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CONTRIBUTION OF INTERNATIONAL TRANSIT TRANSPORT TO LATVIAN GDP

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International transit transport services form approximately a half of the services export in Latvia. For an assessment of the international transit services export contribution to the national economy, it is necessary to develop a methodology for calculating this contribution. The modes of transport that are used for international transit transport in Latvia are road transport, rail transport, sea transport, air transport and pipeline transport.

The objectives of the paper are to develop a theoretical model for calculation of the contribution of international transit transport services to Latvian GDP, as well as to calculate the proportion of this contribution to Latvian GDP in 2010.This analysis can be useful in the development and planning of transit-related projects, as well as in transport sector development in general. This research shows that the proportion of international transit transport in Latvia's GDP has been 6.6% in 2010.

Keywords: Latvia, GDP, transport, international transit, exports

1. Introduction

Improvement of transport system and increase of the international transit services export volume improves the competitiveness of national firms in foreign markets, promotes production and employment growth, as well as increases state budget revenues. International transit services form approximately one-half of the services export for Latvia. For an assessment of the international transit services export contribution to the national economy, it is necessary to develop a methodology for calculating this contribution. International transit is defined as the transportation of goods through other countries.

The objectives of the paper are to develop a theoretical model for the calculation of the contribution of international transit transport services to Latvian GDP, as well as to calculate the proportion of this contribution to Latvia's GDP in 2010. This analysis can be useful in the development and planning of transit-related projects, as well as for transport sector development in general. The methods of the research are systematic, logical and comparative analysis of scientific literature, analysis of statistical data and macroeconomic modelling. In the paper the contribution of international transit transport to GDP is calculated by dividing the international transit services export component into GDP and multiplying by 100%.

2. Contribution of Transit Transport to the Economy

Transit policy addresses simultaneously a number of economic objectives. K.Gwilliam argues that the objectives of transit policy may be expressed at three different levels [1]. At the first level there are the economic objectives of government that might be expressed as the aim of maximizing social welfare. Applied to transport it might appear as minimizing the total generalized cost of urban transport, promoting of social inclusion, minimizing the environmental impact of transport, promoting an increase in state budget revenues from international transit services or promoting economic growth. The second level consists of instrumental or tactical objectives which, for example, might be that maximizing the public transport modal share or minimizing transport fuel consumption could be the best way of pursuing the fundamental environmental objective. Thirdly, the operational goals might be expressed to minimize the cost of transport to the municipality or state budget.

Transit transport consists of its international and urban form. International transit is much less studied than the transit urban form. The link between international transit transport and economic development hasn't been sufficiently studied.

There are three analytical approaches in the study of the link between transport and the economy that can be used for the assessment of the nature and magnitude of the contribution that the international transit infrastructure and infrastructure investments makes to the economy [2]. The first is the microeconomic approach – transparent and causal – describing (a) the direct time and cost savings from transport

improvements, (b) the indirect impacts of these cost and time savings in the form of lower assembly costs in production and gains from logistical reorganization, and (c) the associated costs including external costs. T.R.Lakshmanan highlights that „this approach, typified by Cost-Benefit Analysis (CBA), is deficient in not treating the further „network" or the general equilibrium effects of transport improvements on transport-using sectors in the broader economy" therefore „the current concern in the field to go beyond CBA analysis towards developing methods which capture the broader economic benefits of transport infrastructure investments" [2, p. 1].

In the context of the deficiencies of the microeconomic approach, in last two-three decades a macroeconomic modelling stream has appeared. In the macroeconomic models are identified economy-wide cost reductions and output expansions deriving from transport infrastructure, arguing that there are externalities to investments in infrastructure, which are not captured in microeconomic CBA studies. Over 100 macroeconomic models offer the positive and modest contribution of transport infrastructure, but this macroeconomic approach has two weak points. Firstly, the sharp differences and conflicts among macroeconomic models on the magnitudes and direction of economic impacts of infrastructure, and secondly, these macroeconomic models offer little clue to the mechanisms linking transport improvements and the broader economy.

