	0.072**	1.62	0.014	0.36	-0.080	-0.66	0.057**	1.39
ITO	-1.564*	-2.35	-0.613	-0.74	-2.478*	-4.83	-2.677*	-2.07	-1.559*	-2.34
TATO	0.126	1.20	-0.045	-0.37	0.392*	4.28	0.767*	2.82	0.125	1.19
FATO	2.566*	4.65	2.426*	4.18	3.001*	5.27	3.122	1.11	2.565*	4.67
FADE	-8.753*	-21.50	-8.972*	-19.81	-8.568*	-23.12	-8.535*	-8.03	-8.754*	-2158.00
_cons	1.228*	6.25	1.168*	5.61	1.299*	7.33	1.385*	2.69	1.222*	6.27
R-squared	0.3487		0.3352		0.3565		0.3375			
F-test prob./Wald-test	0.0000		0.0000		0.0000		0.0000		485.69*	
Hausman test (prob.)	0.1231 (0.0000)									
Breusch Pagan Lagrange Multiplier test (prob)	419.44 (0.0000)									

*. ** indicates statistical significance at 1% and 5% levels. respectively

Source: authors` calculations

depreciation (FADE), while assets turnover (TATO and FATO) have a direct influence on ROA. Accordingly, the return on fixed assets would be increased if companies have less inventory, higher accumulated depreciation, and larger values of assets related to turnover.

Table 5 presents the results of the regression models applied for Return on Total Assets (ROTA). The relevant coefficients across all seven variables throughout the five models applied indicate a consistently negative impact on return on total assets from inventory ratios and accumulated depreciation to fixed assets ratio and a positive impact from fixed assets turnover ratio. According to the Hausman test results, the fixed effects regression holds relevant for the ROTA model, suggesting that company characteristics may have an impact on regression results. The statistically significant results (for some of the models employed) also indicate that the fixed assets to net worth ratio carry a negative effect on ROTA while the fixed assets turnover ratio has a positive impact on ROTA.

Table 6 presents the results of the regression models applied for Return on Capital Employed (ROCE). With the most relevant coefficients being centered around asset usage efficiency and warehousing and distribution, the fixed assets to net worth ratio (FATA) and turnover ratio related to fixed assets (SAFA) have a negative impact on ROCE. With the opposite influence, we have the inventory turnover ratio (ITO) and the accumulated depreciation (FADE), which are the variables highlighted to have a positive effect on the return on capital employed. The Hausman test assigns the random-effects model as being the relevant one.

Table 7 evidence the regression models applied for Return on Equity (ROE) results. As the Hausman Test results suggest, the random-effects model is more appropriate. The SAFA variable has some relevant coefficients and t-values, although it is not straightforward to assess the connection of the supply chain variables to ROE as a financial performance indicator. Considering the goodness of fit for the models employed (the F test and R squared values), regardless of the type of regression (OLS, FE, RE, between groups or GEE), the independent variables considered are not appropriate to explain the variance within return on equity, at least not for the database analysed in this study.

Table 8 highlights the results of the regression models applied for Return on Sales (ROS). The results point towards the fixed effects model. However, overall, the relevancy of coefficients and t-values remains insignificant or inconsistent for most independent variables, except for SAFA, for which statistically significant results indicate that they have a positive influence on return on sales. This connection is intuitive through the sales point of analysis marked both in ROS and SAFA ratios. The Inventory to Assets Ratio is also statistically significant for all regression models; however, its values indicate either a positive or a negative influence on the dependent variable.

Table 5: Regression results for the models with ROTA as the dependent variable

	Random Effects		Fixed Effects		OLS		Between		GEE	
	Coef.	z-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	z-values
FATA	-0.360**	-1.62	-0.330	-1.37	-0.497*	-2.40	-0.871	-1.40	-0.360**	-1.63
ITA	-1.908*	-4.00	-1.398*	-2.47	-2.575*	-6.80	-2.797*	2.81	-1.90*	-4.01
SAFA	0.049**	1.58	0.060**	1.81	0.011	0.37	-0.075	-0.78	0.049**	1.59
ITO	-1.253*	-2.47	-0.715	-1.16	-1.874*	-4.79	-1.968**	-1.91	-1.251*	-2.48
TATO	0.113	1.42	0.006	0.07	0.324*	4.65	0.622*	2.88	0.113	1.42
FATO	1.814*	4.40	1.673*	3.88	2.315*	5.33	3.145	1.41	1.813*	4.41
FADE	-6.609*	-21.58	-6.674*	-19.80	-6.655*	-23.53	-6.871*	-8.15	-6.609*	-21.67
_cons	0.921*	6.25	0.889*	5.74	0.988*	7.31	1.094*	2.68	0.921*	6.27
R-squared	0.3577		0.3470		0.3659		0.3507			
F-test prob./Wald-test	0.0000		0.0000		0.0000		0.0000		489.19*	
Hausman test (prob.)	0.1782 (0.0000)									
Breusch Pagan Lagrange Multiplier test (prob)	518.42 (0.0000)									

*. ** indicates statistical significance at 1% and 5% levels. respectively

Source: authors` calculations

Table 6: Regression results for the models with ROCE as the dependent variable

	Random Effects		Fixed Effects		OLS		Between		GEE	
	Coef.	z-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	z-values
FATA	-0.506*	-2.36	-1.465*	-4.83	-0.506*	-2.36	0.209	0.75	-0.481*	-2.29
ITA	0.942*	2.41	-1.785*	-2.50	0.942*	2.41	1.4*	3.14	0.972*	2.54
SAFA	-0.076*	-2.41	-0.128*	-3.06	-0.076*	-2.41	-0.016	-0.39	-0.074*	-2.39
ITO	0.824*	2.04	-1.211**	-1.56	0.824*	2.04	1.204*	2.26	0.846*	2.14
TATO	0.029	0.41	0.36*	3.13	0.029	0.04	-0.146	-1.51	0.024	0.34
FATO	-0.156	-0.35	-0.493	-0.91	-0.156	-0.35	0.995	1.00	-0.119	-0.34
FADE	2.372*	9.13	4.373*	10.32	2.672*	9.13	1.655*	4.38	2.635*	9.16
_cons	0.101	0.72	0.752*	3.86	0.101	0.72	-0.248	-1.36	0.087	0.63
R-squared	0.0915		0.0706		0.0915		0.0422			
F-test prob./Wald-test	0.0000		0.0000		0.0000		0.0031		99.93*	
Hausman test (prob.)	0.0000 (1.0000)									
Breusch Pagan Lagrange Multiplier test (prob)	0.00 (1.0000)									

*. ** indicates statistical significance at 1% and 5% levels. respectively

Source: authors` calculations

Table 7: Regression results for the models with ROE as the dependent variable

	Random Effects		Fixed Effects		OLS		Between		GEE	
	Coef.	z-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	z-values
FATA	-1.119	-1.05	0.593	-0.53	-1.118	-1.06	-0.945	-0.60	-1.118	-1.06
ITA	-0.366	-0.19	0.098**	-1.66	-0.272	0.14	1.729	0.68	-0.272	-0.14
SAFA	-0.276**	-1.76	0.077**	-1.77	-0.274	-1.77	-0.221	-0.90	-0.274**	-1.77
ITO	0.64	0.31	0.996	0.00	0.677	0.34	1.748	0.67	0.677	0.34
TATO	0.275	0.76	0.363	0.91	0.267	0.75	0.048	0.09	0.267	0.75
FATO	2.206	0.99	0.287	1.07	2.186	0.99	1.987	0.35	2.186	0.99
FADE	1.697	1.13	0.179	1.35	1.697	1.18	2.106	0.98	1.697	1.18
_cons	0.903	1.29	0.162	1.40	0.891	1.30	0.513	0.49	0.089	1.30
R-squared	0.0069		0.0050		0.0069		0.0050			
F-test prob./Wald-test	0.4448		0.2085		0.4416		0.9178		6.96	
Hausman test (prob.)	0.6072 (0.4512)									
Breusch Pagan Lagrange Multiplier test (prob)	0.02 (0.4512)									

