ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES
ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Publisher
http://jssidoi.org/esc/home

ASSESSING THE TRANSPORT DEVELOPMENT OF THE EUROPEAN UNION COUNTRIES*

Janis Balodis [1], Vera Komarova [2*], Edmunds Čižo [3], Oksana Ruza [4], Anita Kokarevica [5]

[1,2,3,4] Daugavpils University, Vienibas street 13, Daugavpils, Latvia
[5] Riga Stradinsh University, Dzirciema street 16, Riga, Latvia

E-mails: [1]janis.balodis@gmail.com; [2]vera.komarova@du.lv (Corresponding author); [3]edmunds@chemi-pharm.com; [4]oksana.ruza@du.lv; [5]anita.kokarevica@rsu.lv*

Received 11 August 2022; accepted 28 October 2022; published 30 December 2022

Abstract. In their previous publication, the authors proposed to assess the transport development of any territory (but mainly the territories of the world's countries) according to the following three components: transportization level of a territory, transport internationalization level of a territory and quality of transport in a territory. The authors assessed three components of the transport development of a territory each separately, including them in further empirical analysis. In the course of the authors' empirical research, it became necessary to improve the methodology for assessing the transport development of a territory. The purpose of this study is to develop a single tool for measuring the transport development of a territory – an index – and to test it on the example of the European Union countries. Methods used in the study: monographic method, logical analysis and synthesis of the conceptual essence of the phenomenon 'transport development of a territory', index method – a quantitative technique for assessing the transport development of a territory based on the minimum and maximum values. The information base of the study is the data of the Global Competitiveness Report, as well as data from GlobalEconomy.com and the World Factbook for the EU countries. As a result of the study, the authors developed a new Territory Transport Development Index (TTDI), which includes not three, but four components: transportization level of a territory, transport internationalization level of a territory, quality of the transport infrastructure in a territory, efficiency of the transport services in a territory. These four components of the Index developed by the authors differ from the previously proposed components of the transport development of a territory. This difference is determined by the results of study carried out by researchers of the Riga Technical University (RTU), which confirm the importance of transport infrastructure in the use of a territory's resources, as well as the results of other comparative studies on the transport infrastructure of the EU countries. Thus, the third component (quality of transport in a territory) was divided into two separate components: quality of the transport infrastructure in a territory and efficiency of the transport services in a territory, including additional indicators in the first of them. The authors tested the new Index by assessing the European Union countries and comparing them both in general transport development and separately in its different aspects.

Keywords: transport development of a territory; assessment methodology; Territory Transport Development Index (TTDI); the European Union countries; economic growth; sustainable transport; transportation infrastructure; carbon emissions; environmental degradation.

Reference to this paper should be made as follows: Balodis, J., Komarova, V., Čižo, E., Ruza, O., Kokarevica, A. 2022. Assessing the transport development of the European Union countries. *Entrepreneurship and Sustainability Issues*, 10(2), 130-146. http://doi.org/10.9770/jesi.2022.10.2(8)

JEL Classifications: C43, L91, O52

* *This research was funded by Daugavpils University, Latvia*

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

1. Introduction

The transport sector is a key part of the economy. The economist of *Latvijas Banka* I. Kasyanovs called this the bloodstream of the economy emphasizing the special role of various indicators of the transport development in a territory's macroeconomic development (Kasjanovs, 2012). Even more so in a global economy where economic possibilities have become more linked to the movement of people and goods, including information and communication technology (Kherbash & Mocan, 2015). Transport infrastructure that is dense and well-connected is often correlated with high levels of economic growth. Multiplying impacts such as increased market access, employment possibilities and more investments occur when transportation networks are well-functioning. Deficient transportation networks can have an economic impact in terms of diminished or lost opportunities and worse quality of life, as well as an impact on the environment (Wang et al., 2018; Meng & Han, 2018; Prus & Sikora, 2021).

In their previous publications (Komarova et al., 2021; Balodis, 2022), the authors proposed to evaluate the transport development of any territory (but mainly the territory of the world's countries) according to three components: transportization level of a territory, transport internationalization level of a territory and quality of transport in a territory. The authors separately assessed each of the three components of the transport development of a territory, including them in the further empirical analysis. In the course of the authors' empirical research (Komarova et al., 2021; Balodis, 2022), there is a need to improve the methodology for assessing the transport development of a territory. Thus, the purpose of this study is to develop a single instrument for measuring the transport development of a territory – an index – and to test it on the example of the European Union countries.

To achieve the purpose of this study, the authors used empirical data from the Global Competitiveness Report of the World Economic Forum (World Economic Forum, 2019), as well as GlobalEconomy.com (GlobalEconomy.com, 2022a, 2022b, 2022c) and the World Factbook of the Central Intelligence Agency (Central Intelligence Agency, 2021) data on the transport development of the territories of 27[†] European Union countries in 2019. The following methods were used to achieve the purpose of the study: monographic method, logical analysis and synthesis of the conceptual essence of the phenomenon 'transport development of a territory', index method – a quantitative technique based on minimum and maximum values (Motoryn et al., 2020; Rybalkin, 2022), which is applicable to the assessment of the transport development of a territory (Ambarwati et al., 2017; Gudmundsson & Regmi, 2017; Walters et al., 2022).

2. Literature review

In order to achieve the purpose of this study, the authors carried out the literature review on the most significant components of the transport development of a territory, especially in the European Union countries. In the scientific literature, there are some comparative studies on the transport sector of the EU countries – in particular, on the transport infrastructure development, public performance and long-run economic growth in the EU countries (Cigu et al., 2018), on resilient transport infrastructure systems and sustainable economic growth in the EU countries (Gherghina et al., 2018), on the development of intermodal transport in new European Union states (Šakalys & Palšaitis, 2006), as well as on the impact of transport infrastructure on international competitiveness of Europe (Purwanto et al., 2017).

Thus, a review of recent scientific publications on the transport development of a territory allows the authors to conclude that the conceptual essence of the phenomenon 'transport development of a territory' includes several

[†] Malta is not included in the empirical data analysis due to its very small territory (316 km^2).

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

aspects, covering at least such areas as the efficiency and sustainability (including 'green transportation' – Negrutiu et al., 2020) of transport services, the state of the transport infrastructure, connectivity and density of transport routes. The main trajectory for the transport development of a territory is the sustainable transport (Greene & Wegener, 1997; Steg, 2007; Szczuraszek & Chmielewski, 2018; Mesjasz-Lech & Wlodarczyk, 2022) – within the Smart City concept (Bubeliny & Kubina, 2021; Burlacu et al., 2022) and other conceptual frameworks (Lejda et al., 2017; Hermelin & Henriksson, 2022).