The third approach that might be distinguished is the extensive literature on the broader economic consequences of transport investments on economic processes. In the framework of this approach economic historians argue that economic transformations are attendant on large past investments in railroads and waterways around the world and showing how transport infrastructure improvements open up markets, achieve gains from trade, promote inter-regional integration and enhance the performance of factor markets. One of the key findings in the approach is that the upshot of the full effects of transport infrastructure is the growth of total factor productivity (TFP) and GDP in the economy (Figure 1). The figure is a modified Lakshmanan model where the element „economic restructuring" is specified because it is a more appropriate effect for various types of transport infrastructure investments.

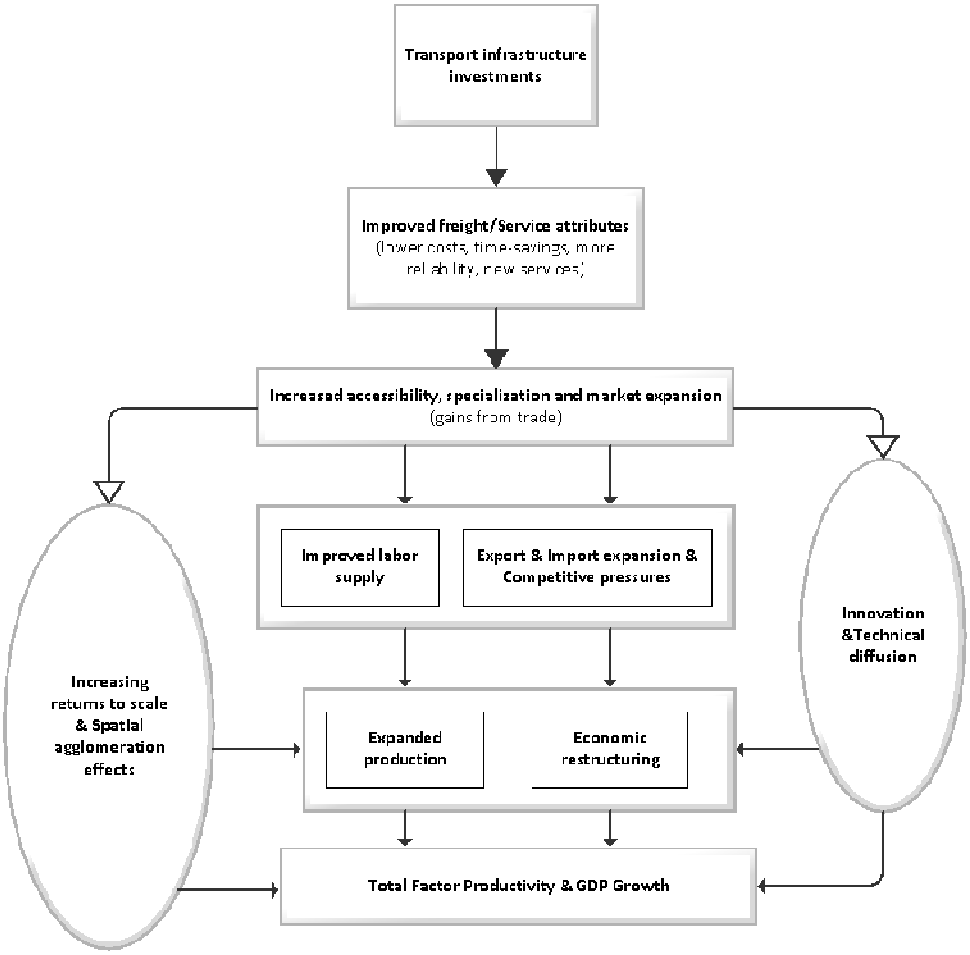

Figure 1. Transport infrastructure and economy-wide benefits
(modified model, adopted from: Lakshmanan, 2011)

All the three approaches described above can be used to assess the contribution of international transit infrastructure and infrastructure investments to the economy. The application of the approaches depends on the objective of the research. The objective of this paper is related to the assessment of the impact of the international transit services on GDP, therefore the microeconomic approach cannot be applied because it focuses on analysing of the improvements in productivity of individual firms due to transport infrastructure investments. However, macroeconomic modelling and the approach regarding the broader economic consequences of transport investments on economic processes can be used to assess the impact of international transit services on GDP.

