



Smart Transport Infrastructure for Border Region Development: Legal Issues and Further Perspectives

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Abstract. The implementation of high technologies in transport infrastructure becomes of vital importance. The reason for it the introduction of automated/autonomous vehicles in transportation. The positive impact of such innovations are considered in commercial, social aspect. Nevertheless, the transportation legislation is not adapt to support such technical and technology progress. There is no the base of legislation – the system of notions. Legislation of different countries has various notions that are not always correspond to internal legislation on different modes of transport and to international regulations. Therefore, the elaboration of transportation legislation on smart transport infrastructure is necessary to begin with the creation of the single system of notions that would be applied on national and international levels. Moreover, due to the vital importance of environmental protection the article deals with the impact of smart transport infrastructure on environment. As the conclusion, there is a statement that the further transportation requires the creation of single intelligent transport ecosystem. The legal regulation on implementation of high technologies in this ecosystem is the subject of mutual work of different countries.

Keywords: Transport Infrastructure, Smart Infrastructure, Intelligence Transport System, Intelligent Transport Ecosystem, Terminology, Environment, Smart City.

1 Introduction

The last several years have shown the increase of goods and services turnover [1]. The satisfaction of needs of different kinds of goods and services requires the acceleration of productive, constructional, transportation, financial and other processes. Transportation is rightly considered to be the central one due to the fact that transport supports all economic and social spheres. Among all elements of transportation, such as: vehicle, persons involved into the process etc., the development of transport infrastructure attracts more attention nowadays.

Such tendency is explained by the influence of transport infrastructure on quality of transportation, its involvement into the process to satisfy transportation need growing strongly around the world. The value of transport infrastructure for the economy can be proved by the quotation of the famous American writer Henry Petroski. In his book

“The Road Taken: The History and Future of America’s Infrastructure” he stipulated that “poor infrastructure can impose large costs on the economy” [2]. In other words, the transportation infrastructure is the backbone of national and international economy.

The adequate legal regulation of transport infrastructure on national and international levels is a specific instrument that brings the benefits of the technology to the whole of society and economy.

Due to the fact that transport infrastructure was not the key issue for a long period of time concerns around some legal aspects connected with transport infrastructure are paramount all levels of infrastructure: national and international. Among them are the following:

- the absence of single national and international terminology that is required to elaborate efficient legal regulation on transport infrastructure including the influence of the recent development of high technologies in vehicle construction;
- the extension of negative profound effects on the environment caused by transport infrastructure and transport networks requires to use less land and fewer material assets, as well taking into account the whole life carbon impact.

In other words, it is acknowledged that transport infrastructure must be able to keep up with increasing freight volumes and growing demand for fast, efficient, reliable and environmentally sustainable transport solutions. Moreover, it is foreseen that the realization of the stated goals is possible only in the frames of single legal field that could be applied as well for national as for international transport infrastructure. For this reason, universal legal regulation including the elaboration of common notions is the tool designed for more efficient operation of transport infrastructure.

2 Definition of the Notion “Transport Infrastructure”: Modern Approach

The collocation “transport infrastructure” contains of two words each of them has its determinative value on the meaning of the whole collocation. The word “infrastructure” derived from Latin: «infra» – lower and «structure» – building, disposing [3]. According to Cambridge Dictionary, this word implies in different spheres: economic, IT etc. and in general means different elements that are needed in special order to support the whole system [4].

The word “transport” in this collocation shows its accessory to the transportation including main such main actions as the delivery of goods, transport of passengers and additional activities aimed to perform the main ones.

Coming to the legal level of notion definition not all national legislation contains the legal determination of the notion “transport infrastructure”. One can suggest that it is complicated to represent one definition combined all aspects of its meaning. According to the analyze of the existing definitions that are contained in different official documents, it is obvious that there is no single approach of giving definitions to the notion “transport infrastructure”. Firstly, in spite of using the word “infrastructure” or collocation “transport infrastructure” not all acts contain such kind of definition. Secondly,

there is no general definition of the notion applied for all modes of transport. Thirdly, the existing definitions are organized as the list of objects that could be used in transportation.

