

Legal aspects in development of transport infrastructure in the city of Tyumen

*Yuri Truntsevsky*¹, *Victoria Lez'er*², *Sergey Belyasov*³, *Anna Kopytova*^{2*}

¹ Institute of Legislation and Comparative Law under the Government of the Russian Federation, Cheremushkinskaya str., 34, Moscow, 117218, Russia

² Tyumen Industrial University, Volodarskogo str., 38, Tyumen, 625000, Russia

³ Moscow Regional Institution of Higher Education "University for Humanities and Technologies", Green St., 22, Orekhovo-Zuevo, Moscow region, 142611, Russia

Abstract. The authors of the article seek to determine the nature, characteristics and main directions of development of transport infrastructure in the municipality of Tyumen; to describe the management system for development of transport infrastructure; to develop a model for improving the management of transport infrastructure in the city of Tyumen, to identify measures for improving regional and municipal legislation; to make recommendations for the system of municipal authorities. The study is based on the basic principles and methods of development of transport systems of municipalities. The authors conclude that only implementation of a complex integrated policy at the state level based on the synthesis of transport management systems, urban planning, land use and traffic management is able to resolve current problems in the transport infrastructure of Russian cities. Federal monitoring and control of compliance of public transport services with the quality standards along with responsibility of heads of municipalities will become the main incentives for the priority development of public transport in Russian cities.

1 Introduction

The relevance of solving transport and environmental problems is explained by the importance of measures aimed at reducing the influence of harmful factors on the environment and public health arising from the functioning of transport. Efficient implementing approaches to solving the transport and environmental problems of a large modern city is possible provided that there is organizational and legal regulation of socio-economic relations, clear organization of management and control over the implementation of regulations based on complete, reliable and relevant information on the status of existing problem.

In this regard, studies developing a mechanism for legal regulation of the transport problem of an urban settlement on the example of the city of Tyumen are particularly relevant. As a fast-growing city and transport hub, Tyumen directly suffers from

*Corresponding author: a.kopytova@yandex.ru

insufficient development of the road transport network. For its reform, it is necessary to clearly define all aspects of the problem and develop a high-quality strategy for reforming the transport infrastructure of the city.

Transport infrastructure of the modern city as a single system consists of elements of external and intercity transport of various types, interacting with each other and ensuring the smooth functioning of urban structures. Elements of transport infrastructure include: road network; off-street transport network (above-ground and underground); networks of external (intercity) transport laid through city planning structures; facilities for servicing the transport sector (parks and depots for parking, repair and maintenance of rolling stock, freight terminals or stations, energy facilities, stations).

It should be noted that the transport infrastructure is a complex organism, functioning as a result of continuous improvement of management by municipal and state authorities. This is very important, since the operation of the city transport network constitutes a significant part in the overall structure of city budget expenditures, including capital. The situation associated with the adverse environmental impact of automobile and public transport in the city of Tyumen is currently typical for most Russian cities, therefore all conclusions, suggestions and recommendations made in this study can be used by municipal authorities of other cities of Russia.

The purpose of the study is to determine the nature, characteristics and main directions of development of transport infrastructure in the municipality of Tyumen; to describe the management system for the development of transport infrastructure in the city of Tyumen; to develop a model for improving the management of transport infrastructure in the city of Tyumen. The authors of the article seek to identify measures to improve regional and municipal legislation; recommendations for the municipal system.

Several studies in the field of the impact of transport on the environment, life and human health were carried out at the end of the twentieth century, mainly the work of ecologists and doctors (Erokhov V.I., Kozlov Yu.S., Krasovitskaya M.JL, Malov R.V., Malyarova T.K., Menshova I.A., Peshkov A.C., Seleznev M.A., Troitskaya H.A., Feldman Yu.G., Eichler V., Yakovlev A.N.) Opinions of all authors are unanimous regarding the existence of harmful factors arising from the operation of automobile transport; the experimental data on the effect of individual components of exhaust gases on human health are presented in the scientific works. In addition, it is necessary to remember the negative noise (acoustic) effects of various modes of transport.

Another aspect of the research of this problem is aimed at improving the technical characteristics of public transport and roads. The works of engineers and designers present the results of bench tests of engines, suggestions for improving their technical characteristics, improving the road surface, introducing new standards in the design of highways, etc. (Authors: Avduevsky B.C., Belousova G.I., Buslaev A.P., Deryabin Yu.A., Lukanin V.N., Marchuk G.I., Porotikov V.R., Tatashev E., Trofimenko Yu.V., Yashina M.V.).