In the scientific literature, there are also some attempts to develop a single instrument for measuring the transport development of a territory – an index. For example, the Sustainable Urban Transport Index (SUTI) for cities in the Asia-Pacific region, which reflects urban transport-related SDGs relevant for Asian cities, based on literature review and expert consultations (Gudmundsson & Regmi, 2017). Another metric expressing the aggregate performance of the city's transport systems is the Transport Performance Index (TPI), in which the total cost of transport system (operational and environmental costs) is divided by willingness to pay (WTP) for transport plus the willingness to accept (WTA) the environmental effects on residents (Ambarwati et al., 2017). The most recent index in the area of transport is the Rural Transport Implementation Index – a much-needed tool to support the implementation of connected, autonomous and electric vehicles (CAEVs) in rural areas (Walters et al., 2022). All these indices are applicable to the assessment of the transport development of a specific – urban or rural – territory (or of a specific aspect – for example, an Index of Transport-User Vulnerability (Glensor, 2018)), but not of a country's territory as a whole.

Transport sector not only provides support for economic and social development, but also has an important impact on carbon emissions. Therefore, some researchers have developed special indices to measure the contribution of the transport sector to environmental degradation (Zhou et al., 2022). For example, based on the DPSIR model, the constraint index of the transportation carbon emissions in the Pearl River Delta under Dual carbon' was constructed (Zhou et al., 2022). The study found that there are six levels of constraints. The economic development level, carbon emission scale and the 'Dual carbon' goals are the core factors of the entire system. Developing public transport and intelligent transportation and increasing investment in new energy infrastructure and technology are conducive to the development of transportation system in the Pearl River Delta and the realization of 'double carbon' goals (Zhou et al., 2022).

3. Theoretical basis and methodology of the research

As described in the Introduction, in their previous publications (Komarova et al., 2021; Balodis, 2022), the authors proposed to evaluate the transport development of any territory (but mainly the territory of the world's countries) according to three components: transportization level of a territory, transport internationalization level of a territory and quality of transport in a territory, but in the course of the empirical research (Komarova et al., 2021; Balodis, 2022), it became necessary to improve the methodology for assessing the transport development of a territory for the following reasons:

- while analyzing more scientific publications on the topic of the study, the authors realized that there are not enough components in the conceptual understanding of the transport development of a territory, which would characterize the studied phenomenon in the most comprehensive way;
- measuring each separate component of the transport development of a territory, the authors saw the need to develop a single instrument for assessing the transport development of a territory – an index that would allow easier comparison of territories with each other and follow the dynamics of the transport development of a territory in relation to itself.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

I. NIedole and D. Averyanov conducted a study on the example of Kuldiga county (Latvia), the results of which confirmed the importance of transport infrastructure in the use of the territory's resources (Niedole, Averyanov, 2011). I. NIedole and D. Averyanov empirically proved that the use of the territory's resources is a function of the development of its transport infrastructure. Thus, the results of the analysis based on energy, transport, ICT, and financial infrastructure indices exhibit that cumulative and disaggregated (transport, energy, financial, and information and communication (ICT)) infrastructure development increase resources consumption in BRIGS countries (Sun et al., 2022). The significance of the transport infrastructure in the long-run sustainable economic growth has been proved also in other comparative studies on the transport sector of the EU countries (Cigu et al., 2018; Gherghina et al., 2018). Moreover, the Polish scientists A. Mesjasz-Lech and A. Wlodarczyk within their study on the role of the transport infrastructure in development of sustainable road transport confirmed that the development of the transport infrastructure leads to a limited negative impact of road transport on the natural environment (Mesjasz-Lech & Wlodarczyk, 2022).

Therefore, the authors included the quality of the transport infrastructure in a territory as a necessary component in the conceptual understanding of the phenomenon 'transport development of a territory'. As a result, the transport development of a territory includes the following four components with the corresponding indicators:

1) transportization[‡] level of a territory:
   - road density per 1000 km^2;
   - railroad density per 1000 km^2;
   - inner waterways density per 1000 km^2.
2) transport internationalization level of a territory:
   - airport connectivity;
   - liner shipping connectivity.
3) quality of the transport infrastructure in a territory:
   - quality of road infrastructure;
   - road connectivity;
   - quality of railroad infrastructure;
   - quality of port infrastructure;
   - quality of air transport infrastructure.
4) efficiency of the transport services in a territory:
   - efficiency of train services;
   - efficiency of air transport services;
   - efficiency of seaport services.

[‡] More detailed analysis of difference between terms 'transportization' and 'transportation' see in Balodis, 2022.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