To illustrate the mentioned peculiarities of the implementation of the notion “transport infrastructure», it is worth bring some abstracts of the Russian transportation legislation. It provides with different definitions of the notion “infrastructure” related to the transportation, as there is no single document that regulates transportation relationships. For instance, the Article 2 of Federal Law “On Railway Transport in the Russian Federation”, dated January 10, 2003, No. 17-FZ, contains the notion “infrastructure of public railway transport” which is briefly referred to as “infrastructure”. According to the article’s provision the infrastructure is transport infrastructure, including public railway tracks and other structures, railway stations, power supply devices, communication networks, alarm systems, centralization and blocking, information systems, traffic control system and other buildings, structures, structures, devices and equipment that ensure the functioning of the infrastructure. Article 7.1 of Federal Law “Air Code of the Russian Federation”, dated March 19, 1997, No. 60-FZ, and Article 2 of Federal Law “Charter of road transport and urban land electric transport”, dated November 8, 2007, No. 259-FZ, have approximately the same list of objects used in air or road transportation.

Eurostat of European Commission has adopted Illustrated Glossary for Transport Statistics, dated 2009 that also contains the list of objects for each mode of transport.

Such kind of approach is not appropriate in accordance with the tendency established by the development of modern technologies. The legal definitions that are fixed in the current legislation do not reflect the technical and technological innovations that are rapidly being introduced into the transport sector, namely automated/autonomous vehicles [5]. Not going deep into the details of automated/autonomous vehicles it is worth mentioning that implementation of such kind of vehicles requires smart environment to support intercommunication with vehicles (“Vehicle-to-Infrastructure (V2I)”) and with other objects (“Vehicle-to-Everything (V2X)”).

The above mentioned explains the necessity along with the notion “transport infrastructure” to introduce some new notions, such as: “smart transport infrastructure” and “intelligent transport system” (ITS).

The notion “smart transport infrastructure” reflects common objects that are technically equipped to support the reception and transfer of signals and data. In other words, it is the complex of upgraded objects. Nowadays this notion cannot replace the notion “transport infrastructure” as the transition to modern technologies is complicated process demanding time, finance, smart technologies etc. Nevertheless, the notion “smart transport infrastructure” is not enough to identify the process “Vehicle-to-Infrastructure (V2I)”) and “Vehicle-to-Everything (V2X)”. The function of intercommunication is covered by the notion “intelligent transport system” (ITS). This notion is more familiar for road traffic, as this sphere of transportation is considered to be better developed.

The appearance of the notion itself was currently preceded by developments carried out for several decades (for example, in 1986, the project of the European Research Coordination Agency (EUREKA) “PROMETHEUS” (Program for European Traffic with Highest Efficiency and Unprecedented Safety) was launched, and in 1991 The US

Congress passed the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) – a law on the efficiency of land transportation with the interaction of various modes of transport [6].

Some elements of intelligent transport system (ITS) has been already introduced in road traffic in different countries. For instance, in Italy, there is a system of automated monitoring of vehicle traffic and control of its movement on toll roads. In France, a system of automatic monitoring and control of the movement of vehicles on the roads has been developed. Further, in the Czech Republic, a system of weighing in motion (Weigh-in-motion, WiM) is operating. In South Korea, in Seoul the TOPIS (Transport Operation and Information Service) has been introduced to manage general traffic system [7].

All these innovations requires adequate legal regulation of implementation of intelligent transport system. Therefore, the notion “intelligent transport system” was given in Article 4 of the Directive of the European Commission 2010/40/EU, dated July 7, 2010, devoted to general principles of ITS development in the field of road transport and interaction with other types of transport. It refers to systems in which information and communication technologies are used in the field of road transport, including infrastructure, vehicles and users, and in traffic management, as well as for interaction with other modes of transport.

Later, the Internal Transport Committee of the Economic Commission for Europe at its 78th session (Geneva, February 23-26, 2016) considered issues related to the use of intelligent transport systems. The result was established in Conceptual Notes on Intelligent Transport Systems, which define their essence, tasks, proposed development activities, etc. [8].