*. ** indicates statistical significance at 1% and 5% levels. respectively

Source: authors` calculations

Table 8: Regression results for the models with ROS as the dependent variable

	Random Effects		Fixed Effects		OLS		Between		GEE	
	Coef.	z-values	Coef.	t-values	Coef.	t-values	Coef.	t-values	Coef.	z-values
FATA	1.793*	2.10	2.02*	2.34	-0.278	-0.28	-4.672	-1.40	1.877*	2.24
ITA	4.891*	2.56	6.048*	2.98	-4.222*	-2.30	-16.448*	-3.08	5.316*	2.78
SAFA	0.221**	1.86	0.214**	1.80	0.131	0.89	-0.327	-0.63	0.219*	1.88
ITO	0.789	0.38	0.618	0.28	-3.038**	-1.60	-12.163*	-2.21	0.769	0.37
TATO	-0.212	-0.68	-0.265	-0.81	0.896*	2.65	3.258*	2.81	-0.237	-0.76
FATO	-1.866	-1.20	-2.499**	-1.62	4.104*	1.95	11.767	0.98	-2.102	-1.39
FADE	-1.419	-1.20	0.707	0.59	-16.282*	-11.89	-35.424*	-7.84	-0.650	-0.56
_cons	-1.937	-3.30	-2.292	-4.14	0.906	1.38	5.752	2.63	-2.066	-3.46
R-squared	0.0223		0.0006		0.1423		0.1316			
F-test prob./Wald-test	0.0038		0.0020		0.0000		0.0000		21.61*	
Hausman test (prob.)	0.0000 (0.0000)									
Breusch Pagan Lagrange Multiplier test (prob)	1324.28 (0.0000)									

*. ** indicates statistical significance at 1% and 5% levels. respectively

Source: authors` calculations

5. Results and discussion

The case study analysis results indicate that the efficiency of using assets – expressed through variables Fixed Assets Turnover Ratio (SAFA), Total Assets Turnover Ratio (TATO), and Fixed Assets Turnover (FATO) – and warehousing and distribution efficiency – as expressed through variable Inventory Turnover Ratio (ITO) – are the most relevant variables across the five constructed models. The assets' structure (Fixed Assets to Net Worth Ratio (FATA), Inventory to Assets Ratio (ITA), Accumulated Depreciation to Fixed Assets Ratio (FADE)) has several relevant coefficients and t-values. However, overall, it is not strongly connected to the financial performance (assessed through return-based ratios: Return on Assets (ROA), Return on Total Assets (ROTA), Return on Capital Employed (ROCE), Return on Equity (ROE), and Return on Sales (ROS)).

The results align with the hypothesis and the expectations derived from the literature review that a 'leagile' supply chain supports sustainable financial performance. The results confirm previous studies conducted by Elgazzar et al. (2012) and Wagner et al. (2012), where supply chain efficiency is positively influencing the financial performance of the company. It is in the research's focus, for the use of practitioners, that this connection is empirically attested and can be a model easily adopted in practice. Similar to the results and demonstrated hypotheses of Myerson (2012), DeSmet (2018), Kim (2018), Feng et al. (2015), and Chan et al. (2017), the present paper outlines the aspects of asset structure, in particular, to guide the users towards the variables employed, that can be applied in the supply chain management.

The assets' structure, which is mainly conducive to cost, therefore the lean concept, is not the highlight factor for 'order winning' but rather an 'order qualifier.' What boosts performance in the long term is the efficient use of the assets in the supply chain – being able to employ the fixed assets to generate sales, have a healthy asset turnover, and efficient inventory management. These characteristics are conducive to improved costs and financial results but, most important to notice, are conducive to a flexible and adaptive environment. By selecting data from the rapidly evolving automotive sector, the 'leagile' concept proof is even more relevant as plants, equipment, R&D investment, and inventories make up these 100 companies' sought-after partners for the car manufacturers' replacement markets.

The study results, namely pinpointing that asset management and inventory management indicators represent the most relevant variables across the five constructed models, are essential considering their economic significance. The results can be appraised by both industry professionals and academics, considering the relationship between supply chain efficiency and sustainable financial development. Therefore, the results confirm that companies understand that supply chain management, both in managing flows and information, is crucial for having a competitive advantage in a volatile and turbulent market.

Managing inventories in a transparent manner help companies evaluate their erosions within the supply chain and permits healthy planning of future evolutions. Current technological development and digitalisation empower companies to track inventory management efficiency in real-time. In terms of asset management, companies should evaluate business efficiency in correlation with their useful life. Finally, companies can optimise their operational system by supply chain evaluation, including planning, sourcing, and performance.

6. Conclusions

The paper investigates the relationship between fostering sustainable financial performance through efficiency in the supply chain by employing fixed and random effects and econometric models. The results indicate how the seven supply chain factors focused on the use of assets, efficiency in the use of assets, and efficiency in the warehousing and distribution process, impact the five dependent variables represented by financial performance ratios.

First, we highlight that the relevant variables are based on Return on Assets, Return on Total Assets, and Return on Capital Employed for the three models, based on asset structure, efficiency in use and warehousing and distribution efficiency. For the models analysing the dependent variables Return on Equity and Return on Sales, the relevant results are exclusively in assets' efficiency, but overall, the models are not sufficiently relevant to give a clear strategic direction. The case study's hypothesis is confirmed, and the output analysis aligns with the knowledge collected in the literature review through theoretical and empirical research. The three categories of supply chain efficiency proxies are: how are assets employed in the supply chain (FATA, ITA, FADE); how efficiently are the assets used (SAFA, TATO, FATO); how efficient are the warehousing and distribution processes (ITO). Together they make up for a good understanding of areas targeted for a 'leagile' supply chain set-up that promotes sustainable financial performance.The paper concludes by outlining relevant strategic directions identified from the case study results. They can be considered by practitioners and academics alike to promote sustainable financial development by developing the supply chain efficiently.

The research is limited by the size of the dataset, considering that the supply chain ratios are mainly derived from assets and turnover indicators. These proxies offer a good overview, but for an in-depth analysis that can pinpoint critical areas in the supply chain, more specific ratios must be used. The disadvantage is that data for such ratios is generally not available in the companies' annual reports or publicly disclosed financial statements. Additionally, an option worth exploring in further research, for more insight into the financial performance dimension, considers

related cash-flow indicators that would yield more insight, mainly if used for smaller time snapshots, for example, quarterly data.

Moreover, future research opportunities for the relationship between supply chain efficiency and financial performance lie in the newly acquired perspective from the Covid-19 pandemic. Affected by the pandemic either in the supply or demand areas, many industries would be essential to assess the shift of the efficiency perspective and financial performance, if at all.The automotive industry is an exciting candidate for analysis since supply and demand have been affected. Assessing the effects on the ability to supply components to car manufacturers and mitigate the effects of reduced demand across original equipment and replacement markets can contribute significantly to the field. The key learnings would explain the phenomena amidst the pandemic and outline areas for improvement in the long run.

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Okvir za modeliranje Tandemske učinkovitosti lanca opskrbe i održive financijske uspješnosti u automobilskoj industriji

Simona Burta[1], *Ana-Cristina Nicolescu*[2], *Sorana Vătavu*[3], *Emilia Bozga*[4], *Oana-Ramona Lobonț*[5]

Sažetak

U ovom radu istražuje se uzročna veza između učinkovitosti opskrbnog lanca i održivog financijskog rezultata na temelju dokaza iz literature koja se bavi prijelazom s financijskog odlučivanja na temelju financijskog ishoda, uključujući financijsku podlogu za oblikovanje opskrbnog lanca, poslovanje i upravljanje. Studija slučaja obuhvatila je 100 tvrtki odabranih iz sektora proizvodnje automobila tijekom deset godina, od 2010. do 2019. godine. Metodološki, studija primjenjuje statistički fiksne modele i modele slučajnih učinaka, uzimajući u obzir parametre modela kao zavisne varijable odnosa imovine i učinkovitosti te kao nezavisne varijable omjera financijske uspješnosti koje se odnose na povrat na imovinu, kapital, kapitalne troškove i prodaju. Odabir modela s fiksnim ili slučajnim efektima postiže se provođenjem Hausmanovog testa. Rezultati panel analize ukazuju na uzročnu vezu za predložene modele, naglašavajući važnost omjera učinkovitosti kao što su omjer obrta dugotrajne imovine, omjer ukupnog obrta imovine i obrta dugotrajne imovine. Iz perspektive praktičara, konstrukcija modela i rezultati rada stječu uvid u strateška područja opskrbnog lanca kojima se može dati prioritet za povećanje učinkovitosti i korporativne konkurentnosti, promicanje održivog financijskog rezultata kroz strukturu imovine, učinkovitost imovine i upravljanje zalihama.

Ključne riječi*: lanac opskrbe, održivi financijski rezultat, korporativna konkurentnost*

JEL klasifikacija: *G30, F63, G39*

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Naturally traditional or traditionally natural – exploring the concepts *natural* and *traditional* in marketing research*

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Abstract

The purpose of this research is to understand how current marketing research conceptualises natural and traditional products – products that strongly attract consumer attention and capture large and growing market shares yet remain vague and weakly defined by a regulatory framework. The analysis is conducted on systematically selected research articles published in relevant journals over the past two decades. The results show that the natural products are mostly defined by the way they are produced and the ingredients they do not contain, while no consensus was reached for the traditional products. Furthermore, not only is the concept of traditional defined by an unusually large number of themes, but the themes also vary considerably depending on stakeholder group from which they originate, indicating an inevitable communication problem between these groups. The results also show that despite attempts by marketers to link the meanings of the two types of products, the themes in the definitions of natural and traditional products are different and overlap only sporadically. These findings serve as a step toward creating better academic conceptualizations and a more specific regulatory framework for natural and traditional products that will reduce the likelihood of misleading business practises and confusion among consumers and researchers.

