

What drives global competitiveness in the European Union countries?

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ABSTRACT

This paper examines the effect of factors of national competitiveness measured by the Global Competitiveness Index (GCI). It aims to identify the key factors that determine GCI of the European Union (EU-28) countries. We observe the composite indicator of GCI and the 12 factors of competitiveness in the period of 2008–2019 focusing on the links between the GCI and the factors of institutions, infrastructure, macroeconomic environment and its stability and market size. The GCI is determined using correlation and regression analyses and Structural Equation Model. A significantly positive relationship with the GCI is confirmed for institutions, infrastructure, macroeconomic environment and stability, labour market efficiency, market size, technological readiness in terms of information and communication technologies, and business sophistication and dynamism, but not for higher education and training and financial market development. The quality institutions are confirmed as a fundamental positive factor for the GCI together with macroeconomic environment and stability and market size. The study contributes with an empirical analysis that confirms the relationship between the selected factors of competitiveness and the GCI in the EU-28 countries.

KEYWORDS

quality of institutions, macroeconomic environment, market size, global competitiveness index, European Union

JEL CLASSIFICATION INDICES

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1. INTRODUCTION

This paper aims to examine the link between the global competitiveness index (GCI) and its 12 pillars as drivers. This is controlled with GDP per capita, which is used as a measure of economic growth. [Porter \(1990\)](#) argues that competitive advantage is not inherited, but it is changing due to factor conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry that continuously create the national competitive environment.

In the face of dynamic changes in the world, the GCI is assessed on the basis of the key drivers of global competitiveness, while economic growth is important for increasing prosperity for which increasing integration of economies is important ([Marčeta – Bojnec 2022](#)). The inequality and the gaps in the level of economic development in the world are deepening and consequently requires necessary swift action in restructuring and adjustment in policies targeting on the factors of economic growth and global competitiveness ([Baldwin – Wyplosz 2020](#)).

We focus on the GCI factors in the EU-28 countries, following the concepts of the World Economic Forum (WEF). Global competitiveness is the set of institutions, policies and factors that determine a country's level of productivity ([WEF 2009](#)). This means, that a competitive economy requires a system of policy and institutions, namely legal frameworks, laws, regulations, property rights and stable macro-economic policy, to ensure competitiveness of nations and their economic growth ([Fagerberg et al. 2007](#)). Economic performance is increasingly dependent on a globalized economic environment due to the growing importance of trade and finance and the linkages between countries ([Marčeta – Bojnec 2023](#)).

Different definitions of competitiveness have been developed in the literature to understand the WEF concept. [Porter \(2000\)](#) defined global competitiveness in relation to productivity on the microeconomic foundations of social welfare: a country's standard of living depends on productivity, while the share of exports to foreign markets and international trade do not play a major role. [Garelli \(2006\)](#) defined competitiveness as the ability of a nation, company or individual to manage a set of disparate competencies to achieve prosperity.

National competitiveness is mostly defined in terms of welfare, high living standards and economic growth of countries ([Simionescu et al. 2021](#)). According to [Camagni \(2006\)](#) the notion of competitiveness appears as territorial because of the role the territory plays by providing individual companies with competitive instruments under the environment, and the role it plays in the process of constructing knowledge, interpretative codes, cooperation and decision-making models on which the innovative paths of companies are based. In the current phase of development, the crucial factors are the knowledge factors and the intangible factors related to creativity and the capacity for innovative use of the existing stock of technologies and knowledge, which require considerable investments. [Aiginger \(2006\)](#) defined competitiveness as the ability of a country or location to generate wealth and living standards for its population. Quality of institutions and their transparency ([Glaser et al. 2004](#); [Acemoglu et al. 2005](#); [Bojnec et al. 2014](#); [Horvat et al. 2021](#)), infrastructure development ([Babatunde 2018](#)) and technological readiness in terms of ICT ([Bojnec – Fertő 2012](#)) can be important for international trade, competitiveness and economic growth of different countries. [Nagy and Šiljak \(2022\)](#) confirmed the convergence hypothesis for the EU countries that the poorer countries tend to grow faster than the richer ones. They also found that economic openness, inflation and government integrity have a positive impact on growth. Trade and



investment integration can improve competitiveness through two channels: first, by increasing the size of the market available to domestic firms, and second, by driving productivity and innovation by exposing firms to international competition, expertise and technology (WEF 2016).

The article fills the gap in the literature on the driving factors of the global competitiveness in the EU-28 countries during the period of 2008–2019. For the purpose of the research, we have set the following two research questions (RQ):

- RQ1: Is there a statistically significant relationship between the indicators of quality of institutions, macroeconomic environment and its stability, market size and the GCI?
- RQ2: Is there a stronger statistically significant relationship between the indicators of business sophistication and dynamism, innovation capacity, than the financial market development and GDP per capita with the GCI?

