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IMPLEMENTATIONS OF ADVANCED TECHNOLOGIES AND OTHER MEANS IN FREIGHT TRANSPORTATION THROUGH THE TERRITORY OF LITHUANIA

Application of advanced technologies and implementation of information systems should be one of the most important guarantees influencing optimal freight transport.

For the acceleration of the interoperability of freight transport much attention should be paid to the enhancement of the ITS, to the development of Lithuanian transport system modelling, to the creation of modern technologies in transport terminals and to the implementation of other information systems.

WDROŻENIE ZAAWANSOWANYCH TECHNOLOGII I INNYCH ŚRODKÓW W TRANSPORCIE TOWARÓW POPRZEZ TERYTORIUM LITWY

Transport powinien zapewniać zrównoważony ruch ludności i przewóż dóbr, wzmacniając dynamiczny rozwój gospodarki narodowej. Najbardziej złożonym problemem jest precyzyjne określenie transportu towarów i odpowiednie wybranie zarówno środków transportu jak i zaawansowanych technologii. W trakcie opracowywania środków związanych z najlepszym przewozem materiałów ważnym jest rozważenie możliwego ich wpływu na cały sektor transportu jak i inne sektory gospodarki narodowej (wpływy związane z aspektami technologicznymi, ekonomicznymi, ale również społecznymi, ekologicznymi i nawet politycznymi). Dlatego rozpatrując zaawansowane technologie, systemy informacyjne i inne środki które wzmacniają rozwój transportu, ważnym jest stworzenie i rozwój inteligentnych systemów transportowych (ITS). Ponadto ważne jest wypracowanie stałego systemu operacyjnego z modelowaniem i przewidywaniem tranzytu i przepływów ładunków oraz ustanowienie nowych technologii na terminalach transportowych aby umożliwić bezpośrednie przeładowanie towaru z jednego transportu na drugi.

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1. INTRODUCTION

Transport should be an important guarantee securing sustainable public mobility and freight transport, enabling to support the dynamic process of the development of national economy. The most important issue - to define precisely problems of freight transport and to select properly as well as to adjust necessary means and advanced technologies.

However, it must be born in mind that in preparation of means related to the improvement of freight transport it is necessary to consider all the realisation consequences to the transport sector as well as to other sectors of national economy as well (including not only those of technological, economical aspect, but social, ecological and even political aspect as well).

Therefore, while speaking of advanced technologies and other means ensuring freight transport and its development, attention should be focused on the following basic issues:

- a) Development of Intelligent Transport System (ITS) in Lithuania;
- b) Information system model of dangerous goods transportation in Lithuania;
- c) Modelling of Lithuanian transport system and of intermodal freight transportation development;
- d) Establishment of new multi-functional freight loading technologies in transport terminals:
- e) System for modelling and forecasting transit and transport flows between the EU and CIS countries;
- f) Implementation of other means in border crossing and customs for improvement of freight transport.

2. DEVELOPMENT OF INTELLIGENT TRANSPORT SYSTEM IN LITHUANIA

Intelligent Transport Systems (ITS) present a new class of transport system that is comprised of advanced information and telecommunications network for users, infrastructure and transport means.

ITS implementation, unlike traditional transport investment, demands new partnerships: between those with an interest in different transport modes, between administrative levels and between the business world and the public sector. ITS market development depends strongly on such partnerships.

The research area of ITS is as follows:

- The theoretical, experimental and operational aspects of electrical and electronics engineering and information technologies as applied to Intelligent Transport Systems,
- Utilising synergistic technologies and systems engineering concepts to develop and improve transport systems of all kinds.

The overall goals of research on telematics applications for transport remain unchanged. They have to improve the efficiency and quality of transport services with greater safety and reduced environmental impact. But the pace of Information Society developments is now starting to re-shape society in fundamentally new ways. The mass market for communications and information services is just starting to take-off driven by digital mobile Implementations of advanced technologies and other means in freight transportation ... 321

communications, digital broadcasting, de-regulation and competition in fixed networks, the Internet phenomenon and many other advanced developments.

The project will present the key challenges for research on the Information Society Systems and applications for transport and related services:

- To set out the political, economic, social and technical context for the future research,
- To describe the current developments in telematics systems for transport,
- To discuss the objectives towards which the research is directed,
- To discuss the overall approach to the management of information society applications for intelligent transport management and related services research activities within the European Framework programme and the factors critical to the successful development and implementation of the result at national level.

The key research priorities in each area of Intelligent Transport Systems will be defined.

3. INFORMATION SYSTEM MODEL OF DANGEROUS GOODS TRANSPORTATION IN LITHUANIA

Main informational base – international regulations of dangerous goods transportation by roads (ADR) and railways (RID). These regulations are made of several thousands of provisions that change continuously in response to change of nomenclature of dangerous goods, to development of new provisions concerning package, transportation vehicles. It is impossible for dangerous goods transportation participants to get oriented in the plenty of ADR and RID requirements.

