

Classification of factors of development of transport infrastructure in the region

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Abstract. The formation of a unified strategy for the development of the transport infrastructure of the region is considered to be the basic direction of the developing the whole territory. The article is devoted to determining priorities in the implementation of programs of redevelopment of the regional plants. The submission suggested authors the characteristics of a grouping of theoretical and practical approaches to spatial reorganization of production. The result of this research, the specific recommendations on the application of redevelopment for the development of industrial areas. The organization of economic relations within the eastern regions of the Russian Federation, as well as the implementation of economic activities involving the transit and processing of a multitude of material and intangible flows on their territory, is a priority task of the state policy of smoothing the development of the regions of the country. To solve these macroeconomic problems, the transport infrastructure of the region has a priority.

1 Introduction

The main aim of the study was the actual scientific and practical problem: definition of priorities in the spatial development of industries. This problem breaks down into specific tasks: 1) reducing the load on the infrastructure of the region, 2) increase the availability of resources and distribution channels to manufacturing companies.

Methodical approaches to formation of strategy of development of transport infrastructure are designed to provide an understanding of the sequence of strategy formation, as well as to determine the means and units of the result of the achieved strategic goals.

In the framework of the strategic vision it is necessary to identify the whole range of resources and opportunities that will be used in achieving its strategic objectives.

The main objectives of the strategy of the region are the formation of the common economic space, the increase of economic activity of economic entities elimination of the differentiation of regions.

2 Methodological approaches and analysis

A systematic analysis of the interaction between transport infrastructure and economic systems (KHS) in the region, determine priorities in the search for new organizational solutions for reducing the load



on regional infrastructure. On the other hand, correlation analysis allows to separate businesses in need of redevelopment from property complexes is not subject to this transfer.

Since the main function of transport infrastructure is formation of system of transport service of the region, and it is based on the interaction of businesses and transport infrastructure of the region in the implementation process of barter, therefore, the main goals of the strategy for development of regional transport infrastructure are: organization of redistribution of the total volume of goods produced in the region and imported on its information resources and KHS. Within the framework of cooperation schemes must be used in all possible models of delivery of cargo from the sender to the receiver; each model differentiated by participating in types of channels transport services, as well as all potential needs transportation from business entities of different activities.

Through the use of the proposed scheme, using the new Economics Institute - the unified information space should be to offer a new methodological approach to development of strategy of development of transport infrastructure of the region [1].

The first component of the proposed approach, based on creating a single information space consists of four interrelated units:

1. Block. Unit of coordination of interests of economic subjects of the region.

In this unit assume the solution of interrelated tasks that define the priorities of formation of a uniform database about the activities and directions of activity of economic subjects of the region. (conferences on the harmonization of private and public interests to form a single information field);

2. Block. Block development of uniform requirements to information resources and terms of their use. Involves determining the value and relevance of information in a single information space;

3. Block. The unit provide control over the accuracy and storage of information. Involves both organizational and technological solutions for the handling of information from economic actors in forming a common information field

4. Unit 4. Block access, determining the terms of availability of information. Implying the payment of information resources into the unified information field. The received funds are allocated for the modernization of the information system the unified information field.

Consistent implementation of works in selected blocks of the first approach will create a database of information sources and data that are necessary and sufficient to define the weak, underdeveloped subsystems of the transport infrastructure and will assess the need for alternative directions of development of transport infrastructure of the region.

The second component of the methodological approach to formation of strategy of development of transport infrastructure based on optimizing the use of integrated information resources:

1. Block. Block groups sources of information. Each source of information should be reviewed and each source must be determined by its place in the priorities of the sectoral, intra-regional and inter-regional cooperation.

2. Block. The unit of analysis. Information should be accumulated in the form intelligible to the user on the basis of a mathematical, linguistic or visual comparison. The specification of the required information should be the procedure following the analysis.

