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INTELLIGENT TRANSPORT SYSTEMS – REQUIREMENT AND OPPORTUNITIES

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ABSTRACT

The main issue of the paper is the necessity of Intelligent Transport Systems (ITS) development and applications, aiming at safe, green and up-to-date transport system. Based upon a review of studies in the field of ITS, the impact of transport over other major fields such as trade, competition, employment, environment, cohesion, energy, security and the internal market has been evaluated.

Key words: Intelligent transport systems, green transport, sustainability.

ABSTRACT

В настоящей работе обосновывается необходимость разработки и реализации интеллектуальных транспортных систем в целях достижения безопасного, "зеленый" и современный транспорт. Обзор исследований в области интеллектуальных транспортных систем и воздействия транспорта на других крупных таких областях, как торговля, конкуренция, занятости, охраны окружающей среды, сплоченности, энергии, безопасности и внутреннем рынке.

Key words: Интеллектуальные транспортные системы, зеленый транспорт, устойчивость.

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1   INTRODUCTION

Transport is among the EU basic sectors. The air transport of EU contributes to 2,6% of GDP and creates 3,1 million jobs, while land transport generates 11% of GDP and employs 16 million people in EU. On the other hand, the transport sector is responsible for 25% of the total harmful emissions of CO_2 in EU. Within the framework of Program "Horizon 2020"[3] during the period 2014-2020, €6 339 would be directed towards financing EU research in the field of more safe, "green" and "intelligent" European transport systems in favor of all the citizens.

2   THE REQUIREMENT OF INTELLIGENT TRANSPORT SYSTEMS

Research in transport will also have a direct impact on other major areas such as trade, competition, employment, environment, cohesion, energy, security and the internal market.

It is mentioned in a survey, executed by IBM [4] that:

"Transport has become one of the major priorities requiring the urgent response of local authorities, which must undertake actions towards improving the traffic flows in order to make cities cleaner and less congested. The city population is increasing due to the global urbanization. According to the UN Department of economic and social matters' statistics for 2014, for the first time in history the greater part of world population inhabits cities. Cities all over the world are facing the challenge of overloaded transport networks and practically non-existent possibilities for infrastructure reforming, in particular the city centers, in order to deal with the difficult situation. City enlargement in open spaces is a good opportunity to solve some of the global problem. In China for instance, current traffic consists of over 20 million cars, the forecasts predicting increased number of 140 million in 2020. Additionally, according to the Transport Department of USA, congestions on the transport system of the country cost up to 200 billion US $ annually. In Europe, where 300 million cars participate in current traffic, road congestions take up 1% of EC GDP per annum, i.e. amounting to about 100 billion Euros".

Another new survey, named "Intelligent transport: How cities could improve mobility", the growth of importance of cities in world economy brings forward competition in attraction of trade and more jobs' opportunities, so the efficiency of their transport system affects to a big extent the city attractiveness for the potential investors as well as the people trying to find employment.

Further, an in-depth study of IBM, executed in more than 50 world cities, among the developed and under-developed, trying to improve shows a definite support for wider use of enforced system of urban transportation means as well as other alternatives for making private cars cleaner and environmentally friendly.

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[3] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/smart-green-and-integrated-transport
[4] IBM: city traffic can be subject of intelligent controlhttp://profit.bg/news/IBM:-gradskiyat-trafik-mozhe-da-se-kontrolira-inteligentno/nid-54924.html

Virtually, the authorities of every city included in the study are developing a vision and strategy towards improved mobility, typically by changing modal shares and delivering improved transport services. In addition, city governments stress upon the importance of intelligent transport systems (ITS) in dealing with the challenges in the field of transport faced by the population and the environment as a whole.

Intelligent transport systems can include integrated management of public transport travel fees, enhanced management of customer relations, traffic forecasting, improved traffic management, traveler information and toll collection.

These systems apply advanced technologies in the process of more and better data generation in order to intelligently analyze the current situation and apply the results in the establishment of more effective networks.

In various cities the understanding and realization of the full potential of ITS is still at an early stage. Therefore the report of IBM [5] suggests five alternatives for intelligent city management in the field of transport:

- Development and implementation of comprehensive long-term, flexible and integrated with the total transport vison of cities intelligent transport strategies;
- Adoption of consumer-oriented approaches aiming at service improvement, understanding the needs of clients and influencing the models of passenger behavior;
- Integrated services between the different modes of transport;
- Providing funding and applying innovative business model;
- Efficient management and implementation through directing project in the field of ITS.

According to Jamie Houghton, Global Leader Intelligent Transport Systems, IBM, "…Clearing congestions and improving the ways of people and goods' intercity and regional mobility are vital for the quality of life as well as cleaner environment. This is of utter importance for the economic viability and sustainability of municipalities all over the world".

According to the mentioned above, intelligent transport systems represent an up to date complex for monitoring, management and general support of the transport system functioning.

These systems use information and communication technologies for transport data generation and processing, in order to support decision-making and assessing transport projects' effects. Every road user could be benefitted before and during the trip. The information generated is used to advance the optimization of different types of transport operations from public and private sectors.