Dangerous goods transportation information systems' purpose is to process information quickly and productively, to present necessary provisions and requirements filed for safer dangerous goods transportation and more effective work: package selection, maximal dangerous goods quantity, determination of allowable transportation norms, composite loading possibility and insurance, preparation of necessary documents and other decisions.

Requirements to dangerous goods transportation information system are as follows:

- 1. The systems should be able to accumulate necessary volume of information concerning dangerous goods transportation, i.e. all international dangerous goods transportation rules with their codes;
- 2. ADR and RID international regulations change constantly, they are amended by new provisions or a list of dangerous goods is adjusted, thus the systems should be designed so that it would be possible to expand and modify it;
- 3. The system should make correct inquiries and present necessary fragments of dangerous goods regulations that are required while transporting dangerous goods;
- 4. Data on dangerous goods transportation regulations, its storage and transfer should be safe and reliable;
- 5. The system should process information quickly and effectively, present required dangerous goods transportation regulations or their fragments and if needed adjust and amend them.

Computer control system of dangerous goods transportation information should consist of the following sub-systems:

- identification of dangerous goods system specifying the list of dangerous substances together with identification numbers, danger codes, etc.;
- sub-system of determination of transportation technological provisions priority;

- sub-system of transportation types;
- sub-system for package selection;
- sub-system of marginal transportation quantities;
- sub-system of packing regulations;
- sub-system of mixed packing regulations;
- sub-system of packages;
- sub-system of marking and danger signs;
- documentation sub-system.

Created model is stored in the database of appropriate structure.

Database of dangerous goods transportation is structured taking into account its data processing technology particulars with a view to bring stored data near to its sources or users. It is considered that main system user is a participant of dangerous goods transportation process.



Fig.1. Structure of data basis for individual participant of transportation

Main participants of dangerous goods transportation process are the consignor, carrier, consignee, vehicle owner. A separate-informational block is attributed to each of them.

Main element of the database structure is information about cargo. It includes data on dangerous goods type (name or identification number), amount.

Check block is important for experts and inspectors. Information entry, modification and removal blocks purpose is to adjust enter and otherwise modify information.

Structure of data basis for individual participant of transportation is represented in fig.1. The following works are performed at the preliminary stage:

1. Creation of dangerous transportation database;

2. Creation of information infrastructure;

3. Design of interinstitutional communication sub-system;

4. DGTIS experts training;

5. Creation of DGTIS project administration and database technological means.

Dangerous goods transportation information system model enables to process information quickly and effectively, to present necessary provisions and requirements adjusted to dangerous goods transportation safety and effective operation: package inspection, maximal dangerous goods quantity, establishment of allowable transportation standards, mixed loading and insurance, necessary data preparation and other.

ADR and RID provisions enable to form common base of information on dangerous goods, mixes, quantities of transported materials, general transportation and etc. The exceptional advantages of modelling of dangerous goods transportation provisions and technological processes are:

- Dangerous goods transportation processes look more pictorially;
- Application resources of information related to dangerous goods increase;
- Important data becomes better understandable;
- Main dangerous goods transportation data is presented for control.

The information system of dangerous goods transportation is needed for Lithuania. This would facilitate the work of all dangerous goods transportation participants, allow to transport dangerous goods safer as it would provide qualitative, timely and effective delivery of information within the transportation links. Work results enable Lithuanian authorities and participants of dangerous goods transportation to present different dangerous goods' transportation technologies, necessary information, issuing dangerous goods transportation permissions, organising transportation control, taking measures for minimisation of accidents and liquidation of their consequences.

The information system of dangerous goods transportation must be included into the total cargo transportation information system.

4. MODELLING OF LITHUANIAN TRANSPORT SYSTEM AND OF INTERMODAL FREIGHT TRANSPORT DEVELOPMENT

4.1. MODELLING OF LITHUANIAN TRANSPORT SYSTEM DEVELOPMENT

Objective: integration of the most important Lithuanian multimodal infrastructure objects into Trans-European networks, which should satisfy the transport needs of the EU candidate countries, under the conditions of the EU enlargement.

Tasks: to create models, which would help to model continually:

- development of separate transport mode and forecast its competitive ability;
 - common Lithuanian transport network;
- interaction of transport modes, as well as interaction of local passenger and freight transport:
- interaction between the transport systems of Lithuania and Latvia, Russia, Belarus, Poland and the EU member states.

With the help of modelling to set the location and route of the European gauge railway track on the territory of Lithuania. Scientifically motivate a basis for the preparation of Lithuanian transport and transit development strategy.