3. Block. Block model solutions. The information field according to its functional content must provide the ability to implement standard solutions such as obtaining information about the source of information, obtaining contact data, possible submission of initial applications of cooperation [2].

The third component of the proposed methodical approach to formation of strategy of development of transport infrastructure based on the systemic analysis of relations within a single information field.

1. Block. Subjects planning. The collective use of materials of uniform information field allows groups of users to form strategic alternatives development. So the manufacturers of end products can build a strategy for the use of transport networks to ensure the production of necessary resources. Public authorities can build a strategy for the development of additional road paintings in the necessary burden on the road network. Consumers goods can form a strategy for procurement in this region, combining in their alternatives, many possibilities for combining and processing of goods

2. Block. Planning objects. The work of carriers, of freight forwarding services, service companies must be strictly regulated on the basis of unity requirement, the timing, cost and quality of transport services. Thus, planning for the use of transport infrastructure is built in a clear, organized process where all the links of the chain are able to achieve their goals.

3. Block. Common. The entire set of identified strategic decisions (block1 third approach) must not contradict the terms and conditions laid down in unit 2 of the first approach. The third block of the second approach must be fully and most reliably described in accordance with the second block of the third approach.

4. Unit 4. The formation of a single counseling center [3]. Any information space requires a moderator, to control information flows and cared about modernization as a technical and information support. This Advisory body should welcome the interests of both private capital and public interest, so the project consulting center seems to be a reason for the implementation of public-private partnerships in the region, which will lie of General interest for the development of transport infrastructure in the region.

3 Results

This group of regions on transport and infrastructure development is evidence of significant differentiation, which undoubtedly leads to insights about the importance of taking regional specificities into account when developing the strategic directions of development of transport infrastructure. Because the existing limitations and problems of regions caused by various factors: economic, geographic, geopolitical, structural, which in varying degrees constrain the development of social and socio-economic system of the region, so it is important to identify factors that determine the possibility of the provision of transport services in the region due to the operation of transport infrastructure. These factors often made to combine in a homogeneous group of population in accordance with different attributes: degree of influence by place of occurrence, origin, degree of development, degree of specialization etc.

Description of the factors that determine the level of development of transport infrastructure in the regions are presented in table 1 [4].

The analysis presented in the table of factors [5] allows to draw the following conclusions:

1. improving the efficiency of socio-economic development of the region is closely connected with the functioning of the transport infrastructure;
2. the lack of relationship between the elements of the transport infrastructure and economic entities at realization of transport process limits the progressive development of the economy of the region;
3. disunity modes of transport affect the level of efficiency of functioning of the region;
4. in terms of the large geographical extent of the territory of Russia and the need for operative interaction of participants of transport process will be of critical importance in information technology.

Presented in the table the factors that determine the level of development of transport infrastructure in the regions, and especially their manifestations in the regional economy, suggests that differentiation of regions in this sphere is characterized as the level of socio-economic development of the transport infrastructure, the capacity of the enterprises of transport infrastructure, and quantitative and qualitative characteristics of the consumers of transport services and their demand for transport services [6].

The investigation of the essence of TI and its significance in the processes of regional socio-economic development allows to draw a conclusion about change of views on this issue, the change in the strategic priorities of its development as a result of increasing the value of information interaction of participants of system of transport service. Changing perceptions of transport infrastructure and its use was associated with the integration processes on transport, because she is the Foundation of the strategic vision of the future in which cargo and passengers move without barriers, and TI acts as a dynamic engine of economic growth and welfare [7].

