

INTELLIGENT TRANSPORT SYSTEMS – IMPROVING THE EFFECTIVENESS OF ECONOMY

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ABSTRACT

The article is devoted to the intelligent transport systems, their nature and role in the Ukrainian economy development. The author identifies the problems and defines strategic goals of national ITS implementation.

Keywords: *Intelligent Transport Systems, economic efficiency*

1. INTRODUCTION

Globalization of the world economy, increasing the intensity and complexity of the traffic flows, new IT opportunities in monitoring and management of various economic and transport processes on different levels require intellectual support. Implementation of intelligent transport systems is one of the tools to increase the level of world economic development.

Intelligent Transportation Systems (ITS) - a complex set of informational, communicational systems and tools of automation in conjunction with transport infrastructure, vehicles and users, ensuring efficiency of the transportation process, improving its safety and quality. [1] In other words, ITS - the integration of information and communication technologies as applied to the key components of the transport processes: man - transport - transportation infrastructure.

ITS are innovative technologies. They are designed to provide efficient solutions to the number of complex problems in the field of transport. Among them are particularly important are the following:

- Reducing the risk and consequences of the natural and man-made disasters;
- Development of technology for development of intelligent monitoring and control systems;
- Creation of new transport systems and management technologies;
- Creation of energy-efficient systems of transportation, distribution and consumption of energy in the interaction of all modes of transport;
- Creation of innovative technologies and systems for processing, storage, transmission and protection of information;

- Creation of innovative software production systems and technologies, etc.

Immediate objectives of the ITS which monitor the transport processes, as well as involved in data mining and modeling, are as follows:

1. Automation of operational forecasting of the arrival time of transport units. In some cases, planning which is based on statistics and standards is quite difficult.
2. Transport management of land transport operators.

The task of analysis, modeling and cargo transportation management for the several operating land transport operators provides another example of the intelligent transport technologies capabilities utilization. It requires monitoring, accumulation and generalization of the results of the individual carriages by sections that were performed by different operators. Special graphical models (reflecting logistics, technology and economic charts) are formed that clearly represent generalized transportation performance with the required level of details. Modeled diagrams allow the analysis, modeling and planning of the carriages. With the aid of diagrams, it's possible to perform estimation of the expected delivery time, assets utilization and operational forecasting of the current traffic characteristics (expected levels of technological and economic KPIs, etc). In this case, it is also possible to apply ITS techniques and expert systems methods for automatic generation and adaptation of relevant mathematical and information resources of transport management systems.

3. Maintaining tasks of safety and accessibility of the data for all user groups.
4. Unification of decision support systems in the event of deviations from the reference system state under specified conditions.

New Technological Alternatives for Enhancing Economic Efficiency

Annual growth in international trade relations, development of the society and global economy demand quite high quality standards of the national transportation system service

Global transport complex has reached a new, innovative path of development. Therefore, in order to remain competitive in the transport market, national transport industry must focus on intense transportation system improvement[2]. It is possible presently with the development and implementation of intelligent transport systems, as confirmed by best available practices.

Relevance of innovative management methods implementation is also confirmed by its influence on the over the efficiency of the national economy as a whole. Efficiency is a complex concept, which is, among others, defined by the level of stability and dynamism, which, in turn, includes safety and quality [3]. In general, increasing the efficiency of the economy (all of its branches) depends on the level of each infrastructure element development, including the transport sector. Development of the latter is impossible without the ITS implementation. ITS are designed to ensure the safety, quality and dynamic development and, consequently, positively influence national economy as a whole.

Currently, Ukraine is carrying out fairly wide range of projects on ITS development and implementation, reflecting the interests of all transport process participants – transport companies and their customers. Thus following tasks require immediate attention:

- The development of transport infrastructure as a critical factor in the design and implementation of ITS;
- ITS operation prospects;
- International use of ITS;
- Development and use of legislative and regulatory support of global and domestic information technologies in transport;
- Create a national single integrated information and control system on transport;
- Improvement of electronic control and security systems;
- Development of the specific IT-logistics systems;
- Wider implementation of global navigation-transportation systems, and satellite technologies in the transport sector (GPS, GPRS, GLONASS, Galileo, etc.);
- Improving electronic systems and navigation equipment on vehicles, deployed at international sea, rail and road transport.

The main problems of ITS implementation in Ukraine:

1. The absence integrated intelligent management systems (IIMS), which is a barrier to long-term development of the transport industry. The modern development of transportation information management and communication systems of the country should be based on a common information and communication environment of the transport complex, which is impossible without the IMIS.

2. The development of intelligent transport systems of Ukraine is hampered by the absence of national legislation in this area.

3. Integration of the interests of all "customers" and "suppliers" as elements of ITS, is an important aspect of the ITS formation, especially as Ukraine intends to continue its integration into the global (at least - European), transport and communications and economic space.

The solution to the problem of supply of necessary quantity and quality of transport services is recognized as a catalyst for the development of the whole transport complex of the country. This is especially important within the maritime transport – an important system level of the foreign trade relations. Timely and regular deliveries of consignments to customers is extremely important to shipper while respecting the principle of "door to door" and compliance with the best available practices on optimization and the safety of the transportation. When the transportation routes are reasonably full, the solution to the above problem requires monitoring of the transport flows, vehicles, cargo, passengers, as well as formation of intelligent monitoring and control systems of transport, logistics and economic processes. Due to present absence of the integration in various modes of transport development in Ukraine, it is necessary to develop and adjust highly effective and innovative technologies. ITS are particularly relevant in the further development of the container transportation as a unified mean. Presently, containers can transport different types of cargo, ranging from general cargo, consumer products and up to coal, liquefied gas, oil, ore, etc. It's development affects not only international, but also regional, inter-regional and local aspects of the present business practices [4].

