

# The Impact of Good Governance on the Quality of Road Infrastructure within the European Union

Cezar Teclean, Gabriela Drăgan<sup>1</sup>

**Abstract:** *The article assesses the role of good governance in promoting the quality of road networks in the European Union. For this purpose, we consider four dimensions related to good governance: effectiveness of government, quality of legislation, control of corruption, and political stability. Our research aims to test the hypothesis that the different indicators of the governing act have differing impacts on the quality of road infrastructures, the objective of our analysis being to quantify the contribution of each of the above-mentioned indicators. Through a quantitative analysis which used coefficients of correlation and determination, we quantified the explanatory contribution of good governance indicators to the configuration of the quality of road infrastructure in the states of the Union from 2007 to 2019. Our findings show that political stability has the most consistent explanatory contribution, followed by government effectiveness, legislative quality, and corruption control, although the distribution of impact varies significantly across EU member states.*

**Keywords:** *road infrastructure, government effectiveness, regulatory quality, control of corruption, political stability, European Union, good governance.*

**JEL classification:** L91, L92, L98, R42.

## Introduction

Territorial cohesion is a core value of the European Union (EU), and transport networks that enhance spatial accessibility are an essential vector of movement and connection in contemporary European society (Condeço-Melhorado, Reggiani and Gutierrez, 2014). Among land transport systems, the road network is particularly relevant in achieving accessibility and territorial cohesion due to its availability in the territory and infrastructure quality (Teclean, 2021, p. 40). Therefore, modernising and developing road networks is a priority for improving territorial accessibility, explaining why the Mechanism for the Interconnection of Europe allocates around 25% of public investments at the EU level (Dijkstra, Poelman and Ackermans, 2018, p. 20).

In this context, measures taken to ensure accessibility include a requirement to modernise road networks with the goal of ensuring that most EU citizens and businesses will be within a 30-minute isochron margin of the nearest modernized road belonging to the global trans-European network (European Commission, 2013). This objective is

---

<sup>1</sup> Cezar Teclean, PhD, is a postdoctoral researcher and associate researcher within the International Economic Relations Research Center, Bucharest University of Economic Studies, Romania.

E-mail: [cezarl0tc@yahoo.com](mailto:cezarl0tc@yahoo.com).

Gabriela Drăgan, PhD, is a University Professor at the Bucharest University of Economic Studies and Senior Researcher within the International Economic Relations Research Center, Bucharest University of Economic Studies, Romania.

E-mail: [gabriela.dragan@rei.ase.ro](mailto:gabriela.dragan@rei.ase.ro).

ambitious and contrasts with the poor quality of infrastructure in the Eastern part of the EU (Kollar, Bubbico and Arsalides, 2018) and the weak institutional capacities of some governments (Crescenzi, Di Cataldo and Rodríguez-Pose, 2016, p. 555), as well as the challenges some authorities face in justifying the high costs of certain modernization works, which may be prone to some fraudulent practices (Fazekas and Tóth, 2018, p. 36).

Given these contradictions, our research aims to investigate the relationship between government performance and the quality of transport infrastructure in the EU, which is a current topic of debate amid discussions surrounding accessibility and territorial cohesion (Curtis and Scheurer, 2010). The research is also relevant considering the controversies related to the government's ability to ensure appropriate quality levels for road infrastructures (Bågenholm *et al.*, 2021; Hasselgren, 2013).

Despite the abundance of studies related to transport network development policies, the qualitative assessment procedures of transport infrastructures have still remained insufficiently developed, many of them being a tribute to traffic indicators calculated exclusively on electronic-cartographic bases (indicators proposed by Moszoro and Soto, 2022). More importantly, there is a lack of quantitative assessment of the role that different components of government management play in configuring the quality of these infrastructures. Our study aims to address this gap through a comparative impact analysis that quantifies the contribution of four government components (government effectiveness, quality of legislation, corruption control, and political stability) to the quality of road infrastructure in the EU. To achieve this objective, we use an empirical analysis model through which we test the determinative relationships between the four government variables and the quality of road networks. The results obtained prove that the existence of different types of impact of the indicators used across the EU explains the road infrastructure quality gaps as a consequence of the quality gaps in the government act.

Our analysis is modularly structured, starting with a theoretical review, followed by the exposition of the research methods, the results obtained, and concluding evaluations.

## **1. Theoretical and conceptual approaches**

The development of road infrastructure in the EU is affected by both good governance and good government. The concept of good governance is closely linked to the sustainable development of transport infrastructure, particularly the sustainable quality of transport infrastructure, sustainable regional development, and accessibility. The notion of territorial accessibility is crucial to promoting good regional development and has led to a focus on the relationship between government management and the development of road infrastructure in the EU (Teclean and Dragan, 2020). The concept of good government is also relevant to the development of road infrastructure in the EU. Defining 'good governance' in the context of the EU is a challenging task. In this article, we use the definition provided by the European Commission (2001), which defines 'governance' as "the rules, processes, and behaviour that influence how powers are exercised at the European level, particularly with regard to openness, participation, accountability, effectiveness, and coherence" (p. 8). On the other hand,

‘good government’ is a more easily understandable concept, referring to “the ability of governments to provide essential public services and infrastructure while ensuring accountability, transparency, and the rule of law” (Bovaird and Löffler, 2015, p. 32).

In recent years, concepts of territorial cohesion and territorial accessibility have gained priority on the EU agenda, with a focus on the sustainable quality of transport infrastructures, government quality, and sustainable regional development. The relevance of territorial accessibility as a condition of good regional development (Teclean and Drăgan, 2020, p. 29) has prompted both research communities and EU bodies to examine the relationship between government management and the development of road infrastructure, seeking solutions for the expansion and modernisation of road networks in the EU (Clements et al., 2023, p. 83).

In the context of road infrastructure, the role played by public administration (at different levels) through good governance and good government is essential in ensuring that investments are made in a transparent and accountable manner, that planning and decision-making processes involve input from stakeholders, and that public funds are used effectively and efficiently (Rietveld and Stough, 2007, p. 94). The administration of road infrastructure by competent institutions is influenced by various factors, including financing, ownership, legislation, and levels of governance (national, regional, and local) which vary across different EU countries depending on the degree of (de)centralization (Hasselgren, 2013, p. 25). These aspects have been evaluated in the literature through three main epistemic theories: the neoclassical, the institutional, and the co-evolutionary paradigm.