An important role in the scientific research of this problem is given to road safety, which is highlighted in the works of Zhulev V.I., Konoplyanko V.I., Kormishkin B.P., Krinitsky E., Lukyanov V.N., Novikov E.A., Pivovarov A.C., Rossiysky B.V., Khomyakov Y. V., Yakubenko N.V. In the works of Menzie Ch. A., Potocki V.V., Santodonato Y., Schelp L., Mueller P.K., Hitchcock M., as well as Russian authors Abalkin I.L., Barabashev G.V., Lapina M. there are reflected the results of studies of foreign scientists regarding the impact of transport to the environment and human health, some points of foreign experience in solving this problem are given. Of great interest to the author were the works of Russian legal scholars: Avakyan S.A., Alekseev S.S., Bahrakh D.N., Kazimirchuk V.P., Kleandrov M.I., Kokotov A.N., Nevinsky V. V., Nikonov V.A., Olkov S.G., Sevryugin V.E., Suntsov A.P., Chebotarev G.N. and others.

2 Methods

The study is based on the basic principles and methods of development of transport systems of municipalities:

1. Orientation to the interests and safety of consumers.

The transport system should be considered as a comprehensive mobility service (including on foot and on all types of individual and public transport of all forms of ownership), which the state provides to consumers, guaranteeing both high quality and safety of the trip itself, and environmental quality (low air pollution, low noise, etc.). It is necessary to abandon decisions "by departments" and to move to decisions in general on the transport system.

2. Availability and completeness of information on quality and cost indicators for the transport system.

It is necessary to include in the system both indicators of the quality of the trip itself (communication speed, comfort, safety, etc.) and indicators of the influence of the transport system on the quality of life of the population (the need for territorial and energy resources, the degree of environmental pollution), and also indicators of costs for the development and operation of the system (including direct and indirect, associated with environmental pollution and loss of time of the population on movement). Indicators should be publicly available on the Internet.

3. Control of decisions about indicators of quality and costs.

Each decision in the field of urban transport should be made on the basis of a specific goal and possible options for achieving it. The development of transport infrastructure (increasing the length of roads, as well as their improvement, building subways) cannot be the goal and substitute for real goals: improving the quality of mobility services, reducing the social and financial costs of the transport system. It is necessary to exclude from the ranking the options that do not provide standards for the quality of mobility services and the quality of life of the population.

4. The legislative framework for the development of state transport policy, including the strategy for the development of transport in general and its individual sectors, are the Constitution of the Russian Federation, the Civil Code of the Russian Federation, the Tax Code of the Russian Federation, the Budget Code of the Russian Federation, other legislative acts regulating public relations, and also by-laws and regulations relating directly to the sphere of activity of the transport complex. The powers of municipalities in the field of transport infrastructure are specified by regulations at various levels. (Legislation and by-laws were examined by the authors as amended on February 1, 2020)

We list only a few of them:

Federal Law of the Russian Federation of November 8, 2007 No. 257 "On Roads and Road Activities in the Russian Federation and on Amending Certain Legislative Acts of the Russian Federation";

Federal Law of the Russian Federation of November 8, 2007 N 259 "The Charter of Road Transport and Urban Surface Electric Transport" (regulates all aspects of passenger transportation, including the territory of municipalities).

"Transport Strategy of the Russian Federation until 2020", approved by Order of the Ministry of Transport of the Russian Federation dated May 12, 2005 No. 45 "On approval of the Transport Strategy of the Russian Federation for the period until 2020".

"Transport strategy of the Russian Federation for the period until 2030", approved by order of the Government of the Russian Federation of November 22, 2008 N 1734-r (as amended on May 12, 2018). (Source: <http://static.government.ru/media/files/Z31ADuvq0eoXlknPdhwWRYI22ISdhpas.pdf>)

The Strategy states that "at a new stage, it is necessary to form an active position of the

state to create conditions for socio-economic development, primarily in order to improve the quality of transport services, reduce the total costs of society that depend on transport, increase the competitiveness of the domestic transport system, strengthen innovation, social and environmental focus on the development of the transport industry. ” (Source: <http://docs.cntd.ru/document/902132678>)

In addition, there has been an increase in global competition spanning markets for goods, services and capital. The Strategy emphasizes that restructuring of the world economy has begun, associated with a change in the balance between economic centers, an increase in the role of regional economic unions and the expected spread of new technologies. An important factor is the increasing role of human capital in socio-economic development.