Key words: *natural products, traditional products, ingredients, production, origin*

JEL classification: *M31, M38*

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1. Introduction

Many global consumer trends are about going back to roots, buying local and natural products from conscious producers, and retreating to personal safe spaces to look after body, mind, and soul (Angus and Westbrook, 2020). As a result, many brands, especially those related to food, claim properties like fresh, local, sustainable, organic, natural, or artisan (Cozzio et al., 2020; Del Gigante, 2013). While some claims reflect clearly defined standards granted by institutions and represented by labels, e.g., Organic product or Protected designation of origin (Borec et al., 2017), many are vague and outside the legally binding frameworks (Berry et al., 2017; Hemmerling et al., 2016; Trichopoulou et al., 2007; Wenzig and Gruchmann, 2018). Expectedly, this causes consumer confusion (Gifford and Bernard, 2011; McFadden and Huffman, 2017), frustration (Anthopoulou, 2013), and lawsuits (Berry et al., 2017; Petty, 2015).

Among the commonly used, under-defined marketing claims, the concepts *natural* and *traditional* arguably require the most attention from researchers for three reasons:

1) Products with these claims occupy huge, ever-growing market shares. The term natural *"*has been attached to food products whenever possible" (Rozin et al., 2012: 449) to become the most common food and beverage claim, used for about a quarter of the products on the market (Cao and Yan 2016; Mintel, 2008). Similarly, traditional food is one of the fastest-growing food trends since the early 2000s (Nikolić et al.*,* 2014; Savelli et al., 2019).

2) Both concepts are complex, each with several conceptual meanings. Natural is a common polysemy (a multiple-meaning word) used in marketing (ThoughtCo, 2019) and can represent nutritive suitability, lack of human influence, familiarity, and more (Siipi, 2013). Similarly, traditional is defined in relation to origin, way of production, familiarity, habit, and more (Guerrero et al., 2009; 2010; Wang et al., 2016; Vanhonacker et al., 2013).

3) Both these concepts have a strong symbolic meaning related to a homemade product from an idyllic family farm (e.g., Cerjak et al., 2014; Rozin et al., 2012), and relate to consumer intentions to live a healthier life and consume high quality products (Nikolić et al., 2014). For these reasons, their conceptualizations are seemingly intertwined, i.e.:

- traditional product associations include those central to the natural products like: natural raw materials (Chung and Hu, 2018; Hafsi and Hu, 2016), no food additives (Bobe et al., 2016), produced in a natural way (Cerjak et al., 2014; Nikolić et al., 2014; Rudawska, 2014), and little or no processing (Guerrero et al., 2009; Vanhonacker et al., 2010),

- natural product definition by USDA (2005), a frequently quoted definition, considers minimal processing one of the main characteristics of natural food and further specifies it as traditional processing used to make the food edible.

Prior research acknowledges that these two concepts have been underdefined (Berry et al., 2017; Hemmerling et al., 2016; Hidalgo-Milpa et al., 2016; Kumar et al., 2021; McFadden and Huffman, 2017; Trichopoulou et al., 2007) and addresses the issue by either quoting a limited legal regulation (e.g., Balogh et al., 2016; Syrengelass et al., 2018; Gheorghe et al., 2013), by endeavouring to understand one of the concepts, most often from consumer standpoint (e.g., Cerjak et al., 2014; Guerrero et al., 2009; Wang et al., 2016; Čut and Pandža Bajs, 2016; Rozin et al., 2012), or by quoting previous studies (e.g., Boncinelli et al., 2017; Davis and Burton, 2019; Hemmerling et al., 2016; Savelli et al., 2019). Since there is no consensus on a dominant definition regarding either of the concepts, it remains unclear whether the many existing conceptualizations currently used in academic research diverge towards many different themes or converge to a few ones, i.e., whether current research adds to the confusion currently present in the marketplace or contributes to its resolution. Also, although views of different stakeholder groups (consumers, professionals, policymakers, and researchers) are at the background of different definitions, no attempts have been made to examine differences or resemblances among these groups' views. Finally, despite the above clear indications that a conceptual relationship between natural and traditional products exists, prior research concentrates on one or the other, neglecting their relationship in the process and so preventing convergence or delineation of the two concepts.

Considering the identified research gaps, the purpose of the present research is to thoroughly explore how are natural and traditional products defined in marketing research and answer the following research questions:

- RQ1: a) what are the main themes in the definitions of natural and traditional products in marketing research, and b) how do these themes differ between definitions coming from different stakeholders and
- RQ2: what are the divergent and overlapping thematic points between the conceptualizations of natural and traditional products.

The results should contribute to researchers and practitioners. To the former, it is important to delineate the domain to understand the studied phenomenon and avoid confusion in future research. To the latter, a clear definition would prevent misleading business practices, which is encouraged by Council directive 2005/29/EC (2005), reduce consumer confusion and eliminate potential lawsuits.

The article consists of six chapters. Chapter 2 provides an overview of how prior research addresses definitional ambiguities of natural and traditional products.

Chapter 3 explains the methods applied in data gathering and analysis, while Chapter 4 presents the empirical data and analysis. Then, Chapter 5 discusses the main findings and implications, while Chapter 6 presents conclusions, limitations and directions for future research.

2. Literature review

As elaborated in the introduction, prior research clearly points out to the lack of agreement on what natural and traditional products represent (Berry et al., 2017; Hemmerling et al., 2016; Hidalgo-Milpa et al., 2016; Kumar et al., 2021; McFadden and Huffman, 2017) and addresses the issue in one of the three approaches described below.

The first approach is to quote a legal regulation. The challenge with this approach is the limited legal framework for the two concepts. Guidelines exist for the natural claim, but only for some products in some countries. In that regard, Petty (2015) undertook a historical review of the existing regulative framework for natural claims in the USA to conclude that the guidelines developed over the years agree that foods promoted as natural "should not contain artificial or synthetic ingredients and should be minimally processed" (Petty, 2015: 131). Relatedly, most prior research (e.g., Berry et al., 2017; Syrengelas et al., 2018) on natural products is conducted in the USA and draws upon the definition by the USDA, which declares that the term natural may be used providing: "(1) the product does not contain any artificial flavor or flavoring, coloring ingredient, or chemical preservative (as defined in 21 CFR 101.22), or any other artificial or synthetic ingredient; and (2) the product and its ingredients are not more than minimally processed. Minimal processing may include: (a) those traditional processes used to make food edible or to preserve it or to make it safe for human consumption, e.g., smoking, roasting, freezing, drying, and fermenting, or (b) those physical processes which do not fundamentally alter the raw product and/or which only separate a whole, intact food into component parts, e.g., grinding meat, separating eggs into albumen and yolk, and pressing fruits to produce juices" (USDA, 2005: 109). On the other hand, most research on traditional products is conducted in the EU (e.g., Balogh et al., 2016; Cerjak et al., 2014; Rudawska, 2014) and the most quoted regulatory framework is Regulation (EU) 1151/2012 on quality schemes for agricultural products and foodstuffs, or related national legislations. This Regulation defines the term traditional in order to regulate the use of the Traditional specialty guaranteed quality label and states that traditional means "proven usage on the domestic market for a period that allows transmission between generations; this period is to be at least 30 years" (Regulation (EU) 1151/2012: 8). Although the Regulation underwent changes over the years, the definition of traditional has remained largely the same.

The second approach that researchers apply to address the fact that traditional and natural concepts are under-defined is to try to understand them. Most research that chooses such an approach explores consumer associations or meanings of traditional (e.g., Cerjak et al., 2014; Guerrero et al., 2010; Wang et al., 2016) or natural products (e.g., Čut and Pandža Bajs, 2016; Rozin et al., 2012). Guerrero et al. (2009) went further to not only discover a set of associations but propose a consumer-driven definition for traditional food products. Their definition states that traditional food is: "a product frequently consumed or associated with specific celebrations and/or seasons, normally transmitted from one generation to another, made accurately in a specific way according to the gastronomic heritage, with little or no processing/manipulation, distinguished and known because of its sensory properties and associated with a certain local area, region or country" (Guerrero et al. 2009: 348). In rare cases when researchers try to understand one of these two concepts, they examine experts' perspective to propose an expert-based definition. For example, Trichopoulou et al. (2007) query the clarity of the term *traditional* in Regulation 2082/92 (an earlier version of the current above quoted Regulation (EU) 1151/2012). Based on rounds of scientific workshops, Trichopoulou et al. (2007: 424) conceptualized traditional as "conforming to established practice or specifications prior to the Second World War". Furthermore, they argue that traditional food is "of a specific feature or features, which distinguish it clearly from other similar products of the same category in terms of the use of "traditional ingredients" (raw materials or primary products), "traditional composition" or "traditional type of production and/or processing method."" and further specify each of the three key terms of the definition. According to them, traditional ingredients are a "raw material (species and/or varieties) or primary product, either alone or as an ingredient, that has been used in identifiable geographical areas and remains in use today", traditional composition is "the uniquely identifiable composition (in terms of ingredients) that was first established prior to the Second World War and passed down through generations by oral or other means", while a traditional type of production and/or processing is one that is "transmitted from generation to generation through oral tradition or other means and has been applied prior to the Second World War and remains in use". Finally, they stress that the ingredients, composition, or production can be abandoned and then reinstated, and that production can be adjusted to hygiene regulations or the technological progress if they remain in line with original methods and the food's intrinsic features are unaltered.