According to the neoclassical theory, investment in transport infrastructure can increase productivity and competitiveness as it enables firms to access a larger market and reduces the cost of inputs and distribution (Ramey, 2020; Blaug, 2007). On the other hand, according to institutional theory, the development and management of transport infrastructure are influenced by a range of institutional factors, including regulatory frameworks, property rights, social norms, and political institutions. These factors shape the incentives and behaviours of actors involved in infrastructure development and can influence the effectiveness and efficiency of infrastructure investments (Pennington, 2011).

To better understand the interplay between the market and government in shaping land transport systems (road and railroad), the co-evolutionary theory explains their developments in the socio-economic context, which resulted from the interaction of technological and economic factors and political and socio-cultural structures (Hasselgren, 2013, pp. 42, 44). According to this paradigm, the government has a critical role in shaping the institutional context and regulatory framework that influence infrastructure development, to which are added public participation and stakeholder engagement in road development (Proulx and Blais, 2014).

Some authors (Hasselgren, 2013; Ottosson, 1997) considered that the land transport system management in Europe is based on three main models: the centralized German model, the market-oriented British model, and the Scandinavian model, which has a hybrid organizational pattern between the German and the Anglo-Saxon models. Thus, Ottosson (1997) distinguishes three models of land transport system management on the European transport map based on the form of ownership and the

devolution of management responsibilities at different levels, as well as the cooperation between public and private actors. The first model is the centralized German model, which is characterized by a centralised ownership structure and strong public control over the management of transport infrastructure; in this model, the state is the sole owner of transport infrastructure, and management is centralised at the national level (Millward, 2005). The second model is the market-oriented British model, which emphasises private ownership and competition in the management of transport infrastructure (Marsden and May, 2006). In this model, transport infrastructure is owned and managed by private companies, and the government plays a limited role in its operation. The third model is the Scandinavian model, which has a hybrid organisational pattern between the German and the Anglo-Saxon model; in this model, transport infrastructure is owned by the state, but management responsibilities are devolved to lower levels of government and to private actors (Ruiter, 2005). The government acts as a regulator and supervisory authority, while private actors may be involved in the management and operation of transport infrastructure (Millward, 2005). Overall, these models highlight the different approaches to the ownership and management of transport infrastructure across Europe, reflecting varying cultural, political, and economic factors in different countries.

The assessment of the quality of road infrastructure is a crucial indicator for evaluating the effectiveness of government, both at the national and the EU levels. At the EU level, the focus on good governance for road networks is driven by the goal of establishing a single European transport space, a process that has been ongoing since 2001 (European Commission, 2018, p. 19); to this end, targeted measures have been implemented to integrate road systems into the Union's internal market (p. 20). These measures include the deployment of intelligent transport systems to ensure optimal integration of transporters in the European market and the harmonization of technical standards for management equipment and traffic monitoring, as stipulated in Directive 2010/40/EU.

However, the lack of a coherent road strategy at the EU level has resulted in different approaches and priorities among member states, leading to persistent technical-functional incompatibilities among infrastructure or regulatory frameworks. This fragmentation contributes to “maintaining an accentuated fragmentation of European transport systems which still makes them insufficiently efficient and adequate” (Granger and Kosminder, 2016, p. 4081). The effectiveness of national governments in ensuring quality road infrastructures can be evaluated based on the normative, technical, and institutional compatibility of road networks (Barfod et al., 2018), the inclusion of the road network in an integrated territorial management system (Rietveld and Stough, 2007), return on investment in road infrastructure (Kyriacou, Muinelogallo, and Roca-Sagalés, 2019), and planning the integration of roads into the single European transport system (Evers, 2008).

In evaluating the yield of road investments, Cigu *et al.* (2019) consider that the quality of regulations and institutions plays an essential role, while Rye *et al.* (2018) demonstrate that “the relationships between public and private institutions shape different priorities with different impact on the development and maintenance of road infrastructures” (p. 203). At the same time, Öberg, Nilsson, and Johansson (2016) found that the road arteries assigned to the nine main trans-European corridors are

the most consistent beneficiaries of favourable regulations. Messick (2011) highlights the importance of corruption control in ensuring honest contracting of construction and maintenance works, reasonable costs, and competitive quality of works. However, according to Hoffmann, Weyer and Longen (2017), the roadmap of road infrastructure works is influenced by the political stability in the EU member states, as well as multilevel dissensions arising from political interests and affiliations (p. 406).

Regarding the measurement of the quality of the road networks in each country, Moszoro and Soto (2022) proposed as an indicator the average driving speed on the national road network. The authors calculated three variants of the mentioned indicator (average speed, geometric average speed, and adjusted average speed) using Google Maps Application Program Interface to estimate the distances and travel time based on which they later calculated the mentioned average speeds. From the outset, the subjectivity of the approach must be noted for two reasons: (a) the electronic application can only correctly evaluate the distances between the various points in the territory, not the time required to travel since the quality of the roads changes over time; (b) the quality of different road segments can be different within the same country, consequently the difference in possible speeds can be large, therefore the calculated average speed does not reflect an average of the quality of a country's road network. The deficiency of the method is illustrated by the questionable results obtained: according to the method of Moszoro and Soto (2022, p. 9), it appears that the quality of the road infrastructure in Namibia would be superior to that of Germany, and the quality of the road network in Bulgaria would surpass that of the United Kingdom United, Netherlands or Denmark! Such remarks are unacceptable.

Considering the ambiguities and controversies shown above, arising against the background of the lack of alternative studies that concretely quantify the impact of different governance indicators on the development of road infrastructures, our investigation continues to find out the contribution of governance effectiveness, the quality of legislation, corruption control and political stability on the quality of road networks in the EU.

## **2. Research methods**

### **2.1. Variables and data**

In investigating the relationship between the quality of the road network and the parameters of government management, our analysis considers a set of indicators established in the specialised literature (Bågenholm et al., 2021; La Porta et al., 1999), which we have attached the appropriate proxy variables. The feasibility of the road network is expressed by the road infrastructure quality index offered by the World Economic Forum (WEF).

This index represents “an assessment of the quality of roads in a given country based on data from the WEF Executive Opinion Survey, a long-running and extensive survey tapping the opinions of over 14,000 business leaders in 144 countries. The respondents are asked to rate the roads in their country of operation on a scale from 1 (underdeveloped) to 7 (extensive and efficient by international standards). The individual responses are aggregated to produce a country score” (Schwab, 2019).

