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## EVALUATION OF TRANSIT SYSTEM POTENTIAL

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The branch of transport, logistics and transit makes about 13% from gross domestic product (GDP) of Latvia; therefore it is important and interesting to make its analysis. At the first step of investigation it is supposed to find out, on what factors development of transit services mostly depends in the European Union, and in particular in Latvia. Values of several indicators of the different European Union countries influencing development of transport, before crisis, for 2006 and for 2011 will be taken for this purpose. As the most significant indicators the indicators characterizing infrastructure, gross domestic product, % GDP from transport, and others, the most important indicators for transport and transit development will be considered according to the author’s opinion. The next step of investigation will be regression analysis and the analysis of a correlation matrix, which will show what of indicators are the most significant. These indicators will be chosen for the creation of transit system model based on a method of system dynamics. Various shortcomings of the Latvian logistics system are given in the articles. According to authors, there is also an essential potential of transit services development in Latvia. It can be tracked on prompt development of other EU member states logistic systems. The potential of development can be divided into two important parts:

- Potential, which is available in already existing system. It is necessary to investigate and estimate the system, to estimate its present use and to plan the system optimisation.
- Potential, which appears during the development of a transit system, its modernization, construction of new infrastructure objects, roads, the Logistics centres.

The above analysis of transit system in Latvia will allow defining the correct action program and reaching optimal results in the conditions of limited resources [14, 15].

**Keywords:** transit system, GDP, goods freight transport, potential of development, limited resources

An animate and inanimate object of nature transportation from one point to another is typical process on micro and macro level. If, in general, all points of motion path aside from starting point (initial) and final (closing) do not belong to the set of start and end points, such transportation is called transit. In this case, sets of points have characteristic differences (informational, structural, authorities, etc.) and the respective boundaries. The criterion of, whether is the movement transit or not, serves at least double crossing of a border minimum of one set of input and output. We are interested in transit movement of objects at the macro level (the level of a region or a country with a small area with the scale factor of one), and as objects are considered such important logistical and economic targets as passengers and cargo. Transit movement of passengers and cargo is an important economical and infrastructural component for any territorial entity, including surface and underground, underwater and water, as well as air and space. We will keep our consideration within bounds of common commercial types of transport – water, rail, auto road, air and pipeline. We will operate with commonly used features of transport and logistics services as units of measurement of the volume of transit, such as the number of transported tonnes of cargo and number of passengers, and tonne-kilometres and passenger-kilometres.

There is necessity of consideration of official statistics for transportation of some EU countries, Latvia’s neighbours on the eastern coast of the Baltic Sea. Based on the analysis we will try to identify modern transit potential and trends in volume of transit change in those countries. This theme is relevant for Latvia as a logistics and transit is one of the priority directions of Latvian economy development and represents itself a specific export of transportation and logistics service, and transit in transport corridor “East-West-East” is determined by the volume. Figures 1-3 shows data [1] of cargo volumes transportation divided by transport means and countries, which strives for transit in the mention above transport corridor at about the same level.

