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World experience in the development of intelligent transport systems

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Abstract: This article analyzes the essence of the concept of "Intelligent Transport System" (ITS), justifies the need for state participation in the formation of a single ITS, and also provides examples of the implementation of ITS in economically developed countries.

In the second half of the last century, professional specialists began to come to understand and realize that the potential opportunities of the industrial economy have almost exhausted themselves for the growth of economic efficiency. At this time, the ways, methods, technologies, elements and systems of the intellectual economy began to form, develop and spread. This circumstance led to the emergence and development of intellectual management, marketing, logistics and other management concepts, as shown by the analysis of statistical data and the topics of scientific schools.

International, cross-border and national logistics are gradually becoming intelligent and require the formation of the concept, mission, goals, tasks, functions, integrated logic, principles and methods, strategies and tactics of intelligent logistics systems. As well as the direct participation of all structural elements in the evolution of supply chains in international logistics, the use of modern innovative information technologies in logistics. Intelligent transport logistics system is the main part of intelligent logistics.

Intelligent Transport System (ITS, eng. Intelligent transportation system)

— this is an intelligent system that uses innovative developments in the modeling of transport systems and the regulation of traffic flows, providing end users with greater information content and safety, as well as qualitatively increasing the level of interaction of road users compared to conventional transport systems. The history of ITS creation and development dates back to the 1980s in countries such as the United States, Japan,and Europe. Today, together with Japan, Singapore and South Korea are the most advanced technologies in the field of ITS at the world level.

Interest in the study and implementation of ITS is associated with the emergence of the problem of road congestion, therefore, there was a need to combine modern modeling technologies, real-time management, as well as communication technologies. Traffic congestion is the result of increasing motorization, urbanization, as well as both population growth and increasing population density. They reduce the efficiency of road transport infrastructure, increase travel time, fuel consumption and environmental pollution. The Government's recent ITS activities are further motivated by an increased focus on internal security, as many of the proposed ITS systems also include road surveillance, which is a national security priority. The main factor in the implementation of ITS-the participation of the

state is very important for creating all the conditions for the formation of a single ITS. The state can provide: all conditions for the development of a unified national information and communication database for data collection and notification, the security of this data for their use, support, that is, funding and promotion of research in the field of the latest technologies in this area.

For example, in the European Union, thanks to the participation of states in the development of a single ITS, the following activities were carried out: analysis of transport networks, automatic identification of road accident sites, informing citizens about the state of traffic through special navigation systems.

Foreign experience of ITS implementation.

Singapore. In Singapore, there are traffic detectors on the roads, which stand at every 500 meters, as well as video cameras – at every kilometer of the tracks, and they are equipped with every traffic light and city buses. Also, each taxi is equipped with transponders-devices that allow you to track the location of the car and its speed. All information obtained from these funds is collected by a single traffic control center. Also, the green light on the zebra turns on by pressing a button on the traffic light (GREEN LINK DETERMINING (GLIDE) SYSTEM) [11], and the elderly or disabled can attach their special smart card to it, which will increase the time to go to the opposite side (GREEN MAN +) [1].

In Singapore, there is a trip planner that is based on taxis, because all cars have GPS sensors that collect and send information about movements to the control room. This data is used to calculate the average speed of traffic on major highways, and the planner corrects the information provided. There is also a program of J-Eye cameras installed in Singapore, with which you can track traffic jams and cars that are parked in violation of traffic rules [2]. Radio channels are actively used, which transmit reports on the congestion of key roads and interchanges. During peak hours, informing citizens becomes more frequent. The same example of driver notification can be found in Seoul (Republic of Korea), but unlike Singapore, this type of notification in this city operates at the state level, that is, on the state radio channel. Also in Singapore, as in Seoul and Hong Kong, you can monitor traffic online.

Japan. In Japan, fixed devices and motion sensors are located near the highways, which help collect information about situations on highways in the Traffic Information Center, through which the collected and edited data about traffic jams, accidents or repair work is transmitted to the navigation systems of users ' vehicles. Information from road users themselves is also very important, as they can send it via their mobile devices [3]. In Japan, there is also a system for monitoring the location of buses, but this system is not so popular, since this type of transport is in low demand among citizens. The basis of ITS Japan is the automotive information and communication system (VICS), on the basis of which navigators are made for the car and through which you can get GPS data on road congestion and detours. The data is transmitted from special roadside transmitters and beacons, which were installed back in 1995.

United States of America. The US uses the DSRC standard (transl. Dedicated short-range Communications), promoted by the American public organization for Intelligent Transportation and the U.S. Department of Transportation [4]. DSRC is a one-way or two-way wireless communication channel, as well as a set of protocols and standards that are specifically designed for automotive applications of use. This system allows for emergency warnings for motorists, adaptive cruise control,

head-on collision warning, safety vehicle inspection, electronic parking payments, electronic toll collection, sensor data collection, rollover warning, commercial clearance, and safety inspection vehicles. In the city of Boston, you can see fire detectors and air pollution detectors that are located throughout the Ten-lane Greater Boston Tunnel, since it is difficult to record various fires or technical problems with surveillance cameras in the tunnels, where they pose the greatest danger.

China. In China, Hong Kong has a single system of travel Octopus (the same are found in the Republic of Korea-T-Money), with which you can pay for travel on all types of public transport, parking, as well as as a nice bonus - small purchases in supermarkets and movie tickets [5]. Hong Kong also has a unified traffic light control system, which controls traffic and pedestrian traffic lights using sensor wires located under the asphalt. These wires determine the number of cars piled up on the road, so the green light starts to burn longer in the direction where there are more cars. Often, several closely located roads are made into a "green" zone (street), so that the flow, after passing one intersection, does not linger on another. Each driver can purchase a special electronic program containing an interactive road map (RoadNetworkData) with all street signs and special signals (DigitizedTrafficAidsDrawings), as well as traffic statistics (TrafficCensusData). Updates to this program are released regularly.

In Hong Kong, as in New York at the Laguardia transport hub, road signs are equipped with LEDs that are better visible in the dark, and they also significantly save electricity. Depending on the time of day and the traffic on a particular section of road, different color indicators are turned on.

Australia. The city of Brisbane has a useful feature for drivers – the parking assistance system. The essence lies in special monitors that broadcast information about available places, as well as about 10 addresses of the nearest parking lots. This computer system operates thanks to the Wi-Fi system.

A multi-lane highway runs through the city of Brisbane to Queensland Airport. Along the highway lanes, special cameras are installed that photograph the license plate number, then the owner is identified, and the required fare is debited from the credit card. This helps to avoid many kilometers of traffic jams.

Unfortunately, the development of ITS in Russia, according to the author, is carried out at a slow pace.

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