Good governance is evaluated by means of four indicators developed by the

World Bank, respectively the quality of the government act defined by the Government Effectiveness Index (GEI), the quality of legislation expressed by the Regulatory Quality Index (RQI), the degree of Corruption Control (CC) and the Political Stability Index (PSI) (*Table 1*).

The rationale for using these indicators is that they represent different aspects of good governance that can potentially impact the quality of road infrastructure. The GEI measures the quality of public services and the degree of bureaucracy, which can affect the efficiency of road construction and maintenance. The RQI measures the quality of the legal and regulatory framework, which can impact the standards for road construction and the enforcement of regulations. The CC measures the degree of corruption control, which can influence the allocation of resources for road construction and maintenance. The PSI measures the level of political stability, which can affect the continuity of government policies and the allocation of financial resources for road infrastructure. To express the variables in question, we use the data series available for the period 2007-2019, having as a reference sample the 28 EU member states in the specified interval.

**Table 1. Correlation variables between the quality of road infrastructure and good governance**

<b>Variables used</b>	<b>Unit of measurement</b>	<b>Data source</b>
Quality of Roads (QR)	points (1 - 7)	World Economic Forum
Government Effectiveness Index (GEI)	points (-2,5 - 2,5)	World Bank
Regulatory Quality Index (RQI)	points (-2,5 - 2,5)	World Bank
Control of Corruption (CC)	points (-2,5 - 2,5)	World Bank
Political Stability Index (PSI)	points (-2,5 - 2,5)	World Bank

*Source: Authors' own representation.*

Over the entire period 2007-2019, the quality of the European road network was relatively high and constant at the EU level: compared to the average of 4.76 points (on a scale between 1-7), the quality of the European road infrastructure varied between 4.59 points (2008) and 4.87 points (2014), but with significant variations between EU states (*Table 2*).

**Table 2. Statistical table of the variables used in the correlation between the quality of road infrastructure and good governance (2007-2019)**

Variable	Mean	Standard deviation	Minimum	Maximum	Obs. (years)
Quality of Roads (QR)	4.76	0.09	4.59 [1.91]	4.87 [6.72]	13
Government Effectiveness Index (GEI)	1.10	0.03	1.03 [-0.37]	1.14 [2.35]	13
Regulatory Quality Index (RQI)	1.19	0.03	1.13 [0.24]	1.25 [2.05]	13
Control of Corruption (CC)	1.02	0.03	0.98 [-0.38]	1.04 [2.44]	13
Political Stability Index (PSI)	0.73	0.04	0.66 [-0.23]	0.79 [1.52]	13

Note: The minimum and maximum represent the annual average minimum and maximum values for the EU as a whole, and the values in brackets represent the absolute minimum and maximum values recorded by country.

*Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019*

Thus, by reference to the European average, three groups of states can be distinguished with very different values of the quality of the road infrastructure. Most European states (15 states) have a high-quality road network, with a quality index value exceeding 5 points; 5 other states register a quality of the road infrastructure close to the EU average with values between 4 and 5 points (Estonia, Ireland, Italy, Greece, and Slovenia), while the road infrastructure in 8 states is relatively poor with values of the quality index under 4 points (Bulgaria, Romania, Latvia, Malta, Poland, the Czech Republic, Slovakia, and Hungary). The best quality road network is that of France, with the highest average quality value in the analysed interval (6.28 points) and with a maximum of 6.72 points in 2008, and the most precarious is the road infrastructure in Bulgaria (with an average of 2.82 points), but the absolute minimum quality was recorded by the Romanian road network in 2008 (1.91 points).

Among the variables of good governance, corruption control, and government effectiveness are the most unevenly distributed in the Union. On the EU as a whole, it turns out to have applied a good and constant control of corruption (the average value of 1 point on a scale between -2.5 - 2.5 points), with variations between 0.98 and 1.04 points, but with an average intra-community gap between the most good control of corruption in Denmark (2.31 points) and the weakest control of corruption in Bulgaria (-0.26 points); the absolute difference, however, opposes a maximum of 2.44 points recorded in Denmark in 2009 against the absolute corruption record of -0.38 points recorded in Romania in 2012 (Table 2). And the effectiveness of government implies a similar unfolding. Compared to a satisfactory European average of government quality (1.10 points), the best government performances are recorded by Finland (2.06) and Denmark (2.00), and the worst by Romania (-0.13) and Bulgaria (-0.01), the latter being

the only EU countries with negative values of the quality of the government action; the absolute difference, however, makes the difference between the record of the highest government efficiency recorded in Denmark in 2007 (2.35 points) and the weakest government performance recorded in Romania in 2008 and 2009 (-0.37).

### 2.2. Model of empirical analysis

In our analysis, we test two possible hypotheses: a) the null hypothesis, according to which there is no relationship between the quality of road infrastructures and the quality of government; b) the hypothesis that each of the indicators of good governance has a different impact on the quality of the road network in each EU member country.

To quantify the impact of the governing act on the quality of road networks in the EU, we use an empirical analysis model that includes three consecutive stages of work, namely: identifying the correlations between the variables used, establishing and ranking the explanatory weight of each indicator of good governance in configuring the quality of the road infrastructure and finally, identifying the priorities for improving the governing elements eligible for improving the quality of the road infrastructure in the EU member states.

We investigated the relationship between the variables considered by means of Pearson correlation coefficients and coefficients of determination operated with the help of EViews 10 Standard Edition software. We associate the road infrastructure quality index with each of the four variables of good governance, and for each of the four associated pairs, we calculate the correlation and determination coefficients to find out the intensity of their connection and, respectively, the explanatory contribution of each of the variables. We ran this model at the EU level and then at the level of each member state to identify the contribution differences of each governance indicator in relation to the quality of the road infrastructure.

We interpreted the values of the coefficient  $r$  according to the model proposed by Davis, and the interpretation of the coefficient  $r^2$  according to Chin's grid (Table 3).

**Table 3. Interpretation of correlation ( $r$ ) and determination coefficient ( $r^2$ ) values**

Interpretation of $r$ coefficient values (after Davis)		Interpretation of $r^2$ coefficient values (by Chin)	
0.70 →	Very strong correlation		
0.50 – 0.69	Substantial correlation	0.67 →	Substantial impact
0.30 – 0.49	Moderate correlation	0.33 – 0.66	Moderate impact
0.10 – 0.29	Low correlation	0.19 – 0.32	Weak impact
0.01 – 0.09	Negligible correlation	0.01 – 0.18	Very weak impact
0	Non-existent correlation	0	Null impact

Sources: James A. Davis, 1971; Wynne W. Chin, 1998.