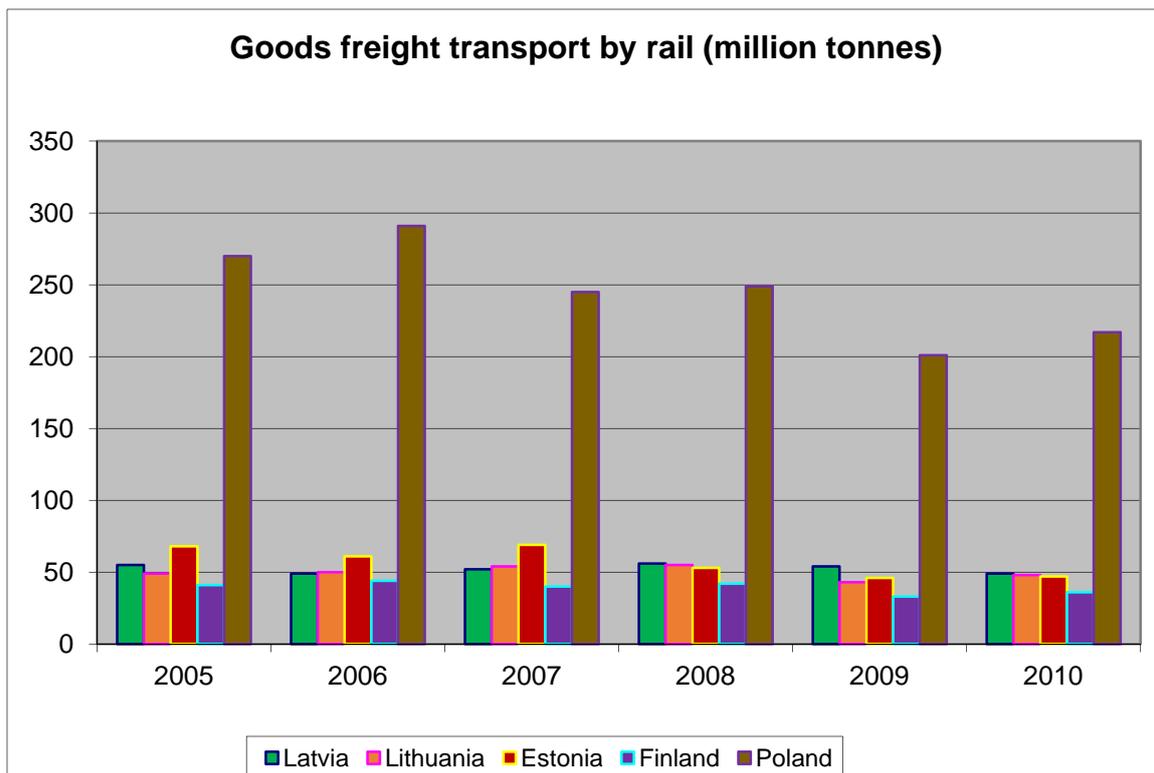


Figure 1. Goods freight transport by rail (million tonnes)