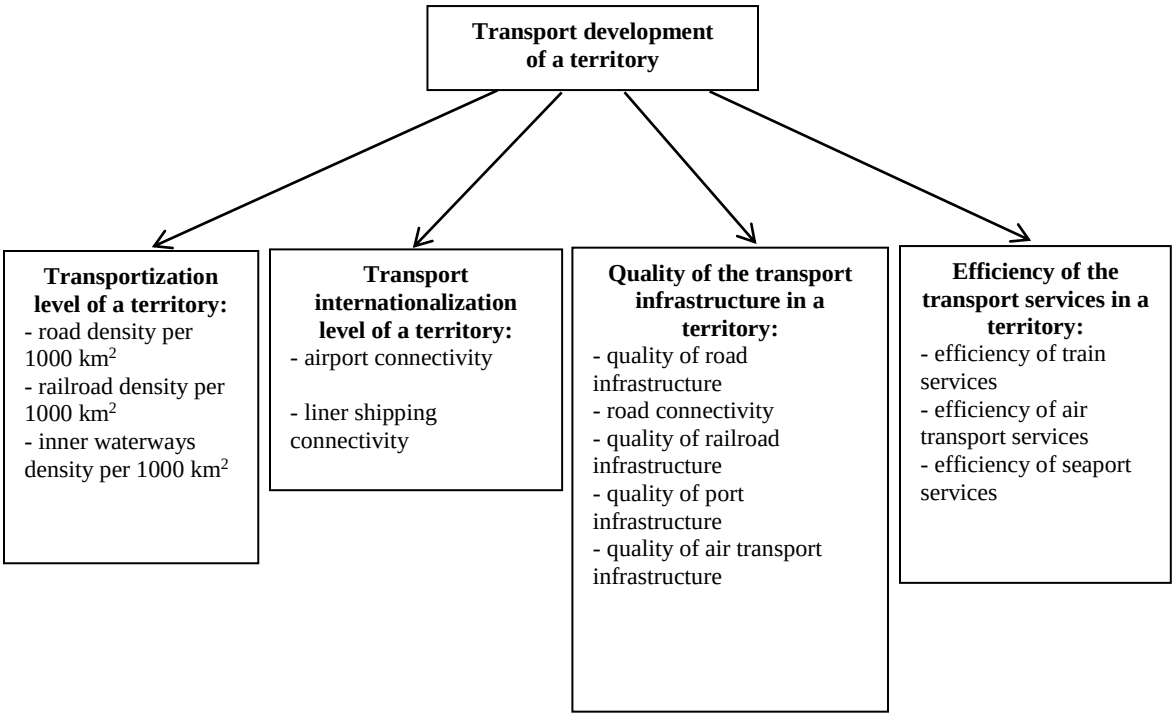

Fig. 1. The structure of the concept 'transport development of a territory'

Source: the authors' scheme based on Komarova et al., 2021; Balodis, 2022; Niedole, Averyanov, 2011.

All components of the transport development of a territory – transportization level of a territory, transport internationalization level of a territory, quality of the transport infrastructure in a territory and efficiency of transport services in a territory – are selected for further empirical analysis for two main reasons:

1) they describe the transport development of a territory;

2) there is empirical data on them for the European Union countries.

The following table presents the system of components and indicators of the transport development of a territory, which [system] includes the names of components and indicators, their empirical interpretation, measurement unit and scale, as well as the source of empirical data for each indicator.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Table 1. The system of components and indicators of the transport development of a territory

Indicator title	Indicator empirical interpretation	Indicator unit and scale	Empirical data source
Transportization level of a territory			
Road density per 1000 km^2	Length of roads in kilometers per 1000 square kilometers of a territory	In absolute terms	World Factbook 2021
Railroad density per 1000 km^2	Length of railways in kilometers per 1000 square kilometers of a territory	In absolute terms	Global Competitiveness Report 2019
Inner waterways density per 1000 km^2	Length of internal waterways in kilometers per 1000 square kilometers of a territory	In absolute terms	World Factbook 2021
Transport internationalization level of a territory			
Airport connectivity	Airport international connectivity indicator, which measures the degree of a territory integration into the global air transport network	Score scale from 0 to 100 (logarithmically transformed weighted number of passengers served)	Global Competitiveness Report 2019
Liner shipping connectivity	An indicator of the international connectivity of seaports that measures connectivity of a territory with the global maritime transport network	An open score scale with a benchmark score of 100 corresponding to the most globally connected country in 2004 (China)	Global Competitiveness Report 2019
Quality of the transport infrastructure in a territory			
Quality of road infrastructure	The experts' weighted mean answer to the question: "How would you rate the quality (width and condition) of road infrastructure in your country?"	Rating scale from 1 (extremely bad) to 7 (extremely good)	Global Competitiveness Report 2019
Road connectivity	An indicator that measures the average speed and straightness of a driving route between 10 or more major cities that [route] covers at least 15% of the country's population	Score scale from 0 to 100 (excellent)	Global Competitiveness Report 2019
Quality of railroad infrastructure	Weighted mean assessment made by experts	Rating scale from 1 (low quality) to 7 (high quality)	GlobalEconomy.com
Quality of port infrastructure	Weighted mean assessment made by experts	Rating scale from 1 (low quality) to 7 (high quality)	GlobalEconomy.com
Quality of air transport infrastructure	Weighted mean assessment made by experts	Rating scale from 1 (low quality) to 7 (high quality)	GlobalEconomy.com
Efficiency of the transport services in a territory			
Efficiency of train services	The experts' weighted mean answer to the question: "How efficient (i.e. frequency, punctuality, speed, price) are the railway transport services in your country?"	Rating scale from 1 (extremely inefficient) to 7 (extremely efficient)	Global Competitiveness Report 2019
Efficiency of air transport services	The experts' weighted mean answer to the question: "How efficient (i.e. frequency, punctuality, speed, price) are air transport services in your country?"	Rating scale from 1 (extremely inefficient) to 7 (extremely efficient)	Global Competitiveness Report 2019
Efficiency of seaport services	The experts' weighted mean answer to the question: "How efficient (i.e. frequency, punctuality, speed, price) are sea port services (ferries, boats) in your country?"	Rating scale from 1 (extremely inefficient) to 7 (extremely efficient)	Global Competitiveness Report 2019

Source: compiled by the authors based on World Economic Forum, 2019; Central Intelligence Agency, 2021; GlobalEconomy.com, 2022a, 2022b, 2022c.

Based on all the components and indicators included in the structure of the transport development of a territory (Figure 1 and Table 1), the authors will further develop a single instrument for measuring the transport

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

development of a territory – an index – and test it on the example of the European Union countries. Unlike the individual components that were empirically analyzed in the authors' previous studies (Komarova et al., 2021; Balodis, 2022), the synthetic index allows for a comprehensive evaluation of the studied phenomenon in the respective countries and for comparing the European Union countries according to their progress in terms of transport development.

In order to obtain the total value of the index for each studied territory, further calculations are made with the entire set of transport development indicators of a territory for the EU countries in 2019. These data form the empirical basis of the study, which [data] is processed with the index method – a quantitative technique based on minimum and maximum values (Ajvazian, 2005; Gudmundsson & Regmi, 2017; Rybalkin et al., 2021; Rybalkin, 2022), which is applicable for evaluating the transport development of a territory.

$$x' = a + \frac{(x - min(x))(b - a)}{max(x) - min(x)}$$

where:
x' – the standardized value of an indicator;
x – the initial value of an indicator;
min(x) – the minimum value of an indicator in a sample;
max(x) – the maximum value of an indicator in a sample;
a – a user defined minimum;
b – a user defined maximum.
Source: Rybalkin, 2022.

Next, the standardized value of each component of the index is calculated as the arithmetic mean of the standardized values of the indicators included in it, while the total value of the index is calculated with the arithmetic mean of the standardized values of the four components of the transport development of a territory:

$$Ind = (x'_1 + x'_2 + x'_3 + x'_4)/4$$

where:
Ind – the total value of the index;
x'_1 – the standardized value of the index component 'transportization level of a territory';
x'_2 – the standardized value of the index component 'transport internationalization level of a territory';
x'_3 – the standardized value of the index component 'quality of the transport infrastructure in a territory';
x'_4 – the standardized value of the index component 'efficiency of the transport services in a territory'.
Source: compiled by the authors based on Rybalkin, 2022.