As the result, many countries, following the international provisions, have adopted Concepts for the development of safe road traffic, which disclose the priority tasks to introduce an intelligent transport system. As an example, we can mention the French Strategy for the Development of Road Traffic Automation for 2020-2022, as well as the Law on Mobility Orientation, adopted on November 19, 2019, or the Integrated Transport Strategy of Bulgaria for the period up to 2030, approved by the Ministry of Transport, Information Technologies and Communications (May, 2017) [9], etc.

The Concept on road safety and security involving unmanned vehicles on public roads, adopted by Decree of the Government of the Russian Federation, dated March 25, 2020, No. 724-p (hereafter – Concept on using unmanned vehicles), gives the definition of the notion of “intelligent transport system” under which one can understand a management system that integrates modern information and telematics technologies and is designed for automated search and adoption of the most effective scenarios for managing the transport and road complex of the region, a specific vehicle or a group of vehicles in order to ensure a given mobility of the population, maximizing the indicators of the use of the road network, improving the safety and efficiency of the transport process, comfort for drivers and transport users.

Based on the analysis of the above documents, it can be concluded that the notion “intelligent transport system” deals with telecommunications, electronic equipment, information technologies. At the same time, the concept of “intelligent transport system” does not include the entire variety of essential features that currently characterize the

vehicle and transport infrastructure. Therefore, it is necessary to use in legislation all the above mentioned notions: “transport infrastructure”, “smart transport infrastructure”, “intelligent transport system”. These notions has different meaning and are of vital importance to create the future intelligent transport environment or intelligent transport ecosystem. This ecosystem can automatically support automated/autonomous vehicles, smart transport infrastructure and common transport infrastructure with the implementation of intelligent transport system.

In addition to the above stated the question of notions is one of the basic as well on national as on international levels. The age of high technologies cannot allow countries to act by themselves issuing standards acknowledged within this country territory. Nowadays, transportation questions, which were always viewed as international due to the goods and services exchange, become “the deal of all countries”. High technologies will be efficient only than when their regulation is coherent, adopted and acknowledged by all or majority of countries. Divergent national rules are likely to create obstacles for transport companies, consumers of transportation services (e.g. consignor, consignee, passengers) in the single transport market. In this sense, the famous proverb “In Unity there is Strength” is applicable to the development of intelligent transport ecosystem.

To conclude the above mentioned to build an intelligent transport ecosystem of excellence that can support the development of national’s and world’s society and economy, there is a need to step up mutual action at multiple levels.

3 Smart Transport Infrastructure and Environment

International cooperation in the sphere of smart transport infrastructure can be also productive on questions of environmental protection.

The impact of the implementation of smart transport infrastructure should be considered not only from the business and individual perspective, but also from the perspective of society as a whole. The use of smart infrastructure can have a significant role in achieving the positive effect in environmental protection.

For this reason intelligent transport system can contribute to reducing CO₂ emissions and the level of air pollution in cities by optimizing the management of networks and encouraging eco-driving and more frequent use of public transport and modes of transport with lower carbon emissions instead of personal cars. As part of the integrated approach needed to reduce CO₂ emissions, ITS allows you to bring together the service links: connected to networks and autonomous vehicles; satellite applications for transport; electric mobility; management of parking facilities and intercept parking lots; urban logistics and transport flow management based on environmental criteria.

This goal is closely connected with the programs of smart cities that are introduced in many metropolis. For instance, the government of Paris has announced the plan to make Paris smart city till 2050 [10]. The main tools are the development of sharing economy. For instance, enlarge sharing services. Using car-sharing [11] can help to reduce air pollution with carbon dioxide and improve social problems concerning health protection, time management etc.

As environmental well-being is a key principle for all countries, the plan of implementation of smart transport infrastructure must be the mutual work of all countries.

4 Conclusion

The development of modern technologies is the permanent process aimed to satisfy the economy and society needs. The worldwide implementation of automated/autonomous vehicles in private and business spheres of interest is the question of time. The transport infrastructure has to support the implementation of such vehicles and be a part of intelligent transport ecosystem where all elements can intercommunicate with each other. The creation of such ecosystem is beyond one country's abilities.

Therefore, the creation of legal regulation including notion system is the mutual work of all countries.

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