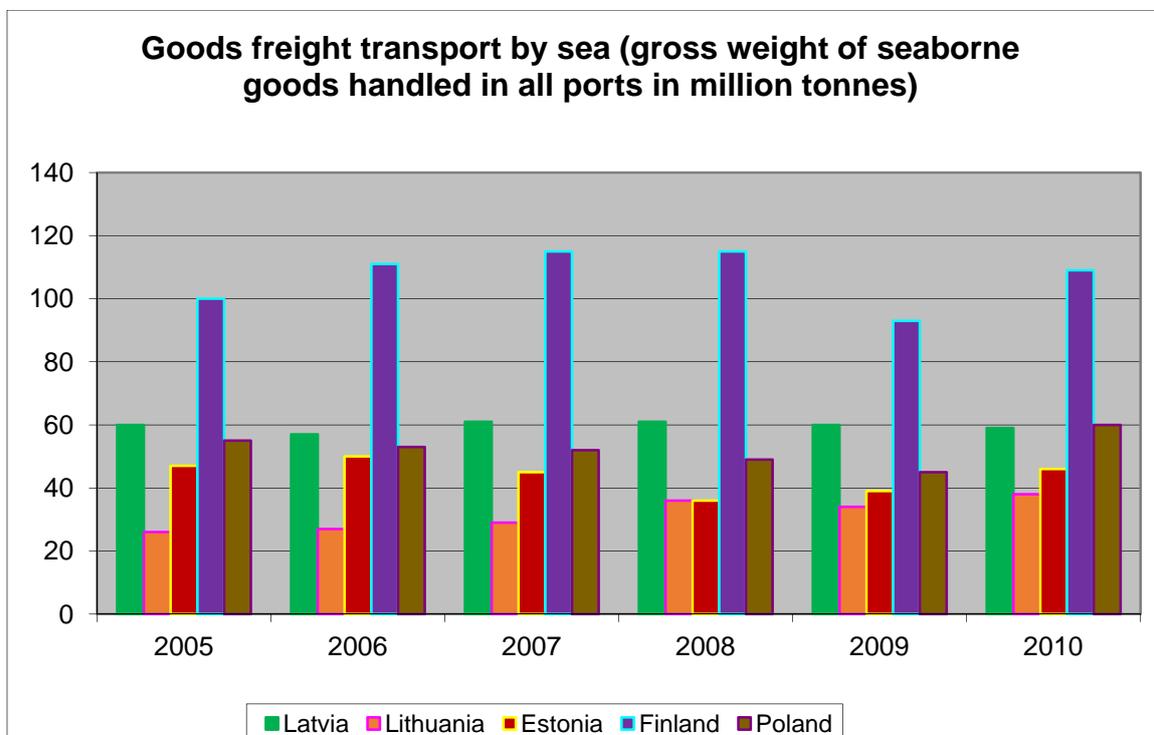


Figure 2. Goods freight transport by sea (gross weight of seaborne goods handled in all ports in million tonnes)

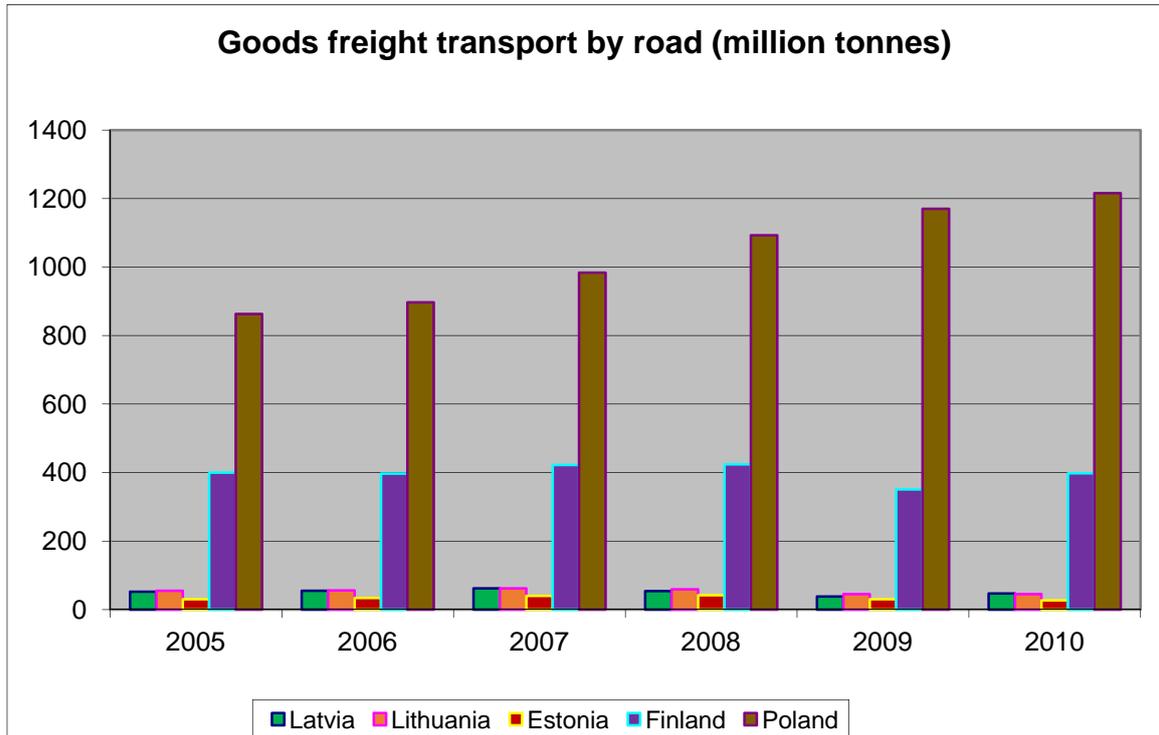


Figure 3. Goods freight transport by road (million tonnes)

In the following Figures 4-5 similar characteristics of turnover of goods in tonne-kilometres are represented [2].