Intelligent Transport Systems have to start gradually unburden the traffic while there are benefits from fuel savings and accelerating the process of improving the environment. In the traffic management process, The Intelligent transport systems (ITS) combine information technologies and communication systems and make them part of the transport systems.

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[5] IBM: city traffic can be subject of intelligent controlhttp://profit.bg/news/IBM:-gradskiyat-trafik-mozhe-da-se-kontrolira-inteligentno/nid-54924.html

Thus influenced, roads could become safer, less congested and hence cleaner. The "Green transport" Initiative is aiming at accelerating the implementation of ITS in the land transport. Broadly, the process envisages a system of services about traffic and travel management in real time, generation of road data for traffic information, establishment of nation-wide systems for travel planning, management of cargo movement on the European transport corridors, single electronic cargo transport management medium, the application of RFID and EGNOS/Galileo-based location services, electronic systems for road used charging, etc.

From the point of view of economic efficiency, the attention has been drawn towards a number of political, engineering and social and economic challenges. Among the considerations are the implementation of "cleaner and safer car" of the future, the interoperability and the introduction of multi-modal transport systems including the water borne and railway transport.

The development of aiding the GALILEO System and its application technologies would be the major part in the implementation of European policies in the field of ITS, such as:

- A part of ITS serving for the measurement of different road traffic parameters, the driving behavior as well as the environmental state;
- Another group representing the on-road information systems, whose data could be used before and during travel;
- A third group including communication systems, transmitting different types of information towards the control center as well as the means of storing, analyzing and visualization of the data generated.

Identifying the transport system's problem fields requires determining its parameters as a function of time, place and different disturbing circumstances, such as bad weather conditions, incidents and repairing activities as well as various economic factors.

The load measurement, determining the usual congestion places as well as those of often occurring road accidents, the identifying of the general car flows and peak times would considerably assist the revealing process of existing transport problems causes and their solution through adequate measure.

The launching of road network computer models and load traffic simulations, based upon historical data or data obtained in real time from road sensors will allow the entire network monitoring, as well as various projects and events' faster and more accurate evaluation.

The accessibility of the different kinds of services, provided by ITS, requires the generation and summarizing information from the various fields of transport. Examples of information sources are the levels of car park occupation, closed streets, places with road repairs, traffic over the central streets, etc.

This brings forward the necessity of integrating different information systems and their establishment in case they don't exist. The huge amount of the generated information on road congestions requires a big number of census points, situated at different places throughout the city or the region.

The fulfillment of the projects connected to their situation necessitates their number optimization in order to obtain the optimal useful information.

Great advantage of intelligent transport systems is the ability they give to management of traffic, parking, accidents and emergency situations, providing automated driving, awareness of the users of transport services, traffic control and users of public services through video monitoring of environmental impacts.

ITS provide a number of ways to decreasing the costs and energy consumption in transport. The establishment of a Single Center for traffic management is a major challenge, requiring big financial, administrative and organizational investments.

The aim is towards integrating of more complex services in one management center.

The following ITS are subject to application in cities:

For traffic management:
- toll services
- access control
- traffic research, modelling, simulation and analysis, including cars and pedestrians
- traffic organization, adaptive light signaling regulation
- road signs with variable contents.

For city public transport management:
- rolling stock management
- prioritizing the means of public transport on the light signal' regulated crossroads
- providing travel information for the city transport users inside and outside the public transport means
- electronic toll systems: through specially designed devices, mobile phones (by sending SMS)
- analyzing the level of service consumption through passenger registration.

For parking facilities' management:
- drivers' information for the park places and the free space in them through changing contents' signs, by Internet and mobile applications (such as Android)
- collection of park fees through sending SMS.

For informing the transport service users:
- signs with variable contents
- internet portals
- mobile phone applications.

For incidents and accidents information management:
- providing the reaction services through special vehicles' prioritizing (police cars, fire brigade cars, ambulances)
- telephone 112
- rising and management of safety.

For traffic and public transport users' control by means of video stations, situated at or in:
- the streets and crossroads
- bus stops and metro stations
- transportation means.

For the automatic management of vehicles:

- aiding the driver in the process of driving
- vehicle equipment with a communication system linked to the global system centers
- auto driving and piloting.
  For monitoring the effects over the environment:
- through monitoring the state of the atmosphere
- through measuring the noise levels.

3   CONCLUSION

Bulgarian government has adopted a Regulation on the additional terms and conditions for the deployment of Intelligent Transport Systems in the field of road transport in the country.

The Regulation lays down the conditions and procedures for implementation, as well as how to use intelligent transport systems in the field of road transport. It will definitely assist the application process, supporting the adoption of EU legislation in connection with the implementation and management of intelligent transport in the country.

The requirement and opportunities of the intelligent transport systems are entirely corresponding with the sustainable development of the transport sector as a whole, considering the supporting European transport policy ideas, the Sustainable development strategy as well as Strategy 2020 of the EU.

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Článok recenzovali dvaja nezávislí recenzenti.