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Legal Regime of Transport Ecosystems Based on the Principles of Artificial Intelligence

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ABSTRACT

The functioning of transport and all the relevant infrastructure gives rise to the phenomenon of a transport ecosystem. The nature of transport and other legal relations arising within the transport ecosystem is largely determined by the process of technological development of society.

The objective of the study was, based on the achievements of legal hermeneutics and the application of systemic legal analysis, to analyse the legal regime of transport ecosystems based on the principles of functioning of artificial intelligence. Application of comparative legal and formal dogmatic analysis methods allowed to achieve scientific results in the field of transport legal science, particularly, to substantiate a scientific hypothesis that the implementation of a high-tech element in the form of artificial intelligence entails fundamental changes in the methodological basis of functioning of transport ecosystems, transforms the concept of management influence on the processes occurring in them and entails a change in the nature and content of legal regulation of transport and related public relationships. The findings focus on shaping new scientific ideas on the legal regime of transport ecosystems based on the principles of functioning of artificial intelligence.

Keywords: *transport law, economic activity, economic ecosystem, transport ecosystem, artificial intelligence.*

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INTRODUCTION

Currently, the transport system is of essential importance for ensuring functioning of society and the national security of the country, and administration and management in the field of transport is the most important function of the state [1], requiring the use of a set of methods of legal regulation, characteristic of branches of both public and private law [2, P. 117; 3]. Various modes of transport form a single transport system of the country, which, as rightly noted by specialists in the field of transport law, needs orderly, systemic legal regulation [3, p. 8; 4]. At the same time, it is obvious that considering transport in isolation from the infrastructure that supports it seems methodologically incorrect, since transport is a «tool» for carrying out transportation and providing transport services using the corresponding transport and associated ways of communication available to the transport right holder [5, P. 118].

The functioning of transport and of all the infrastructure necessary for it gives rise to the phenomenon of a transport ecosystem, which is a type of economic ecosystem of an infrastructural nature. The nature of transport and other legal relations that arise within the transport ecosystem is largely determined by the process of technological development of society, which is confirmed by the results of several studies, which substantiate that the emergence and development of new technologies is a challenge to the law [5, P. 5; 7, P. 128]. Innovative development of transport requires the adoption of system measures that are scientifically based, aimed at resolving the contradictions that arise between previously existing paradigmatic approaches to ensuring the functioning of the transport system and the risks associated with introduction of new technologies [8, P. 116].

Within the framework of this article, an attempt is made to analyse the legal regime of transport ecosystems based on the principles of functioning of artificial intelligence.

RESULTS AND DISCUSSION

When studying the few existing sources on the problems of economic ecosystems, one may get the impression that this is something new, characteristic only of our time. However, the phenomenon of economic ecosystems is not an invention of modern society. Economic systems similar in nature have been known to mankind since ancient times (the most famous of them are the «Great Silk Road» in ancient Asia, water supply systems of ancient Roman cities, the British East India Company, etc.). The consumer cooperative system formed in the USSR and its successors in the post-Soviet space are also a striking example of an economic ecosystem. The fundamental feature of each of the named options for economic ecosystems was and still is a set of roads and other objects that form the infrastructure.

In other words, historically the economic ecosystem has turned out to be formed under the impact of factors of the objective nature and to become the symbiosis of objects of rights of a different nature and subjects using such objects based on a certain generally accepted methodology for production of goods relevant for the modern economic ecosystem of society and the state. At the same time, the economic ecosystem has been formed and functions on the basis of the same set of principles as those guiding biological ecosystems, since the very fact of their existence is based on the fundamental idea that forms the design of the ecosystem – creation and functioning of a set of routes that ensure rapid and systematic life support for all residents of the ecosystem without exclusion and for objects and subjects passing through it.

In other words, *an economic ecosystem* is always a set of routes bearing a public character (not conditioned by the form of ownership of the means of production and constituting a «single platform» of the economic ecosystem), combined with other elements of communication, and of the infrastructure serving it, ensuring the life of a certain small or large community of people.

