International Journal of Engineering & Technology, 7 (4.3) (2018) 623-627

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper



Assessment of the Transport Complex in Providing Economic Spatial Development of the Territories

V. Rodchenko[1*], Yu. Prus[1], M. Svidenska[1], D. Khripunova[1]

[1] *Karazin Kharkiv National University*
**Corresponding author E-mail: rodchenko@karazin.ua*

Abstract

The role of the transport component in ensuring economic development processes of the territories was considered. Works of many scientists were analyzed, systematized and generalized, it was discovered that the key task of forming a single economic space in Ukraine is to overcome inter-territorial differentiation, spatial integration of territories, which provides the maximum intensive interaction of business entities of certain territories through all possible channels of communication. One of the key factors in such integration is transport. The peculiarities and main tendencies of the transport network development in Ukraine were highlighted. The results the qualitative indicators of socio-economic development of Kharkiv region territorial communities study, was confirmed by the hypothesis that the transport factor directly influences the quality of the population life of a certain territory, significantly increasing the level of social inclusion of its population. The results of the residents' survey in terms of assessing the quality of life in the community and perceiving their inclusion in community development processes, taking into account the results of the groupings and organization, are representative for all communities of the state. The proposed approach of territorial communities clustering is based on four main indicators: population size, length of roads, area and revenues of the community budget, as well as the share of community territories in the total area of the district. Two-parameter graphs were illustrated to generalize the characteristics of the communities distribution, which provide an ordered cumulative visualization based on the main indicators.

Keywords: *social inclusion; territorial community; transport infrastructure.*

1. Introduction

Decentralization reforms taking place in Ukraine lead to the tightening of requirements on the level of spatial integration of settlements, the quality of the transport accessibility of frontier territories and the increase of socio-economic dynamics. The experience of the functioning of the first territorial communities has shown that the problem of high-quality transport connection is an important factor that significantly influences the dynamics of socio-economic development, enabling (or limiting) the development of the sectors of the economy of the territorial community, attracting investment, ensuring the quality of the population life.

Convenience of the population movement is an indispensable condition for its active participation in public life. Most of the productive, social and cultural factors of the territorial community can be effectively realized only in case of the existence of an efficient transport system, the creation of which must be fully promoted by local self-government bodies. The ability to meet practically all the needs of territorial communities requires the availability of transport.

Transport is considered to be a key factor in the formation of economic and social areas. Moreover, the development of scientific thought and business practice has shown strengthening of its role: "Europe-2020" strategy considers transport accessibility as one of the main factors [1]; when assessing the level of socio-economic development of the economy draws more attention to inclusiveness [4].

Theoretical, methodological and applied aspects of spatial organization of economic systems together with transport factor are the subject of study of many foreign scientists, in particular, W. Hansen, A. Hurrell, P. Krugman, A. Markusen, P. Rosenstein-Rodan, C. Schurmann, K. Spiekermann, J. Wardrop, M. Wegener, A. Wilson etc.

For example, the Nobel laureate in Economics P. Krugman points out that nowadays there is an urgent need to take into consideration spatial factors in economic research, because the economy exists and occupies a certain place on the map [6].

According to the American scientist W. Hansen, the main product of the transport system is the provision of transport accessibility [2].The ultimate goal of the transport functioning is the formation of effective territorial and industrial relations and ensuring sustainable social and economic development.

The scientists of the National Institute for Strategic Studies are convinced that nowadays Ukraine experiences a lag in the development of transport network, especially of public highways in respect of the country's motorization. This is due to a number of objective reasons, in particular, such as the heavy burden on the maintenance of the transport network per capita compared to European countries because of relatively small population density (78 people/sq.km), low purchasing power of citizens (1/5 of the purchasing power of citizens of the Eurozone). In addition, the average speed on the roads of Ukraine is 2-3 times lower than in Western European countries. Therefore, Ukraine loses UAH 32 billion or 3% of GDP annually because of bad roads [9]. In such conditions, the recovery of Ukrainian economy, the resolution of socio-economic tasks facing the state, should be based on the policy of dynamic and efficient development of the transport sector of the economy.