Thus, the newly developed index includes all four components of the transport development of a territory: transportization level of a territory, transport internationalization level of a territory, quality of the transport infrastructure in a territory, efficiency of the transport services in a territory. The authors of the newly developed Index propose to call it the Territory Transport Development Index (TTDI), which can be used for assessing and comparing the transport development of the European Union countries (as well as other countries).

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

4. Research results and discussion

The analysis of the research results begins with the calculation of the non-standardized values of the TTDI components of the European Union countries in 2019. The first is transportization level of a territory, which includes the density of roads, railways and inner waterways per 1000 km^2 (Table 2).

Table 2. Transportization level of territories in the European Union, n = 27 countries,* 2019

EU countries**	Indicators of the transportization level of a territory			Transportization level of a territory***
	Road density per 1000 km^2	Railroad density per 1000 km^2	Inner waterways density per 1000 km^2	
Belgium	5027.8	119.0	66.9	5213.7
Netherlands	3338.3	89.4	171.0	3598.7
Hungary	2222.8	80.0	17.4	2320.2
France	1920.6	53.4	15.5	1989.5
Germany	1806.7	95.9	20.9	1923.5
Czechia	1646.8	121.8	8.1	1776.7
Denmark	1675.2	50.2	9.3	1734.7
United Kingdom	1626.3	67.2	13.1	1706.6
Austria	1465.2	60.0	4.3	1529,5
Ireland	1394.4	27.4	13.6	1435.4
Poland	1355.9	60.5	12.8	1429.2
Spain	1353.3	31.1	2.0	1386.4
Cyprus	1363.7	No railroad	No inner waterways	1363.7
Lithuania	1295.9	30.5	7.0	1333.4
Estonia	1300.6	23.8	7.1	1331.5
Luxembourg	1119.3	113.2	14.3	1246.8
Slovenia	986.7	60.0	172.7	1219.4
Latvia	901.6	29.9	4.6	936.1
Portugal	897.3	27.8	2.3	927.4
Greece	886.5	17.4	No inner waterways	903.9
Italy	825.9	57.1	8.0	891.0
Slovakia	798.2	75.4	3.5	877.1
Croatia	520.2	46.6	12.9	579.7
Sweden	473.3	23.8	4.6	501.7
Romania	362.7	46.8	7.3	416.8
Bulgaria	372.0	37.1	4.2	413.3
Finland	310.9	19.5	23.2	353.6

* Malta is not included in the empirical data analysis due to its very small territory (316 km^2).
** Countries are ranked by their transportization level.
*** The sum of the indicators' values of the transportization level.
Source: compiled and calculated by the authors based on data from World Economic Forum, 2019; Central Intelligence Agency, 2021.

As can be seen from the data in Table 2, the most transportized EU countries, in terms of the density of all types of transport roads per 1000 km^2, are Belgium, the Netherlands and Hungary, while the least transportized are Romania, Bulgaria and Finland.

The following table presents the non-standardized values of the second TTDI component – the transport internationalization level of a territory – in the European Union countries in 2019. This component includes

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

indicators such as the degree of a territory integration into the global air transport network and the possibility of a territory to "connect" to the global maritime transport network (Table 3).

Table 3. Transport internationalization level of territories in the European Union, n = 27 countries,* 2019

EU countries**	Indicators of the transport internationalization level of a territory		Transport internationalization level of a territory***
	Airport connectivity, score scale from 0 to 100	Liner shipping connectivity, an open score scale with a benchmark score of 100	
Germany	100.0	97.1	98.6
United Kingdom	100.0	95.6	97.8
Spain	100.0	90.1	95.1
France	95.8	84.0	89.9
Netherlands	77.0	98.0	87.5
Italy	97.1	67.2	82.2
Belgium	62.0	91.1	76.6
Portugal	72.0	65.1	68.6
Greece	77.2	59.4	68.3
Austria	65.3	No data	65.3
Poland	64.7	63.1	63.9
Sweden	66.9	59.7	63.3
Denmark	66.3	58.5	62.4
Czechia	56.5	No data	56.5
Hungary	52.5	No data	52.5
Croatia	55.2	38.4	46.8
Romania	54.5	29.8	42.2
Ireland	68.1	10.7	39.4
Luxembourg	37.8	No data	37.8
Finland	59.4	13.4	36.4
Cyprus	50.9	19.5	35.2
Slovenia	30.4	39.3	34.9
Lithuania	36.1	21.0	28.6
Bulgaria	49.0	6.8	27.9
Slovakia	27.5	No data	27.5
Latvia	40.1	8.1	24.1
Estonia	33.3	7.2	20.3

* Malta is not included in the empirical data analysis due to its very small territory (316 km^2).
** Countries are ranked by their transport internationalization level.
*** The arithmetic mean of the indicators' values of the transport internationalization level.
Source: compiled and calculated by the authors based on data from World Economic Forum, 2019.

As can be seen from the data in Table 3, Germany, the United Kingdom and Spain took the leading positions in the European Union in terms of the transport internationalization of their territories in 2019, while Slovakia, Latvia and Estonia took the last places.

The following table presents the values of the third TTDI component – the quality of the transport infrastructure in a territory (one of the indicators of this component was standardized according to a scale from 1 to 7) in the European Union countries in 2019. This component includes indicators such as road infrastructure quality, road connectivity within the territory, railway, port and air transport infrastructure quality (Table 4).

