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Intelligent Transport Systems as the Basis of de Lege Ferenda of the Transport System of the Russian Federation

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highly automated vehicle,
intelligent transport system,
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Safety,
transport infrastructure,
transport legislation,
unmanned vehicle

Abstract

Objective: to research the trends of legal regulation of using intelligent transport systems under digital transformation of the transport sector of economy, namely, the growing importance of intelligent transport systems in the future transport system of the Russian Federation.

Methods: systemic-structural method is the basis for researching intelligent transport systems. It enables to study the architecture of intelligent transport systems as a complex structural unity. Also, comparative-legal method was used, aimed at illustrating the differences and similarities in the legal regulation of intelligent transport systems. Methods of legal modeling and forecasting, as well as formal-logic method, served as secondary methods to comprehensively study the legal regulation of intelligent transport systems.

Results: the article presents conceptual approaches to defining the notion of "intelligent transport systems" and outlining the hierarchy of intelligent transport systems, which play a fundamental role in building the transport sector. Based on the analysis, conclusions are made about the vectors of forming transport legislation, aimed at regulating the use of intelligent transport systems.

Scientific novelty: the article provides a conceptual approach to forming the legal regulation of intelligent transport systems. To this end, the issue is considered about the essential content of the notion

of “intelligent transport systems” at legal and scientific levels; the current terminological problems in building the legal regulation are shown. Analysis of the architecture of intelligent transport systems allowed for the first time to formulate the basic approaches to shaping the legal regulation of its individual elements (including highly automated and fully automated transport means, “smart” infrastructure, etc.) not in isolation but as constituent parts of the whole matter.

Practical significance: the presented materials and conclusions facilitate the development of legal regulation of transport industry under digital transformation. The article accentuates the legal regulation of intelligent transport systems taking into account their technical and technological features. It is the intelligent transport systems that are de lege ferenda of the transport system, which determines the vector of transformation of transport legislation. In turn, development of the legal bases allows broadening the geography of introducing technical novelties and making their application much more large-scale.

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Contents

Introduction

The modern national and global transport system is characterized by constantly growing numbers of transport means participating in carrying cargo and passengers. This trend has the following negative consequences:

1) the growing number of transport accidents, the immediate cause of which is the human factor, in most cases;

2) harmful impact on the environment (Bagreeva et al., 2019);

3) overload of transportation routes, which leads to problems with coordination of logistic chains and decreasing the speed of cargo delivery (Du et al., 2023);

4) lack of transparency of the transportation process;

5) lack of a "seamless" transportation corridor for carrying cargo and passengers (underdeveloped multimodal transportation).

At the same time, the stable development of the Russian economy (in particular, the effective functioning of distribution chains and other economy segments) requires accelerating the cargo turnover on the premise of the increased safety of transportation process, quality of the transportation operations performed, ensuring their reliability and transparency. In other words, it is necessary to create an integrated and continuous multimodal system of sustainable and intelligent transport mobility[1].

To solve the above tasks for all modes of transport, certain measures are taken, associated with the increased automation of certain transport operations, emergence of digital services for the participants of transportation process, development of interfaces to implement projects controlling parking lots and stands, traffic regulation, automated identification of vehicles, etc. The current changes, touching upon all modes of transport, require creating a legal system, which is nowadays is being formed through issuing individual normative-legal acts. Examples include the following. In aviation industry, the Complex program of aviation sector development in the Russian Federation up to 2030[2] was adopted. In the maritime sphere, the Naval doctrine of the Russian Federation[3] was adopted. In railroad sector, changes will come into force since September 2023 referring to transporting passengers, luggage, and cargo using automated systems[4].

However, the largest number of changes is related to the legal regulation of automobile transportation. This is due to the fact that, on the basis of the 78th session of the Global forum on road safety held in Geneva on March 25–29, 2019, a resolution was adopted[5], according to which highly- and fully automated vehicles are introduced into road traffic. This document became the basis for further development of legal regulation of the use of automated vehicles in various countries. For example, the Russian Federation adopted the Concept of ensuring road safety on general purpose automobile roads using unmanned

1 This task seems relevant not only within one state but at the international level as well (decision of the European Commission of December 3, 2021, establishing the Multimodal forum for passenger mobility).