The authors respond it with sufficient elaboration of the regulation of transport issues at the national level, the regulatory and legal framework of the transport infrastructure of municipalities is not sufficiently developed and does not regulate many aspects, which negatively affects the development of transport infrastructure and transport safety.

5. To solve the tasks, we also applied the deduction method to determine the transport infrastructure of the city, the survey method to identify problems in the transport infrastructure of the city of Tyumen and the modeling method in developing a model for improving the management of transport infrastructure in the city of Tyumen.

3 Results

The authors have analyzed regulatory documents developed by the administration of the city of Tyumen in 2018-2019 on planning of transportation for 2019 - 2021 and on amending the resolution of the Administration of the city of Tyumen of 08. 06. 2015 No. 104-pc. This resolution approved the “REGULATION on the creation of conditions for provision of transport services and organization of transport services for the population within the boundaries of the municipality of the urban district of the city of Tyumen” (hereinafter - the “Regulation”). The priority direction of state policy in the field of transport and road facilities is the creation of favorable living conditions for the population, the improvement of production and social infrastructure. To this end, a set of measures is being taken to develop a modern and efficient transport infrastructure that accelerates commodity distribution and reduces transport costs in the economy, and road safety.

According to the data, as of 01.01.2018, the public passenger transport route network includes 109 regular transport routes and has a length of 506.9 km. The total number of passengers transported on all scheduled regular passenger routes in 2017 amounted to 139.93 million, including 0.97 million students, 5.34 million schoolchildren, 20.76 million old-age pensioners, and 29.80 million regional and federal beneficiaries. The average age of regular vehicles is 4.5 years. As of January 1, 2018, the public passenger transport route network includes 1,191 stopping points.

As an example, we can cite statistical data (Source Tyumen region in numbers (2014-2018) BRIEF STATISTICAL COLLECTION OFFICIAL EDITION. Tyumen, 2019, p. 129) in tables No. 1, 2 and 3.

Based on the foregoing, when reforming the transport system, it is necessary to clearly define all aspects of the problem and develop a high-quality strategy for reforming the transport infrastructure of the city of Tyumen and the Tyumen region as a whole without autonomous areas - Khanty-Mansi Autonomous Area-Yugra and Yamalo-Nenets Autonomous Area).

The existing problems in the organization of regular transport are identified:

- a) the glut of the rolling stock of public passenger vehicles using small vehicles;
- b) increasing level of motorization while maintaining negative dynamics of demand for

passenger transportation by public transport, increasing level of motorization as a factor that impedes positive dynamics of demand for public passenger transport services among city residents;

c) insufficient provision of priority for passenger motor vehicles of general use when driving in a traffic stream.

Table 1. Accidents in transport in the Tyumen region (according to the traffic police of the Internal Affairs Directorate of Russia)

№	2014	2015	2016	2017	2018
Number of incidents	6,028	5,268	5,091	5,086	5,107
Number of deaths	621	530	524	504	400
Number of injured	8,182	7,097	6,923	6,750	6,921
Per 100,000 population					
Number of incidents	169.1	146.4	139.9	138.3	137.7
Number of deaths	17.4	14.7	14.4	13.7	10.8
Number of injured	229.6	197.2	190.3	183.6	186.6

Table 2. Provision of population with vehicles.

Provision of population with vehicles	2014	2015	2016	2017
- public buses per 100,000 OF CITIZENS	121	121	127	126
- personal cars owned by citizens	312.2	310.5	316.4	321.8

Table 3. Passenger turnover of public motor vehicles (including individuals engaged in the carriage of passengers on a commercial basis)

Passenger turnover	2014	2015	2016	2017	2018
Total million pass.- km	3148,9	3,066.4	3,109.1	3,292.0	3,554.3
Percentage of previous year	84,4	97,4	101,4	105,9	108,0

Having studied the features and problems of the functioning of the transport infrastructure of the city of Tyumen, we came to the conclusion that it is necessary to increase the level and quality of control. To do this, it is necessary to take the following measures: create a hotline on all issues of transport infrastructure; create an electronic resource or a tab in it, where a single record of all citizens' appeals will be kept; when developing a strategy for the development of the transport infrastructure of the city, conduct social research in order to take into account the identified problems; to increase the information support of the population on road construction and repair, as well as public transport.