The foregoing allows us to draw a conclusion that predetermines the essence of this study: the very fact of formation of a regional or single national transport system means formation of an economic ecosystem (*to be precise, such its variety as a transport ecosystem*). The fact that the transport system is always integrated into the national system of accumulation, maintenance, distribution and redistribution of goods (that is, into the public utilities sector, which is an absolute property and an obligatory element of the structure of any state), allows us to state another fact: the transport system and the infrastructure necessary for its functioning (as an economic ecosystem) is key and absolutely necessary for formation of the national public utilities sector as a «large economic (macroeconomic) ecosystem».

The famous economist James F. Moore argued, refracting the idea of biological ecosystems onto the «human economy» system, that «like its biological counterpart, the business ecosystem gradually moves from a random collection of elements to a more

structured community»[1]. This idea actually helped to identify the nature of such an objectively existing social institution as economic ecosystems, thereby translating to human society the recognized idea of the British botanist Arthur Tansley about the interconnectedness, interdependence and interaction of living organisms within a certain objectively established environment of their habitat, who coined the term «ecosystem»[2].

However, the current state of the doctrine of economic ecosystems contains certain shortcomings: economic literature, directly or indirectly touching on the problems of economic ecosystems, allows us to conclude that the most common option for understanding economic ecosystems in economic science is conditioned by the will of entrepreneurs (we especially emphasize that it is entrepreneurs, not subjects of economic activity in general, which significantly narrows the range of subjects of such relations) and is cluster or network development of economic relations, and if such development is conditioned by the infrastructure aspect, then this aspect is considered only as an accompanying element of functioning of the economic ecosystem [9, P. 1499].

In other words, if we are guided by the tenets of economic science, then an economic ecosystem is the result of formation of a certain organisational and legal structure of a network or cluster type, solely conditioned by the will of business entities, the very fact of whose existence is not associated with formation of a «comfortable» infrastructure for business with a wide variety of purposes, but follows from the idea of increasing sales and, accordingly, profits [10]. If the above is brought closer to the understanding of the economic system inherent in the legal or political sciences, then we can state an extremely narrowed understanding of the nature of economic ecosystems in economic science, since it comes down to only one single option for emergence of such an ecosystem – a proactive one, involving creation and functioning of such an economic community within the economic group of persons. And although the economic literature describes a wide variety of methodologies for functioning of economic ecosystems (which indicates that various types, types and forms of economic ecosystems have been studied), the generalised version still conveys the idea of an economic group of individuals.

Since until recently only economic science paid attention to economic ecosystems, the problem of «formulations» gave rise to the effect of erroneous perception of the institution of economic ecosystems in the scientific and practical communities. At the same time, the absence of a legislator's position on this issue is due to objective reasons: for the state, until recently (until the advent of the so-called «digital era»), all options for the external embodiment of economic ecosystems had and have two external forms of expression – the infrastructure of the state or an economic group of individuals.

The perception of economic ecosystems in society and the state has changed dramatically only with the emergence of such a phenomenon as digital platforms for managing economic ecosystems. This is what contributed to the emergence of such a new type of economic ecosystems as «digital ecosystems». And although we consider such a qualification of an economic ecosystem to be only conditionally correct (reflecting the specifics of the type of economic activity rather than the nature and legal structure of the economic ecosystem), for the purposes of this study we still use this term in the text of the article to designate a fundamentally important feature of the economic ecosystem, the main infrastructure of which is the infrastructure of public communication – that is, a combination of information and financial infrastructure that allows the use of two factors of production – information and capital – at a fundamentally new level of efficiency. The qualimetric assessment of understanding of this complex legal institution faces «difficulties of translation». In this regard, in the framework of this study (considering the format of the scientific article), we identify economic ecosystems, first of all, as a legal structure, while the organisational structure remains in brackets [11, P. 12].

From our point of view, outlined by us in a number of related studies, we propose to understand «*an economic ecosystem*» *as an element of infrastructure of a state expressed in physical and/or digital form, managed by a state-authorised entity or rights holder(s) on the basis of a uniform methodology for conducting public or private economic activity ensuring implementation of public interest, used for various legal purposes by an unlimited number of individuals and organisations.*

Such a definition allows not only to form a holistic doctrinal understanding of the nature and legal structure of the economic ecosystem, but also to identify among them the right holders of the previously mentioned «digital ecosystems» (for example, Microsoft, Apple, Samsung, Google, Telegram,

[1] What are business ecosystems and why are they needed? [Electronic resource]: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3. Last accessed 21.12.2023.