The relevance of the development of transport infrastructure at different territorial levels is demonstrated by the Government's

Copyright © 2018 V. Rodchenko, Yu. Prus, M. Svidenska, D. Khripunova. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

attention. Thus, in April 2017, the Ministry of Infrastructure of Ukraine presented the National Transport Strategy of Ukraine for the period up to 2030, the key priorities of which were: the efficiency of public administration in the transport sector; provision of high-quality transportation services; ensuring stable financing of the transport sector; increase of safety and reliability of transportation; improvement of urban mobility and regional integration of Ukraine [14].

On 22 February, 2018, the Ministry of Infrastructure of Ukraine signed a Memorandum on the launch of the transport innovation project HypeUa, which is focused on the development of the latest transport technologies in Ukraine, first of all, 'hyperloop', high-speed transport system [13].

At the same time, the capital-intensive nature of transport infrastructure and research in this area are focused mainly on the usage of extensive development factors. A number of theoretical and applied issues of socio-economic development of territories based on the revitalization of organizational and economic factors of transport infrastructure and further obtainment of sectorial and non-sectorial effects are not fully resolved.

In this regard, the aim of the article is to determine the role of the transport component in ensuring the processes of economic spatial development of territories.

2. Development of Transport Network of Ukraine

For the Ukrainian economic space, there is a high level of differentiation of socio-economic development of territories, which is manifested by differences in the rates of economic growth, quality of population life. Differentiation is due to objective reasons for inequality (geographical location, resource potential, etc.) and subjective (efficiency of the use of resources, effectiveness of local authorities), with significant territorial disproportions hampering the achievement of high rates of the national economy growth.

The key task of forming a single economic space in Ukraine is to overcome inter-territorial differentiation, spatial integration of territories, which involves maximally intensive interaction of economic entities of certain territories with all possible channels of communication. One of the key factors for such integration is transport as a link in the territorial processes of production, distribution, exchange and consumption, which regulates product flows and influences a significant part of the costs of production and sales, ensuring sustainable economic development.

One of the defining parameters of the economic system, which characterizes not only the transport component, but also the entire socio-economic aspect, is transport accessibility [15]. Using transport accessibility as a criterion for the development of transport infrastructure destroys departmental barriers, facilitates the combination of sectorial and territorial planning, allows taking into account both the efficiency of transport system itself, its quantitative and qualitative characteristics, and the impact of transport on economic and demographic processes, social standard of living, territorial economic development.

The terminology of social inclusiveness was adopted at the level of the European Union in the late 1980s and early 1990s. In 2001, at the European Summit in Laeken, statistical indicators of 'social inclusiveness' were identified; the key one is the level of transport accessibility of the territory. In addition, one of the priorities of "Europe-2020" strategy is growth that promotes social inclusiveness: strengthening high-employment economy that provides social and territorial cohesion. In such conditions, transport and transport infrastructure play an important role in ensuring the process of achieving of development goals of the European Union.

Transport infrastructure supports and simplifies business activities, providing geographic accessibility for the territories concerned with both national and international business. Transport networks, as a central element in sectorial restructuring, play a leading role in integrating the regional market, providing physical access to all components of the economic system.

The evolution of productive forces placement and regional economy theories confirm that the transport factor significantly influences the formation of economic centres of space. Thus, in the 15th and 17th centuries, the centres of the population attraction and the formation of new territorial settlements were trade fairs as places of trade development and transport infrastructure. With the development of industrialization large cities become the centres of space formation – transport costs as well as concentration of enterprises and objects of various industries as employment places have become the key factors of spatial development [11].

The transport sector is economically significant: in 2017, almost 1 million enterprises in the EU were specialized in providing transport services, generating 308 billion euros of added value in the EU-28 that accounted for 12.7% of the added value of the service sector (excluding financial services). 7.4 million people or 10.9% of the employees in the service sector (excluding financial services) are employed in the transport sector [12].

There are 13 seaports in Ukraine, the total cargo handling capacity of which is about 230 million tons per year. The territory of Ukraine extends 1562.6 thousand km of navigable waterways. There is an advanced network of ferry lines, sea container lines connecting Ukraine with partner countries in the Black Sea region. The national network of public roads is 169643 km. The railway network of Ukraine is one of the largest in Europe and reaches about 19790 km, of which 9354.8 km (47.3%) are electrified. There is a differentiated network of aviation connections.

In 2016, transport, warehousing, mail and courier activities accounted for about 6.7% of GDP and 6.0% of the total employed population. The most dependent sectors of transport are agriculture, metallurgy, coal, oil and gas, retail trade, communications and postal services, and the defence [14].