2 Executive Order of the Government of the Russian Federation No. 1693-r of 25.06.2022. (2022). *Collection of legislation of the Russian Federation*, *27*, Article 4877.

3 Decree of the President of the Russian Federation No. 512 of July 31, 2022 (2022). *Collection of legislation of the Russian Federation*, *31*, Article 5699.

4 Order of the Ministry of Transportation of the Russian Federation No. 352 of September 5, 2022 (2022). *Official Internet-portal of legal information*. www.pravo.gov.ru, # 0001202210270033.

5 *Report of the Global forum on road safety on the work of its 78th session*. https://unece.org/DAM/trans/doc/2019/wp1/ECE-TRANS-WP1-167r.pdf

vehicles[6] (further – the Concept of ensuring road safety). Besides, the Russian government adopted new rules of transporting cargo by automobile vehicles[7].

Foreign countries also develop legislation in this field. For example, Japan adopted the Public-Private ITS Concept Roadmap 2018[8]. On June 7, 2019, the plan was reviewed, but no conceptual changes were introduced (Public-Private ITS Concept Roadmap 2019)[9].

The mentioned measures are a serious step towards creating and functioning of an integrated transportation system in the country. However, it is obvious that they are not sufficient for implementation of the set task, as the current digitalization measures are discrete. This local character exists not only in technical but also in legal terms. Isolation of the technical component consists in automation being implemented only in certain segments of the transportation process. Each segment functions in isolation, without the required interconnections between them. Besides, digitalization of transport industry is performed separately by modes of transport. From the viewpoint of legal regulation, the adopted normative-legal acts aimed at regulating transport relations (in particular, the use of intelligent transport systems) are explicitly pro-automobile. The lack of a common legal regulation stipulating the universal rules with regard to all modes of transport[10] is an obstacle for creating a national interactive transport system, as was indicated in the Transport strategy of the Russian Federation up to 2030 with a forecast up to 2035[11], which would serve as the basis for solving the above problems (Zhihan & Shang, 2022). Also, locality in the legal aspect implies the lack of international regulation but the predominance of the national legislation.

The above testifies to the fact that in the Russian Federation there is still no transportation system as an integral structure, providing transportation accessibility, mobility, transparence, safety of transportation services, and a common legal regulation of transportation system. Under digitalization, such separation of the elements of transportation system becomes even more obvious.

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6 Executive Order of the Government of the Russian Federation No. 724-r of March 25, 2020 (2020). *Collection of legislation of the Russian Federation*, 13, Article 1995.

7 Decree of the Government of the Russian Federation No. 2200 of December 21, 2020 (2020). *Collection of legislation of the Russian Federation*, 52(part II), Article 8877.

8 Public-Private ITS Concept Roadmap 2018. https://www.kantei.go.jp/jp/singi/it2/kettei/pdf/20180615/siryou9.pdf

9 Public-Private ITS Concept Roadmap 2019. https://www.kantei.go.jp/jp/singi/it2/kettei/pdf/20190607/siryou9.pdf

10 In this case, there may be exceptions from the universal approach in legal regulation, due to technical features of a specific kind of transport and the transportation process associated with it.

11 Executive Order of the Government of the Russian Federation No. 3363-r of November 27, 2021 (2021). *Collection of legislation of the Russian Federation*, 50 (part IV), Article 8613.

Thus, the transportation industry faces the need to create a single transport environment, providing the multimodal technological interaction of various modes of transport, participants of the transportation process and infrastructure both within one state and at international level. The sustainable and inclusive mobility can be only provided by increasing connectedness and coordination between all processes taking place in the transport activity.

Emergence of end-to-end digital technologies (artificial intelligence, Internet of Things, cloud and fog computing, robotics, big data processing[12]) became the necessary tool (Gromova & Ivanc, 2020) which enabled to solve the set tasks in transport industry. The use of digital technologies makes it possible to speak of creating intelligent transport systems, intended for synchronization and coordination of all its elements, on the one hand, and integration of information-communication technologies into the country's transport complex, on the other hand. It is intelligent transport system that forms a potential for developing the transport system in Russia. This important role of intelligent transport systems is due to the fact that, on the basis of collecting, processing and analyzing the data from all sources, the valuable information is formed, which is then used for control and decision making on transport. Due to the said characteristics, intelligent transport systems can meet the challenges indicated in the Strategic direction in the sphere of digital transformation of transport industry of the Russian Federation up to 2030[13].