The correlations calculated between the variables attest to the fact that, in the EU as a whole, the quality of road infrastructures is most closely related to political stability (given by the 0.98 value of the Pearson coefficient), followed by the effectiveness of government (0.95) (Table 4). Moreover, political stability and government effectiveness are strongly interdependent and have a similar correlation coefficient (0.95), which proves their character as essential vectors for improving the quality of road infrastructure. The role of political stability as a motor for the development of road infrastructure is materialized through the quality of legislation, a fact highlighted by the very close link identified between political stability and the quality of regulations (0.97).

**Table 4. Correlation between the quality of the road infrastructure and the variables of good governance (2007-2019)**

	(1)	(2)	(3)	(4)	(5)
Quality of Roads (QR)	1				
Government Effectiveness Index (GEI)	0.951	1			
Regulatory Quality Index (RQI)	0.929	0.907	1		
Control of Corruption (CC)	0.459	0.234	0.359	1	
Political Stability Index (PSI)	0.980	0.950	0.976	0.399	1

*Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019*

Therefore, the null hypothesis (of the non-existence of any relationship between the quality of road infrastructures and the quality of government) does not validate, in a context in which we go along the lines of identifying the correlations and the impact between variables at the level of each EU member country. The distribution of these correlations calculated by state shows differentiated radiography of the relationships between good governance and the quality of roads, as well as their consequences, which we evaluate and interpret further.

### 3. Findings and discussion

To quantify and interpret the relationships between the quality of the road infrastructure and the indicators of the governing act, we use the calculated values of the correlation coefficients (R) and the determination coefficients (R<sup>2</sup>) listed in Table 5.

**Table 5. The relationship between the quality of road infrastructure and the variables of good governance in the EU, expressed by Pearson correlation coefficients (R) and determination coefficients (R<sup>2</sup>) (2007-2019)**

States	QR & GEI		QR & RQI		QR & CC		QR & PSI	
	R	R <sup>2</sup>	R	R <sup>2</sup>	R	R <sup>2</sup>	R	R <sup>2</sup>
Austria	0.522*	0.272*	0.554**	0.306**	0.579**	0.335**	0.442	0.196
Belgium	0.595**	0.354**	0.757***	0.573***	0.742***	0.550***	0.665**	0.442**
Bulgaria	0.500*	0.250*	0.693***	0.481***	0.681**	0.464**	0.609**	0.371**
Croatia	0.735***	0.540***	0.734***	0.539***	0.721***	0.521***	0.803***	0.645***
Cyprus	0.562**	0.316**	0.441*	0.194*	0.638**	0.407**	0.652**	0.426**
Czechia	0.668**	0.446**	0.159	0.025	0.704***	0.496***	0.548*	0.300*
Denmark	0.948***	0.898***	0.691***	0.477***	0.613**	0.376**	0.809***	0.655***
Estonia	0.084	0.007	0.824***	0.679***	0.806***	0.650***	0.782***	0.612***
Finland	0.529*	0.280*	0.766***	0.588***	0.775***	0.601***	0.431**	0.185**
France	0.689***	0.474***	0.761***	0.579***	0.761***	0.580***	0.928***	0.861***
Germany	0.828***	0.686***	0.792***	0.627***	0.750***	0.562***	0.724***	0.524***
Greece	0.491*	0.241*	0.479*	0.230*	0.560**	0.314**	0.427*	0.182*
Hungary	0.484*	0.235*	0.032	0.001	0.496*	0.246*	0.437*	0.191*
Ireland	0.687***	0.472***	0.730***	0.533***	0.749***	0.561***	0.314*	0.098*
Italy	0.712***	0.507***	0.678**	0.459**	0.505*	0.255*	0.700***	0.490***
Latvia	0.074	0.005	0.403*	0.163*	0.493*	0.243*	0.371*	0.137*
Lithuania	0.358*	0.128*	0.350*	0.122*	0.737***	0.543***	0.734***	0.539***
Luxembourg	0.909***	0.827***	0.927***	0.860***	0.500*	0.249*	0.917***	0.842***
Malta	0.212	0.045	0.524*	0.274*	0.678**	0.460**	0.486*	0.236*
Netherlands	0.561**	0.314**	0.621**	0.385**	0.368	0.135	0.557**	0.310**
Poland	0.591**	0.350**	0.540*	0.291*	0.509*	0.259*	0.535*	0.286*
Portugal	0.255	0.065	0.142	0.020	0.171	0.029	0.804***	0.647***
Romania	0.567**	0.322**	0.644**	0.415**	0.524*	0.274*	0.306	0.094
Slovenia	0.399*	0.159*	0.710***	0.504***	0.678**	0.460**	0.717***	0.515***
Slovakia	0.630**	0.398**	0.430**	0.184**	0.412**	0.170**	0.296*	0.087*
Spain	0.253	0.064	0.720***	0.519***	0.577**	0.333**	0.392*	0.153*
Sweden	0.760***	0.578***	0.852***	0.727***	0.913***	0.835***	0.458**	0.209**
UK	0.608**	0.370**	0.592**	0.350**	0.591**	0.350**	0.714***	0.509***
UE-28	0.951***	0.904***	0.929***	0.863***	0.459	0.211	0.980***	0.960***

Note: \*\*\*, \*\*, \* represent the significance level of 1%, 5% and 10% respectively

Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019.

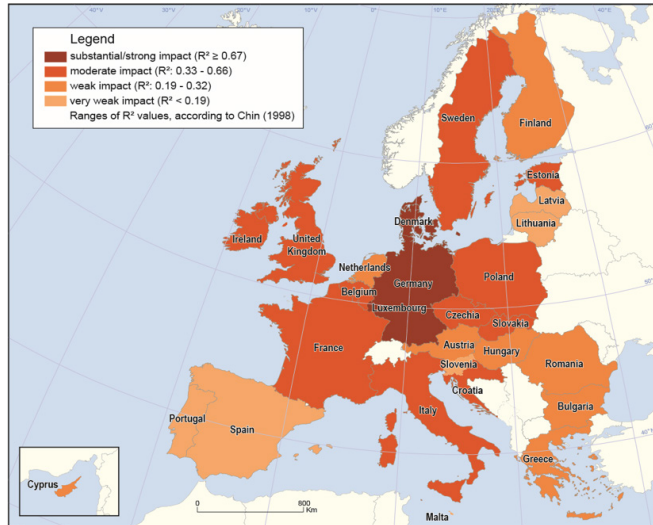
In order to reveal the extent to which the indicators of the governing act explain the quality of road networks, we evaluate the values of the coefficients of determination ( $R^2$ ) according to the ranges of values defined by Chin (1998).