D.Bazaras and R.Palšaitis have developed a model that shows which factors are influenced by transit transport (Figure 2) [3]. Figure 3 is a simplified model. The transit transport profitable effect for an economy can be evaluated by counting paid-in taxes (for example, entry, transit, ecological, using of infrastructure) and new workplaces. The international transit state income could also consist of the prices of provided services and the goods, which were bought by transit sector enterprises.

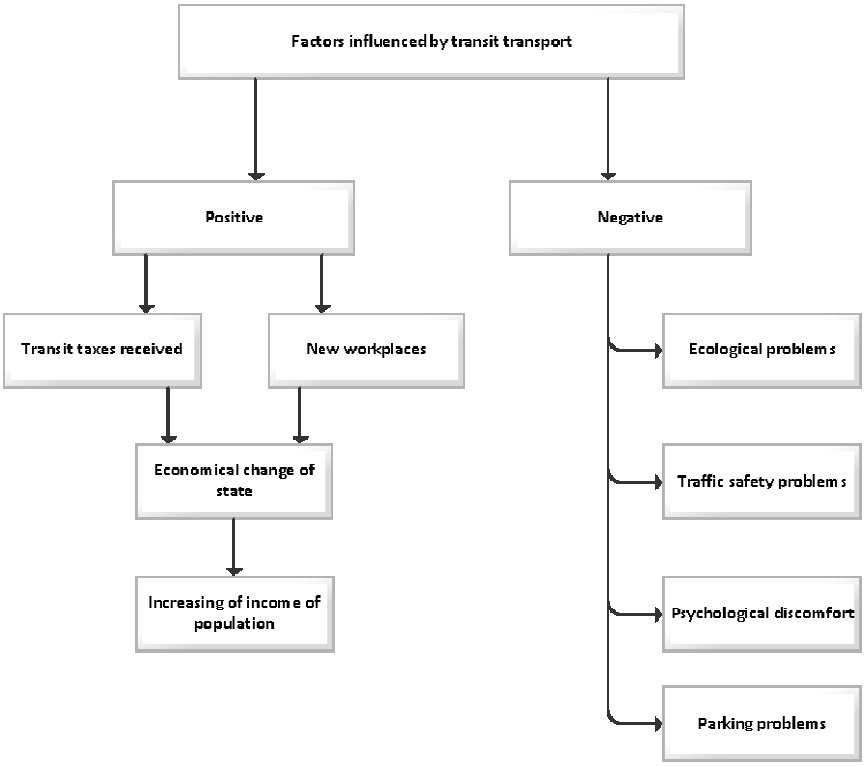

Figure 2. Factors influenced by transit transport
(modified model, adopted from: Bazaras and Palšaitis, 2003)

The transit system consists of three elements [4]. Firstly, transit goods transportation: by road, by railway, by water, by air and by pipelines (Figure 3).

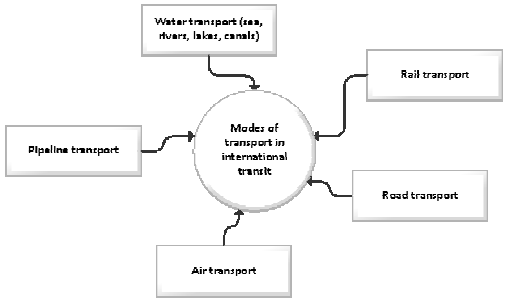

Figure 3. Modes of transport used in international transit transport

Secondly, a transit system consists of transit infrastructure: roads, railroads, harbours, terminals, transport logistics centres, banks, insurance companies, shipping companies, etc. Thirdly, wayside infrastructure:

gas-stations, road vehicle technical supervision and repair stations, hotels, restaurants and other transit transport service objects. The selection of terminals and the choice of the place of freight transhipment are important factors in dealing with international transit competitiveness. Terminals are a nodal point where a vehicle of one type is exchanged with a vehicle of the other. The advantage of terminals located in the harbours is that they can serve ocean-going ships, which can carry all types of cargo in large quantities [5].