Despite the high significance of intelligent transport systems, their legal regulation is currently still being formed. This is due to formation of the essential content of the notion "intelligent transport systems" and building the structure of intelligent transport systems.

1. Ontology of the notion of "intelligent transport systems"

Legal regulation of various public relations is based on the conceptual apparatus (Bazhina, 2022), the syntagmatic unit (Fomenko, 1970) of which is a notion. The essential content of notions determines the very direction of legal regulation. Efficiency of legal regulation depends on the accurate wording of the notion content and construction of logical interconnections between the notions. That is why establishing the content of the notion of "intelligent transport systems" seems to be a primary tasks in the study of legal regulation of using intelligent transport systems.

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12 Clause 36 of the Strategy of information society development in the Russian Federation, adopted by the Decree of the President of the Russian Federation of May 9, 2017 No. 203.

13 Executive Order of the Government of the Russian Federation No. 3744-r of December 21, 2021. (2021). *Collection of legislation of the Russian Federation*, 1 (part IV), Article 264.

In the 1980s–1990s, some countries researched the issues of transport flows coordination. One example is a Munich project COMFORT, aimed at optimizing the transport flow in a city center taking into account the planning of highway network in the neighboring towns[14].

In 1994, an international congress was for the first time held in Paris, devoted to intelligent transport systems, namely, intelligent automobile highway transport systems[15]. In 1995, the congress was held in Yokohama, Japan. This event became the basis for creating a project called the "Extensive plan for development of intelligent transport systems". Thus, Japan is considered to be the country where the intelligent transport systems originated.

Currently, many countries of the world carry out developments in this sphere. In this regard, it is important to define the essential content of intelligent transport systems.

In a broad sense, an intelligent transport system is interpreted as a system ensuring mobility using digital technologies. However, various countries provide their own definitions of the notion of "intelligent transport systems", which differ in certain aspects. Notably, some documents offer no definitions but focus on the importance of intelligent transport systems for the transport sector of economy.

Below we consider several approaches to defining the notion of "intelligent transport systems".

1. Essential component of the notion "intelligent transport systems" is defined by indicating their direct purpose.

The Japanese Society of Automotive Engineers issued a special document called "Standardization of intelligent transport systems. Activity of ISO/TS 204"[16] (further – Standardization of ITS adopted by the Japanese Society of Automotive Engineers); it points out that intelligent transport systems are specially created to rapidly increase traffic safety, transportation efficiency and comfort, energy saving and environment protection (Hasegawa, 2013).

2. Intelligent transport system is interpreted as a system of transportation.

The UNECE Road Map on Intelligent Transport Systems for 2021–2025, issued by the UN Economic Commission for Europe in December 2020[17] (further – the UNECE Road Map on Intelligent Transport Systems), intelligent transport system is understood as a system of internal transport to which information-communication technologies (further – ICT) with a view of providing mobility.

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14 Zhankazieva S. V., & Vorobyeva T. V. (2013). World experience of formation and development of regional ITS. *Vestnik GLONASS*. http://vestnik-glonass.ru/stati/mirovoy_opyt_stanovleniya_i_razvitiya_regionalnykh_its/

15 European Commission. (1995). "Towards an intelligent transport system". Community Research and Development Information Service.

16 https://www.jsae.or.jp/01info/org/its/its_2019_en.pdf

17 *Draft revision of the UNECE Road Map on Intelligent Transport Systems*. UNECE. https://unece.org/sites/default/files/2021-01/ECE-TRANS-2021-15r.pdf

3. Intelligent transport systems are a set of applications or technologies. Such approach is used in the Preamble of the Directive 2010/40/EU of the European Parliament and of the Council of July 7, 2010, "on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport"[18] (further – EU Directive 2010). These applications are aimed at provision of innovative services related to various modes of transport. They help various users to be better informed about the condition of transport network. Thus, the use of transport networks becomes safer, more coordinated and 'smarter'. In the legislation of Canada, intelligent transportation system is defined as the advanced and emerging technology (including computers, sensors, control, communications, and electronic devices) in transportation to save lives, time, money, energy and the environment[19].