[2] Ecosystem. [Electronic resource]: http://www.lomonosov-fund.ru/enc/ru/encyclopedia:0134539: article. Last accessed 21.12.2023.

Yandex, ByteDance (copyright holder of the social network «TikTok»), Sberbank, etc.). At the same time, there is no need to question the thesis that the economic activity of such economic ecosystems has not only acquired a clearly public character and has become capable of influencing the state of the national economy, social and political spheres of the state, but is also increasingly becoming an economic activity with elements of administering the system of public relations. From a practical point of view, such identification allows the state to form, for the purposes of national security, a transparent picture of the legal structure of economic activities of a wide variety of economic ecosystems, drawing a clear line between the economic and political components of such economic activities.

In addition, determining the legal structure of an economic ecosystem based on the methodology we propose, additionally allows us to identify the entity managing such an ecosystem or its legal holder as a subject of a prudential monopoly (which is one of the types of public monopoly) [12, P. 78], which allows the state to apply in relation to such entities legal barriers, a special, preferential or repressive legal regime for carrying out economic activities, ensuring the protection of national interests within the framework of the institution of national economic security and national security in general.

And from our point of view, the entire set of known economic ecosystems can be classified as follows:

1. *According to the criterion of the scale of economic activity carried out within the economic ecosystem:*

– National, state-wide (macroeconomic) economic ecosystems, which have always been and will be the state transport ecosystem and public utilities, as well as various elements of public communication infrastructure, represented by two segments which are information and financial infrastructure (such as ERIP in the Republic of Belarus, Sberbank in the Russian Federation; economic ecosystems formed by mobile operators, etc.).

– Sectoral economic ecosystems operating within the conventional organisational structure of a certain branch of the national economy, its economic complex or sector (examples include the High Technology Park or the Skolkovo Innovation Centre).

– Microeconomic ecosystems formed on the basis of private initiative, but due to technological features, transformed into an element of national and (or) international infrastructure (these include economic ecosystems based on the use of digital technologies).

2. *Based on the nature of the managed infrastructure:*

– Economic ecosystems formed on the basis of physical infrastructure.

– Economic ecosystems formed on the basis of digital infrastructure; moreover, the peculiarity of such ecosystems is that they always form an economic group of persons, the nature and legal structure of which is extremely non-standard and complex, and therefore requires a separate scientific study.

3. *Based on the criterion of market conditions:*

– Universal economic ecosystems (transport ecosystem, public utilities; financial system of the state).

– Opportunistically determined economic ecosystems – ecosystems that are relevant for the state and society during the period of demand for the technological basic values they provide.

4. *Based on the criterion of community of economic interests of residents:*

– Economic ecosystems that are not an economic group of individuals (a classic example is the transport ecosystem of the state and the public utilities of the state).

– Economic ecosystems, which are an economic group of persons.

Among the named variations of economic ecosystems, there is only one ecosystem of an «absolutely universal» nature, capable, among other things, of «absorbing» adjacent economic ecosystems. This is the transport ecosystem of the state. And its ability to become comprehensive can become a reality under one fundamental condition – the transition to a methodological basis formed on the principles of functioning of artificial intelligence. In this case, the transport ecosystem of the state will be able to acquire another unique and inimitable feature – it will be able to simultaneously become an economic ecosystem that is not an economic group of persons, and an economic ecosystem – an economic group of persons (and this feature is both a paradox and a pattern). It is this particular feature of the transport ecosystem that predetermines, firstly, the specifics of transport and transport-connectivity relations, and secondly, the specifics of transport law (which, in the context of widespread implementation of artificial intelligence in the system of public relations, will soon radically change its essential characteristics, transforming from the infrastructure branch of law into, in fact, a kind of «industrial law» (for reasons described below)).

The functioning of transport and of all the infrastructure necessary for it gives rise to the phenomenon of an economic ecosystem in which:

1. The transport system and transport infrastructure of the state together form an economic ecosystem that unites in its legal and organisational framework

economic entities, the vast majority of which do not have any legal connection among them other than belonging to a sector of the economy or an economic complex.

2. In the absence of a «single digital platform» in the legal and organisational framework, the transport system and transport infrastructure of the state are inextricably linked, but still function independently of each other.