The third approach to addressing definitional ambiguities of the natural and traditional concepts is quoting prior research. Among the many different papers quoted, the most often quoted include: Bertozzi (1998), Jordana (2000), Trichopoulou et al. (2007) and Guerrero et al. (2009; 2010) for traditional products, and Rozin et al. (2012) and Rozin (2005) for natural products.

Finally, past research mostly focuses on either natural or traditional products. Only few studies compare these two product types (e.g., First Komen et al., 2021), or similar ones like organic and traditional products (e.g., Nikolić et al., 2014) or natural and regional products (e.g., Umberger et al., 2009) in terms of the differences in consumer preferences, perceived benefits, or willingness to pay. However, so far research was not concerned with comparing what these two product types represent and whether their definitions suggest their convergence or delineation.

3. Methods

To address the specifics of the qualitative data required by the purpose of this research, several procedures were introduced to ensure validity of the findings. The first subchapter explains sampling procedures applied to select relevant articles and definitions, while the second content analysis procedures.

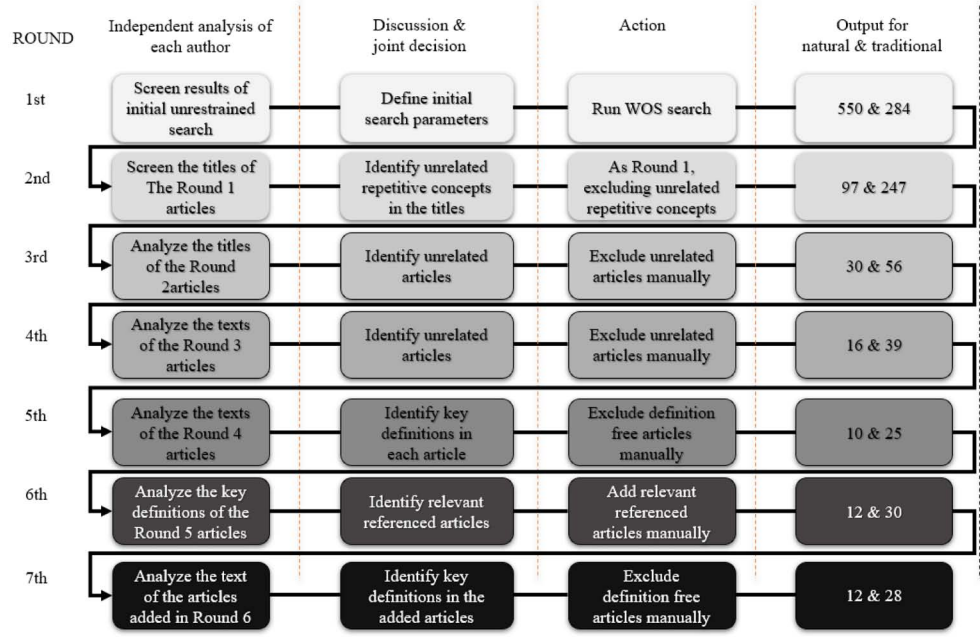
3.1. Sampling procedure

To systematically select relevant, high-quality marketing research that deals with conceptual definitions of traditional and natural products, guidelines by Paul and Criado (2020) were followed. The initial search parameters focused on articles published in journals indexed in *WoS SSCI*: *Business* and *Agricultural Economics and Policy* research areas that included *natural** or *traditional** in the titles to ensure that the concepts studied were central to an article and therefore expected to be clearly defined. To include only contemporary, research-based content, *articles* published between *2000 and 2020* were considered. In this period traditional food consumption emerged as one of the fastest growing food trends in the USA and Europe (Savelli et al., 2019), while natural was the most common food and beverage claim (Cao and Yan, 2016). In addition, Paul and Criado (2020) argue that a systematic literature review should cover at least 10 years, whereas a period of 20 to 30 years is common. Finally, only *English-language* articles were selected to avoid losing meaning in translation.

The initial search parameters yielded 550 articles for natural and 284 for traditional concepts. Then, a multiple-round procedure (figure 1), enabled careful exclusion of the articles that did not relate to the study. Specifically, in the second round, title analysis, identified frequent unrelated concepts (e.g., natural: resource, gas, experiment; and traditional: media, advertising), and automatically eliminated articles with those themes. In the third round, each author individually evaluated each remaining title and coded articles as: unrelated or potentially related to the study. The observed intercoder agreement was 89% for natural and 90% for traditional. At this stage, only articles by both authors defined as unrelated were

excluded. In the fourth round, the remaining articles were full-text analysed and again coded as unrelated or potentially related to the study. Now, the intercoder agreement was 100% for natural and 93% for traditional. Each article was discussed before reaching an exclusion decision. This round ended with 16 articles on natural and 39 articles on traditional products.

Figure 1: The relevant articles selection protocol



Source: authors' research

In the fifth round, a special protocol ensured that the key definition(s) in the articles were identified. That is, the articles were looked through from end to beginning to find a definition, because the more central a definition is to the main goal of the article, the later in the article it appears. That is, if the main goal of an article was to define a concept, a definition (or a set of associations for understanding the concept) should appear at the end of the article as a research output. If an article was not about defining a concept, the next place to look for a definition was in the methods chapter, as it could have been used as a research input (i.e., as a rule for including cases in the case study approach or as a suggestion for respondents in the survey-based approach). If the concept was neither a research output nor a research input, the definition was sought at the beginning of the article as it could have also served to set the stage in the Introduction or Literature Review chapters. This procedure discovered that for both concepts, one-third of the articles did not

contain a definition, so these articles were excluded in this round, while at the same time some articles contained multiple definitions in one of the protocol steps; in this case, all these definitions were used for the analysis.

Finally, in the sixth round of the relevant articles' selection protocol (figure 1) the definitions selected in the fifth round were analysed to find references to prior research. The cited articles were included in the sample if they were SSCI-indexed and met the technical parameters established in the first round of the protocol (articles, English, 2000 –2020). If the cited articles did not clearly define the concepts under study (according to the definition selection protocol established in the fifth round), they were excluded in the final, seventh, round.

3.2. Content analysis procedure

MAXQDA software was used to create a codebook. First, each author independently performed inductive open coding as advised by Corbin and Strauss (2015). Then the identified codes were analysed, merged where necessary, and structured into three levels in a bottom-up approach, as recommended by Kalpokaite and Radivojevic (2019). The bottom level comprised data-driven codes (the *meaning* codes). Grouping these codes defined the middle level codes (the *theme* codes) and the top level conceptual codes (the *category* codes). The dataset was then coded on a trial basis using the codebook but remaining open for necessary additions. Minor changes were made to the meaning codes at this stage. The final category and theme codes were:

- Ingredients (*Free from* and *Comprised of*),
- Production (*Way of Production*, *Longevity of Production*, and *Place of Production*),
- Consumption (*Way of Consumption*, *Longevity of Consumption*, and *Place of Consumption),*
- Origin (*Gastronomic and Cultural Heritage*, *Longevity of Existence*, and *Place of Origin*),
- Consequences (*Attributes*, *Consumer Benefits*, and *Community Benefits*).

These codes alone served to find the answers to RQ1a and RQ2 of the research, i.e., identify the main themes in the definitions of natural and traditional products and to identify divergent and overlapping points of the two concepts.

In addition to the data-driven, content-based codes, two other sets of codes were used. The first set specifies the origin of the definitions, i.e., a stakeholder group behind the definition. In combination with the main coding set, this was used to

find answers to RQ1b of the research, i.e., to compare whether the identified themes differed between the stakeholder groups. This coding set included:

- policymakers (definitions based on legal regulations),
- professionals (definitions based on producers' opinions or producer association documents),
- consumers (definitions based on B2C or B2B consumer opinions), and
- researchers:
  - prior research (definitions based on prior academic research),
  - author opinion (definitions provided by the authors of the research papers without reference to prior research).

Finally, the second additional set of codes specifies the role that a definition had in its original paper as defined in the previous subchapter:

- setting the stage,
- a research input, and
- a research output.