The Standards of International Standardization Organization ISO/TS14812:2022 Intelligent transport systems – Vocabulary in clause 3.1.2.4 define intelligent transport systems by listing their constituent elements. These are various technologies, namely: information, communication, sensor, and control technologies, intended for use in the interests of ground transport system.

4. Intelligent transport system is interpreted as a system of transport complex management. This approach underlies regulation of intelligent transport systems in Russia. The notion of "intelligent transport systems" is stipulated in the Russian national standard of the same title. It is understood as "the management system integrating modern information and telematic technologies and intended for automated search and acceptance for implementation of the maximally effective scenarios of managing a regional transport-road complex, a specific vehicle or group of vehicles, with a view of providing the set mobility of the population, maximizing the indicators of road network exploitation, increasing safety and efficiency of the transportation process, comfort of the drivers and users of transport"[20].

This notion is fully repeated in several normative-legal acts, namely: the Concept for providing safety of road traffic with participation of unmanned vehicles on general purpose automobile roads[21], as well as the general provisions of the Concept for creating and functioning of the national network of intelligent transport systems

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18 European Parliament. https://www.europarl.europa.eu/legislative-train/theme-resilient-energy-union-with-a-climate-change-policy/file-electronic-freight-transport-information

19 *ITS Canada*. https://www.itscanada.ca/about

20 *GOST R 56829-2015 "National standard of the Russian Federation. Intelligent transport systems. Terms and definitions"*. https://docs.cntd.ru/document/1200128315?section=text

21 Executive Order of the Government of the Russian Federation No. 724-r of March 25, 2020 (2020). *Collection of legislation of the Russian Federation*, 13, Article 1995.

on general purpose automobile roads[22] (further – Concept for creating intelligent transport systems).

Scientific literature also supports the above concept in terms of the essence of intelligent transport systems. An intelligent transport system is integration of management, information and communication technologies with transport infrastructure (Sladkowski & Pamula, 2016).

The presented concepts illustrate the overall pattern of the development of legal regulation with regard to intelligent transport systems. As was justly noted in the UNECE Road Map on Intelligent Transport Systems, due to the differences in economic priorities each state may interpret the content of the notion "intelligent transport systems" in its own way[23]. From the viewpoint of legal regulation of the use of intelligent transport systems, such inconsistency may cause "confusion at international level"[24]. This seems to be an obstacle for the global introduction and use of intelligent transport systems. Accordingly, an important step in overcoming the said difficulties may become the development of the general, interstate guidelines and rules which would allow determining the order of technical and technological compatibility of intelligent transport systems used in each state.

The presented definitions have certain common features which can be identified.

First, intelligent transport systems are the basis of the contemporary transport system.

Second, intelligent transport systems are directly connected with digital technologies with the help of which they function.

Third, the key purpose of using intelligent transport systems consists in automation of transport operations with a view of creating a competitive transport system.

However, none of the mentioned deterministic approaches is comprehensive. This is due to the fact that the elements of an intelligent transport system are not comprehensively considered in the presented definitions. Meanwhile, structural elements are significant for determining the essential content of a notion, as well as for building logical links with other notions and forming the conceptual apparatus underlying any legal regulation. It is this aspect that served as the basis for considering the architecture (structure) of intelligent transport systems.

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22 Order of the Ministry of Transportation of the Russian Federation No. AK-247-r of 30.09.2022. (2022). *Transport of Russia*, 49, 05.12.2022–11.12.2022.

23 *Status of the implementation of the ECE Road Map on Intelligent Transport Systems.* UN Economic Commission for Europe. https://unece.org/sites/default/files/2023-01/ECE_TRANS_2023_19_Rev1R.docx

24 *Ibid*.

2. Architecture (structure) of intelligent transport systems

When considering the issue of the architecture of intelligent transport systems, one should specify several conceptual aspects.