4.2. MODELLING OF INTERMODAL FREIGHT TRANSPORT DEVELOPMENT

Objective: to assess the current interaction between separate transport modes. On this basis to project possible trends for development of intermodal transport, and by ascertaining the needs of the new infrastructure and technology, to project the development of intermodal transport on the national and regional level.

Tasks: to explore the possibilities of the separate transport mode, by ascertaining the supply and demand of service provided by it;

- to survey the national, international and transit commodity flows, and at the same time to carry out the analysis of intermodal freight flows directions;
- to prepare a forecast on possibility to carry out the intermodal transport;
- on the basis of given above surveys and forecasts to start to model intermodal network by connecting single modal networks into one common, through a number of intermodal terminals;
- to start to expand the surveys on the possibility to implement new intermodal infrastructure and technologies, and in that way seek for integration into the regional and European intermodal networks.

5. SYSTEM OF MODELLING AND FORECASTING TRANSIT AND TRANSPORT FLOWS BETWEEN THE EU AND CIS COUNTRIES

Objective: to form the methodical basis for national transit transport policy, which would ensure attractive national transport system and business environment from the technological, organisational and legal point of view.

Tasks: to establish the system for modelling and forecasting transit freight and transport flows between the EU and CIS countries, which would ensure:

- development of transit transport and effective servicing of transport flows;
- modelling, forecasting and analysis of transit freight and transport flows between the EU and CIS countries, by assessment of technical, economical, juridical, social, and factor of transport infrastructure;
- assessment of Lithuanian transport system and the regularities of distribution of territorial carriers market flows:
- analysis of current and perspective availability of Lithuanian road and railroad network for transit transport;
- definition of transport infrastructure objects, having the greatest demand for transit

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transport;

- assessment of transit transport impact on the national transport system and the national economic development;
 - analysis of transit transport system, as well as analysis of transport mean making the greatest environment pollution impact;
 - establishment of integrated customs communications network, based on modern information and communication technology, enabling to connect the appropriate control systems, and covering the whole Lithuanian customs territory;
 - preparation of concept of enhancement of internal customs offices basing on the analysis of commodity flows from/to the EU and CIS and their shift trends;
- Establishment of modern control technologies based on prevention of law violation, risk analysis, recon information and modern technical devices.

6. ESTABLISHMENT/IMPLEMENTATION OF NEW MULTI-FUNCTIONAL FREIGHT LOADING TECHNOLOGIES IN TRANSPORT TERMINALS

Objective: to establish new multifunctional freight loading technologies in transport terminals, enabling to ensure the modernization of currently existing terminals, thus giving a guaranty to all the enterprisers, willing to expand logistical service of cargo delivery. Tasks:

- to improve existing freight loading technologies at transport terminals (rail, water, road);
- to establish and present new technological lines enabling the proper activity of loading equipment and enhancing their efficiency;
- to carry out research works in such terminals, striving to optimise the effective operation of loading equipment;
- to establish new multi-functional technologies of cargo loading for the relevant transport mode terminals.

7. IMPLEMENTATION OF OTHER MEANS IN BORDER CROSSING AND CUSTOMS FOR THE IMPROVEMENT OF FREIGHT TRANSPORT

For the freight transportation through the territory of the Republic of Lithuania the customs aims are following:

- 1. To develop a modern system for administering import and export duties and taxes.
- 2. To introduce advanced control technologies, based on sufficient prevention of law violations and authorisations to carry out investigations, application of risk analysis, use of information and intelligence, and modern technical equipment.
- 3. To expand the field of application of simplified customs procedures, creating necessary preconditions for the "electronic" declaration of goods.
- 4. To concentrate customs activities in the modern, well-equipped inland customs posts, provided with modern technology, while strengthening customs posts at the future external frontier of the European Union.
- 5. To introduce a modern customs information system based on up-to-date information and communication technologies.

- 6. To reorganise the transit system according to the principles of the Common transit system.
- 7. To expand co-operation with other Lithuanian institutions, the customs administrations of foreign states, institutions of the European Union, and other international organisations.

8. CONCLUSIONS

- For acceleration of the interoperability of freight transport, firstly it is necessary to create and develop the ITS, to model Lithuanian transport system in general, as well as to establish a constantly functioning system of modelling and forecasting transit and freight transport flows. It is also important to create new technologies in transport terminals enabling direct reloading of goods from one transport mode to another.
- For acceleration of the interoperability process it is important to focus the attention on optimisation of customs and border-crossing operation. In the analyses of the strategic objectives of customs it is necessary to consider the main aims related to the application of information systems, to the implementation of advanced control technologies, to the implementation of modern customs information system based on the advanced information telecommunication technologies.

Reviewer: Prof. Barbara Kos