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Table 4. Quality of the transport infratsructure in the European Union, n = 27 countries,* 2019

EU countries**	Indicators of the quality of the transport infrastructure in a territory					Quality of the transport infrastructure in a territory****
	1	2***	3	4	5	
Netherlands	6.4	4.9	5.7	6.4	6.4	6.0
Spain	5.7	7.0	5.4	5.4	5.6	5.8
Finland	5.3	5.4	5.5	6.4	6.3	5.8
France	5.4	6.3	5.0	5.2	5.5	5.5
Germany	5.3	6.1	4.9	5.2	5.5	5.4
Sweden	5.3	6.2	4.0	5.3	5.7	5.3
Denmark	5.6	4.4	4.5	5.8	5.8	5.2
Portugal	6.0	5.9	4.2	4.9	5.0	5.2
Belgium	4.4	5.3	4.1	5.6	5.6	5.0
United Kingdom	4.9	5.3	4.3	5.2	5.3	5.0
Lithuania	4.8	5.1	4.6	4.8	4.9	4.8
Austria	6.0	3.5	5.3	3.7	5.2	4.7
Ireland	4.4	4.8	4.0	5.0	5.5	4.7
Latvia	3.6	4.9	4.6	4.9	5.7	4.7
Estonia	4.7	4.5	3.1	5.6	4.6	4.5
Italy	4.4	4.3	4.1	4.7	4.9	4.5
Czechia	3.9	5.5	4.5	3.2	5.0	4.4
Luxembourg	5.5	1.5	5.0	4.4	5.6	4.4
Poland	4.3	4.7	3.9	4.5	4.8	4.4
Croatia	5.6	2.9	2.4	4.7	4.8	4.1
Greece	4.6	2.4	3.0	4.8	5.4	4.0
Hungary	4.0	4.4	3.8	3.2	4.6	4.0
Cyprus	5.1	1.0	No railroad	4.3	5.1	3.9
Slovenia	4.9	2.1	3.1	4.7	4.6	3.9
Slovakia	4.0	3.8	4.0	3.1	3.8	3.7
Bulgaria	3.4	2.5	3.1	4.3	4.5	3.6
Romania	3.0	3.0	2.8	3.9	4.6	3.5

* Malta is not included in the empirical data analysis due to its very small territory (316 km^2).
** Countries are ranked by the quality of the transport infrastructure in a territory.
*** Initial data is standardized on a scale from 1 to 7, applying the method of minimum and maximum values.
**** The arithmetic mean of the indicators' values of the quality of the transport infrastructure in a territory.
1 – quality of road infrastructure, rating scale from 1 to 7;
2 – road connectivity, score scale from 0 to 100;
3 – quality of railroad infrastructure, rating scale from 1 to 7;
4 – quality of port infrastructure, rating scale from 1 to 7;
5 – quality of air transport infrastructure, rating scale from 1 to 7.
Source: compiled and calculated by the authors based on data from World Economic Forum, 2019; GlobalEconomy.com, 2022a, 2022b, 2022c.

As can be seen from the data in Table 4, in terms of the quality of the transport infrastructure, the leading positions in the European Union in 2019 were occupied by the Netherlands, Spain and Finland, while the last places are occupied by Slovakia, Bulgaria and Romania.

The following table presents the non-standardized values of the fourth TTDI component – the efficiency of the transport services in a territory – in the European Union countries in 2019. This component includes indicators such as the efficiency of train, air transport and seaport services (Table 5).

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Table 5. Efficiency of the transport services in the European Union, n = 27 countries,* 2019

EU countries**	Indicators of the efficiency of the transport services in a territory			Efficiency of the transport services in a territory***
	Efficiency of train services, rating scale from 1 to 7	Efficiency of air transport services, rating scale from 1 to 7	Efficiency of seaport services, rating scale from 1 to 7	
Netherlands	5.5	6.3	6.3	6.0
Finland	5.5	6.2	6.2	6.0
Germany	5.5	5.6	5.3	5.5
Spain	5.4	5.6	5.2	5.4
Denmark	4.3	5.8	5.7	5.3
France	5.1	5.5	5.0	5.2
Sweden	4.4	5.8	5.5	5.2
United Kingdom	4.6	5.7	5.4	5.2
Belgium	4.1	5.6	5.6	5.1
Estonia	4.7	4.6	5.6	5.0
Portugal	4.6	5.4	5.0	5.0
Latvia	4.5	5.5	4.8	4.9
Luxembourg	4.9	5.5	4.4	4.9
Ireland	3.9	5.4	5.0	4.8
Austria	5.3	5.1	3.6	4.7
Cyprus	No railroad	5.1	4.2	4.7
Lithuania	4.5	4.6	4.6	4.6
Czechia	4.7	5.2	3.5	4.5
Italy	3.9	4.8	4.5	4.4
Poland	4.0	4.8	4.4	4.4
Greece	3.0	5.2	4.6	4.3
Slovenia	3.2	4.6	4.7	4.2
Bulgaria	3.3	4.4	4.2	4.0
Croatia	2.7	4.6	4.5	3.9
Romania	3.1	4.7	3.9	3.9
Slovakia	4.1	3.9	3.3	3.8
Hungary	3.8	4.1	3.3	3.7

* Malta is not included in the empirical data analysis due to its very small territory (316 km^2).
** Countries are ranked by the efficiency of the transport services in a territory.
*** The arithmetic mean of the indicators' values of the efficiency of the transport services in a territory.
Source: compiled and calculated by the authors based on data from World Economic Forum, 2019.

As can be seen from the data in Table 5, in terms of the efficiency of the transport services, the leading positions in the European Union in 2019 were occupied by the Netherlands, Finland and Germany, while the last places are occupied by Romania, Slovakia and Hungary.

The following table presents the standardized values of TTDI in the the European Union countries in 2019.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Table 6. Territory Transport Development Index (TTDI) in the European Union, n = 27 countries,* 2019

EU countries**	Components of the Territory Transport Development Index (TTDI)				TTDI****
	Transporti-zation level of a territory***	Transport internationali-zation level of a territory	Quality of the transport infrastructure in a territory***	Efficiency of the transport services in a territory***	
Netherlands	67.1	87.5	100.0	100.0	88.7
Belgium	100.0	76.6	61.6	59.8	74.5
Germany	33.0	98.6	77.5	75.6	71.2
Spain	22.0	95.1	94.5	72.7	71.1
France	34.3	89.9	81.4	64.1	67.4
United Kingdom	28.6	97.8	62.2	65.6	63.5
Denmark	29.1	62.4	70.9	67.0	57.4
Finland	1.0	36.4	92.8	97.1	56.8
Sweden	4.0	63.3	74.0	65.6	51.7
Portugal	12.7	68.6	69.8	55.5	51.6
Austria	25.0	65.3	51.8	41.2	45.8
Italy	11.9	82.2	41.2	29.7	41.3
Ireland	23.0	39.4	51.4	45.5	39.8
Czechia	30.0	56.5	38.9	32.6	39.5
Poland	22.9	63.9	39.7	29.7	39.0
Luxembourg	19.2	37.8	38.1	52.7	36.9
Lithuania	21.0	28.6	55.3	36.9	35.4
Latvia	12.9	24.1	51.8	52.7	35.4
Estonia	20.9	20.3	42.1	54.1	34.3
Greece	12.2	68.3	23.5	24.0	32.0
Hungary	41.1	52.5	21.8	1.0	29.1
Cyprus	21.6	35.2	17.2	40.5	28.6
Slovenia	18.6	34.9	17.2	19.7	22.6
Croatia	5.6	46.8	25.4	9.6	21.8
Slovakia	11.7	27.5	12.2	2.4	13.4
Romania	2.3	42.2	1.0	8.2	13.4
Bulgaria	2.2	27.9	4.8	11.0	11.5

* Malta is not included in the empirical data analysis due to its very small territory (316 km^2).
** Countries are ranked by the Territory Transport Development Index (TTDI).
*** Initial data (Tables 2, 4 and 5) is standardized on a scale from 1 to 7, applying the method of minimum and maximum values.
**** The arithmetic mean of the components' values of the Territory Transport Development Index (TTDI).
Source: compiled and calculated by the authors according to data of Tables 2–5.