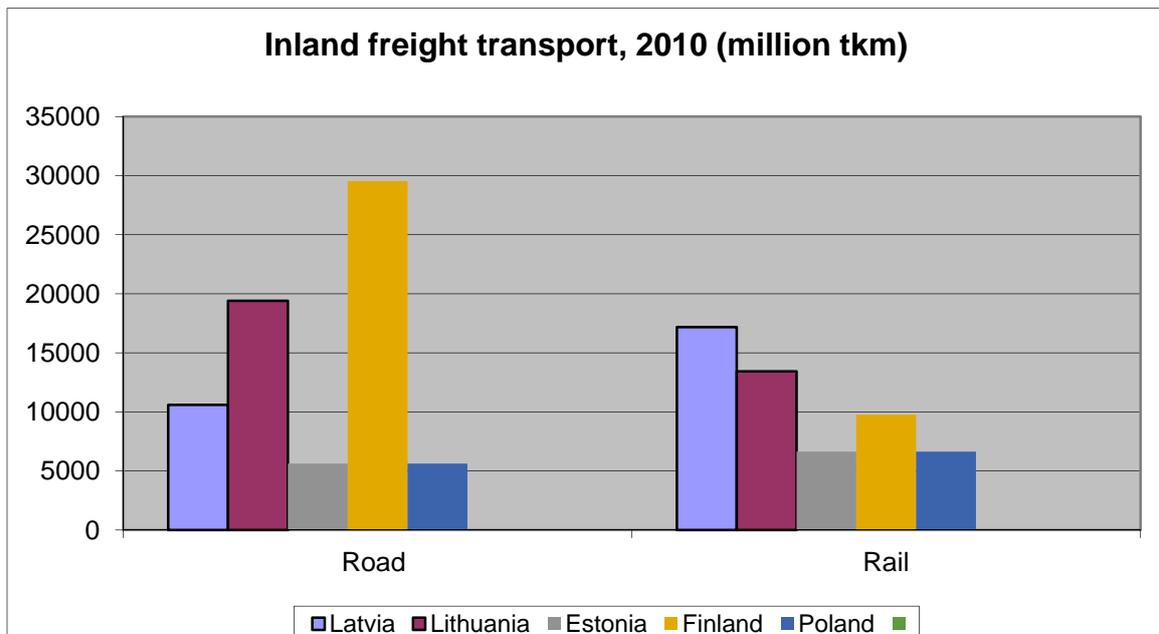


Figure 4. Inland freight transport, 2010 (million t-km)