The results indicate that in the Union as a whole, political stability has the most consistent contribution to the quality of road infrastructure ( $R^2=0.96$ ), followed by the effectiveness of government ( $R^2=0.90$ ) and the quality of legislation ( $R^2=0.86$ ) with an equally substantial impact / strong, while corruption control offers a relatively weak contribution ( $R^2=0.21$ ) against the background of the solidity of the European legislative and institutional framework. This pattern of impact is replicated in somewhat more nuanced geography throughout the EU when it comes to the analysis by states.

Thus, the effectiveness of governance makes a substantial/strong contribution to the feasibility of the road network in Denmark ( $R^2=0.89$ ), Luxembourg ( $R^2=0.82$ ) and Germany ( $R^2=0.68$ ), in 11 states it has a moderate contribution, and in 14 states the effectiveness of governance has a weak and very weak contribution to the quality of the road infrastructure (Figure 1). The most interesting group of countries is the one in which the effects of government effectiveness are moderate and in which the quality of government is relatively evenly distributed: in five countries (UK, Sweden, Belgium, France and Ireland) the values of the government effectiveness index are above the European average, and the other six countries (Estonia, Poland, the Czech Republic, Slovakia, Croatia and Italy) register values of government effectiveness below the Union average.

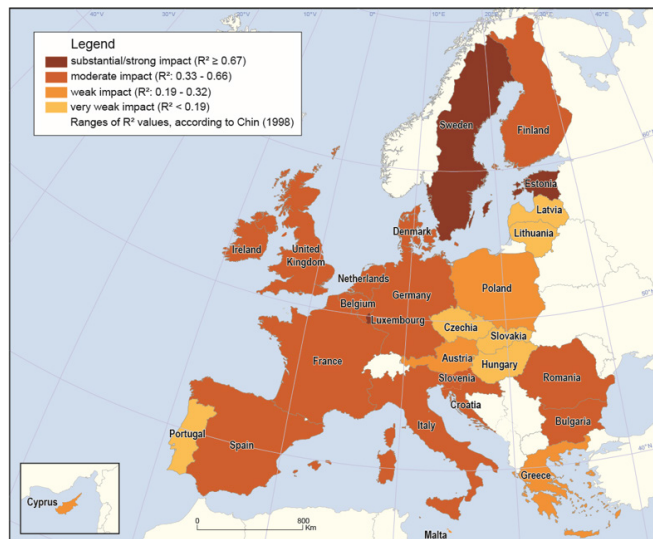
The quality of the legislative framework substantially impacts the improvement of road quality only in Luxembourg ( $R^2=0.86$ ), Sweden ( $R^2=0.72$ ) and Estonia ( $R^2=0.67$ ), but it has a somewhat more extensive moderate impact, respectively in half of the EU (14 states), and in 11 states a weak and very weak contribution prevails (Figure 2). And in this case, the convergence towards the quality of road infrastructures is significant, so that of the 11 states where the contribution of the quality of legislation on road quality is low, only Austria registers a value of the quality index for regulations above the community average for the analysed interval.

Figure 1. The impact of government effectiveness on the quality of road infrastructure in the EU



Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019

Figure 2. The impact of regulatory quality on the quality of road infrastructure in the EU



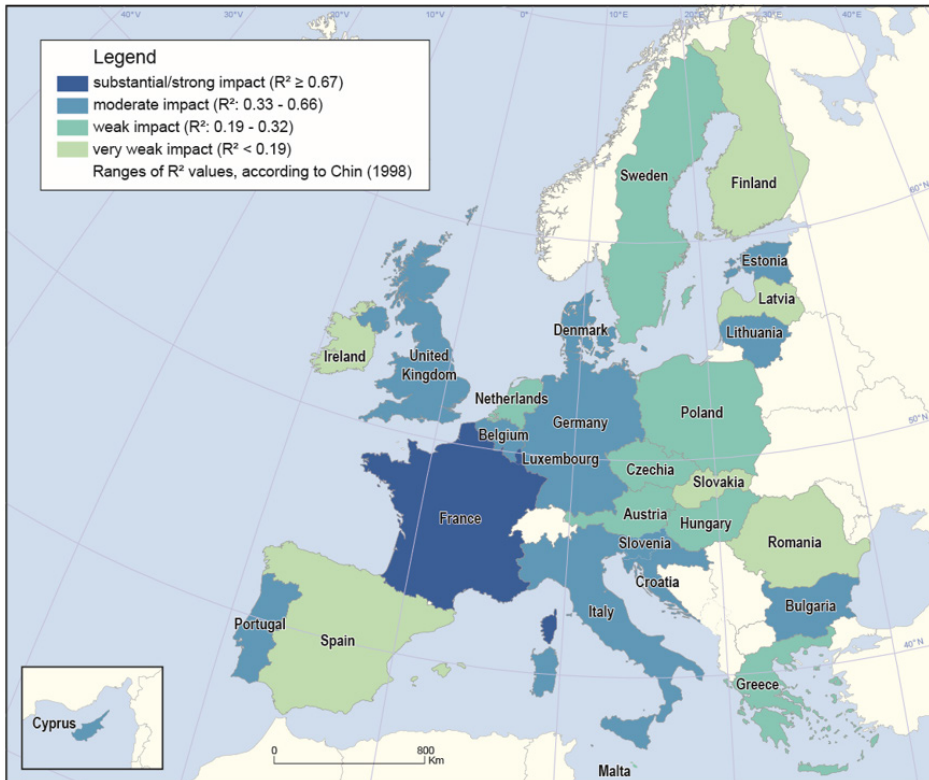
Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019

Similarly, political stability, so abundantly impactful at the community level, delivers a substantial / strong contribution only in France ( $R^2=0.86$ ) and Luxembourg ( $R^2=0.84$ ) to the configuration of road infrastructure quality, and for 12 states the impact is moderate (Figure 3).