The vector of European integration of Ukraine determines the need to improve the role of transport infrastructure, and first of all highways: 51.1% of which do not meet European requirements for equality, 39.2% – for strength. In general, in Ukraine, at the beginning of spring the area of potholes was 12.2 million sq.m, 4.6 million sq.m of which on roads of national importance and 7.6 – on roads of local importance. Experts predict an increase in potholes to 16-18 million sq. m at the end of April [3]. In addition, the rolling stock renewal is slow-moving – almost 70% of the rolling stock is technically and / or morally obsolete, and 50% of the buses have been in operation for more than 10 years.

That is confirmed by the results of the infrastructure study of the regions of Ukraine, in which 14 regions (Dnipropetrovsk, Zhytomyr, Transcarpathian, Ivano-Frankivsk, Kyiv, Kirovograd, Lviv, Mykolaiv, Odesa, Sumy, Ternopil, Kharkiv, Chernivtsi and Chernihiv) identified transport as key problems, which can influence the level of development of the entire infrastructure, the main among them are: unsatisfactory road conditions and low quality of road pavement for highways of various purposes; high level of moral and physical depreciation of the material and technical base, which does not meet modern requirements; imperfect tariff policy, in particular, lack of compensation for transportation of privileged categories of the population; imperfection of rolling stock (wear, lack of buses of large and very large capacity); inability to service people with disabilities.

Kharkiv region belongs to the regions with the highest level of development of transport infrastructure, which includes railway, automobile and aviation connections, as well as an extensive public transport system. In addition, Kharkiv region ranks first in Ukraine for the length of public highways (over 9.6 thousand km), of which almost 98% are hard-coated.

However, in the Ukrainian ranking of the level the transport subsystem development, Kharkiv region occupies the 7th place with the index 0.9902 (top three being Khmelnytskiy region (index 1.1116), Poltava region (index 1.0482), and Transcarpathian region (index 1.01439)). This is due, first of all, to the decrease in cargo turnover and passenger turnover, which was observed recently, due to the reduction of international transport connections with the Russian Federation and internal traffic with Donetsk and Luhansk regions. Thus, in 2015, cargo turnover in road transport

decreased by 0.52 billion tons / km against 2014, and passenger turnover by 0.30 billion tons / km. The density of roads and railways during this time has not changed, but the state of motor roads has deteriorated significantly [5].

At the same time, the system of administrative-territorial organization reform in Ukraine and the development of decentralization processes stress the problem of development of transport facilities of the territories and determine its place among the main constraints of economic development.

3. The Role of Transport Factor in Assessing Attractiveness and Prospects for Territorial Community Development by Residents

During 2017, with the participation of authors, the study of qualitative indicators of socio-economic development of the united territorial communities of Kharkiv region (the panel of more than 2500 people) was conducted [10]. In the process of conducting research, the hypothesis was made that the transport factor directly influences the quality of life of the population of a certain territory and it also significantly increases the level of social inclusiveness of its population.

The results of the study show that 7.12% of the respondents are seeking to leave the territorial community at the first possible opportunity; 23.54% believe that their territorial community has no prospects for development; 29, 50% noticed that they simply have to live on the territory of the territorial community; 23.42% consider their territorial community a comfortable place to live; 4,08% recommend their territorial community to other people; 3.77% believe their territorial community is a good place for self-fulfilment and 8.58% of respondents want their children to live in the territorial community.

Most respondents assessed the state of roads in their territorial community as unsatisfactory (Fig. 1), which is due to chronic underfunding of the industry. It is worth mentioning that the distribution of panel participants' assessments on the state of roads is practically the same among those who live in the territorial community, who are completely satisfied with the standard of living in the territorial community and those who are aiming to change their place of residence.