First, considering the issue of the architecture of intelligent transport systems seems strategically important to reflect the essence of intelligent transport systems and their definite purpose in the evolution of transport activity. It is through the architecture of intelligent transport systems that integration into the very idea of creating the intelligent transport systems takes place and its emergence is determined. Building the architecture of intelligent transport systems is pivotal for developing an adequate legal regulation of the use of intelligent transport systems.

Second, the architecture of intelligent transport systems is currently developed with regard to road transport network. Other components of transport system (other modes of transport) are not considered in the documents devoted to automobile transport. This determines the specified elements of the architecture of intelligent transport systems.

Many documents, including normative legal acts, use the notion of "the architecture of intelligent transport systems". According to the Russian preliminary national standard on intelligent transport systems, "the architecture is understood as fundamental concepts or properties of the system in its own environment, embodied in elements, relations, and structure"[25]. In other words, the term "architecture" denotes a certain structure, forming the intelligent transport system as a system consisting of various elements. It is used to emphasize the complexity and multifunctionality of intelligent transport systems.

Various sources, both normative and academic, call these components differently, namely: levels, subsystems, etc. The grounds for specifying such elements also differ.

The Concept for creating intelligent transport systems indicates that their architecture must consist of certain levels, namely: integration platform, complex subsystem, instrumental subsystem, peripheral equipment, telecommunication infrastructure, and solutions (including hardware-software) in the sphere of information security and failure safety.

Another approach to defining the levels is described in a book devoted to intelligent transport systems in road traffic, published by Radiocommunication Bureau (Switzerland)[26]. According to it, the criterion for specifying the levels of intelligent transport systems are their users, divided into three groups. The first group is road operators, i. e. an organization managing roads for local purposes, as a rule, to maintain the traffic and react

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[25] *PNST RF 636-2022 «Intelligent transport systems. Commercial transportation. Control over automobile transportation in a supply chain. Part 1. Architecture and definitions of data".* (2022). Moscow: FGBU RST.

[26] *Intelligent transport systems: Handbook on Land Mobile (including Wireless Access)* (Vol. 4. 2021 edition). https://www.itu.int/dms_pub/itu-r/opb/hdb/R-HDB-49-2021-PDF-E.pdf

to road accidents. They control the traffic situation and provide information to the traffic participants. The road operator plays an important role in rendering various services of intelligent transport systems. One exception is the systems for providing safety between vehicles. The second group of users consists of vehicle drivers. This group is the final user of many services of intelligent transport systems and an indirect supplier of a large amount of data about the road characteristics (either through remote testing or through information collection by a vehicle and providing it to a third party). The third group of users is travelers or pedestrians who use intelligent transport systems to obtain information about the road situation, to plan trips, use transit services or require for emergency assistance.

According to the definition of "intelligent transport system"[27] by the division of the US Department of Transportation – Research and Innovative Technology Administration (RITA)[28], it consists of 26 types of technology-based systems. These systems can be divided into two large categories: smart infrastructure and smart vehicles.

Another viewpoint is that intelligent transport systems consist of the following elements: road signals management systems, road traffic management systems, highway management systems, transit management systems, accident management systems, traveler information services, emergency management services, extended analytics of road traffic, electronic payment systems, public transport management systems, connected cars infrastructure, road network productivity monitoring, safety systems on railway crossings, and commercial transport management systems (Abduljabbar et al, 2019).

Similar to this is the concept according to which intelligent transport systems include a smart system of public transport, a smart system of road infrastructure, a smart system of parking lots, a smart system of road management and control, safety and emergency management, a smart system of pavement management (Lakshmi Shankar Iyer, 2021).

The hierarchical analysis of intelligent transport systems shows the lack of a common approach to specify the components of intelligent transport systems. Accordingly, the components indicated in a system differ from each other based on the grounds for their specification. This feature determines the development of legal regulation of the use of intelligent transport systems.

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27 *Intelligent Transportation Systems Joint Program Office. Strategic Plan 2020–2025*. www.ITS.DOT.GOV/STRATPLAN2020

28 This division of the US Department of Transportation was created in 2005 in order to improve coordination of transport research, develop transport studies, technologies, and analysis.

3. Prospects of development of legal regulation and use of intelligent transport systems

The above analysis of the essential content of the "intelligent transport systems" notion and the hierarchical structure of the intelligent transport systems allows making certain conclusions regarding the legal regulation of the use of intelligent transport systems. Below we consider them in more detail.