This coding set allowed describing a sample in relation to the definition selection protocol.

Having compiled the codebook, each author coded the data set individually. The intercoder agreement was 86%, which is acceptable according to Campbell et al. (2013). Authors discussed the coding differences and agreed on the final codes for each disagreement.

4. Empirical data and analysis

This chapter presents empirical data organized in four subchapters. The chapter starts with the sample analysis, followed by individual content analysis of the natural and the traditional product definitions, and ends with a comparison of the two products' definitions.

4.1. Sample analysis

The articles selection protocol produced 18 relevant articles for natural products (16 in the 4th round and 2 in the 6th round of the protocol depicted in Figure 1) and 44 relevant articles for traditional products (39 in the 4th round and 5 in the

6th round). The analysis revealed that not only did no article examine both types of products, but that two completely distinct groups of authors examined the two concepts. In addition, the articles were published in 29 different journals, of which only five covered both natural and traditional products. The British Food Journal published most of the selected articles, i.e., 2 on natural and 15 on traditional products; Food Policy followed with 2 articles on natural and 3 on traditional products. Although articles on each concept were mainly about food, traditional products were most frequently mentioned in journals about food or agriculture, whereas natural products were mentioned in journals from a wider range of fields, from food and agriculture to economics and marketing. Finally, both concepts were studied primarily in the second half of the studied period, with only two articles published before 2009. This suggests that interest in this topic has increased in the last decade compared to previous years.

Table 1: Role of the definitions and their origin

		Policymakers (legal regulations)	Consumers	Professionals	Researchers	
					Prior research	Author opinion
Setting the Stage	Natural	2		2	1	
	Traditional	3.5*		1.5*	18*	1
Research Input	Natural	4		1	1	
	Traditional	4		1	3	4
Research Output	Natural	1	1		1	
	Traditional		8			

* Two definitions were based on two origins so 0.5 was ascribed to each origin.

Source: Authors' research

Having described the sample in terms of relevant articles, the sample is now described in terms of relevant definitions. The definition selection protocol yielded a total of 14 definitions for natural products and 44 definitions for traditional products. As Table 1 shows, most definitions quote prior research (23 only prior research and 2 combine prior research with other origins). Further insight into the cited prior research reveals that nearly half of definitions in this category relate to research that examined consumer perceptions of the concepts and one third to papers in which authors expressed opinions about what natural or traditional products represented without specifying what their opinions were based on.

4.2. Natural product definitions content analysis

Table 2 presents the results of the content analysis of definitions for natural products. The first row of the table contains a breakdown of the definitions by origin, i.e.,

stakeholder group (so that the sum of all the columns is 100%). The other rows of the table illustrate the importance of each category and theme within the definitions of a stakeholder group (so that, for example, 86% under the policymakers' column, means that 86% of all definitions by policymakers refer to Ingredients).

The analysis revealed that the definitions are mostly based on legal regulations, by far most often quoting the USDA's definition presented in Chapter 2. Regardless of the origin, the definitions are similar and revolve around two main themes: the Ingredients-related theme *Free from* and the Production-related theme *Way of Production.* Apart from these two, the Origin-related theme *Place of Origin* is often found in definitions based on prior research but not so often elsewhere. Other themes are rarely mentioned, and many are missing altogether (hence not listed in the table).

Table 2: Central themes in natural product definitions by origin

	Policymakers	Consumers	Professionals	Prior research	Total
Total	**50%**	**7%**	**21%**	**21%**	**100%**
Ingredients	**86%**	**100%**	**67%**	**67%**	**79%**
Free From	86%	100%	67%	67%	79%
Comprised of	0%	0%	33%	0%	7%
Production	**86%**	**100%**	**100%**	**67%**	**86%**
Way of Production	86%	100%	100%	67%	86%
Consumption	**0%**	**0%**	**0%**	**33%**	**7%**
Way of Consumption	0%	0%	0%	33%	7%
Origin	**14%**	**0%**	**33%**	**67%**	**29%**
Place of Origin	14%	0%	33%	67%	29%
Consequences	**0%**	**0%**	**0%**	**33%**	**7%**
Consumer Benefits	0%	0%	0%	33%	7%

Source: Authors' research

The following list presents the meanings (the bottom level, data driven codes) that dominate the three most frequently identified themes (the middle level codes):

- *Way of Production: minimally processed* (e.g., Petty, 2015; Syrengelas et al., 2018; Rozin et al., 2012), *not transformed by human hand* (e.g., Rozin et al., 2012; Siipi, 2013),
- *Free from: free from chemicals and artificial additives (*e.g., Berry et al., 2017; McFadden and Huffman, 2017; Petty, 2015), and

- *Place of Origin: derived from nature* (e.g., Berry et al., 2017; Davis and Burton, 2019).

4.3. Traditional product definitions content analysis

Like natural products, the definitions of traditional products were classified into the same five categories and their themes (Table 3). Likewise, the first row of the table shows the breakdown of the definitions according to the origin, i.e., stakeholder group while the other rows show the importance of each category and theme within the definitions of a stakeholder group.

Table 3: Central themes in traditional product definitions by origin

	Policy-makers	Consum-ers	Profes-sionals	Prior research	Author opinion	Total
Total	**17%**	**18%**	**6%**	**48%**	**11%**	**100%**
Ingredients	**33%**	**25%**	**60%**	**14%**	**80%**	**30%**
Free from	13%	0%	0%	0%	0%	2%
Comprised of	33%	25%	60%	14%	80%	30%
Production	**47%**	**75%**	**60%**	**81%**	**80%**	**73%**
Longevity of Production	0%	25%	0%	10%	20%	11%
Place of Production	7%	38%	0%	21%	60%	25%
Way of Production	47%	75%	60%	67%	60%	64%
Origin	**73%**	**100%**	**40%**	**83%**	**60%**	**80%**
Cultural & Gastro. Heritage	7%	63%	40%	26%	60%	34%
Place of Origin	27%	63%	0%	57%	0%	43%
Longevity of Existence	60%	38%	0%	60%	40%	50%
Consumption	**13%**	**63%**	**40%**	**38%**	**0%**	**34%**
Longevity of Consumption	0%	0%	40%	5%	0%	5%
Place of Consumption	0%	0%	0%	5%	0%	2%
Way of Consumption	13%	63%	40%	33%	0%	32%
Consequences	**27%**	**88%**	**80%**	**43%**	**0%**	**45%**
Community Benefits	0%	13%	0%	0%	0%	2%
Consumer Benefits	0%	50%	40%	10%	0%	16%
Attributes	27%	38%	80%	43%	0%	36%

Source: Authors' research

Unlike definitions for natural products, which often originate from policymakers, definitions for traditional products do not. Only one paper refers to Regulation (EU) 1151/2012 and another two papers to its earlier version (Council Regulation

(EC) 509/2006). Consequently, when the relevant EU Regulation is quoted, 25 years (Pieniak et al., 2009), 30 years (Balogh et al., 2016), and 50 years (Kühne et al., 2015) are defined as the minimum time required for the product to be on the market to be considered traditional. The comprehensive definition by Trichopoulou et al. (2007) presented in Chapter 2 is referred to in several definitions, but once (Rudawska, 2014) in its entirety. Finally, most definitions of traditional products quote prior research that frequently provides consumer-based definitions; the most widely quoted is the one provided by Guerrero et al. (2009).

Overall, definitions of traditional products were content-wise far more diverse than the natural product definitions. The Production-related theme *Way of Production* is the most frequent and the only theme found often in the definitions regardless of their origin. However, the analysis at the more abstract level of data (i.e., categories codes), reveals that the most common category is Origin rather than Production, with three themes (*Longevity of Existence*, *Place of Origin,* and *Cultural and Gastronomic Heritage*) each dominating the definitions of a different stakeholder group. Furthermore, the results show that definitions of policymakers focus on the Origin-related theme of *Longevity of Existence*, while other stakeholder groups' definitions focus on many different categories and themes. Moreover, themes appear very unevenly across different origins. Specifically, consumer-based definitions cover a wide spectrum of themes like: *Way of Production*, *Cultural and Gastronomic Heritage*, *Place of Origin*, *Way of Consumption*, and *Consumer Benefits*, professionals-based definitions include *Comprised of*, *Way of Production*, and *Attributes*, the prior-research-based definition often cover themes like *Way of Production*, *Place of Origin* and *Longevity of Existence* while author-opinion-based very often include themes like *Comprised of*, *Place of Production*, *Way of Production* and *Cultural and Gastronomic heritage.*

The following list presents the most common meanings (bottom level data-driven codes) within the identified main themes (middle level codes):