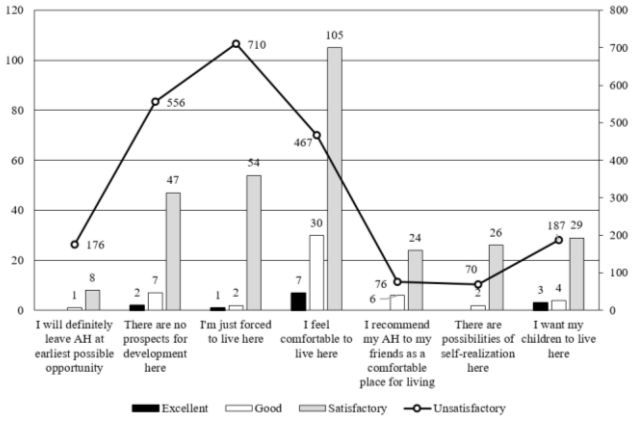


Fig. 1: Assessment of road traffic situation in territorial communities

The results of the survey determined the importance of the state of roads role in assessing the quality of life and attractiveness of the territory. Thus among the respondents who positively evaluate the prospects of life on the territory of the territorial community, the problem of road quality was put in the first place 21.53%, the second – 22.49%, and the third – 20.46%. The lack of opportunities to ensure social inclusiveness of the territorial community due to the poor quality of the road surface prevents the full use of the human potential of territorial community, which could act as a driver for the socio-economic development of territories. Among those who are dissatisfied with the standard of living in the territorial community and are eager to move, put the problem of road surface in the first place – 26.7%, the second – 24.9%, and the third place – 23.1%. In most cases, the territorial community's transport accessibility is becoming a reason for residents to change their place of residence, as they are forced to apply to higher levels of public administration to obtain the services of a living standard, most of them study or work outside their territorial community. This tendency can lead to the extinction of the Ukrainian village. Every year about 20 rural settlements disappear from the country map. Since the beginning of the 1990s, their total number has decreased by 1.5% (or 427 villages) [7].

4. The Evaluation of the Transport Network and the Main Indicators of Socio-Economic Development of Territories

To assess the significance of the impact of the transport network development on the economic development of the territories, the authors collected indicators of population size, area, length of roads and volumes of own revenues of the budget of 45 united communities.

Two types of communities were included in the sample: communities whose centres were former district centres and communities established on the basis of other settlements. The start-up potential for economic development of the territorial community of the first type is comparatively higher – due to the existence of established institutions and the traditional orientation of the transport network. The preliminary analysis showed lack of direct correlation between the indicators of the formation of the income base and the development of the network of highways.

To assess the significance of the development of the transport network impact on the possibility of economic development of the territories, the authors collected indicators of 45 territorial communities by population, area, length of roads and volumes of budget revenues.

A notable direct correlation was observed only between the indicators of population size and the volume of budget revenues, which is explained by the leading role of the personal income tax in the formation of the territorial communities' budgets. This may be an additional argument in favour of the fact that each territorial community needs its own approach and takes into account its specific development factors.

The authors made a dendrogram of territorial community's clustering based on four main indicators: population size, length of roads, area and revenues of the territorial communities' budget, as well as the share of territorial communities' territory in the total area of the largest part of the district location. (Fig. 2)

According to the data in Fig. 2, it can be argued that the majority of studied territorial communities are similar to the main indicators (the central part of the graph) and the presence of specific features of the territorial communities that are located in the acute parts of the graph.

Two-parameter graphs have been developed to generalize the distribution features of territorial communities, providing a structured cumulative visualization based on the main indicators. As a criterion of ordering, the volume of territorial communities' revenues is used. Ordering took place from the largest to the smallest value. The cumulative volumes of the budget of the territorial communities are shown on the graphs in the form of a dotted line (Fig. 3). The cumulating curvature is much lower than the general form of Pareto optimality (according to which the largest 20% in number form 80% of the population). In our case, 80% of the total budget revenues of territorial communities are formed at the expense of almost 45% of their number. This fact is evidence of the territorial communities' budget distribution. On the other hand, it should be noted that this situation on the backdrop of a general depression in the economy, the prevalence of cases when the largest aggregates of the territorial community's budget are organizations funded at the expense of budgetary funds, looks unattractive.