Table 1. Description of factors determining the level of development of transport infrastructure of regions (compiled by the author)

Group factors	Characteristic factors	Features manifestations in the regional economy
Forming the conjecture	The factors determining the conditions of regional transport infrastructure may be non-cyclic (permanent) and cyclical (cyclic linked to the change of cycles)	Cyclical: economic threats and risks; the likelihood of their occurrence; recession, recovery, depression, the rise of regional economies; inflation; seasonality. Acyclic: scientific and technical progress, the expenditure of material resources, social conflicts, natural disasters
Social	The population in the region; unemployment and employment in the region; prices (tariffs) for transport services; involve the public in the use of transport services; the provision of own vehicles	The establishment of optimal prices (tariffs) for transport services; encouraging people to use transport services; low level of coverage of consumers with affordable transportation services hinders the development of regional transport infrastructure and, as a result, reduces the level of socio-economic development of the region;
Institutional	Transparency, consistency of legislation governing the transport infrastructure of the region; the level of development of mechanism of public-private partnerships; the level of development of the overall socio-economic institutions; the mechanism of interaction of public authorities to the problems of development of regional transport infrastructure	At the moment, this group of factors in the Russian Federation is in the development stage: developed and approved the concept of development of regional transport infrastructure; improve the normative-legislative acts regulating the processes and relationships of regional transport infrastructure
Economic	Economic and financial sustainability of enterprises of the transport infrastructure; the effectiveness of the use of the means of production; profitability of the enterprises of transport infrastructure of the region; the ratio of supply and demand for transport services; the level of competition of the subjects of transport infrastructure	The lower freight rates; availability of transport services; the extension of the segment of consumers; the demand for transport services consumers; minimize the amount of money required for the storage of inventory due to the predictability of consumption of transport services
Innovative	The rate of diffusion of innovation at the enterprises of transport infrastructure at the regional level; the level of use and development of innovative technologies by consumers of transport services; differentiation of regions of Russia on level of technical equipment of transport infrastructure; the speed of transport service	Low level of innovative development of enterprises of regional transport infrastructure reduces the competitive advantage; high costs of transportation services reduce the competitiveness of regional businesses, thereby reducing revenues to the budget in taxes and contributions, reduced the number of jobs
Organizational and structural	The multiplicity of actors of the regional transport infrastructure; a growing concentration of constituent entities of the transport infrastructure of the region; different level of corporate governance of the transport infrastructure of the region; decentralisation of transport infrastructure and increased competition between transport companies, the lack of integration of the mechanism of interaction between transport infrastructure and economic entities	A large number of constituent entities of the transport infrastructure in the region is the need for coordination and integration of activities of enterprises of transport infrastructure to improve the efficiency of their interaction; transport infrastructure operators; the unresolved issues of cooperation of subjects of transport infrastructure, economic relations and public authorities impeded a unified concept of the functioning of the transport infrastructure of the region.
Information	The level of development of information support of subjects of the transport infrastructure of the region; the presence (absence) of standardized plans of transportation that allow you to organize for all participants a convenient system of interaction that are possible through integration of information resources of regional transport infrastructure of all modes of transport and demand for transport services businesses.	Low level of communication reduces the possibility of integrating all types of transport, is limiting for the formation of macro-integration systems and, subsequently, transport-technological systems

All of the above allows us to propose a clarification of the essence of TI in the region. The region's transport infrastructure is a collection of geographically dispersed organisations and all types of transport, working together in the information field, which activity is directed on formation of system of transport service of the region, providing favorable conditions for an economic integration TI and the MS, aimed at a quick and smooth execution of transport and related information flows in the process of addressing the needs for transport services businesses in the region.

Today, the development of TI is constrained by the influence of the external environment, which increases the uncertainty and risk management actions taken in the sphere of barter for: search partners transport activities; choosing the optimal variant of cargo; operational planning of logistics and transport-technological processes; to develop an efficient workflow; preparing analytical basis for managerial decision-making; acceleration of information flows and other transactions between the elements of TI and the economic entities. So there is a two-way relationship: how transport infrastructure affects both consumers and the characteristics of the consumers influence the dynamics of the development of transport infrastructure plays an important role here, their awareness of the supply and demand for transport services, and this, in turn, suggests that further transport infrastructure development in the region is possible only on the basis of the interaction and integration of transport infrastructure entities and economic entities (consumers). In these circumstances, come to the fore the issues of forming an effective information environment interaction in the framework of the transport service system that will improve resource efficiency, reduce costs, and to ensure the availability of transport services [8, 9].