3. The implementation of artificial intelligence into the transport system and transport infrastructure, which has the attribute of a «single digital platform» and is endowed with the function of managing the transportation process, automatically entails the elimination of the boundaries between the conditional «transportation» and the conditional «infrastructure for transportation», turning everything that belongs to «transport and logistics» into a single economic organism.

4. The implementation of artificial intelligence into the transport system and transport infrastructure, which has the attribute of a «single digital platform» and is endowed with the function of managing the transportation process, automatically entails not only the blurring of the boundaries between infrastructure of a «transport nature», but also actually turns the entire infrastructure of the state into a «single transport infrastructure».

5. The transformation of the entire infrastructure of the state into a «single transport infrastructure» due to the implementation of a high-tech element in the form of artificial intelligence into the process of its functioning entails fundamental changes in the methodological basis for the production of goods and their sale in commodity markets, since any production facilities will automatically be forced to not just integrate into a «single transport infrastructure», but to turn into just an element of such an «enormous infrastructure».

Even at the stage of «designing» a transport ecosystem based on the principles of artificial intelligence, in which the main means of producing goods will be an unmanned vehicle or a vehicle operating as autonomously as possible from a person capable of driving it, the qualimetric characteristics of rights should be assessed considering the following factors:

1. Since the transport ecosystem (as an economic ecosystem at the macro- or meso-level) is turning into a system operating on the principles of organisational unity (which is due to the need for centralised and uniform management from a single centre, dictated by considerations of national security), it is necessary to reconsider approaches to determining the nature of economic entities' activities that are not capable by their nature of being organisations. After all, the future transport ecosystem of the discussed format will not be formalised into a legal entity or an organisation without the status of a legal entity. This will be an economic group of persons that is not an organisation, but operates on the basis of the principle of organisational unity, managed from a single centre on the basis of a single algorithm, but at the same time by many economic entities that make up such an economic group of persons.

This state of affairs turns the described economic group of persons into a legal monopoly on the commodity market, the nature of which is currently not determined (since it will gravitate more towards a state monopoly (and we believe that it is this approach that should be given priority, but clearly does not fall under the criteria of natural monopoly). Moreover, it is a legal monopoly, within which competition takes place. Moreover, this is competition of a special kind: the commodity market within the framework of such a legal monopoly will be the «market for rights to manage the commodity transportation market». And this presupposes a radical transformation in the nature of legal barriers, antitrust, conditioning, infrastructure and even industrial regulation.

2. The transport ecosystem, based on the principles of artificial intelligence, gives rise to another phenomenon: public utilities as a whole, industrial facilities and service sector facilities seem to «lose their independence». That is, if previously such objects functioned on their own, and transport and its infrastructure – on their own, then from the moment of formation of a full-fledged transport ecosystem based on the principles of artificial intelligence, utilities, industrial facilities and service sector objects turn into an element of transport ecosystem, the functioning of which (of the facility) must meet the requirements of the transport infrastructure, and not vice versa (as is the case now).

Accordingly, virtually all legislation regulating not only economic activity, but also the procedure for carrying out administrative procedures, and even marriage and family legislation will be subject to amendments, because from the moment of formation of a full-fledged transport ecosystem based on the principles of functioning of artificial intelligence, transport and its infrastructure will be no longer on the street, but actually in an apartment, and the apartment will turn into just an element of the transport ecosystem.

3. The transport ecosystem, based on the principles of artificial intelligence, gives rise to another, much

more fundamental, difficult to comprehend and dangerous phenomenon: along with «human rights», there is a need to develop and adopt «machine / technological law» – that is, a set of rules for the behaviour of a «large carrier» of artificial intelligence and of a separate machine – the carrier of artificial intelligence as part of the every-minute process of managing the transport ecosystem. After all, «simple» technical algorithms «imposed» on machines by humans will not work in this case, since the road is a constant movement in space and among circumstances.