For 14 EU member states, the impact of political stability on the quality of the road networks is weak or very weak, although ten of these states register political stability index values above the European average; only for Latvia, Romania, Greece, and Spain the weak impact of political stability on road quality corresponds to the value of the political stability index below the European average.

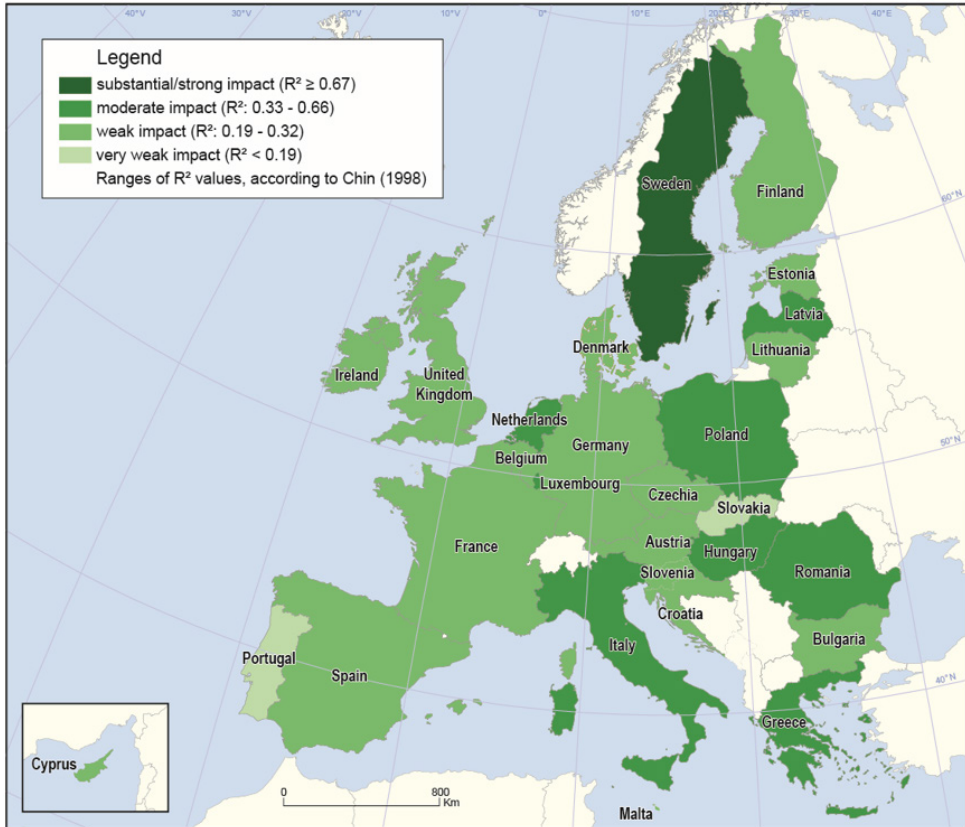
In the case of corruption control, this indicator mirrors the situation at the community level, which reveals the lower impact of this parameter on road quality. Thus, Sweden is the only country in the EU where the impact of corruption control on the quality of the road network is strong ( $R^2=0.83$ ), in eight states it is moderate, and in most of the EU (19 states) the contribution of corruption control is weak or very weak (Figure 4). Thus, corruption control is the only parameter of good governance that has a more atypical behaviour, in the sense that its impact on the quality of the road infrastructure is not directly correlated with its concrete value on the states. Among the eight states with a moderate impact on corruption control, only the Netherlands and Luxembourg have corruption control values above the EU average, while Latvia, Poland, Hungary, Romania, Italy and Greece exercise control over corruption below the average standard of the EU. Among the 19 states with a low impact of corruption control on road quality, a number of nine states nevertheless ensure good control of corruption (above the European average), and ten states are below the average.

**Figure 3. The impact of political stability on the quality of road infrastructure in the EU**



Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019

Figure 4. The impact of the control of corruption on the quality of road infrastructure in the EU



Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019

The distribution of the indicators with the highest contribution from each state presents a much more balanced spatial design. Our evidence demonstrates that the contribution of government effectiveness prevails in ensuring road quality in five states (Denmark, Germany, Italy, Poland, and Slovakia), the predominant impact of legislation quality can be found in seven states (Estonia, Belgium, Luxembourg, Spain, the Netherlands, Bulgaria, and Romania), and in six states (France, Croatia, Cyprus, Portugal, Slovenia, and Great Britain), political stability has the highest impact (Figure 5). Surprisingly, for 10 states, the most relevant contribution comes from corruption control, even though this indicator registers a weak impact in most of the community space, as we showed previously. The phenomenon is explained by the fact that in a number of countries, such as the Czech Republic, Ireland, Lithuania, Malta, Austria, and Finland, where the impact of corruption control on the quality of the road infrastructure is of little relevance, the contributions of the other government indicators are even lower, indicating a context in which corruption control acquires statistical relevance.

**Figure 5. Distribution of good governance indicators with the highest contribution in each state in the EU**



Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019

Based on this evaluation, we note that the good governance parameters with the greatest contribution to road quality in each state have the highest development possibilities, regardless of their actual value in the respective state. Practically, the increase in the indicator with the best impact in a certain country contributes the most to the quality of the road network in that country. For this purpose, we interpolated the states with the highest impact values of each good governance indicator with the states where that indicator has the lowest values, i.e., below the first value quartile (Table 6).

Following this investigative procedure, our findings emphasise a series of priorities for improving government indicators, which, once achieved, would significantly contribute to improving the quality of road infrastructure in the states of the Union. Thus, from the category of the five states for which government effectiveness has the greatest impact on road quality, Poland and Italy are under the first value quartile of the GEI, therefore improving government management in these countries would be the fastest way to improve the quality of their road networks. According to the same working procedure, we found that an improvement of the regulatory framework in Bulgaria and Romania would have the most relevant impact on the quality of their road networks, respectively a betterment in corruption control in Greece and

Hungary would have a significant impact on the quality of their national road infrastructures.