Following the literature, we hypothesize that a country's global competitiveness is its ability to improve the standard of living of its citizens through productivity, the integration of industries, improvements in technology, education, health, innovation capacity and quality of institutional factors.

In order to build a model of drivers of global competitiveness, it is important to demonstrate the links between the competitiveness factors and the GCI. To this purpose, we present a theoretical background, a review of the scientific literature in the context of global competitiveness in the Second section. In the third and fourth sections, we present methodology and data, and results of applied correlation and regression analyses and structural equation model (SEM) to explain the drivers of the GCI in the EU-28 countries. In the fifth Section, we provide a discussion and implications of the results, and conclude in the sixth Section.

2. LITERATURE REVIEW

The classical political economics developed principles of absolute (Smith 1776) and relative comparative advantages (Ricardo 1817) in favour of industry specialisation, combined with free international trade. In the new trade theory (Krugman 1994), the focus is on the geographical concentration of economic activities, which creates a flow of knowledge and skilled labour towards the geographical agglomeration of activities. In reality, competitiveness does not mean zero-sum competition between nations (WEF 2019).

The WEF concept is a system for assessing and ranking the competitiveness of countries based on three sub-indices according to three stages of development: (I) basic conditions of competitiveness, (II) performance enablers, and (III) innovation and sophisticated business processes. Since 2018, the WEF assesses the competitiveness of countries based on four pillars: (I) environment, (II) human capital, (III) markets, and (IV) innovation ecosystems. The sub-indices of the GCI are therefore defined as aspects or dimensions of competitiveness.

The GCI is an average score of 12 competitiveness factors that determine the productivity and prosperity of countries, which are collected from yearbooks or survey data and there are the basis for comparing developments between countries: institutions, infrastructure,



macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation capacity.

WEF (2019) highlights the role of human capital and technological readiness with ICT, which not only drive but also typically contribute to economic success. It is important to assure the overall skill level of the workforce and the quantity and quality of education, which include the development of digital literacy, interpersonal skills, critical and creative thinking abilities. According to WEF (2016), GDP per capita is more closely linked to the technological readiness with ICT, business sophistication and innovation capacity pillars than to the infrastructure, education and market pillars (market size, financial market development and labour market efficiency). GDP per capita and standard of living of population can be linked to competitiveness (Pucara – Glavaski 2020).

A body of research has developed that examines and defines competitiveness based on the socio-economic factors. According to Rusu and Roman (2018) for innovation-driven countries the determinants of competitiveness are: GDP, inflation rate, tax rate, foreign direct investment (FDI), trade and costs. Moreover, in the efficiency-driven countries, efficient macroeconomic policy dealing with economic growth, inflation rate, tax rates, FDIs, trade balance, labour productivity, and costs could be included among the essential drivers of competitiveness (Rusu – Roman 2018). Cheng and Hou (2022) highlighted the critical role that innovation can play in the growth process and stated that financial market development is no longer a key for real economic growth. Trade and investment integration can improve competitiveness through two channels: first, by increasing the size of the market available to domestic firms, and second, by driving productivity and innovation by exposing firms to international competition, expertise and technology (WEF 2016).

The increased role of knowledge as a source of competitiveness in the OECD countries has led to a rise in innovation and economic growth (OECD 2010). Knowledge creation and dissemination play an important role as more people in the EU countries have completed tertiary education, which is an important factor for international competitiveness. Quality of institutions, information technologies, financial market development with capital movement and innovation capability with transportation of goods on long distances at relatively low cost can be important for competitiveness (Agnew 2015). Rotar et al. (2022) underlined the importance of policies that foster labour productivity growth, in particular those that promote innovation and ensure macroeconomic stability, efficient markets and a flexible and skilled workforce.

Placido and Hwang (2019) argued that the government has an important role to play in improving innovation pillar scores in the Philippines, and that GCI is strongly and positively associated with investment in innovation activities and innovative institutions. Marčeta and Bojnec (2021) showed that GDP per capita is positively correlated with the innovation factor indicators and the GCI. In China, government intervention in the finance sector to allocate credit to back state-owned enterprises helps to achieve sustainable growth (Li 2022).

Investments in innovation activities and creation or development of new and more efficient processes, services, products and technologies and their successful assimilation and exploitation can help to improve economic growth, social development, business and national competitiveness (Fagerberg et al. 2010; Marčeta – Bojnec 2021). Innovation in companies can be associated



with beneficial changes in the areas of competitiveness, productivity, efficiency, market access or governance (Likar et al. 2013).

Fagerberg and Srholec (2008) based on data for 75 countries on different levels of economic development found that there is a strong correlation between technological capability, innovation-friendly governance and social capital suggesting the important role that policies can play and deeper social and cultural factors for technological catch-up.