1. The current trend in forming the national legislation regarding the use of intelligent transport systems does not fully reflect the needs of modern economy. This is due to the fact that the development of all spheres of activity is oriented towards international exchange of goods. Besides, the development of intelligent transport systems testifies to the emergence of interstate issues related to providing cybersecurity. Thus, information-communication technologies, so to say, blur the existing territorial boundaries between the states and a threat to digital security of a state occurs (Kutyur & Toupin, 2020). Solving these problems at a self-contained national level cannot be effective. An interstate approach is demanded in developing the legal regulation of intelligent transport systems.

2. Specifying the above listed elements as components of the integral entity is only oriented towards automobile transport. This does not comply with the conceptual approach stipulated by the program documents devoted to reforming the transport industry. Mobility in transport sphere implies not only the possibility to seamlessly deliver cargo from one point to another (including using various modes of transport), but also transparency of the whole transportation process (including the document flow).

3. The hierarchy of intelligent transport system determines the directions of legal regulation development in the transport sphere. The described approaches to specifying the structural components are built on the basis of the tasks faced by the transport sector of economy. These include: transport management, safety provision, "smart" vehicles and transport infrastructure. Legal regulation of these directions is currently imperfect (Zemlin, 2022). It is fragmentary and does not allow building a systemic approach in legal regulation. As an example, we consider the sphere of transport management.

Transport management is the key sphere, as it is through management that "the process of orderly impact of a subject onto an object" is implemented (Kharitonova, 2011). Without going deep into the approaches to researching the category of "management" (Ananyeva, 2015), we have to point out that management is understood in several meanings in the transport industry. On the one hand, the state implements management of various transport processes by introducing digital technologies (for example, using the artificial intelligence technologies[29]). Thus, between the state represented by its bodies and subjects of transport activity public relations occur consisting in observance

[29] Passport of the Strategy of digital transformation of transport industry of the Russian Federation. *SPS KonsultantPlyus*.

of the established rules and requirements. On the other hand, management in the sphere of transport is carried out by the subjects of transport activity themselves. It occurs within civil-legal relations when the subjects of transport activity render transport services to their clients. As an example, one may mention the relations of servicing highly automated vehicles, including control over movement of such vehicles. The most relevant actor is this situation is the operator. However, the prepared draft law and some provisions of the current legislation in the sphere of legal regulation of highly automated vehicles consider the operator as a physical person performing certain actions.

The draft law "On highly automated vehicles and on amendments in certain legislative acts of the Russian Federation"[30] introduces the notion of "an operator of a highly automated vehicle" which is understood as a physical person situated outside the highly automated vehicle, performing monitoring over its motion via remote access, having an opportunity of remote interference into strategic management of the highly automated vehicle, and possessing the knowledge of remote interference into the functioning of such vehicles. The Decree of the Government of the Russian Federation of December 29, 2022, No. 2495 "On establishing an experimental legal regime in the sphere of digital innovations and adopting the Program of experimental legal regime in the sphere of digital innovations in rendering transport services using highly automated vehicles in the territories of certain subjects of the Russian Federation"[31] uses the notion "operator", who is a physical person not being a test driver and situated outside the highly automated vehicle of the 2nd category, performing routing and supervisory control of the highly automated vehicle of the 2nd category (determining and changing the route of movement, activation and deactivation).

In the cited extracts from law, an operator is not a subject of transport activity. Stemming from the analysis of norms, one may suggest that their status is closer to a subcontractor – a physical person in civil-legal contractor agreement or an employee in labor relations, when a physical person has a labor function in the form of a list of certain actions or inactions.

Such approach seems fragmentary, not suitable from the viewpoint of hierarchy of intelligent transport system, where management is the key element for the functioning of the whole intelligent transport system. We believe such activity should be licensed and subject to state control in order to have an opportunity for regulation.

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30 Draft Federal Law "On highly automated vehicles and on amendments in certain legislative acts of the Russian Federation" of June 8, 2021, No. 02/04/06-21/00116763. http://regulation.gov.ru/p/116763

31 Decree of the Government of the Russian Federation No. 2495 of December 29, 2022 (2022). *Collection of legislation of the Russian Federation*, 1 (part II), Article 300.