**Table 6. Classification of the EU states according to the quartiles of good governance indicators with the greatest impact on the quality of road infrastructure**

Categories of states	Distribution of states according to the quartiles of government indicators			
	Below Quartile 1	Between Quartiles 1 - 2	Between Quartiles 2 - 3	Above Quartile 3
States where the effectiveness of government has the greatest impact on the quality of road infrastructure	Italy, Poland	Slovakia	–	Denmark, Germany
States where the quality of legislation has the greatest impact on the quality of road infrastructure	Bulgaria, Romania	Spain	Belgium, Estonia	Luxembourg, Netherlands
States where corruption control has the greatest impact on the quality of road infrastructure	Greece, Hungary	Czechia, Latvia, Lithuania, Malta	Ireland, Austria	Finland, Sweden
States where political stability has the greatest impact on the quality of road infrastructure	France, UK	Croatia, Cyprus	Portugal, Slovenia	–

*Source: Authors' proceedings based on World Economic Forum and The World Bank, 2007-2019.*

Our results regarding the impact of government management on the quality of road networks are confirmed by recent studies that identify the quality of infrastructure development policies and the quality of government institutions as conditions for the good development of road systems (Cigu et al., 2019; Kyriacou, Muinel-Gallo, and Roca-Sagalés, 2019; Crescenzi, Di Cataldo, and Rodríguez-Pose, 2016). The weaker effects of corruption control identified by us at the EU level and for most of the Union states are consistent with the conclusions of research in the field (Fazekas and Tóth, 2018; Messick, 2011) and are due to the well-structured regulations and institutions in the EU highlighted in the current analyses (Volintiru et al., 2021; Cigu et al., 2019; Öberg, Nilsson, and Johansson, 2016). The essential role of political stability in the development of road networks reiterated by our evidence is confirmed by recent assessments that argue that the development of road infrastructure projects is conditioned by political (in) stability and multi-level relations in European countries (Hoffmann, Weyer and Longen, 2017).

With the intention of bringing more clarification regarding the management of European transport networks, the current analysis attempted an introspection of the relations between the governing act and the good development of road infrastructures in the EU, being affected, however, by the following intrinsic limits: (a) not placing the study in an international



comparative analysis framework; (b) the non-existence, at the time of the study, of available data regarding the quality of the road infrastructure during the 2020-2022 health crisis and (c) the non-processing of the analysis and functional criteria related to the transport capacity of the road infrastructures.

### **Concluding remarks and future openings**

Our investigation has been intended to represent a comprehensive analysis of the contribution of government effectiveness, legislation quality, corruption control, and political stability to road infrastructure quality. Considering the necessity of ensuring territorial accessibility within the EU, the interplay between effective governance and high-quality road networks assumes a crucial role in promoting sustainable development and territorial cohesion. As such, the relationship between the indicators of good governance and the viability of road infrastructure represents a critical aspect that we investigate using correlation and determination coefficients. Through our analysis, we intended to expand the existing body of knowledge by establishing a hierarchy of the impact that the four government parameters we consider to have on the quality of road networks across EU member states.

Our findings suggest that different levels of good governance deliver an unevenly distributed input on road quality, with large interstate discrepancies between the contributions of different components of governance. Thus, the emulated results highlight that, in the EU, political stability has the most robust impact on the quality of road infrastructure, followed by the effectiveness of government, the quality of legislation, and the control of corruption. However, this model presents significant differences at the level of the Union countries: government effectiveness has the most relevant contribution to the feasibility of the road network in five states, the majority impact of the quality of legislation runs in seven states, political stability has the highest impact in six states, and in ten states the most relevant contribution comes from corruption control.

Basically, the otherness of good governance translates into the heterogeneity of the technical and normative parameters of the infrastructures, which explains the qualitative divergences of the road infrastructure as an effect of the qualitative divergences of government management. This fact is due to the absence of a unified European strategy regarding the road network, an absence essentially caused by a lack of political will and the distinctly different quality of government performance between the member states.

Overall, the investigation of the contribution of government indicators to road infrastructure quality in the EU is a complex and multifaceted task that requires a comprehensive approach that considers various factors as well as the specificities of individual member states. It may be relevant to examine the impact of other factors on road infrastructure development, such as the level of investment in the sector, the use of innovative technologies and materials, and the engagement of stakeholders in the decision-making process. The consideration of these factors can provide a more complete understanding of the complex relationship between government indicators and road infrastructure quality and foreshadow an opening that is both realistic and opportune for future sectoral research.

## References

- Bågenholm, A., Bauhr, M., Grimes, M., and Rothstein, B. (eds.), (2021), *The Oxford Handbook of the Quality of Government*, Oxford: Oxford University Press.
- Barfod, M.B., Leleur, S., Gudmundsson, H., and Sørensen, C.H., (2018), "Promoting sustainability through national transport planning", *European Journal of Transport and Infrastructure Research*, 18(3), pp. 250-261.
- Bovaird, T., and Löffler, E., (2015), "Understanding Public Management and Governance", in Bovaird, T. and Löffler, E. (Eds.), *Public Management and Governance*, London: Routledge, pp. 28-46.
- Blaug, M., (2007), "The Fundamental Theories of Modern Welfare Economics, Historically Contemplated", *History of Political Economy*, 39(2), pp. 185-207.
- Chin, W.W., (1998), "The partial least squares approach to structural equation modeling", *Modern methods for business research*, 295(2), pp. 295-336.
- Cigu, E., Agheorghiesei, D.T., Gavriliuță, A.F., and Toader, E., (2019). "Transport infrastructure development, public performance and long-run economic growth: A case study for the EU-28 countries", *Sustainability*, 11(1), 67.
- Clements, R., Alizadeh, T., Kamruzzaman, L., Searle, G., and Legacy, C., (2023), "A Systematic Literature Review of Infrastructure Governance: Cross-sectoral Lessons for Transformative Governance Approaches", *Journal of Planning Literature*, 38(1), pp. 70-87.
- Condeço-Melhorado, A., Reggiani, A., and Gutierrez, J., (2014), *Accessibility and Spatial Interaction*, Cheltenham: Edward Elgar Publishing.
- Crescenzi, R., Di Cataldo, M., and Rodríguez-Pose, A., (2016), "Government quality and the economic returns of transport infrastructure investment in European regions", *Journal of Regional Science*, 56(4), pp. 555-582.
- Curtis, C., and Scheurer, J. (2010), "Planning for sustainable accessibility: Developing tools to aid discussion and decision-making", *Progress in Planning*, 74(2), pp. 53-106.
- Davis, J. A., (1971), *Elementary survey analysis*, Hoboken, NJ: Prentice Hall.
- Dijkstra, L., Poelman, H., and Ackermans, L. (2018), *Road Transport Performance in Europe: Introducing A New Accessibility Framework*, European Commission, DG Regio Working Paper, Luxembourg: Publications Office of the European Union.
- Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport. JO L 207: 1-13, Brussels, 6.8.2010. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0040&from=EN> (Accessed: 7 April 2023).
- European Commission (2001), *European Governance: A White Paper*, COM (2001) 428. Brussels, 25.07.2001. Available at <https://European Governance A White Paper.pdf> (Accessed: 2 April 2023).
- European Commission (2013), *The New EU Transport Infrastructure Policy*. Brussels, 17.10.2013. Available at [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_13\\_948](https://ec.europa.eu/commission/presscorner/detail/en/IP_13_948) (Accessed: 2 April 2023).