As can be seen from the data in Table 6, the Netherlands, Belgium and Germany took the leading positions in the European Union in terms of their transport development in 2019, while Slovakia, Romania and Bulgaria took the last places.

The following table summarizes the European Union countries with leading positions according to the Territorial Transport Development Index (TTDI) and its individual components in 2019.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Table 7. European Union countries with leading positions according to the Territory Transport Development Index (TTDI) and its components, 2019

TTDI	Components of the Territory Transport Development Index (TTDI)			
	Transporti-zation level of a territory	Transport internationali-zation level of a territory	Quality of the transport infrastructure in a territory	Efficiency of the transport services in a territory
Netherlands (88,7)	Belgium (100,0)	Germany (98,6)	Netherlands (100,0)	Netherlands (100,0)
Belgium (74,5)	Netherlands (67,1)	United Kingdom (97,8)	Spain (94,5)	Finland (97,1)
Germany (71,2)	Hungary (41,1)	Spain (95,1)	Finland (92,8)	Germany (75,6)
Spain (71,1)	France (34,3)	France (89,9)	France (81,4)	Spain (72,7)
France (67,4)	Germany (33,0)	Netherlands (87,5)	Germany (77,5)	Denmark (67,0)

Source: compiled by the authors according to data of Table 6.

As can be seen from the data in Table 7, the Netherlands is the leading country in the transport development of a territory in the European Union, which occupies a leading position in two of the four TTDI components – the quality of the transport infrastructure in a territory and the efficiency of the transport services in a territory, as well as in TTDI in general.

As for Latvia, its position among countries in terms of the transport development of a territory can generally be assessed as slightly lower than average, as Latvia ranks 18th among 27 EU countries according to TTDI, one position behind Lithuania and one position ahead of Estonia (Table 6). In Latvia, the strongest field in terms of the transport development is the efficiency of its transport services – 12th place among 27 EU countries (Estonia is 10th, Lithuania – 17th) (Table 5). The weakest field of Latvia in terms of the transport development is its transport internationalization level – 26th place among 27 EU countries (Estonia is 27th, Lithuania – 23rd) (Table 3), which is the weakest field of all Baltic countries in terms of their transport development.

The reason for the low transport internationalization level of the Baltic countries may be the long period when they functioned as a gateway for other EU countries to the Russian market (Spens et al., 2004; Mauris, 2022), and this cannot be changed in a short and even medium run. In this regard, great hopes are pinned on the Rail Baltica (Jonaitis & Butkevičius, 2005) called 'the project of the century' (Pomykala, 2018) – the largest and most important project currently being implemented in Europe by three Baltic countries. This project is a tool for the integration of the Baltic countries and Europe, as railway infrastructure of Lithuania, Latvia and Estonia does not fulfil the requirements of competent network (Laisi & Saranen, 2013), although nowadays the Rail Baltica is undermined due to some reasons, including institutional fragmentation (Briškens, 2022).

5. Conclusions

The transport development of any territory of the world (but mainly the territories of the world's countries) can be assessed using the authors' newly developed Territory Transport Development Index (TTDI), which includes four components: transportization level of a territory, transport internationalization level of a territory, quality of the transport infrastructure in a territory, efficiency of the transport services in a territory. The use of this index makes it possible to comprehensively assess and compare territories – countries or regions – according to the progress achieved in them in terms of the transport development, as well as to assess the progress of the specific territory in relation to itself. In the modern scientific space, there is no other 'transport' index (for example, the Sustainable Urban Transport Index (SUTI) for cities in the Asia-Pacific region, the Transport Performance Index (TPI), the Rural Transport Implementation Index) that could face the same challenge.

Among the European Union countries, the leading position in terms of the transport development is held by the Netherlands with a TTDI value of 88.7 points in 2019 on a scale from 0 to 100, while Bulgaria has the lowest

position with 11.5 points. Latvia's position among the European Union countries in terms of the transport development in general can be assessed as slightly lower than the average. The strongest field of Latvia in terms of the transport development is the efficiency of its transport services, but the weakest is the transport internationalization level, which is the weakest field of the transport development of all the Baltic countries compared to the EU leaders in the field of transport internationalization – Germany, the United Kingdom and Spain.

The limitation of the research is the empirical analysis for one year, but considering that the purpose of the article was mainly methodological – to develop a single instrument for measuring the transport development of a territory, this limitation was not critical for achieving the research goal within the scope of this article. In addition, the specificity of most indicators of the transport development of a territory is that they practically do not change (especially the transportization level of a territory) in the short term.

The results obtained during the approbation of the newly developed Territory Transport Development Index (TTDI) on the example of the EU countries are novel, since they allow to analyze the transport development of the EU countries both in general and separately in different aspects. The results of empirical analysis are valuable and applicable in the practice of sustainable management – in particular, to justify the need for a particular transport project for each EU country. For example, for the Baltic countries, the most relevant transport projects today are those that will allow these countries to increase their transport internationalization level – the weakest field of all Baltic countries in terms of their transport development.