For the purposes of development management of regional transport infrastructure is proposed to group the factors that determine the level of development of transport infrastructure in the region, depending on the degree of predictability of the result of the influence of the factor and the direction of the impact factor on the system of transport services (table 2) [10].

- The first group includes factors determined the degree of predictability of the obtained results the influence of which is installed in advance and is inevitable, and stochastic, the predictability of the results of the random effects which. Determined to include institutional, as their influence is determined in advance when forming the institutional base. To apply stochastic konjunkturanalyse and social, the uncertainty of their impact on the level of development of transport infrastructure is linked to the fact that at the regional level, it is impossible to calculate in advance the result of the impact of these factors.

- The second group includes factors, which are separated in the direction of the impact on the system of transport service of the region: economic, innovation, organizational-structural, information.

Using the classification of factors can ensure the development of the strategic priorities of the TI region on the basis of understanding the predictability of results and direction of effects of factors that can create conditions for effective and stable functioning of transport services in the region.

Table 2. Classification of the factors defining the level of development of transport infrastructure (compiled by the author)

On the degree of predictability of the result of the influence of transport infrastructure			On the degree of predictability of the result of the influence of transport infrastructure			
Stochastic		Stochastic				
Forming the conjecture	Social	Institutional	Economic	Innovative	Organizational and structural	Informational

4 Discussion

Consistent implementation of methodological approaches to development of strategy of development of transport infrastructure of the region using the common information space allows to solve the tasks TI of the region: current state analysis to identify the existing limitations and

advantages for further development of TI in the region; analysis of the spatial structure of all the businesses involved in this process; formation of unified information space of interaction between transport infrastructure and economic entities; the definition of the prospects and processes of integration business entities and transport infrastructure on the basis of a single information space; development of interregional and regional transport linkages through the development of conceptual schemas of interaction and implementation of information and economic relationships [11,].

All regions of the country have different levels of transport infrastructure development. According to research by the Institute of geography RAS [12] experts have identified five Russian regional zones, which are aggregated on the level of development of transport infrastructure [14, 15, 16]:

- 1) external peripherals, which occupies about half the territory of the Russian Federation. It is home to approximately 1.5% of the population of Russia, mainly in the Northern regions, which is necessary in the first place, the development of waterways and regional aviation.
- 2) the forest zone which occupies about 22% of the territory of the Russian Federation. It is home to approximately 3% of the total population of Russia. For normal development it is necessary to preserve the fading of settlements by improving communication and transport accessibility;
- 3) forest-agricultural area, where approximately 33% of the total population of Russia, and which becomes a center of industrial development and urbanization, and this entails the need for a qualitative change of the transport infrastructure on the basis of innovative technologies;
- 4) South Russian regions, where nearly 60% of the rural population) are in need, primarily in developing transport infrastructure agro-industrial and tourism areas;
- 5) the southern mountainous areas, where practically no transport infrastructure [13].

5 Conclusions

A significant role in the economic development of the region is its large-scale and rapid propagation of traffic flows by integrating information resources, the creation of a single information space, introduction of information and communication technologies, allowing to conduct business in real time around the world. The information and economic integration of businesses and elements of transport infrastructure today can be a source of growth as the economy of a particular region, and its competitiveness. Therefore, the most important for realizing the objectives of the present study is presented of the organizational structure and information factors determining the possibility of rational organization of transport and associated information flows that enable the integration of transport infrastructure and economic structures of the region [18].

Thus, for achieving the overall goal of research should pay more attention to a group of shared factors in the direction of the impact on the system of transport services. Among which the group of information factors is of particular interest for the development of the strategy of development of transport infrastructure of the region. Information factors are designed to equip regional administration's guidelines to determine state participation in the development of transport infrastructure, while economic entities, relying on the information factors is able to predict changes in the conjuncture of supply and demand.