3. International Transit Transport and Latvian GDP

International transit transport is a part of the transport and communications sector in Latvia, which was 12.5% of Latvian GDP in 2010, employing 9.9% of total employed in the country; the revenues from transit transport services (sea transport, air transport and other transport) constituted 49.2% of the services export in Latvia in 2010 [6]. International freight transit provides for the use of transport infrastructure capacities and the development of transport infrastructure in Latvia. The turnover of Latvia's seaports is 89% transit freight. Approximately 97% of all transported freight carried by railways through Latvia territory is transit freight, mainly from Russia and Belarus to the ports of Latvia (East – West transit corridor). In the future Latvia can serve as a distribution centre for cargo from Asian countries (e.g. China, Korea) not only in the Baltic States, but also with an equally successful result in Russia and the CIS countries [7].

There is no explicit assessment of what is the contribution of international transit to Latvian GDP and the economy in general. Currently Latvian authorities assess the contribution of international transit to GDP by obtaining approximate results. The Ministry of Transport has estimated that for each 10 million tonnes carried by Latvian territory the international transit services give at least 1% of the total GDP [8]. Accordingly, the total contribution of cargo transit to the Latvian GDP might be about 6% in 2010.

On the basis of Figure 3 the proportion of international transit transport in GDP can be calculated by the equation:

$$R_C = \frac{R_W(R_{S;}R_{R;}R_{L;}R_{CAN}) + R_P + R_{RAIL} + R_{AIR} + R_A}{GDR} \times 100\%, \quad (1)$$

where

R_C – proportion of international transit transport services in GDP (%) of the country;
R_W – revenues from water transport;
R_S – revenues from sea transport;
R_R – revenues from rivers transport;
R_L – revenues from lakes transport;
R_{CAN} – revenues from canals transport;
R_P – revenues from pipeline transport;
R_{RAIL} – revenues from rail transport;
R_{AIR} – revenues from air transport;
R_A – revenues from auto (road) transport;
GDP – gross domestic product.

In Latvia, transit transport services export consists of road transport, rail transport, sea transport, air transport and pipeline transport (Figure 4).

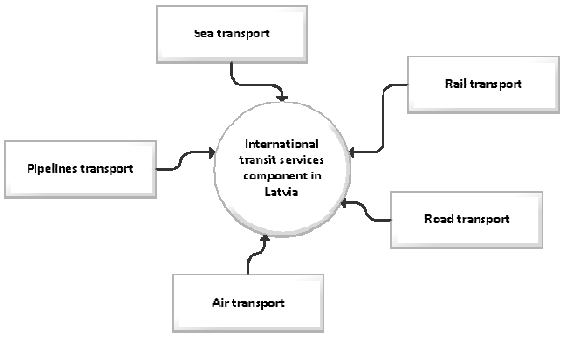

Figure 4. International transit services component in Latvia

According to Figure 4 and the composition of Latvian international transit transport, the contribution of international transit transport to Latvian GDP can be calculated using the following equation:

$$R_{LAT} = \frac{R_S + R_P + R_{RAIL} + R_{AIR} + R_A}{GDP_{LAT}} \times 100\%, \quad (2)$$

where

R_{LAT} – proportion of international transit transport services in Latvian GDP (%);
R_S – revenues from sea transport;
R_P – revenues from pipeline transport;
R_{RAIL} – revenues from rail transport;
R_{AIR} – revenues from air transport;
R_A – revenues from auto (road) transport;
GDP_{LAT} – gross domestic product of Latvia.