Today, the government focuses its efforts to society-oriented economic development. Which means that availability and quality of transport services to the public shall comply with social standards. Thus, development of the appropriate state system to control transportation quality is necessary. In a line with this, development of urban and suburban passenger transport and passenger rolling stock, which would adhere to the modern standards, are required. Special attention shall be

focused on the development of high-speed and ultra-high-speed passenger transport. ITS shall become the basic tool for resolving these issues, as they integrate video surveillance and recording of public transport, electronic passenger identification and fare collection, etc.

Integration into the global transport and communications space and need for the realization of the national transit potential require the harmonization of technical and technological parameters of transport complex of Ukraine with appropriate international standards. In turn, it will ensure its competitiveness in the modern environment. Here, one of the major problems is the optimization of the major transport hubs (such as seaports, railway hubs, etc.) with the use of ITS.

In order to design, develop and deploy the ITS, it is necessary:

1) to assess the impact of ITS on the objectives and key performance indicators of the state program of development of the transport sector;

2) develop a program of pilot projects on ITS implementation at specific regions (separate transport hubs), where ITS should be considered as a set of technologies related to the use of the information on the state of traffic, elements, systems, and the economic parameters (their dynamics) that allow to implement operational monitoring, control and optimization (and timely correction).

Global transportation is influenced by major institutional and technological processes that have already radically changed and continue to change the face of the world transport. However, positive changes are accompanied by a number of negative consequences, the scope and significance of which give reason to consider these as a strategic challenge of national and global scale [5]. These include a high level of human waste, increasing consumption of non-renewable sources of energy and other resources, the negative impact of transport and its infrastructure on the environment, the ever-growing delays of goods and passengers in transit (as a result of the so-called "bottlenecks"), caused by actual lack of the capacity of the transport infrastructure, and even more so by inadequate traffic management.

For modern world ITS mean new fields in interaction of science, engineering, economics and business, considered as the most effective tool for solving transport problems and creation of the new industrial segments. The efforts of the government, public, international organizations, academicians, and business circles are aimed at finding solutions in such key areas as a significant increase in security at sea, rail, road, pipeline transportation, as well as productivity increase, growth of the capacity of internal and intermodal transport systems.

Taking into account that Ukraine country is dragging behind the intellectualization of the transport processes, proposals for the development of ITS in Ukraine shall first of all contain analysis of international experience on similar projects of ITS development and implementation. Starting from 1980-s most countries of Western Europe, the Asia-Pacific region (including China and India) and the U.S. deliberately and systematically promote own ITS as the basis of transport policy.

In accordance to the international practice, it is appropriate to consider ITS as a common transport ideology, the integration of the best IT and telecom achievements into all kinds of transport. Problem of ITS implementation is strategic in nature, as solution determines the overall competitiveness of each country on the world market. Also, due to large scale investments required, it can not be realized without the direct involvement of the state (i.e., without a government support program). The role of the state should be measured in the following four key areas:

- The formation of an institutional framework for national architecture, planning and coordination of economy development management;

- Creation of a legal framework, standardization and harmonization of requirements for technical solutions and software within security field;

- Support research and pilot projects on forming and implementation of the knowledge-based ITS-services with a high level of initial commercial risk and development of socially oriented ITS projects in the of low economic development;

- Development and implementation of ITS infrastructure components in the field of the public transport - drivers information system, adaptive traffic control systems, shipment information systems for shippers/cargo owners, ship operators and managers, owners, stevedoring companies, terminals, warehouses, weather conditions monitoring, driver behavior, road vehicles parameters monitoring, etc.

The theory and practice of innovations confirms that state involvement is crucial, since it determines the legal environment, creates a favorable innovative and investment climate, ensures compliance with established rules and regulations.

ITS marketing prospects are of interest to the scientific and business community. However, the current state of the market, particularly in Ukraine, has the following features:

- Fragmentation;

- Disconnection;

- Lack of national standards;

- Absence of the constant contacts with international ITS associations.

However, the solution of these problems, the formation and implementation of ITS in Ukraine will increase the efficiency of traffic management, reduce overhead costs for the transportation of goods and passengers, will accelerate the development of the national transport and communications, provide a favorable environment for the introduction of services on the basis of existing satellite navigation systems.

The expected socio-economic impact of the introduction of transport information management systems may be estimated (similarly to the effect of the introduction of the same at the Western Europe, the U.S. and China) as 10% of GDP growth, the reduction of accidents by 30%, reduced fuel consumption by 20 % and increased employment by 5%, which in turn will increase the effectiveness of the Ukrainian economy as a whole and, consequently, the quality of life.

2. CONCLUSIONS

ITS is the common transport ideology of telematics integration achievements in all types of transport.

Problem of the introduction of ITS is strategic in nature, the solution generally the determining each country's competitiveness in the global market and due to the capital intensive and they can not be realized without the direct involvement of the government (i.e., without a government program and its support).

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