This group of factors include:

1. The development of the network communications;
2. Development of communication channels;
3. The availability of technical means of communication;
4. The unity of requirements to build information platforms;
5. Metrological unification of the processes of loading and unloading;
6. Completeness of filling databases on the status and development of economic activity in the region;
7. Systematic information on processing of goods.

Structurally a lot of the information factors in the development of transport infrastructure to serve information and economic integration of government, business and consumers in achieving a single goal: improving the welfare of all participants of market relations in the border region.

Prospects for improving transport infrastructure in the region on the basis of information and economic integration are associated primarily with:

- integration of information resources of elements of transport infrastructure and economic entities in the region in terms of use of the Internet and telematics technologies to provide global monitoring of transport streams;
- the formation of a network of toll highways, equipped with a remote forms of mutual settlements;
- improvement of external and internal documentation flow in transport service and transport companies;
- creating online virtual complex of transport-forwarding companies, which provide self-regulating processes in the relationship between transport providers and customers (Internet services samasamaja);
- problem solving idle transport vehicles on the borders with the extensive implementation and use of technologies "Green Custom", which is based on electronic data interchange (EDI);
- integration of information resources of the transport-service and goods-producing organizations with consumers on the basis of a common telecommunications platforms.
- the formation of a network of logistic centers, which provide integrated control of technological and production processes of the transport infrastructure of the region.

Thus, the conducted study allowed us to identify the factors that determine the level of development of transport infrastructure in the regions. The authors believe that recently there was a reorganization of the hierarchy of these factors associated with what is on the forefront of organizational-structural and informational factors that affect the implementation of information and economic integration of transport infrastructure and businesses. Therefore, it is advisable to conduct a study of the role of information and economic integration in the strategic development of the transport infrastructure of the region.

References

- [1] Mottaeva A 2013 *Metodologija prostranstvennogo raspredelenija predprinimatel'skih struktur regiona na osnove razvitija transportnoj infrastruktury. monografija* (Saint-Petersburg: Asterion) 301 p
- [2] Valasova A 2010 *Rynok ego struktura i infrastruktura* (Moscow: Laboratorija knigi) 95 p
- [3] Shannon K Smets K 2010 *The landscape of contemporary infrastructure* (Rotterdam) 272 p
- [4] Hass L Mazzei L O'Leary D 2008 *Transport infrastructure investment: options for efficiency* (Paris OECD) 234 p
- [5] *Setting standards for communication and governance: the example of infrastructure projects* 2007 (Washington) 47 p
- [6] Stein E Taskaeva N and Chibisova E 2016 *Procedia Engineering*, **165** pp 1410-1416
- [7] Miroshnikova T and Taskaeva N 2016 *MATEC Web of Conferences* **73** 07006
- [8] Polyakova I and Vasilyeva E 2016 *Procedia Engineering* **165** pp 1380-1387
- [9] Mottaeva A et al 2016 *MATEC Web of Conferences*, 07018, DOI: <https://doi.org/10.1051/mateconf/20167307018>
- [10] Mottaeva A 2016 *MATEC Web of Conferences* **73** 07020, DOI: <https://doi.org/10.1051/mateconf/20167307018>
- [11] Morozov V and Taskaeva N 2016 *Journal of Internet Banking and Commerce* **21** Special issue 4 p 20
- [12] Chibisova E 2015 *Journal of International Scientific Publications* **5** 2 pp 600
- [13] Meshcheryakova T 2017 *MATEC Web of Conferences* **106** 06021
- [14] Mottaeva A 2017 *MATEC Web of Conferences*, 08071, DOI: <https://doi.org/10.1051/mateconf/201710608071>
- [15] Mottaeva A 2016 *MATEC Web of Conferences*, 07020, DOI: <https://doi.org/10.1051/mateconf/20167307020>
- [16] Akimova E 2017 *MATEC Web of Conferences* **106** 01043