References

Ambarwati L., Verhaeghe, R., van Arem, B., & Pel, A. J. 2017. Assessment of transport performance index for urban transport development strategies — Incorporating residents' preferences. *Environmental Impact Assessment Review*, 63, 107-115. https://doi.org/10.1016/j.eiar.2016.10.004

Balodis, J. 2022. Pasaules valstu raziguma un produktivitates atkariba no transporta attistitibas [The dependence of productivity and efficiency of the world's countries on their transport development]. Mensikovs V. (zin. red.) *Starptautiskas zinatniskas konferences "Socialas zinatnes regionalajai attistibai 2021" materiali. III daļa: Ekonomikas aktualitates [Proceedings of the International Scientific Conference "Social Sciences for Regional Development 2021". Part 3: Economic Issues].* Daugavpils: Daugavpils University, 5-20. [in Latvian]

Briškens, K. 2022. Viewpoint: Institutional fragmentation has undermined Rail Baltica. *Railway Gazette.* Retrieved from https://www.railwaygazette.com/industry-view-point/viewpoint-institutional-fragmentation-has-undermined-rail-baltica/62693.article (accessed on 14.10.2022)

Bubeliny, O., & Kubina, M. 2021. Impact of the concept Smart City on public transport. *Transportation Research Procedia,* 55, 1361-1367. https://doi.org/10.1016/j.trpro.2021.07.120

Burlacu, M., Boboc, R. G., & Butiĭa, E. V. 2022. Smart cities and transportation: Reviewing the scientific character of the theories. *Sustainability*, 14, 8109. https://doi.org/10.3390/su14138109

Central Intelligence Agency. 2021. Roadways. *The World Factbook.* Retrieved from www.cia.gov

Cigu, E., Agheorghiesei, D. T., Gavriluță, A. F., & Toader, E. 2018. Transport infrastructure development, public performance and long-run economic growth: a case study for the EU-28 countries. *Sustainability*, 11(1). https://doi.org/10.3390/su11010067

Gherghina, Ș. C., Onofrei, M., Vintilă, G., & Armeanu, D. Ș. 2018. Empirical evidence from EU-28 countries on resilient transport infrastructure systems and sustainable economic growth. *Sustainability*, 10(8). https://doi.org/10.3390/su10082900

Glensor, K. 2018. Development of an Index of Transport-User Vulnerability, and its application in Enschede, The Netherlands. *Sustainability*, 10(7), 2388. https://doi.org/10.3390/su10072388

GlobalEconomy.com. 2022a. *Railroad Infrastructure Quality: European Union, 2019.* Retrieved from https://www.theglobaleconomy.com/rankings/railroad_quality/European-union/ (accessed on 14.10.2022)

GlobalEconomy.com. 2022b. *Port Infrastructure Quality: European Union, 2019.* Retrieved from https://www.theglobaleconomy.com/rankings/seaports_quality/European-union/ (accessed on 14.10.2022)

GlobalEconomy.com. 2022c. *Air Transport Infrastructure Quality: European Union, 2019.* Retrieved from https://www.theglobaleconomy.com/rankings/air_transport_infrastructure/European-union/ (accessed on 14.10.2022)

Greene, D. L., & Wegener, M. 1997. Sustainable transport. *Journal of Transport Geography*, 5(3), 177-190. https://doi.org/10.1016/S0966-6923(97)00013-6

Gudmundsson, H., & Regmi, M. B. 2017. Developing the Sustainable Urban Transport Index. *Transport and Communications Bulletin for Asia and the Pacific*, 87. Retrieved from https://www.unescap.org/sites/default/files/bulletin87_3%20Developing%20the%20Sustainable%20Urban%20Transport%20Index_0.pdf

Hermelin, B., & Henriksson, M. 2022. Transport and mobility planning for sustainable development. *Planning Practice & Research*, 37, 527-531. https://doi.org/10.1080/02697459.2022.2082756

Jonaitis, J., & Butkevičius, J. 2005. Analysis of the possibilities of building the railway Rail Baltica in Lithuania, *Transport*, 20(5), 204-213. https://doi.org/10.1080/16484142.2005.9638021

Kasjanovs, I. 2012. Latvijas tautsaimniecības asinsrite – transporta nozare [The bloodstream of the Latvia's economy – the transport sector]. *Makroekonomika [Macroeconomics]*. Retrieved from https://www.makroekonomika.lv/latvijas-tautsaimniecibas-asinsrite-transporta-nozare [in Latvian]

Kherbash, O., & Mocan, M. L. 2015. A review of logistics and transport sector as a factor of globalization. *Procedia Economics and Finance*, 27, 42-47. https://doi.org/10.1016/S2212-5671(15)00969-7

Komarova, V., Mietule, I., & Arbidane, I. 2021. Vliianie transportnoj razvitosti territorii na eio proizvoditel'nost' i produktivnost' [Influence of the state of transport development of a territory on its productivity and efficiency]. *Vestnik Vitebskogo Gosudarstvennogo Tekhnologicheskogo Universiteta [Bulletin of Vitebsk State Technological University]*, 40(1): 201-215. https://doi.org/10.24412/2079-7958-2021-1-201-215 [in Russian]

Laisi, M., & Saranen, J. 2013. Integrating the Baltic States and Europe - Rail Baltica. *International Journal of Business Excellence*, 6(3), 251-269. https://doi.org/10.1504/IJBEX.2013.053609

Lejda, K., Mądziel, M., Siedlecka, S., & Zielińska, E. 2017. The future of public transport in light of solutions for sustainable transport development. *Scientific Journal of Silesian University of Technology*, 95, 97-108. https://doi.org/10.20858/sjsutst.2017.95.10

Mauris, J. 2022. Latvian transport sector. Long good-bye to the East-West transport corridor. *Makroekonomika [Macroeconomics]*. Retrieved from https://www.macroeconomics.lv/latvian-transport-sector-long-good-bye-east-west-transport-corridor

Melecký, L. 2018. The main achievements of the EU structural funds 2007? 2013 in the EU member states: efficiency analysis of transport sector. Equilibrium. *Quarterly Journal of Economics and Economic Policy*, 13(2), 285-306. https://doi.org/10.24136/eq.2018.015

Meng, X., & Han, J. 2018. Roads, economy, population density, and CO_2: A city-scaled causality analysis. *Resources, Conservation and Recycling*, 1128, 508-51528. https://doi.org/10.1016/j.resconrec.2016.09.032

Mesjasz-Lech, A., & Wlodarczyk, A. 2022. The role of logistics infrastructure in development of sustainable road transport in Poland. *Research in Transportation Business and Management*, 44(SI), 100841 https://doi.org/10.1016/j.rtbm.2022.100841

Motoryn, R., Motoryna, T., & Prykhodko, K. 2020. Using the index method for international comparison of indicators of GDP factors. *Statistical Journal of the IAOS*, 36(2), 569-573. https://doi.org/10.3233/SJI-190599