The measures to improve the organization of regular transport are analyzed:

1). Implementation of measures to develop the route network, taking into account the development of transport infrastructure facilities annually in accordance with the "Regulation". 2) An increase in the share of buses of especially large, large and middle classes in the overall structure of the fleet of vehicles involved in the regular transportation routes of the city of Tyumen, from 53% as of 2018 to 70% in 2021. 3) Implementation in 2019 - 2021. a set of measures to popularize public passenger transport in order to increase its demand among the population and related measures to stimulate the rejection of personal transport in favor of public passenger transport. 4) Bringing the total share of buses in a single color scheme (green color "Flora") in the overall structure of the fleet of vehicles involved in the regular transportation routes of the city of Tyumen to 100% by 2021, in order to create a uniform appearance of public passenger transport. 5) Implementation of measures to ensure the priority movement of block vehicles, including by changing the organization of traffic in certain sections of the road network.

4 Discussion

The economy of large cities in general, and Tyumen in particular, is completely dependent on transport. The lack of reliable, stable transport means a “collapse” of the labor market (the choice of a job is limited to the immediate vicinity), curtailment of the consumer market (citizens do not go anywhere again - therefore, they make less purchases and use less services), transport fatigue and decrease in labor productivity, fall the effectiveness of emergency services, loss of free time, growth of transport costs, deterioration of the environmental situation. The problem affects about 65% of Russia's population, providing at least 80% of the country's GDP. Without a reliable transport system in cities, we jeopardize the production of these same 80% of Russia's GDP.

The problem is cyclically aggravated: as public transport deteriorates due to congestion, more and more citizens change to individual cars - and the need for a road network for each passenger increases by 10 times. The method of "treating urban congestion" in the world has long been known - this is the construction of a reliable public transport system with the simultaneous creation of obstacles to using an individual car in cities.

Unfortunately, in Tyumen there are currently no mechanisms for the priority development of urban public transport: market mechanisms in this area are counterproductive, administrative measures have no incentives and are not fixed by law. Cases of concentration of efforts of the city administration on the priority development of public transport are happy exceptions, while city administrations act by trial and error due to the absence of any state policy and recommendations in this area.

The main problems of the functioning of transport in Tyumen can be divided into objective and subjective. Objective problems: an increase in the level of motorization of the population, an increase in the intensity of using individual vehicles, a decrease in the efficiency of urban passenger transport, an increase in the need for city residents to move, a disproportion between the level of motorization and the pace of road construction, urban planning problems of urban development.

According to data for 2017-2018. the number of cars registered with residents of Tyumen and the Tyumen region increased by almost 8.5% - from 355 to 385 thousand. (Source: <https://72.ru/text/transport/66030892/>)

Subjective problems: imperfection of the organization and management system for the development of the road transport complex, insufficient legislative base at the local and regional level in the field of managing the transport system of the city, region, insufficient information component in making managerial decisions, lack of financing for the development of road networks and transport infrastructure, negative impact of human factor.

The state of transport and environmental security in cities urgently requires increasing real responsibility for ensuring order in this area of local authorities. In this connection, an approximate mechanism for the legal regulation of the motor transport problem of a city of regional scale has been developed.

If the maximum permissible indicators of adverse factors (maximum permissible concentrations of automobile emissions, exceeding the average threshold of diseases associated with the negative impact of exhaust gases) are repeatedly exceeded, the executive body of state authority of Tyumen, as a subject of the Russian Federation, must declare a “territorial environmental and road transport emergency”, take over fulfillment of certain powers of local authorities and take emergency measures to normalize the situation.

To-do list includes normative consolidation as a priority direction for transport organizations, expanding the city network of trolleybus routes, increasing units of environmentally friendly trolleybus transport while reducing buses on these routes,

excluding buses from the urban cycle of passenger transportation if their life time is longer than 8 years, creation of conditions for mass use of bicycle transport. The necessity of compulsory insurance of environmental risks of enterprises whose activities, in one way or another, is potentially hazardous to the environment, in particular, activities related to the maintenance of road transport, is justified.

The federal laws relating to environmental protection contain many declarative articles, i.e., there is no legal mechanism for their implementation, which makes it impossible to apply, enforce, use and comply with these articles in practice. In such a situation, local authorities must take the initiative and develop these mechanisms independently in relation to the specific conditions of municipalities, without waiting until the legal mechanisms necessary to implement the provisions of the laws are developed at the state level.