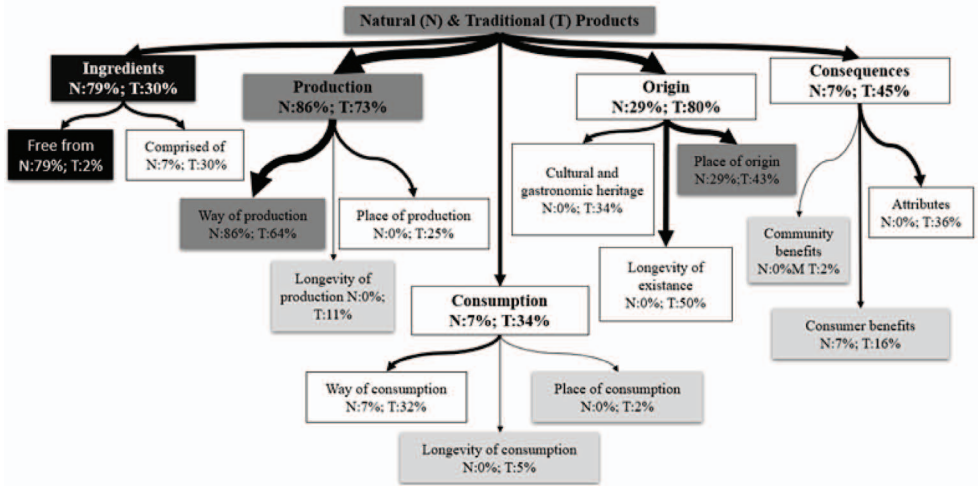
- *Way of Production: distinguished processing* (e.g., Bobe et al., 2016; Guerrero et al., 2010), *made according to gastronomic heritage* (e.g., Guerrero et al., 2009; Kühne et al., 2013; Rudawska, 2014),
- *Longevity of Existence: transmitted over generations* (e.g., Boncinelli et al., 2017; Cerjak et al., 2014), *existing over a long time* (e.g., Balogh et al., 2016; Kühne et al., 2015),
- *Place of Origin: associated with location, region, or country* (e.g., Boncinelli et al., 2017; Guerrero t al., 2009; Pieniak et al., 2013),
- *Attributes: distinguished sensory properties* (e.g., Guerrero et al., 2009; Rudawska, 2014; Vanhonacker et al., 2010),

- *Cultural and Gastronomic Heritage: part of cultural or gastronomic heritage* (e.g., Savelli et al., 2019; Serrano-Cruz, 2018),
- *Way of Consumption: frequently consumed / habit* (e.g., Bobe et al., 2016; Pieniak et al., 2009), *consumed on special occasions* (e.g., Boncinelli et al., 2017; Guerrero et al., 2009)
- *Comprised of: authentic raw materials* (e.g., Gellynck et al, 2012; Molnár et al., 2011; Rudawska, 2014),
- *Place of Production: produced locally, regionally, or nationally* (e.g., Gellynck et al., 2012; Gockowski et al., 2003; Molnár et al., 2011), and
- *Consumer Benefits: healthy* (e.g., Hidalgo-Milpa et al., 2016; Guerrero et al., 2010).

4.4. At the crossroads between natural and traditional products

The comparative analysis of natural and traditional products is depicted in Figure 2. Categories and themes primarily relevant to natural products are shaded black, primarily relevant to traditional products are shaded white, similarly relevant to both are shaded dark grey, and relevant to neither are shaded light grey.

Figure 2: At the crossroads between natural (N) and traditional (T)



Source: Authors' research

Specifically, category Ingredients (especially *Free from*) belongs to natural products, while Consumption (especially *Way of Consumption*), Origin (especially

Longevity of Existence and *Cultural and Gastronomic Heritage*), and Consequences (especially *Attributes*) belong to traditional products. Both sets of definitions often mention Production (especially *Way of Production*) although meanings are different, i.e., *minimally processed* (for natural) vs. *distinguished processing* and *made according to gastronomic heritage* (for traditional). The other theme found in both types of products, *Place of Origin,* also differs in meanings for the two types of products, i.e., *derived from nature* (for natural) vs. *associated with location, region, or country* (for traditional).

5. Results and discussion

Previous research shows that natural and traditional products have large and growing market shares (Cao and Yan 2016; Savelli et al., 2019), and consumer interest in these two products is unlikely to wane (Angus and Westbrook, 2020). Yet, these types of products are not well defined (Berry et al., 2017; Hemmerling et al., 2016; Hidalgo-Milpa et al., 2016; McFadden and Huffman, 2017). While previous research has addressed definitional ambiguity by relying on one of the many existing vaguely specified definitions, citing limited legal regulations, or examining consumer perceptions of the concepts, this research took a different approach. The purpose of this research was to examine the themes currently used in academic research in the conceptualization of natural and traditional products. This approach made it possible to contribute to current research by revealing whether academic research is helping to resolve the definitional ambiguity that exists in the marketplace or adds to the confusion. Furthermore, by revealing the potentially different languages that different stakeholders speak when referring to natural and traditional products, this research also contributes to bridging the gap between the narratives and understandings of different stakeholders. This paves the way for authentic producers of natural and traditional products to better align their production and marketing activities to become stronger market players, which ultimately promotes overall economic growth, especially in rural communities.

The results show that the definitions based on legal frameworks (mainly USDA, 2005 and Regulation (EU) 1151/2012) thematically converge to only three categories, each with one theme. For natural products, these are Ingredients (theme *Free from*) and Production (theme *Way of Production*), and for traditional products, Origin (theme *Longevity of Existence*). In contrast, an analysis of the full set of the definitions found in systematically selected academic research, reveals a more complex situation. The definitions of natural and traditional products both include all three categories mentioned in the legal regulations but also an additional two: Consumption and Consequences. Moreover, within these five categories, the definitions of natural products include six different themes and those of traditional products as many as fourteen. Further, the definitions of natural products are quite

consistent in that, regardless of the stakeholder group from which they originate, the two main themes (*Free from* and *Way of Production*) dominate the content. On the other hand, the themes of traditional products are remarkably diverse and dependent on the stakeholder group from which they originate. This points to the misunderstandings that exist among the stakeholder groups when they refer to traditional products. It also points to misunderstanding among researchers who use various conceptualisations to research traditional products. Moreover, current research on traditional products often provides consumer-driven definitions to set the stage or as a field research input, which is not ideal as the consumer perspective mostly represents association-based processing, which is unlike rule-based processing not rigorous enough to define a research concept (cf. Sloman, 1996).

Finally, although current marketing communication tends to create the idyllic image of a product that is both natural and traditional (Nikolić et al., 2014), and despite many definitions that suggest a conceptual overlap of these two product types (e.g., Chung and Hu, 2018; Hafsi and Hu, 2016; Bobe et al., 2016; Cerjak et al., 2014; Nikolić et al., 2014; Rudawska, 2014; Guerrero et al., 2009; Vanhonacker et al., 2010; USDA, 2005), current efforts to understand the two have not attempted to compare and delineate one from the other. The results of this study show that the definitions originating from the legal regulations completely distinguish these two concepts. Even when comparing the full set of the observed definitions, the definitions of the two concepts still largely diverge. Most of the themes are specific to either natural or traditional products; and even when there is overlap between the themes, as in the case of *Way of Production* or *Place of Origin*, the concrete meanings of these themes are specific to each of the two types of products.

6. Conclusion

The results presented provide answers to the research questions raised in the introduction. First, marketing research considers the way of production and the missing ingredients as the main themes in defining natural products, while it has not reached a consensus for traditional products. Second, the perspectives of the various stakeholders considered in academic research in the conceptualization of traditional products differ considerably. Third, the academic conceptualizations of the two products under study do not have many thematic overlaps. Implications for various stakeholders arise from these conclusions. Although traditional and natural products are each concisely defined in the existing legal framework, the legal framework is limited nation and product wise. If these concepts were afforded a legal regulation that was binding on all product categories worldwide, they would also be more delineated in practitioners' promotional messages. Current court cases are already urging policymakers to be more diligent in defining the concepts. In the meantime, academic

research should not be biased because of inadequacies in the legal framework but should help establish common ground. Experts, rather than consumers as is the case with current academic research on traditional products, should play an important role in formulating definitions. Further, although marketers currently benefit from consumers' preference for natural and traditional products and the limited legal framework for the use of these claims, consumers may soon lose confidence in overused (and misused) claims and turn their heads and wallets elsewhere. Therefore, it is also in marketers' best interest to be more authentic and use these claims wisely. By mapping the main meanings that different stakeholders associate with natural and traditional products, this study makes an important contribution to marketers who claim their products are natural or traditional. That is, by knowing the views of policymakers, marketers can adjust their products and production to what may soon be a legally binding regulation. Similarly, knowing what consumers mean by natural and traditional products, marketers can adjust their production, promotion, and other marketing activities to better meet consumer expectations for these types of products.