To sum up, the literature has strengthened the role of different factors of global competitiveness and economic growth contributing to countries economic development. The results and findings may vary due to different reasons, such as different countries samples selection, different periods of the analysis, and different methods and approaches that have been used.

In order to answer the RQ1 and RQ2, we have set two objectives: 1) to identify the influential factors using the WEF concept and to identify differences in the 12 GCI factors across the EU-28 countries and to determine their spatial variability and 2) to examine the linkages and influencing factors of GCIs in the EU-28 countries. Both relations in the RQ1 and RQ2 are controlled with GDP per capita expressed as a measure of economic growth.

Based on the reviewed literature and in line with the objectives of the research, we develop two hypotheses on the evolution and drivers of GCI in the EU-28 context. The basic thesis of the research is that the national competitiveness of the EU-28 countries depends on a number of socio-economic factors derived from WEF and GDP per capita. There is heterogeneity in the linkages and differences of the influencing factors within the EU-28 countries. On this basis, we put forward the following two hypothesis (H):

- H1: Indicators of quality of institutions, macroeconomic environment and its stability, and market size have an impact on the GCI of the EU-28 countries.
- H2: Indicators of business sophistication and dynamism, innovation capacity and GDP per capita have stronger impact on the GCI of the EU-28 countries than financial market development.

3. METHODOLOGY AND DATA

We are interested on drivers of GCI in the EU-28 countries. We test the two hypotheses based on the GCI factors from the WEF reports and GDP per capita from Eurostat (2021).

3.1. Methodology

To show the changes and differences between the influential factors of GCI, we present descriptive statistics with 12 competitiveness factors and GDP per capita. This is followed by the analysis to identify the GCI drivers in the EU-28 countries using the correlation and pooled ordinary least square (OLS) regression analyses carried out in the Statistical Package for the Social Sciences (SPSS). Finally, we report the results of the estimation of the SEM of the causal links between the variables using the Analysis of a Moment Structures (AMOS) statistical software. We analyse the strength of the associations and the direction of the relationships between the variables. We used panel data for the EU-28 countries over the period of 2008–2019.



3.2. WEF data and GDP per capita

Data used on dimension of competitiveness are based on the WEF reports that rank the world's nations according to the GCI, initially presented in 2004 as the GCI 1.0 (Sala-I-Martin 2010). The GCI in its original form was based on 12 indicators and has been released annually. In the latest iterations, the GCI has expanded to cover 113 indicators, grouped into 12 pillars as competitiveness factors in four areas. According to the WEF (2016), the development of the GCI 4.0 has been guided by the emergence of new fundamental changes in the functioning of national economies with the advent of the Fourth Industrial Revolution. This transformation –the 4th Industrial Revolution – is not defined by any particular set of emerging technologies themselves, but rather by the transition to new systems.

The research is carried out for the EU-28 countries using WEF data for the period of 2008–2019 resulting to 336 observations. We use the GCI as a key instrument, which is defined by different factors or index scales according to the WEF reports. We operationalise it on the basis of 12 factors of competitiveness (Table 1).

All the GCI indicators are scored in each space based on a scale from 1 – poorly to 7 – effective.

GDP per capita is calculated from chain linked indices (Eurostat 2021) to the 2010 base-year index.

4. RESULTS

4.1. Descriptive statistics

Table 2 presents descriptive statistics of the WEF 12 dimensions or the GCI factors with scores ranging from 1 to 7 and for GDP per capita as real index with the constant base year (2010 = 100) for the EU-28 countries in the period of 2008–2019 with 336 observations. The GCI for the years 2018 and 2019 is adjusted from the scale from 1 to 100 to the scale from 1 to 7 ($GCI * 7/100$).

The mean values of the GCI factors are greater than the mean value of GCI for the following dimensions: infrastructure, macroeconomic environment and its stability, health and education, and higher education and skills. It is at a similar level for technological readiness with ICT and market size, while lower for other dimensions: quality of institutions, labour market efficiency, business sophistication and dynamism, innovation capacity, goods market efficiency, and financial market development. GDP per capita has almost doubled during the analysed period of 2008–2019.

The standard deviation and the variance reflect the differences across factors between the EU-28 countries. The variance is highest for GDP per capita across 12 factors of competitiveness for macroeconomic environment, infrastructure, innovation capacity, technological readiness with ICT, and market size. The smallest variance occurs for health and primary education, labour market efficiency and goods market efficiency. For the GCI factors, the large variation implies that changes are needed, especially in terms of improving innovation capacity and its capability, macroeconomic environment and its stability, and market size.