- European Commission (2018), *Transport in the European Union. Current Trends and Issues*. Available at <https://ec.europa.eu/transport/sites/transport/files/2018-transport-in-the-eu-current-trends-and-issues.pdf> (Accessed: 2 April 2023).
- Evers, D., (2008), "Reflections on Territorial Cohesion and European Spatial Planning", *Journal of Economic and Social Geography*, 99(3), pp. 303-315.
- Fazekas, M., and Tóth, B., (2018), "The extent and cost of corruption in transport infrastructure. New evidence from Europe", *Transportation Research Part A: Policy and Practice*, 113, pp. 35-54.
- Granger, R. J., and Kosminder, T., (2016), "Towards a Better European Transport System", *Transportation Research Procedia*, 14, pp. 4080-4084.
- Hasselgren, B., (2013), *Government's Role for Transport Infrastructure: Theoretical Approaches and Historical Development* (PhD dissertation), Stockholm: KTH Royal Institute of Technology. Available at <https://www.diva-portal.org/smash/get/diva2:628222/FULLTEXT01.pdf> (Accessed: 15 March 2023).
- Hoffmann, S., Weyer, J., and Longen, L., (2017), "Discontinuation of the automobility regime? An integrated approach to multi-level governance", *Transportation Research Part A: Policy and Practice*, 103(1), pp. 391-408.
- Kollar, M., Bubbico, R. L., and Arsalides, N., (2018), *Smart Cities, Smart Investment in Central, Eastern and South-Eastern Europe*, European Investment Bank. Available at [https://www.eib.org/attachments/efs/smart\\_cities\\_smart\\_investments\\_in\\_cesee\\_en.pdf](https://www.eib.org/attachments/efs/smart_cities_smart_investments_in_cesee_en.pdf) (Accessed: 13 June 2023).
- Kyriacou, A.P., Muinel-Gallo, L., and Roca-Sagalés, O., (2019), "The efficiency of transport infrastructure investment and the role of government quality: An empirical analysis", *Transport Policy*, 74, pp. 93-102.
- Marsden, G., and May, A.D., (2006), "Do institutional arrangements make a difference to transport policy and implementation? Lessons for Britain", *Environment and Planning C: Government and Policy*, 24(5), pp. 771-789.
- Messick, R., (2011), *Curbing Fraud, Corruption and Collusion in the Roads Sector*, Washington: World Bank. Available at [http://siteresources.worldbank.org/INTDOII/Resources/Roads\\_Paper\\_Final.pdf](http://siteresources.worldbank.org/INTDOII/Resources/Roads_Paper_Final.pdf) (Accessed: 25 March 2023).
- Millward, R., (2005), *Private and Public Enterprise in Europe*, Cambridge: Cambridge University Press.
- Moszoro, M., and Soto, M., (2022), *Road Quality and Mean Speed Score*, Working Paper No. 2022/095, Washington: International Monetary Fund. Available at <https://www.imf.org/en/Publications/WP/Issues/2022/05/20/Road-Quality-and-Mean-Speed-Score-518200> (Accessed: 3 April 2023).
- Öberg, M., Nilsson, K., and Johansson, C. (2016), "Governance of major transport corridors involving stakeholders", *Transportation Research Procedia*, 14, pp. 860-868.
- Ottosson, J., (1997), *Path dependence and institutional evolution: the case of the nationalisation of private railroads in interwar Sweden*, in Magnusson, L. and Ottosson, J., *Evolutionary economics and path dependence*, Cheltenham: Edward Elgar Publishing, pp. 186-196.

- Pennington, M., (2011), *Robust Political Economy, Classical Liberalism and the Future of Public Policy*, Chetenham: Edward Elgar Publishing.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R., (1999), "The quality of government", *Journal of Law, Economics, and Organization*, 15(1), pp. 222-279.
- Proulx, P.P., and Blais, M. (2014), "The co-evolution of infrastructure and institutions: implications for smart cities", *Journal of Urban Technology*, 21(2), pp. 33-49.
- Ramey, V.A., (2020), "The Macroeconomic Consequences of Infrastructure Investment", in Glaeser, E.L. and Poterba, J.M., *Economic Analysis and Infrastructure Investment*, Chicago: University of Chicago Press, pp. 219-268.
- Rietveld, P., and Stough, R. (2007), *Institutions and Sustainable Transport: Regulatory Reform in Advanced Economies*, Cheltenham: Edward Elgar Publishing.
- Ruiters, D., (2005), "Is Transaction Cost Economics Applicable to Public Governance?", *European Journal of Law and Economics*, 20(3), pp. 287-303.
- Rye, T., Monios, J., Hrelja, R., and Isaksson, K., (2018), "The relationship between formal and informal institutions for governance of public transport", *Journal of Transport Geography*, 69, pp. 196-206.
- Schwab, K., (2019), *The Global Competitiveness Report 2019*, Geneva: World Economic Forum.
- Teclean, C., and Drăgan, G. (2020), "How to measure territorial accessibility. An accessibility evaluation model applied in the European Union space", *Eastern Journal of European Studies*, 11(2), pp. 26-47.
- Teclean, C., (2021), *Rețelele de transport și coeziunea teritorială în Uniunea Europeană* [Transport networks and territorial cohesion in the European Union], București: Editura Academiei Române [Bucharest: Romanian Academy Publishing].
- Volintiru, C., Bârgăoanu, A., Ștefan, G., and Durach, F. (2021), "East-West Divide in the European Union: Legacy or Developmental Failure?", *Romanian Journal of European Affairs*, 21(1), pp. 93-118.