Negrutiu, C., Vasiliu, C., & Enache, C. 2020. Sustainable entrepreneurship in the transport and retail supply chain sector. *Journal of Risk and Financial Management*, 13, 267. https://doi.org/10.3390/jrfm13110267

Niedole, I. & Averyanov, D. 2011. Transporta infrastruktūras attīstības nozīme teritorijas resursu izmantošanā [The significance of the development of transport infrastructure for use of territorial resources]. *Ilgtspējīga telpiska attīstība [Sustainable Spatial Development]*, 3: 20–25. Retrieved from https://ortus.rtu.lv/science/lv/publications/12593 [in Latvian]

Pomykala, A. 2018. Rail Baltica – the project of the century. *Perspectives*, 4, 33–36. Retrieved from file:///C:/Users/Admin/Downloads/RailBalticaEN.pdf

Prus, P., & Sikora, M. 2021. The impact of transport infrastructure on the sustainable development of the region – case study. *Agriculture*, 11, 279. https://doi.org/10.3390/agriculture11040279

Purwanto, A. J., Heyndrickx, Ch., Kiel, J., Betancor, O., Socorro, M. P., Hernandez, A., Eugenio-Martin, J. L., Pawlowska, B., Borkowski, P., & Fiedler, R. 2017. Impact of transport infrastructure on international competitiveness of Europe. *Transportation Research Procedia*, 25, 2877-2888. https://doi.org/10.1016/j.trpro.2017.05.273

Rybalkin, O. 2022. Sustainable development goals progress in the European Union: correlation with EEPSE Green Economy Index. *Access to Science, Business, Innovation in Digital Economy, ACCESS Press*, 3(2), 121-135. https://doi.org/10.46656/access.2022.3.2(3)

Spens, K., Kovács, G. & Vellenga, D. B. 2004. Transportation and Logistics Networks in the Baltic States: Keys for Successful Economic Development and Integration into the E.U. *Ekonomika*, 68. https://doi.org/10.15388/Ekon.2004.17401

Szczuraszek, T.; Chmielewski, J. 2018. Sustainable transport development and passenger transport demand in Poland. *MATEC Web of Conferences, 3rd Scientific Conference Environmental Challenges in Civil Engineering (ECCE 2018)*, 174. https://doi.org/10.1051/matecconf/20181740102

Steg, L. 2007. Sustainable transportation. *IATSS Research*, 21(2), 58-66. https://doi.org/10.1016/S0386-1112(14)60223-5

Sun, Y. P., Ajaz, T., & Razzaq, A. 2022. How infrastructure development and technical efficiency change caused resources consumption in BRIGS countries: Analysis based on energy, transport, ICT, and financial infrastructure indices. *Resources Policy*, 79, 02942. https://doi.org/10.1016/j.resourpol.2022.102942

Šakalys, A., & Palšaitis, R. 2006. Development of intermodal transport in new European Union states. *Transport*, 21(2). https://doi.org/10.1080/16484142.2006.9638057

Walters, J.G., Marsh, S., & Rodrigues, L. 2022. A Rural Transport Implementation Index for Connected, Autonomous and Electric Vehicles. *Future Transportation*, 2, 753-773. https://doi.org/10.3390/futuretransp2030042

Wang, L.l Xue, X., Zhao, Z., & Wang, Z. 2018. The impacts of transportation infrastructure on sustainable development: Emerging trends and challenges. *International Journal of Environmental Research and Public Health*, 15(6), 1172. https://doi.org/10.3390/ijerph15061172

World Economic Forum. 2019. *The Global Competitiveness Report 2018-2019.* Geneva.

Zhou, Z. J., Liu, Y. L., & Du, J. J. 2022. Analysis on the constraint mechanism of transportation carbon emissions in the Pearl River Delta based on 'Dual carbon' goals. *Systems Science & Control Engineering*, 10(1), 854-864. https://doi.org/10.1080/21642583.2022.2107116

Funding: This research was funded by Daugavpils University, Latvia

Author Contributions: J. Balodis - literature review, theoretical justification of methodological approach to assessing the transport development of a territory, collection and preparation of empirical material for quantitative analysis, V. Komarova - concept and design of the research, theoretical justification of methodological approach to assessing the transport development of a territory, development of methodology for the empirical study, E. Čižo - development of methodology for the empirical study, selection and justification of research methods, collection and preparation of empirical material for quantitative analysis, O. Ruza - literature review, analysis of the obtained data, writing and translation of the text into English, A. Kokarevica - selection and justification of research methods, analysis of the obtained data, proofreading and technical editing of text, tables and figures, correction of errors and typos.

ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES
ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2022 Volume 10 Number 2 (December)
http://doi.org/10.9770/jesi.2022.10.2(8)

Janis BALODIS is PhD student at the Faculty of Social Sciences in Daugavpils University (Latvia). Research interests: regional development, economy of transport, quantitative research methods, data analysis.
ORCID ID: https://orcid.org/0000-0001-5668-8041

Vera KOMAROVA is Dr.oec., Mg. translat., the Leading researcher at the Social Investigations Centre of Institute of Humanities and Social Sciences of Daugavpils University (Latvia). She is the expert of Latvian Council of Science in the field of economics and entrepreneurship, economic and social geography, sociology and social work, other social sciences, as well as the external expert of the COST Association. Research interests: regional economics, sustainable development, economic research methodology, quantitative methods.
ORCID ID: https://orcid.org/0000-0002-9829-622X

Edmunds ČIŽO is Science Doctor (Ph.D.) in Economics and Business, Assistant professor at the Department of Economics of Daugavpils University (Latvia). He is the expert of Latvian Council of Science in the field of economics and entrepreneurship. Research interests: industrial and regional economics, sustainable economic development, economic research methodology.
ORCID ID: https://orcid.org/0000-0003-0654-2962

Oksana RUZA is Dr.oec., Assistant professor, Researcher at the Social Investigations Centre of Institute of Humanities and Social Sciences of Daugavpils University (Latvia). She is the expert of Latvian Council of Science in the field of economics and entrepreneurship, sociology and social work. Research interests: regional economics, industrial economics, finances.
ORCID ID: https://orcid.org/0000-0002-6194-3841

Anita KOKAREVICA is Science Doctor (Ph.D.) in Economics and Business, Assistant professor at the Department of Public Health and Epidemiology of Faculty of Public Health and Social Welfare of Riga Stradinsh University (Latvia). Research interests: regional economics, sustainable economic development, quantitative research methods.
ORCID ID: https://orcid.org/0000-0001-6173-0910