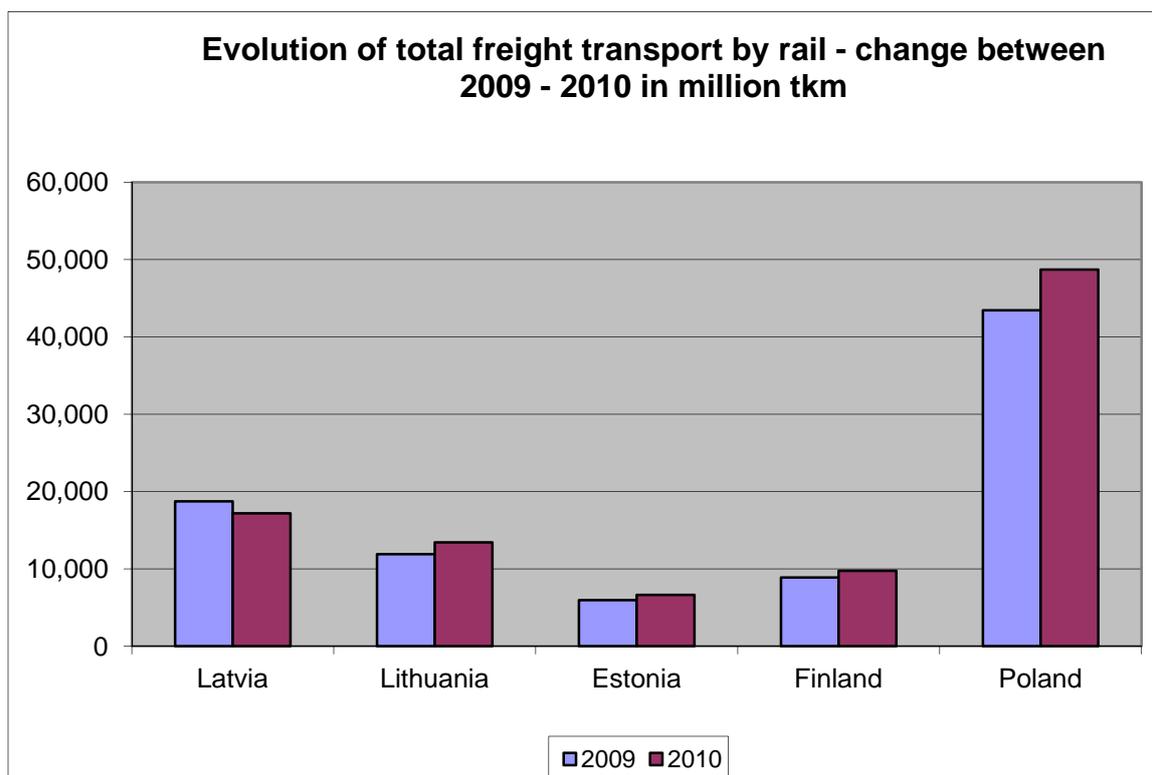


Figure 5. Evolution of total freight transport by rail - change between 2009 - 2010 in million t-k

Comparative data for the main transport modes in Latvia and the volume of traffic [3] is given in Tables 1 and 2.

**Table 1.** Freight volumes, thousand tonnes

Year	Rail	Road	Pipe	Air
2005	54861	51525	20259	10
2006	48731	54187	14543	14
2007	52164	59905	6497	11
2008	56061	54459	5033	12
2009	53679	37820	3771	14
2010	49164	46809	5635	15
2011	59385	53064	5845	13

**Table 2.** Freight turnover, million tonnes/km

Year	Rail	Road	Pipe	Air
2005	19779	8547	3381	31
2006	16831	10936	3628	36
2007	18313	13142	2711	13
2008	19581	12344	2097	15
2009	18725	8115	1573	19
2010	17168	10590	2350	18
2011	21340	11629	2439	12

The data in tables shows us that the volume of transported cargo and cargo turnover increased in the years before the crisis, but after it, in 2009-2010, decreased. This is especially evident according for road transport, because this industry suffered the most during the crisis years – in 2009 year there was a

sharp decline by 30%. According to the data for 2011 year cargo turnover on the road transport still could not reach the before crisis level, that is, the level of the year 2008. Rail transport was the largest one in the terms of traffic and the freight turnover from the selected modes. There is not shown a strong reduction of cargo turnover by the rail transport in crisis years, which means rail transport is less sensitive to changes in the economic situation in Latvia. In 2011, the volume of transported cargo by rail increased by 20% compared with 2010, whereas in 2010 year there was the decline by 9% compared with 2009.

As statistical data available in Central Statistics Office shows that only rail transportation has the most accurate information about the number of transit cargo. For other transport modes such information lacks or exists in some approximate percentage.

While analyzing the transit transportation in Latvia, there is possibility to see, that the volume of transit transportation does not depend on economic growth of the country, there is no clear and stable growth rate.