4.2. Correlation analysis

Table 3 presents the Spearman correlation coefficients. As can be seen, some pairs of variables are correlated with high statistical significance, especially GCI with quality of institutions



Table 1. WEF-12 factors of global competitiveness

Name of the factors	Explanation or content of the factor	Sign of the factors
Institutions	The institutional environment reflecting the administrative and legal frameworks of institutions	<i>instit</i>
Infrastructure	Facilitates integration with new markets	<i>infrastr</i>
Macroeconomic environment	Macroeconomic (in)stability means budget balance, savings	<i>macro</i>
Health and basic education	State of health and quality	<i>health</i>
Higher education	Skills, include quality education – secondary and tertiary	<i>skileduc</i>
Goods market efficiency	Favourable environment for exchange of goods (matching supply and demand)	<i>marketprod</i>
Labour market efficiency	Job creation and entrepreneurship, and the development of entrepreneurship	<i>marketlab</i>
Financial market development	Financial system, namely the allocation of financial resources	<i>finmarket</i>
Technology readiness (ICT)	Level of use of technology and availability of new technologies	<i>techread</i>
Market size	Domestic and foreign market, enable company to be more productive	<i>markets</i>
Business sophistication (dynamics)	Quality of business networks and operation of company, interconnection	<i>busdyn</i>
Innovation capacity	Capability, enable development of innovative activities and cutting-products innovative edge	<i>innov</i>

Note: The predicted impact of each of the WEF-12 factors on GCI is positive.

Source: WEF (2008 – 2020).

(0.825), infrastructure (0.785), higher education and skills (0.759), innovation capacity (0.796), business sophistication and dynamism (0.784), technological readiness – ICT (0.536), financial market development (0.664), product market efficiency (0.647), labour market efficiency (0.673), and financial market development (0.631). The Spearman correlation coefficients for the GCI with the market size (0.485) and macroeconomic environment (0.517) are modest.

4.3. Regression analysis

To test H1 that the indicators of quality of institutions, macroeconomic environment and its stability, and market size have an impact on the GCI of the EU-28 countries, we determine the relationship between GCI and its factors using the regression analysis on the basis of



Table 2. Descriptive statistics for GCI, 12 competitiveness factors, and GDP per capita for the EU-28 countries, 2008–2019

Variables	N	Minimum	Maximum	Mean		Std. Deviation	Variance
				Value	Std. Error		
GDPp	336	81.00	177.00	107.85	0.72	13.22	174.77
GCI	336	3.86	5.80	4.78	0.03	0.51	0.26
Instit	336	3.19	6.18	4.57	0.04	0.81	0.66
Infrastr	336	2.56	6.83	5.14	0.05	0.84	0.70
Macro	336	2.42	7.00	5.27	0.05	0.94	0.88
Health	336	5.32	7.00	6.23	0.02	0.35	0.12
Skileduc	336	4.01	6.27	5.11	0.03	0.51	0.26
marketprod	336	3.67	14.00	4.69	0.04	0.69	0.47
Marketlab	336	3.29	5.71	4.50	0.02	0.45	0.21
Finmarket	336	2.49	6.28	4.48	0.04	0.69	0.48
Techread	336	2.57	6.46	5.00	0.05	0.83	0.69
Markets	336	2.31	6.29	4.49	0.05	0.90	0.81
Busdyn	336	2.33	6.00	4.63	0.04	0.69	0.48
Innov	336	2.64	6.13	4.12	0.05	0.87	0.75
Valid N (listwise)	336						

Source: Authors' calculations based on [WEF \(2008 – 2020\)](#) and [Eurostat \(2021\)](#).

12 competitiveness factors and GDP per capita in the period of 2008–2019. Four out of 12 factors – higher education and skills, financial market development, goods market efficiency, and innovation capacity – were found insignificant as their *P*-values are greater than 0.05 ([Table 4](#)). In addition, GDP per capita was also not statistically significant. They were excluded from the regression analysis results in the next steps.

The correlation coefficient (*R*) in model summary is 0.946, which confirmed high correlation between the 12 explanatory variables, GDP per capita and the GCI. The adjusted coefficient of determination is 0.891, which shows that the independent covariates can explain 89.1% of the variability of the dependent GCI variable. The standardized regression coefficients of statistically significant factors are higher for quality of institutions (0.300), market size (0.235), macroeconomic environment and its stability (0.214), labour market efficiency (0.143), business sophistication and dynamics (0.164), and infrastructure (0.097). The lowest ranked are health and primary education (0.062) and technological readiness with ICT (0.077). The higher value suggests higher possible impact on increases of global competitiveness.