Given the existing experience of stipulating such actors in the current legislation devoted to digitalization, one may draw an analogy with an operator of an information system (Article 5 of Federal Law of July 31, 2020, No. 259-FZ "On digital financial assets, digital currency and on amendments in certain legislative acts of the Russian Federation"[32]), as well as with an operator of an investment platform (Chapter 2 of Federal Law of August 2, 2019, No. 259-FZ "On attracting investments using investment platforms and on amendments in certain legislative acts of the Russian Federation"[33]).

Another example of targeted legal regulation is development of legislation on "smart" vehicles as one of the elements of intelligent transport system. A "smart" vehicle should be understood as highly automated or fully automated vehicle. It is important to point out a terminological confusion which is due to the fact that both the academic community and the national and international legislations lack a single notion meaning a vehicle that is managed by itself through an automated driving system built into the vehicle.

For example, the Concept of traffic safety contains a terminological paradox. On the one hand, the document title includes the notion of "unmanned vehicle". On the other hand, this document points out the priority of using the notions of "highly automated vehicle" and "fully automated vehicle". These notions were also recommended by the Resolution of the Global Forum on traffic safety. Another document – the Program of experimental legal regime using highly automated vehicles – uses solely the notion of "highly automated vehicle". However, these highly automated vehicles are divided into two categories.

As the legal level shows no terminological accuracy, academic literature also uses different terms. Each author denotes the examined objects by a term they consider to be more appropriate. For example, some author use the term "unmanned vehicle" (Ananenko, 2020; Begishev, 2021; Korobeev, Chuchaev, 2019; Stepanyan, 2019; Begishev, Bersei, Sherbakova et al., 2022). Others consider the term "highly automated vehicle" to be more appropriate (Yudkina, 2022; Evstigneev, 2019; Takeyoshi Imai, 2019; Begishev, Bersei, Amvrosova et al., 2022).

Each of the presented viewpoints regarding the naming of such smart vehicles deserves attention. However, in order to avoid discrepancies in the future legal regulation, it is necessary to elaborate a common approach to naming such vehicles. In this regard, we believe it appropriate to pay attention to the following.

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32 Federal Law No. 259-FZ of July 31, 2020 (2020). *Collection of legislation of the Russian Federation*, 31 (part I), Article 5018.

33 Federal Law No. 259-FZ of August 2, 2019. (2019). *Collection of legislation of the Russian Federation,* 31, Article 4418.

First, the notion "unmanned" is used in various acts to denote a vehicle which can manage movement without a human inside. This notion is largely used in the acts devoted to air transport. For example, GOST R 56122-2014 "National standard of the Russian Federation. Air transport. Unmanned aviation systems. General requirements"[34] and Regulation No. 428/2009 of the European Council[35] use the term "unmanned aerial vehicle". Clause 5 of Article 32 of the Aviation Code of the Russian Federation[36] interpret unmanned aerial vehicle as a vessel managed or controlled by an external pilot, i. e. a person situated beyond the board of the vessel.

Thus, the term "unmanned" means only that the person controlling the vehicle is not situated inside the vehicle (Sipetas et al, 2023; O'Hern, & St. Louis, 2023).

Second, the notion of "automated vehicle" is used with regard to road transport in normative-legal regulation, including international one. For example, the classification of automation levels[37] (further – SAE classification), developed by the Society of automotive engineers (SAE), the notion of "automated vehicle" includes the vehicles of levels 3–5:

– level 3 – conditional automation, i. e. control over the vehicle requires the presence of a driver, who may not constantly trace the road situation but must be ready to take control over the vehicle;

– level 4 – high automation, i. e. the vehicle is equipped to move without a driver under certain conditions;

– level 5 – full automation, i. e. a driver is not required to control the vehicle (Schubert, 2015).

Besides, other national systems also use the notions "highly automated vehicle" and "fully automated vehicle". For example, in a German law devoted to regulation of road traffic (Straßen verkehrs gesetz (StVG)) one of the first articles (clause 1a) is called "Kraftfahrzeuge mit hoch- oder voll automatsierter Fahrfunktion", meaning "Motor vehicles with highly or fully automated driving function"[38].