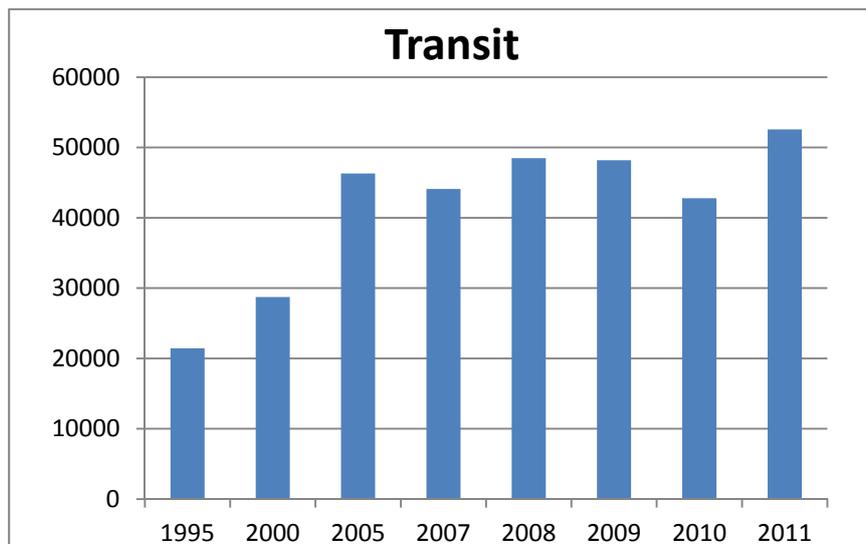


Figure 6. Transit transportation by rail in Latvia (thousand tonnes) (Latvijas Dzelzceļš (LDZ) (Latvian Railways) "Basic Performance Indicators" 2011)

This suggests that the volume of transit traffic in one of the most important transport sectors in Latvia - by rail - depends on other factors. Unfortunately, transit freight data, which is presented in the Report by LDZ "Basic Performance Indicators" in 2011 year, significantly differs from those presented in the Central Statistical Office data. Perhaps methodology of calculation or the definition of the transit cargo differs. In the report by LDZ the majority of cargo, about 89% for 2011, is transit, whereas according to the Central Statistical Office only 8% of the total cargo transported by rail relates to transit freight. At the same time, the total volume of cargo transported and volume of international cargo are the same in both sources.

According to recent statistics, Latvia's economy develops, and with it, starting from 2010 year, the transport sector after the crisis increased traffic volumes sequentially. GDP growth in Latvia in 2012 compared to 2011 was about 9% [4], and about 10% in 2011 compared to 2010.

An analysis of the statistical data indicates that the statistics data quite well describes behaviour of the transported volumes and according of their share in transit during stable economic situations. The crisis of 2008-2009 complicates the tasks to identify trends and potential of transit only on the basis of statistics data and can lead to significant errors in the conclusions. Therefore the authors for further receive of more reliable results, decided to explore and develop combined type algorithms, taking into account the principal and related factors of transit identified in the SWOT-analysis, benchmarking across countries, the Porter model and others, and then to rank the selected factors and give them quantitative values discovered by experimental way, include them in the appropriate statistical models.

Let's give a generalized definition of transit without limitation by analytical description.

The volume of transit through the corresponding region is the total dynamic result of combinative decisions of the general populations of chains or networks of providers (cargo owner), logisticians (service providers, freight forwarders, brokers, agents, etc.), transport companies, insurance companies,

logistics centres (hubs and terminals) constructed and adopted on the basis of professional analysis of the state (economic, commercial, transport, etc.) legislation with mandatory registration of political component of all parties involved in transit.

As can be seen from this rather general formulation, solution of calculating the volume of transit in general terms, the quantitative analysis of its trends and forecast of behaviour of transit may be submitted by some units of the additive and multiplicative models maybe with some general part and specific additions.

Published material analysis of the processes of transit generally confirms above mentioned rather complex verbal language's formulation for the characteristics of transit. Issue or specific aspects of transit are represented in the monographs [6], special surveys [7], the draft law for transit transportation [8], Resolution of the Cabinet of Ministers [9], etc.

Countries give attractive description of national transit systems to the global transportation and logistics community [10, 11, 12].

To understand the transit system and take advantage of a stiff competition for a share of the transit of goods and passengers, special research projects are being developed for the purpose to increase the volume of transit. One such project [13], which is dedicated to the prospects of development of transport in the Baltic Sea region based on SWOT analysis, offers a subset of the criteria that influence the transportation and transit. In the opinion of authors to them belong:

- Transport infrastructure
- Interoperability
- Accessibility
- Transport performance (passenger)
- Transport performance (goods)
- Logistics management
- Role in global logistic chains
- Environment and safety

The authors show the list of the quantitative description of a qualitative assessment of different measures. It is considered as an open tool of choice as it allows a systematic approach to a qualitative analysis not only of measures but also of situations and produces a comparable score for each evaluated measure, which allows a comparison.

These materials and sets of factors may provide some confirmation of the general definition of transit in this paper, and the next steps for its applied research.

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