The results of the ANOVA test of statistically significant factors reveal that the *P*-value is less than 0.05 for each of the 8 variables considered that are statistically significant. The *F*-value,



Table 3. Spearman's rho correlation analysis between the GCI, 12 factors of competitiveness, and GDP per capita ($N = 336$)

Spearman's rho of variables	gdpp	gci	instit	infrastr	macro	health	skileduc	marketprod	marketlab	finmarket	techread	markets	busdyn	innov
GDPP	1.000	0.250**	0.094	0.055	0.597**	0.043	0.165**	−0.001	0.219**	0.241**	0.019	0.026	0.036	0.033
GCI	0.250**	1.000	0.825**	0.785**	0.517**	0.611**	0.759**	0.647**	0.673**	0.664**	0.536**	0.485**	0.784**	0.796**
Instit	0.094	0.825**	1.000	0.702**	0.384**	0.599**	0.708**	0.784**	0.730**	0.660**	0.609**	0.222**	0.682**	0.747**
Infrastr	0.055	0.785**	0.702**	1.000	0.316**	0.589**	0.619**	0.445**	0.368**	0.455**	0.437**	0.544**	0.696**	0.686**
Macro	0.597**	0.517**	0.384**	0.316**	1.000	0.181**	0.323**	0.140**	0.452**	0.508**	0.076	0.078	0.272**	0.290**
Health	0.043	0.611**	0.599**	0.589**	0.181**	1.000	0.696**	0.490**	0.391**	0.433**	0.448**	0.225**	0.571**	0.670**
Skileduc	0.165**	0.759**	0.708**	0.619**	0.323**	0.696**	1.000	0.554**	0.538**	0.500**	0.612**	0.303**	0.758**	0.780**
Marketprod	−0.001	0.647**	0.784**	0.445**	0.140**	0.490**	0.554**	1.000	0.683**	0.525**	0.652**	0.099	0.608**	0.713**
Marketlab	0.219**	0.673**	0.730**	0.368**	0.452**	0.391**	0.538**	0.683**	1.000	0.631**	0.398**	0.093	0.498**	0.568**
Finmarket	0.241**	0.664**	0.660**	0.455**	0.508**	0.433**	0.500**	0.525**	0.631**	1.000	0.358**	0.230**	0.574**	0.638**
Techread	0.019	0.536**	0.609**	0.437**	0.076	0.448**	0.612**	0.652**	0.398**	0.358**	1.000	0.035	0.574**	0.658**
Markets	0.026	0.485**	0.222**	0.544**	0.078	0.225**	0.303**	0.099	0.093	0.230**	0.035	1.000	0.453**	0.404**
Busdyn	0.036	0.784**	0.682**	0.696**	0.272**	0.571**	0.758**	0.608**	0.498**	0.574**	0.574**	0.453**	1.000	0.838**
Innov	0.033	0.796**	0.747**	0.686**	0.290**	0.670**	0.780**	0.713**	0.568**	0.638**	0.658**	0.404**	0.838**	1.000

Note: N = Number of observations. ** Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculations.



Table 4. Regression coefficients with 12 factors and GDP per capita, 2008–2019 (*N* = 336)

Dependent variable: GCI	Unstandardized coefficients		Standardized coefficients Beta	<i>t</i>	Sig.	Collinearity statistics	
	B	Std. error				Tolerance	VIF
(Constant)	0.056	0.252		0.224	0.823		
GDPp	0.001	0.001	0.014	0.618	0.537	0.608	1.644
instit	0.186	0.026	0.300	7.051	0.000	0.179	5.576
infrastr	0.058	0.020	0.097	2.940	0.004	0.301	3.326
macro	0.116	0.015	0.214	7.607	0.000	0.408	2.453
health	0.091	0.040	0.062	2.242	0.026	0.421	2.374
skileduc	0.015	0.034	0.015	0.428	0.669	0.268	3.738
marketprod	0.020	0.017	0.027	1.176	0.241	0.625	1.599
marketlab	0.158	0.033	0.143	4.769	0.000	0.363	2.757
finmarket	−0.011	0.021	−0.015	−0.504	0.615	0.385	2.595
techread	0.047	0.017	0.077	2.782	0.006	0.419	2.386
markets	0.132	0.014	0.235	9.614	0.000	0.544	1.840
busdyn	0.120	0.026	0.164	4.656	0.000	0.261	3.832
innov	0.030	0.028	0.052	1.077	0.282	0.141	7.088

Source: Authors' estimations.

212.6 is statistically significant at the 0.000 significance level and shows that there is a linear dependence between the variables and that the model does fit. Statistically significant regression coefficients are found for 8 factors that can improve GCI (Table 5).

The standardized regression coefficients are 0.315 for quality of institutions, 0.245 for market size, 0.219 for macroeconomic environment and its stability, 0.151 for labour market efficiency, 0.188 for business sophistication and dynamics, 0.092 for infrastructure (0.092), 0.077 for health and primary education, and 0.096 for technological readiness with ICT. The higher value suggests higher possible impact on increases of global competitiveness.

Sofrankova et al. (2017) find that the GCI is not statistically significant in the relationship with Pillar 4: Health and primary education, Pillar 5: Higher education and training, Pillar 7: Labour market efficiency, Pillar 9: Technological readiness, and Pillar 10: Market size. However, the study found that there is a statistically significant relationship between GCI and innovation capacity in the EU-28 context.