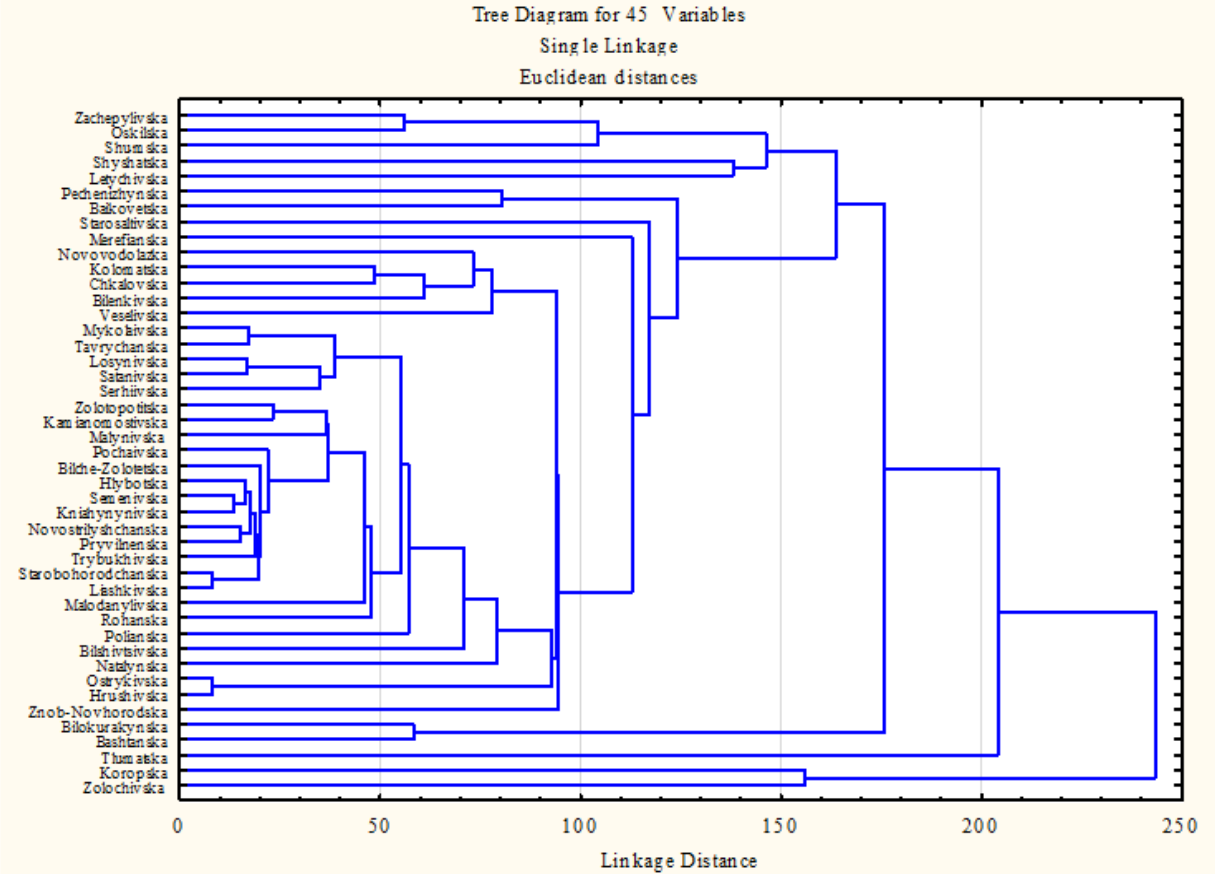


Fig. 2: Dendrogram of territorial community clustering

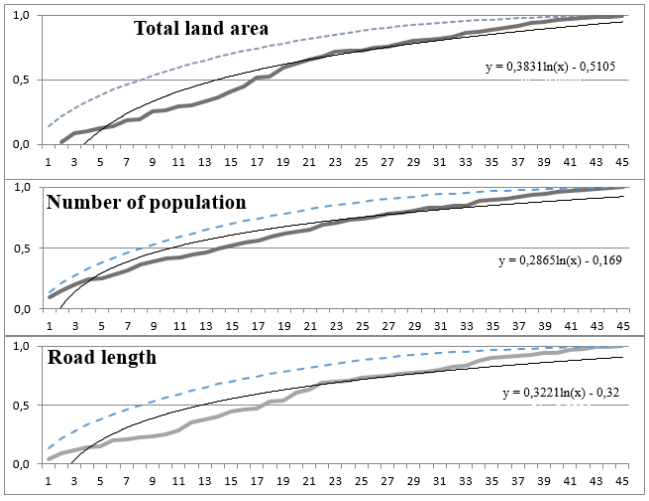


Fig. 3: Territorial communities' cumulative distribution by main indicators

As can be seen from the diagrams, the cumulative graphs of the main indicators (shown by the thick line) are even slower, which confirms the hypothesis of the proportionality of territorial community's development in terms of territory, road networks development and population.