5 Conclusion

Only a systematic approach to solving transport problems, i.e. the implementation at the state level of a complex integrated policy based on the synthesis of transport management systems, urban planning, land use and traffic management, implemented through appropriate industry and legal bases, is able to resolve the current situation in the transport infrastructure of Russian cities. The "stumbling block" in solving modern problems in the transport industry as a whole is currently the imperfection of the regulatory framework that ensures the implementation of the transport policy of large cities, taking into account their specific features. The adopted laws sin with a large number of shortcomings and omissions, as well as the lack of a clear and comprehensive delineation of subjects under the jurisdiction between the federal, regional and local levels of government. Solving the transport problem in Russian cities requires the creation of a federal policy in the field of urban transport management, the development of federal legislation, a management system and financial support for public transport. Federal monitoring and control of compliance with the quality standards of public transport services along with the responsibility of heads of municipalities will become the main incentives for the priority development of public transport in Russian cities, and will strengthen the socio-economic basis of urban activities.

References

1. M. Finka, M. Husar et al., *IOP Conference Series: Materials Science and Engineering* **603(2)**, 022004 (2019) DOI: 10.1088/1757-899X/603/2/022004
2. E.M. Bukhvald. *Journal of Russian Law*, **11**, 131-143. (2019) DOI: 10.12737/jrl.2019.11.10
3. J. Gozdecki, K. Loziak et al., *MT-ITS 2019 - 6th International Conference on Models and Technologies for Intelligent Transportation Systems* 8883382 (2019) DOI: 10.1109/MTITS.2019.8883382
4. V.I. Kolesov, A.I. Petrov *Transport. Science, technology, management*, **6**, 20-22 (2015)
5. A.R. Bakhtizin, Ye.M. Bukhvald *Journal of Russian Law*, **9**, 102-112. (2018) DOI: 10.12737/art_2018_9_10
6. V. Lez'Er, N. Semerianova, A. Kopytova, Y. Truntsevsky, *E3S Web of Conferences* **110**, 02093 (2019) DOI: 10.1051/e3sconf/201911002093
7. E.S. Boltanova, *Journal of Russian Law*, **10**, 81-90. (2017) DOI: 10.12737/article_50c4d75de5fa4.90386392

8. A.V. Kopytova, N.S. Zotkina, I.G. Reshetnikova, *MATEC Web of Conferences* **239**, 04012 (2018) DOI: 10.1051/mateconf/201823904012
9. A.I. Petrov Features of the formation of motor accident in space and time (Tyumen, Tsogu, 2015)
10. *Chemical, environmental and experimental date.* **32**. (Lyon, JARC6, 2016)
11. E. Vozniak, A. Burgundosova, A. Kopytova, *MATEC Web of Conferences*, **239**, 01016 (2018) DOI: 10.1051/mateconf/201823901016
12. J.H. Johnson, *Air Pollution: the Automobile and Public Health*, 39-75 (Washington, D.C, National Academy Press, 2016).
13. G. Domergue, *International Criminal police review.* **458/459**, 2016
14. D. Izvin, V. Lez'Er, A. Kopytova, *MATEC Web of Conferences*, **170**, 01065 (2018) DOI: 10.1051/mateconf/201817001065
15. Ch. A. Menzie, B.B. Potocki, Y. Santodonato, *Environ. Sci. Technol.* **26(7)** (2012)
16. A. Deja, J. Harasym, M., Kaup, D. Łozowicka, *Smart Innovation, Systems and Technologies* **155**, 507-520 (2019) DOI: 10.1007/978-981-13-9271-9_42
17. A. Koehler *WIT Transactions on the Built Environment* **182**, 373-377 (2019) DOI: 10.2495/UT180341
18. A. Kopytova, *MATEC Web of Conferences*, **106**, 08056 (2017) DOI: 10.1051/mateconf/201710608056
19. G. Baldini, L. Sportiello, M. Chiaramello, V. Mahieu *International Journal of Critical Infrastructure Protection* **21**, 3-21 (2018) DOI: 10.1016/j.ijcip.2018.02.001
20. M. Bazarbekova, Z. Assipova, A. Molgazhdarov, M. Yessenov, *Cogent Engineering* **5(1)**, 1450799 (2019) DOI: 10.1080/23311916.2018.1450799
21. V.A. Lez'Er, N.A. Semeryanova, A.V. Kopytova, *MATEC Web of Conferences*, **239**, 04027 (2018) DOI: 10.1051/mateconf/201823904027
22. N. Semeryanova, O. Fedorenko, A. Kopytova, *MATEC Web of Conferences*, **239**, 04013 (2018) DOI: 10.1051/mateconf/201823904013