According to our results and findings, we cannot reject H1 that the indicators of quality of institutions, macroeconomic environment and market size have an impact on the GCI of the EU-28 countries.



Table 5. Regression coefficients with 8 factors, 2008–2019 ($N = 336$)

Dependent variable: GCI	Unstandardized coefficients		Standardized coefficients Beta	t	Sig.	Collinearity statistics	
	B	Std. error				Tolerance	VIF
(Constant)	−0.025	0.208		−0.120	0.904		
Instit	0.196	0.024	0.315	8.101	0.000	0.214	4.682
Infrastr	0.055	0.019	0.092	2.902	0.004	0.322	3.102
Macro	0.118	0.012	0.219	10.042	0.000	0.681	1.468
Health	0.113	0.035	0.077	3.225	0.001	0.560	1.785
marketlab	0.167	0.032	0.151	5.216	0.000	0.387	2.587
Techread	0.059	0.015	0.096	3.900	0.000	0.528	1.894
Markets	0.137	0.013	0.245	10.935	0.000	0.643	1.555
Busdyn	0.137	0.021	0.188	6.614	0.000	0.399	2.509

Source: Authors' estimations.

4.4. The structural equation model (SEM)

As a verification of our analysis, we provide the results of the estimation of the SEM, showing the effects of 12 factors of competitiveness and GDP per capita on the GCI of the EU-28 countries. We test H2 that the indicators of business sophistication and dynamism, innovation capacity and GDP per capita have stronger impact on the GCI of the EU-28 countries than financial market development.

The purpose is to investigate whether the selected factors have expected positive direct effect on GCI. The results vary by factor scores, predictors and strength of association. Table 6 presents the Comparative Fit Index (CFI) = 0.391, Normalised Fit Index (NFI) = 0.388, Incremental Fit Index (IFI) = 0.396, Tucker Lewis Index (TLI) = 0.136, and Root Mean Square Error of Approximation (RMSEA) = 0.294.

For the SEM, RMSEA is higher than 0.05. Other indices are high for NFI and IFI as good fit. Values 1 represent the perfect fit, and values between 0 and 1 represent a good fit. We consider that the adaptation of the model is acceptable.

Table 6. Fits to structural equation model (SEM)

SEM	Chi square	RMSEA	NFI	IFI	TLI	CFI
Model	0.00	0.294	0.388	0.396	0.136 1.0000	0.391 1.000
Independence		0.316	0.000	0.000	0.000	0.000

Source: Authors' calculations.



The SEM can be accepted for all structures, as model independence value is less than 0.05, which indicates a good fit of the model. RMSEA is >0.08 as actual value is 0.294 and 0.316. Based on the findings, we consider that the SEM is acceptable based on the model fit criteria for our measurement model.

The graphical representation of the SEM assessment is presented in [Figure 1](#).

From [Figure 1](#) we can see that the SEM GCI model includes 12 competitiveness factors, including financial market development, business sophistication and dynamism, and innovation capacity. The relation between the GCI and 12 factors of competitiveness indicates a different impact. The most positive results and strong effect on the GCI were obtained for the variables of the quality of institution (0.47), macroeconomic environment and its stability (0.34), market size (0.37), technological readiness with ICT (0.25), business sophistication and dynamism (0.26), and labour market efficiency (0.22). These are the most important driving elements of the GCI. These are followed by infrastructure (0.15), and innovation capacity (0.08). Moreover, the SEM shows that the impact of GDP per capita is very low (0.02), and also for higher education and skills (0.02) on the GCI. Finally, financial market development negatively affects the GCI (-0.02). Therefore, there is a problem in the financial market development and its integration in the EU-28 countries which is also consistent with [Jagrič et al. \(2015\)](#) using an optimized spiral spherical self-organizing map approach to the banking sector analysis.

5. DISCUSSION AND IMPLICATIONS

To test the influence between the 12 competitiveness factors and the GCI, and GDP per capita, we performed the correlation and regression analyses, and the SEM. We confirm H1 that the indicators of quality of institutions, macroeconomic environment and its stability, and market size have an impact on the degree of GCI for the EU-28 countries in the period of 2008–2019. The regression analysis shows that quality of institutions, labour market efficiency, business sophistication and dynamism, infrastructure, technological readiness with ICT, market size, macroeconomic environment and its stability, and health with primary education have most positive impact on the GCI. The importance of quality of institutions confirmed the finding which needs to be ensured by the national instruments, and namely by legal infrastructure ([Marčeta – Bojnec 2020](#)).

The SEM analysis confirmed H2 as the indicators of business sophistication and dynamism, innovation capacity and GDP per capita have stronger impact on the GCI of the EU-28 countries than financial market development. Moreover, the SEM confirmed the importance of quality of institutions, macroeconomic environment and its stability, and infrastructure for the GCI. In addition, a positive link of the GCI is confirmed with market size, health and basic education (state of health and quality of primary education), and goods market efficiency.