The line graphs of trends (shown by a thin line) and their equations provide a fairly high level of approximation of the chart of territorial communities' main indicators of the development. At the same time, in the future perspective, an increase in the level of territorial communities' differentiation, which will be reflected in the growth of the linear coefficients of the approximation equations, is expected with a similar analysis.

5. Conclusion

The conducted research allows making a number of conclusions:

1. At the stage of implementing the reform of the administrative system, the development of transport and transport infrastructure is one of the key tasks of the long-term success of the local self-government reform in Ukraine, the creation of opportunities for business development, and the introduction of entrepreneurial initiatives of the territorial community (first of all, through the development of individual entrepreneurship among the local population.
2. The developed transport infrastructure allows meeting the needs of enterprises and population in goods and passengers transportation, establishing stable industrial-cooperative links, achieving balanced spatial development and increasing the level of territorial communities' local accessibility, their investment attractiveness and competitiveness.
3. The results of the residents' survey in terms of assessing the quality of life in the territorial community and their perception of their inclusiveness in community development processes, together with the results of the groupings and organizations, are representative for all territorial communities of the state. That is why changing the attitude of the territorial communities towards decentralization processes and development of the transport network requires the efforts of the subjects at all levels of public administration. Improving the state of roads will allow people to perceive their own role in the development of the state, which in its turn will increase their social activity and stimulate economic processes in the community.
4. The usage of the cluster analysis toolkit allows concluding that the territorial communities' economic development is relatively uniform and there is a need to develop their economic potential and transport, in particular, the one which will contribute to in-

creasing the inclusiveness of the population and stimulating economic development.
5. The proposed approach of two-parameter cumulative visualization of the main indicators of the territorial communities' development allows assessing the uniformity of the development of the studied set of indicators with a reference to the main indicator changing – one's own budget revenues.

References

[1] Europe 2020 strategy, available online: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework/europe-2020-strategy_en.
[2] Hansen WG, How accessibility shapes land use, Journal of American institute of planners, (1959), vol. 35., №2., pp. 10-44.
[3] In "Ukravtodor" the road condition was named the worst in recent years, available online: https://dt.ua/ECONOMICS/v-ukravtodori-nazvali-stan-dorozhnogo-pokrittya-naygirshim-za-ostanni-roki-235023_.html.
[4] In Davos, they came up with an alternative to GDP. And who is the world leader now?, available online: https://meduza.io/cards/v-davose-pridumali-alternativu-pokazatelyu-vvp-i-kto-teper-mirovoy-lider.
[5] Infrastructure of the regions of Ukraine. Priori-ties for modernization, NGO "Polish Foundation for International and Regional Studies", Friedrich Ebert Foundation (2017), p.108.
[6] Krugman P, End this depression now!, W.W. Norton & Company, (2012) available online: http://www.krugmanonline.com/books/end-this-depression-now.php.
[7] Lupenko Y, Every year from the map of the country disappears about 20 rural settlements, available online: https://agropolit.com/interview/309-yuriy-lupenko-schoroku-z-mapi-krayini-znikaye-blizko-20-silskih-naselenih-punktiv.
[8] Mykhailychenko K, Transport Strategy in the National Interest of Ukraine, Foreign Trade: Economy, Finance, Law, (2017), No. 2., pp.82-94.
[9] Preiger D, Sobkevich O, Emelyanova O, Realization of the potential of the transport and infrastructure of Ukraine in the post-crisis eco-nomic development strategy, (2017), p. 37.
[10] Rodchenko VB, Local Development : Best Practices and Tools for Smart Growth, (2017).
[11] Rodchenko VB, Prus YuI., Theoretical and methodical principles of development of regional economic space in conditions of transformational changes, Social economy, (2016), №2., pp. 46-53.
[12] The EU explained: Transport. – Luxembourg, Publications Office of the European Union, (2017), p. 20
[13] The Ministry of Infrastructure of Ukraine, with the support of its partners, launches a transport innovation project HypeUA available online: https://mtu.gov.ua/news/29567.html.
[14] The project of the National Transport Strategy of Ukraine for the period up to 2030, available online: https://mtu.gov.ua/projects/115/.
[15] Transport & Accessibility, Knowledge Centre for Territorial Policies of The European Commission, available online: https://ec.europa.eu/jrc/en/territorial-policies/themes/transport-accessibility.