This research is not without limitations. The initially collected sets of articles were considerable, but after carefully excluding articles that were either not related to the studied theme or did not contain a definition, the final sets of articles were not as extensive. Future research could expand the sets of articles examined by expanding the initial research criteria to include additional research areas. In addition, future research should expand the analysis to bring together and delineate other similar, under-defined concepts such as local, homemade, and the like.

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Prirodno tradicionalni ili tradicionalno prirodni – istraživanje koncepata *prirodno* i *tradicionalno* u marketinškim istraživanjima

Ivana First Komen[1], *Nina Grgurić Čop*[2]

Sažetak

Svrha ovog istraživanja je razumjeti kako marketinška istraživanja konceptualiziraju prirodne i tradicionalne proizvode – proizvode koji snažno privlače pozornost potrošača i zauzimaju velike i rastuće tržišne udjele, a nedovoljno su jasni i slabo definirani regulatornim okvirom. Analiza je provedena na sustavno odabranim znanstvenim radovima objavljenim u relevantnim časopisima tijekom posljednja dva desetljeća. Rezultati pokazuju da se prirodni proizvodi uglavnom definiraju načinom proizvodnje i sastojcima koje ne sadrže, dok konsenzus nije postignut za tradicionalne proizvode. Nadalje, ne samo da je pojam tradicionalnog definiran neuobičajeno velikim brojem tema, nego se teme također značajno razlikuju ovisno o skupini dionika koja ih definira što ukazuje na neizbježan komunikacijski problem među tim skupinama. Rezultati također pokazuju da su unatoč pokušajima marketera da povežu značenje ovih dviju vrsta proizvoda, teme u definicijama prirodnih i tradicionalnih proizvoda različite i preklapaju se tek sporadično. Ove spoznaje su korisne kao korak naprijed u kreiranju bolje znanstvene konceptualizacije i specifičnijeg regulatornog okvira za prirodne i tradicionalne proizvode što će smanjiti vjerojatnost obmanjujućih poslovnih praksi i nedoumice među potrošačima i istraživačima.

Ključne riječi: *prirodni proizvodi, tradicionalni proizvodi, sastojci, proizvodnja, podrijetlo*

JEL klasifikacija: *M31, M38*

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Uredništvo skreće pozornost autorima da pažljivo pročitaju upute koje su dopunjene detaljnom metodologijom organizacije teksta.

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Uredništvo zaprima sve rukopise. Glavni i odgovorni urednik tekstove, nakon pregleda i prihvaćanja, upućuje u postupak prosudbe ("assessment process") članovima Uredništva, ali i ekspertnim stručnjacima izvan Uredništva u slučaju specifičnog sadržaja teksta. Poslije prosudbe, glavni i odgovorni urednik predlaže Uredništvu odluke za daljnji postupak i to: (a) koje se rukopise, u slučaju potrebe, vraća autoru sa sugestijama, preporukama i primjedbama radi poboljšanja, prije svega, metodološke prezentacije građe istraživanja; (b) koje rukopise uputiti u postupak recenzija ("reviewing process"); (c) koje rukopise odbiti, budući da:

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Svi znanstveni članci obvezno se recenziraju. Za svaki članak predviđena su dva recenzenta, jedan iz inozemstva i jedan iz Hrvatske, a oba su anonimna. Imena autora također su za recenzente anonimna. Recenzenti pišu recenziju prema dobivenim uputama i na propisanom formularu. Ukoliko članak, prema stajalištu recen zenta, ne udovoljava međunarodnim standardima i kriterijima časopisa, Uredništvo članak ne prihvaća. Ukoliko pak recenzent članak pozitivno ocijeni, može ga kate gorizirati u jednu od kategorija vrsnoće:

Izvorni znanstveni članak (Original scientific paper) je originalno znanstveno djelo u kojem su izneseni novi rezultati fundamentalnih ili primijenjenih istraživanja. Informacije iznesene u članku potvrđuju da je moguće:

a) reproducirati metodološki i računski postupak i dobiti rezultate s jednakom točnošću ili unutar granice stupnja slobode, kako to navodi autor; ili
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c) provjeriti točnost analiza i dedukcija na kojima se temelje autorovi nalazi.

Prethodno priopćenje (Preliminary communication). Taj znanstveni članak obavezno sadrži jednu ili više znanstvenih informacija, ali bez dovoljno pojedinosti koje bi omogućile čitatelju provjeru iznesenih znanstvenih spoznaja.

Izlaganje sa znanstvenog skupa (Conference paper). Može biti objavljeno samo kao cjeloviti članak koji je prethodno referiran na znanstvenom skupu, a u obliku cjelovitog članka nije objavljeno u zborniku skupa.

Pregledni rad (Review article). Sadrži poseban problem o kojem je već publiciran znanstveni rad, ali mu se pristupa na nov način.

Stručni članak (Professional paper). Sadrži korisne priloge iz struke i za struku.

Nakon primljenih recenzija, Uredništvo analizira recenzije. Ukoliko je to potrebno, rad vraća autoru koji ga je dužan prilagoditi zahtjevima recenzenta. Rad se dostavlja autoru nakon primitka obje recenzije. Međutim, u slučajevima gdje se ne dovodi u pitanje kvaliteta i autoriziranost teksta, Uredništvo također može intervenirati. Nakon što autor ponovno dostavi rad, Uredništvo utvrđuje usklađenost članka s primjedbama recenzenata.

Objavljuju se samo kategorizirani radovi koji imaju dvije pozitivne recenzije.

Glavni i odgovorni urednik, nakon završetka postupka recenziranja te izmjena i dopuna tekstova od strane autora i Uredništva, predlaže redoslijed prihvaćenih članaka u sadržaju. Kriteriji redoslijeda jesu:

(1) kategorizacija sukladno stupnju znanstvene vrsnoće;
(2) u slučaju dva različita stupnja kategorizacije članka od strane recenzenata, glavni i odgovorni urednik predlaže odluku Uredništvu, u pravilu, u prilog autora, tj. višu kategoriju;
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U okviru ciljeva povećanja kvalitete i broja objavljenih radova Uredništvo se obvezuje da će nastojati odgovoriti autorima o statusu poslanog rada u okviru od deset radnih dana. Također, od 2018. godine, objavljivat će se radovi u najavi na web stranici Časopisa koji će biti tiskani u redovnom polugodišnjem tiskanom izdanju. Okvirni rok završetka **recenzentskog** postupka, tehničkog uređivanja te online objave rada je dva mjeseca.

Osim tradicionalnog fokusa na empirijske radove, časopis poziva autore da dostave teorijske radove koji bi trebali pokriti nedostatak temeljnih istraživanja i meta-analize literature s ciljem pružanja temelja za kvalitetnija empirijska istraživanja, kao i razvoj novih ideja i uvida u ekonomskoj teoriji i praksi. Posebno pozivamo autore s radovima s visokom razinom teorijske argumentacije (ali za većinu ljudi razumljive) s jasnom analizom / porukama / preporukama usmjerenom na preporuke i buduća istraživanja; studije koje se usredotočuju na međuovisnost različitih, osobito aktualnih, ekonomskih kretanja; studije usmjerene na trans-disciplinarni i interdisciplinarni karakter ekonomskih analiza (tehnička, pravna, socijalna, ekonomska i druga područja).

Časopis crpi metodologiju za teorijske radove iz časopisa Journal of Economic Perspectives (https://www.aeaweb.org/journals/jep), sa sličnim ciljevima: sintetizirati i integrirati naučene lekcije iz najrelevantnijih područja i dilema suvremene ekonomske teorije i prakse; prezentirati ekonomske analize vezane za dileme javnih politika; poticati međusobnu razmjenu ideja među pojedinim znanstvenim područjima; ponuditi čitateljima dostupan izvor za najsuvremenija ekonomska promišljanja i predložiti smjerove za buduća istraživanja. Fokus teorijskih članaka trebao bi biti na razumijevanju središnjih ekonomskih ideja, koje su postojeće dileme i neistražena područja, zašto su navedena pitanja posebno važna, koja su najnovija dostignuća i koje aspekte treba ispitati.

U slučaju predaje teorijskog rada umjesto cjeline *Empirijski podaci i analiza*, autori trebaju obraditi poglavlje *Teorijska/konceptualna analiza* gdje bi autori trebali dati argumentaciju na temelju predložene metodologije/koncepta istraživanja. U ovom dijelu autori trebaju dati novu analizu područja/teme, dati teorijsku argumentaciju koja svoju hipotezu dokazuje korištenjem različitih dostupnih alata kao što su matematički, grafički ili bilo koji drugi koji jasno prikazuju i otkrivaju ekonomske odnose u odnosu na određeno znanstveno područje.

Sadržaj članka

Rad treba biti relevantan za međunarodnu znanstvenu i stručnu javnost s jasno naznačenim ciljevima i rezultatima istraživanja, zaključkom, referencama u tekstu i bibliografskim jedinicama na kraju rada. Ideje u radu moraju biti originalne i trebaju značajno doprinositi razvoju predmeta istraživanja, a metodologija mora biti jasno opisana.