These findings can help to identify future challenges for the EU-28 countries in terms of achieving global competitiveness. Financial market development has a negative association with the GCI. However, this does not necessarily mean that in the short term it does not have an effect on the GCI. [Blanco et al. \(2020\)](#) argued for the need to revise the EU research policies towards greater coordination in use of resources and to introduce new instruments given the impact of the expenditures for research, development and innovation on growth, development and integration.



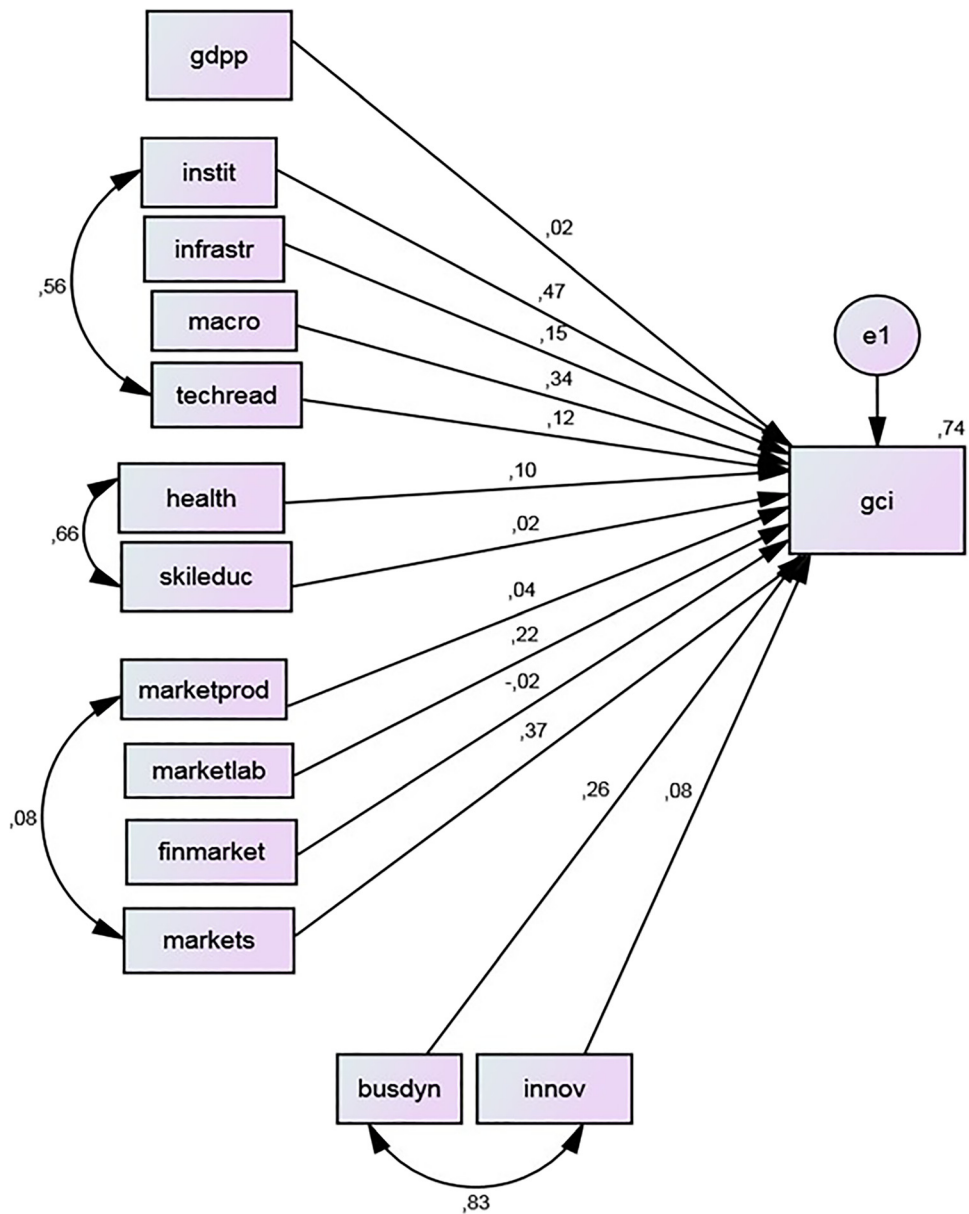


Fig. 1. Path SEM for variables

Source: Authors' calculations based on [WEF \(2008 – 2020\)](#) and [Eurostat \(2021\)](#).

Therefore, H2 cannot be rejected. While there are positive linkages between innovation capacity, business sophistication and dynamism with the GCI, this does not hold for the linkage between the financial market development and the GCI. This finding is also in line with [Baldwin and Wyplosz \(2020\)](#) that financial market development deals with risk in many ways.