Accordingly, in case of risks and threats of various nature, artificial intelligence will have to assess them and find a legitimate way out of the current situation. There are a huge number of examples when this would be necessary. So, if on the path of an unmanned vehicle that is in motion simultaneously with many other unmanned vehicles of a very different nature (starting from an unmanned drone performing the function of a pizza courier, and ending with an unmanned train levitating in the air (which is also quite possible to become a reality in the relatively near future)) an obstacle arises in the form of a person whom, as a general rule, the machine cannot harm, then the machine will certainly be forced to stop. But what if such a stop could lead to catastrophic anthropogenic consequences that cannot be prevented if this particular unmanned vehicle stops without alternative?! What if a necessary and inevitable condition for eliminating such a public danger is movement of an unmanned vehicle forward and causing harm to a person?! This means that in the «simple algorithm» for functioning of artificial intelligence it is necessary to add the legal construction of extreme necessity, justified risk and even «error in the presence of circumstances that exclude the «criminality» of the act of the bearer of artificial intelligence».

Or the second example: a person who finds himself in the path of an unmanned vehicle is a terrorist or a hired killer who threatens the life and health of the passengers of such a vehicle. Following the «simple algorithm» of functioning of the artificial intelligence carrier, the unmanned vehicle will have to stop and wait peacefully until the villain finalises his guilty intent and leaves the trajectory of our vehicle. Or maybe a vehicle not only can but should provide protection to its passengers in such a situation, while causing harm to life and health of a terrorist or assassin encountered on its way?! If the answer is affirmative, then it is necessary to add to the «simple algorithm» for functioning of artificial intelligence a completely legal structure of necessary defence or even actions to prevent socially dangerous consequences.

Third example: an unmanned vehicle should only be an indifferent witness to offenses of any kind, or it should actively participate in maintaining public order and ensuring national security (for example, in counter-terrorism activities). If it is given an active position, then this means a radical disruption of the entire system of law enforcement activities and the activities of state security agencies, suggesting the inclusion in the relevant legislation of another block / level of legal norms – «machine / technological law (robot law)».

At the same time, by «machine/technological law (robot law)» we mean not a digital algorithm incomprehensible to the common man, embedded in the processor of an artificial intelligence carrier, but a set of rules for the mutual «lawful» behaviour of a person and the machines around him, as well as similar mutual «lawful» behaviour of machines among themselves. The emergence of such a set of legal norms of a new format will entail not only the need to revise the design of the legal system and the rule-making process, but also to make a decision on determining the legal regime, and possibly even the legal status of the carrier of artificial intelligence.

From our point of view, humanity will be forced to recognize the most advanced carriers of artificial intelligence as subjectivised objects of rights. In addition, such subjectivised objects of rights will require «personification.» We believe that the institution of public identification objects (which is a new type of intellectual property object), proposed by the scientific school of economic law of Belarusian State University [12, P. 79; 13, P. 232].

The institutionalisation of our proposed concept of personification of artificial intelligence carriers in the future will allow us to solve several conceptual problems at once:

– To establish technological liability as a specific type of legal liability for artificial intelligence carriers (we have no doubt that there will be a need to institutionalise such liability).

– To develop a «formula» for distribution of legal and economic responsibility between the owner of the means of production within the transport ecosystem, based on the principles of functioning of artificial intelligence, the owner of other rights to such means (which, as is thoroughly noted, will become widespread in the future [14, P. 55]), investors, other interested parties, as well as artificial intelligence carriers managing the «core» of a single digital platform for managing the transport ecosystem of the future.

4. Another, no less «global» phenomenon generated by the transport ecosystem based on the principles of artificial intelligence is a radical breakdown of property relations.

From our point of view, in such conditions, investors will lose interest in obtaining ownership rights to transport and related infrastructure, as well as to unmanned vehicles operated using it. Most likely, individuals will either lose interest in owning such vehicles, or the state will establish a ban on such ownership. This will mean, conditioned by objective factors (most of which are forced), the need for actual nationalisation of the means of production within the transport ecosystem, based on the principles of functioning of artificial intelligence, and the «invention» of such an innovative property right to the means of production within the transport ecosystem of the future, which will combine all the positive aspects of all types of property rights (real, exclusive and obligatory).

5. The final phenomenon, which will certainly be generated not only by formation of a transport ecosystem based on the principles of functioning of artificial intelligence, but also by implementation of such technologies in public life, is the emergence of a previously unknown subject of public interest – a collection (a kind of society) of artificial intelligence carriers recognised as subjectivised objects rights and endowed with an object of public identification.

No matter how fantastic and implausible it sounds now, it is quite possible that very soon «trade unions of artificial-intellectual labour workers» may arise. This means that now we need to talk about a completely new format of quality in law and the quality of law itself [13].

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