Autori u članku moraju posebnu pozornost obratiti na odgovarajuće strukturiranje teksta sukladno priznatim standardima znanstvene metodologije u ekonomskim istraživanjima, kako je navedeno:

Posebna stranica treba sadržavati: naslov članka, ime i prezime autora ili ako je više koautora za svakog ponaosob znanstveno zvanje, stručnu spremu, znanstveni interes, odnosno područje kojim se autor bavi, naziv i adresu institucije u kojoj je autor zaposlen, broj telefona, broj faksa, e-mail adresu i osobnu web stranicu. Svi navedeni podaci moraju biti napisani:

– na jeziku članka,
– na hrvatskom jeziku,
– na engleskom jeziku ako izvorni jezik članka nije engleski.

Prva stranica članka treba sadržavati: naslov članka, sažetak, JEL klasifikaciju i ključne riječi na jeziku članka.

Na kraju članka isti podaci daju se na:

– hrvatskom jeziku, te
– na engleskom jeziku ako izvorni jezik članka nije engleski.

Tekst članka mora početi uvodom, a sadrži još glavna poglavlja, fusnote, tablice, grafikone, slike, reference u tekstu, zaključak i popis korištene literature.

Tehničko uređivanje članka

Tekst rada piše se u programu Microsoft Office Word (inačica 95 i viša). Opseg rada smije iznositi **do 8.000 riječi**, što je oko 16 stranica A4 formata, a tekst je pisan vrstom slova Times New Roman (veličine 12 točaka), s jednostrukim razmakom, poravnan s obje strane, pisan od početka reda (bez uvlačenja prvog retka pasusa), s marginama od 2,5 cm. Ukoliko je u tekstu potrebno posebno označiti neku riječ ili rečenicu koriste se pisana kosa slova (italic), nikako ne podebljana (bold). Za odvajanje pasusa koristi se dvostruki razmak. Opseg rada može biti veći samo u dogovoru s glavnim i odgovornim urednikom.

JEL klasifikaciju predlaže autor u skladu s Journal of Economic Literature klasifikacijom koja je dostupna na web stranici: http://www.aeaweb.org/journal/jel_class_system.html.

Fusnote se rabe samo za dodatna pojašnjenja osnovnoga teksta. One se ne koriste kao poziv na Literaturu. Označavaju se na dnu stranice, u kontinuitetu, kroz cijeli članak, arapskim brojevima počevši od 1.

Naslovi poglavlja (od Uvoda do Zaključka) moraju biti kratki i jasni, te redom numerirani arapskim jednocifrenim brojevima. Poglavlja mogu imati i podpoglavlja koja se obavezno numeriraju s dvocifrenim odnosno trocifrenim brojevima. (primjer: 1; 1.1.; 2.; 2.1.; 2.1.1. itd.), ali ne više od toga.

Tablice, grafikoni i slike moraju imati, broj, naziv i izvor podataka. Numeriraju se u kontinuitetu arapskim brojevima (posebno grafikoni, posebno slike).

Važna napomena: Ukoliko tablica, grafikon ili slika sadržavaju posebne znakove te su rađeni u posebnom programu dostavljaju se u posebnom dokumentu s točno navedenim i označenim položajem na kojem dolaze u tekstu.

Članak mora zadovoljavati sve tehničke propozicije navedene u ovim uputama.

Stil i organizacija teksta

Autori se obvezno moraju pridržavati znanstvene metodologije prezentacije građe u pisanju tekstova koja je uobičajena u znanstvenim publikacijama ("Harvard style"). To zahtijeva sljedeći pristup:

(1) Naslov i organizacija prezentacije građe:

Naslov je najvažniji sažetak rada koji mora održavati sadržaj i svrhu rada. Ne smije biti "opisan" niti sadržavati riječi poput "analiza" ili "metoda", i sl. Građu se raspoređuje u dijelove kao što su:

- *Sažetak (Abstract)* – ispod naslova
- *Ključne riječi*
- *JEL klasifikacija.*

Iza toga slijedi glavni dio rada podijeljen u odlomke:

- *Uvod*
- *Pregled literature*
- *Metodologija/metoda/model/koncepcija analize* (treće poglavlje)
- *Empirijski podaci (dokumentacijska podloga) i analiza* (četvrto poglavlje)
- *Rezultati i diskusija* (peto poglavlje)
- *Zaključci* (šesto poglavlje).

(2) Sadržaj pojedinih dijelova prezentirane građe:

a. Sažetak – ispisuje se u 100-250 riječi, a obvezno treba sadržavati:

- utvrđeni cilj istraživanja,
- metodu/model/koncepciju analize,
- glavni rezultat istraživanja (analize),
- temeljni zaključak istraživanja.

Sažetak se ne smije pisati u odlomcima!

b. Ključne riječi – moraju odražavati suštinu sadržaja rada, a navodi se do pet takvih riječi.

c. JEL klasifikacija – autor svoju temu mora razvrstati sukladno kodu časopisa The Journal of Economic Literature (JEL).

d. Uvod – sadrži definiranje problema i predmeta istraživanja s pozivom na recentnu literaturu odnosno rezultate istraživanja. Taj se dio može istaknuti i u posebnom, tj. 2., poglavlju kao *Literature review*. Pri kraju uvodnog dijela treba utvrditi radnu pretpostavku (hipotezu) istraživanja o kojoj se treba očitovati (kasnije) na početku poglavlja *Zaključak*. *Uvod* treba završiti s naznakom organizacije teksta.

e. Pregled literature – prethodi istraživačkom dijelu, a pruža čitateljima pregled referentne literature s ključnim točkama dosadašnjih spoznaja

temeljenih na relevantnim rezultatima aktualnih istraživanja. Pregled literature ne smije biti taksativno navođenje prethodnog znanstvenog doprinosa, već autori trebaju izvršiti sintezu dosadašnjih istraživanja kako bi dokazali opravdanost teorijskog i empirijskog doprinosa vlastitog rada.

f. Metodologija/Metoda/Model/Koncepcija – obično se prezentira u trećem poglavlju; metoda/model/koncepcija analize mora biti transparentno istaknuta radi eventualnog ponavljanja testiranja rezultata od strane zainteresiranih istraživača (to je jedno od temeljnih pravila znanstvene metodologije).

g. Empirijski podaci i analiza – sadržavaju dokumentacijsku podlogu i rezultate empirijske analize. Potrebno je opisati i prikazati uzorak podataka korišten u analizi te prezentirati i objasniti statistička te ekonometrijska obilježja dobivenih rezutata uz tumačenje njihova ekonomskog sadržaja.

h. Rezultati i rasprava – autor objašnjava rezultate, osobito njihovo ekonomsko značenje i poruke. U ovom dijelu očekuje se argumentacija znanstvenog doprinosa, povezivanje rezultata rada s rezutatima te zaključcima dosadašnjih empirijskih istraživanja te preporuke za promjene javnih i drugih politika.

i. Zaključci – treba imati u vidu da taj dio teksta nije i ne smije biti sažetak! Zaključci su autorovo originalno mišljenje (ocjena) o dobivenim rezultatima i obvezno sadrže:

- očitovanje o polaznoj hipotezi – je li ili nije dokazana;
- ocjenu rezultata istraživanja/analize, novine, te koji je doprinos znanosti;
- osvrt na ograničenja i probleme u istraživanju;
- smjernice za buduća istraživanja;
- utvrđivanje institucionalno-sustavnih implikacija dobivenih rezultata istraživanja (kao npr. prijedlozi za promjene u ekonomskom sustavu, ekonomsko-financijskoj i razvojnoj politici, instrumenti, mjere i sl.).

Preporuka je da se Zaključak ne piše u odlomcima.

(3) Literatura – navesti samo one naslove (izvore) koji su korišteni u tekstu!

TABLICE dolaze unutar teksta. Svi podaci u tablici stavljaju se u redove i kolone odvojene jednostrukim tankim linijama. Svaka kolona sadrži naziv i uključuje numeričku jedinicu koja se odnosi na cijelu kolonu. Tako se za višecifrene brojeve rabe jedan ili dva broja, a u nazivu za određenu kolonu označuju se numeričke jedinice u tisućama, milijunima i sl. Tablice se numeriraju u kontinuitetu arapskim brojevima (Tablica 1, Tablica 2, itd.), a pored broja i naziva, moraju imati i izvor podataka.

Mole se autori da se pridržavaju sljedećih pravila:

- iza godine nikad ne dolazi točka;
- tisuće, milijuni i sl. odvajaju se zarezom: 2,000; 250,000; 3,555,284 i sl.; milijarde se označavaju s bn (billion); decimalni brojevi odvajaju se točkom: 2.32; 0.35 i sl.

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