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34 GOST R 56122-2014 "National standard of the Russian Federation. Air transport. Unmanned aviation systems. General requirements". Moscow: Standartinform, 2020.

35 Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items (recast). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32009R0428

36 Aviation Code of the Russian Federation No. 60-FZ of March 19, 1997 (1997). Collection of legislation of the Russian Federation, 12, Article 1383.

37 Automated Vehicles for Safety. https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety

38 http://www.gesetze-im-internet.de

The presented conclusions testify to the absence of a unified approach to naming the new objects of the real world and determining their essential characteristics, as well as of a systemic approach to developing the legal regulation common for all modes of transport and taking into account the requirements of the contemporary transportation process.

Conclusion

The present work is the initial stage of developing legal research in the sphere of using intelligent transport systems. Stemming from the above said, the following conclusions can be made.

1. Formation of the legal regulation of the use of intelligent transport systems is of fragmentary character. This is due to the fact that normative regulation is created separately for different modes of transport both at the national and international levels. Besides, the development of normative regulation is largely of self-contained, national character.

2. There is currently no clear determination of the essential content of the notion "intelligent transport systems". Thus, it is necessary to improve the normative notion of "intelligent transport systems". This is due to the fact that any legal regulation is based on the conceptual apparatus consisting of coordinated, interrelated notions.

3. The structural elements forming the architecture of intelligent transport systems are important for building interconnections within the system. This said, the architecture of intelligent transport systems is not "rigid" but transforms with the changes in its individual elements under the influence of digital technologies.

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Интеллектуальные транспортные системы – основа de lega ferenda транспортной системы Российской Федерации

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Ключевые слова

Безопасность,
беспилотное транспортное средство,
высокоавтоматизированное транспортное средство,
интеллектуальная транспортная система,
искусственный интеллект,
право,
правовое регулирование,
транспортная инфраструктура,
транспортное законодательство,
цифровые технологии

Аннотация

Цель: исследование тенденций правового регулирования применения интеллектуальных транспортных систем в условиях цифровой трансформации транспортного сектора экономики, а именно нарастающего значения интеллектуальных транспортных систем в будущей транспортной системе Российской Федерации.

Методы: системно-структурный метод является основой изучения интеллектуальных транспортных систем. С помощью него представляется возможным изучить архитектуру интеллектуальных транспортных систем как сложного структурного единства. Наряду с указанным методом используются также сравнительно-правовой метод, направленный на иллюстрацию различий и сходных черт в правовом регулировании применения интеллектуальных транспортных систем. Методы правового моделирования и прогнозирования, а также формально-логический метод выступают второстепенными методами для полноценного изучения правового регулирования интеллектуальных транспортных систем.

Результаты: в статье представлены концептуальные подходы по определению понятия «интеллектуальные транспортные системы», выделению иерархии интеллектуальных транспортных систем, которым отводится основополагающее место в построении транспортной отрасли. На основе проведенного анализа делаются выводы о векторах формирования транспортного законодательства, направленного на регулирование применения интеллектуальных транспортных систем.

Научная новизна: в статье представлен концептуальный подход по формированию правового регулирования интеллектуальных транспортных систем. С этой целью рассмотрен вопрос о сущностном содержании понятия «интеллектуальные транспортные системы» на легальном и научном уровнях, показаны существующие терминологические проблемы для выстраивания правового регулирования. Анализ архитектуры интеллектуальных транспортных систем позволил впервые сформулировать основные подходы к формированию правового регулирования отдельных ее элементов (в том числе высокоавтоматизированных и полностью автоматизированных транспортных средств, «умной» инфраструктуры и т. д.) не обособленно, а как составных частей целого.

Практическая значимость: представленный в исследовании материал и сделанные на его основе выводы способствуют развитию правового регулирования транспортной отрасли в условиях цифровой трансформации. В статье делается акцент именно на правовом регулировании интеллектуальных транспортных систем с учетом их технических и технологических особенностей. Именно интеллектуальные транспортные системы являются de lega ferenda транспортной системы, которая предопределяет вектор трансформации транспортного законодательства. В свою очередь разработка правовых основ позволяет расширять географию внедрения технических новелл и делать их применение более масштабным.

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