Our results are in line with some previous studies on the importance of technological readiness with ICT. [Bojnec and Fertő \(2012\)](#) argued on the importance of the broadband availability for economic growth. Managers need to devote more attention to the individual dimensions of ICT.

The findings could be important information relevant for the EU countries, aimed at improving GCI, providing recommendations for government policy interventions and also for practitioners and managers. Policy makers need to improve support particularly for quality of institutions, market size, business sophistication and dynamism, technological readiness with ICT and innovation capacity. Surprisingly, human capital (health and primary education, and higher education and skills) and financial market development in the EU-28 countries were not found either as significant or as a positive driver for the increase in the global competitiveness measured by the GCI.

While cohesion policy in the EU ([Farole et al. 2011](#)) can contribute to economic and structural convergency, the EU-28 countries are heterogenous in numerous ways such as in integration perspectives from cohesion to divergence ([Recher – Kurnoga 2017](#)), quality of institutional environment in the product market competition between and within the old and new EU member states ([Próchniak 2018](#)), quality of institutions ([Balcerzak 2020](#)), macroeconomic decomposition of GDP ([Kuruczleki et al. 2022](#)), and global competitiveness ([Marčeta – Bojnec 2022, 2023](#)). Our research results confirmed that quality of institutions, macroeconomic environment and its stability, infrastructure, technological readiness with ICT, health and primary education, market size, business sophistication and dynamism, and labour market efficiency are more relevant for the GCI.

Government effectiveness appears to be a strong tool increasing competitiveness, especially in the area of quality of institutions, and macroeconomic environment and its stability. Furthermore, it is also useful for managers to expand companies' entry into foreign markets. The findings shed more light on the issues of financial market development, which is a striking problem at government level in the EU-28 countries.

6. CONCLUSION

The study explores the global competitiveness factors measured by the GCI from WEF and GDP per capita for the EU-28 countries over the period of 2008–2019. Following the theoretical background with the previous studies and their findings on competitiveness, we have explored the influential factors of the GCI in the EU-28 countries. We highlight the interrelationship of the dimensions of the institutional environment reflecting the administrative and legal frameworks of quality of institutions, infrastructure as facilitates integration with new markets, macroeconomic environment and its (in)stability, health and basic education, higher education-skills including quality of secondary and tertiary education, goods market efficiency with favourable environment for exchange, labour market efficiency with job creation and entrepreneurship, financial market development with financial system allocation of resources, technology readiness with ICT and level of use of technology and availability of new technologies, market size of domestic and foreign ones that enable enterprises to be more effective, business sophistication and dynamics with quality of business networks and operation of company and its interconnection, and innovation capacity and its capability that enables development of



innovative activities and cutting-products innovative edge. In addition, GDP per capita as a proxy for the economic growth has been specified and tested in the models.

The results confirmed the importance of quality of institutions, infrastructure, macroeconomic environment and its stability, market size, technological readiness with ICT, innovation capacity and its capability, business sophistication and dynamism as drivers of the GCI. Our first hypothesis (H1) cannot be rejected because the indicators of quality of institutions, macroeconomic environment and its stability, and market size have a positive impact on the GCI of the EU-28 countries. The second hypothesis (H2) is confirmed as the indicators of business sophistication and dynamism and innovation capacity have a positive impact on the GCI – as well as GDP per capita – of the EU-28 countries, but a negative impact is found for financial market development with asymmetric and inefficient linkages with the GCI. It is necessary improving the domestic financial system with a positive ramification and enable action regarding financial markets integration.

The empirical evidence is important for policy makers to better understand the nature of competitive position of the EU-28 countries. Policy makers in the EU-28 countries need to identify new opportunities that improve national competitiveness, particularly to identify areas that are lagging behind. Policymakers should be focused on reinforcing quality of institutions, infrastructure development and market size that can foster global competitiveness. The results can provide informational basis to allow for better decision-making on how national competitiveness can be improved. Our analysis can assist policymakers in prioritizing the major factors influencing competitiveness particularly to improve quality of institutions, infrastructure to facilitate integration with new markets, macroeconomic environment and (in)stability.

Among research limitations, we have limited our study to a selection of aspects or dimensions of competitiveness according to the WEF reports, which include 12 factors of three groups of indicators according to the GCI: basic conditions, performance enablers, and business sophistication and innovation. Only GDP per capita is included as an external driver. On the other side, there are factors of environment, human capital indicators, markets and innovation ecosystems. The period is limited to the years 2008–2019 due to the WEF data availability at the level of individual EU-28 countries, rather than regional competitiveness. Therefore, among issues for the research in future, this can broaden the perspectives in the research literature to include additional potential drivers of GCI, in addition to the 12 competitiveness factors and GDP per capita. These can be factors that increase the effectiveness of market functioning and market integration that can contribute significantly to global competitiveness.

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