For approbation of the equations shown above, the authors calculate the contribution of the international transit transport to Latvian GDP for the year 2010 where the data is available and verified. The calculation is applied for transport modes that are used for international transit transport services in Latvia, that is, sea transport, rail transport, auto transport, pipelines transport and air transport (Table 1).

Table 1. Freight transport in Latvia in 2010
(Source of data: the Central Statistical Bureau of the Republic of Latvia)

	Sea transport	Rail transport	Auto transport	Pipeline transport	Air transport
Thousand tons	61 160	49 164	46 809	5 635	15
Proportion (%)	37,58%	30,21%	28,76%	3,46%	0,01%

The following assumptions are made to separate the international transit freight from total freight transport in Latvia:

- In sea transport received and sent freight is counted, 89% of sea port freight is international transit freight [9];
- In rail transport only the international transit freight is counted;
- In auto transport the international transit freight is taken into account;
- In pipeline transport the international transit of petroleum products are counted because only petroleum products were transported in pipelines transport in 2010;
- In air transport received and sent freight is counted. All freight transported in air transport is international transport.

Taking into account the assumptions described above, the structure of the international transit transport is as follows: sea transport accounts for 47.09% of total international cargo transit, rail transport – 41.44%, auto transport – 6.58%, pipeline transport – 4.88% and air transport – 0.01% (Figure 5).

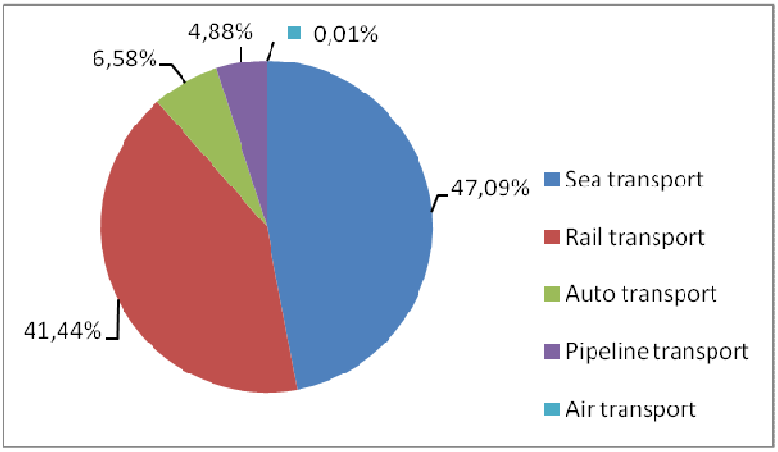

Figure 5. The structure of international transit freight transport in Latvia in 2010 (%)
(Source of data: the Central Statistical Bureau of the Republic of Latvia)

Sea transport and rail transport are the transport modes that provide the largest volume of cargo handled (Table 2). Rail transport ensures the majority of cargo flows to international sea ports.

Table 2. International transit transport in Latvia in 2010
(Source of data: the Central Statistical Bureau of the Republic of Latvia)

	Sea transport	Rail transport	Auto transport	Pipelines transport	Air transport
Thousand tons	54 432	47 901	7 600	5 635	15
Proportion (%)	47.09%	41.44%	6.58%	4.88%	0.01%

Latvian GDP is expressed in Lats, therefore a methodology that would allow revenues from international transit transport to be expressed in terms of money in Lats is needed (1 LVL = 0,702804 EUR). The authors suggest using the following method of calculation:

- Pipeline transport (R_P). The private company „LatRosTrans" is the only company that does business in international transit pipeline transport in Latvia. This company is owner of all (three) pipelines in Latvia that can be used in international transit transport. These pipelines transport are the only business for „LatRosTrans". The income of „LatRosTrans" in 2010 reflects the revenues from pipeline transit transport in Latvia in 2010 which was 9.9 million LVL [10].
- Rail transport (R_{RAIL}). Rail transport is a major element in Latvian international transit transport because Latvia has direct railway connections with Russia and other CIS countries, which is the main source of cargo. 97.4% of all transported freight carried by railway through Latvia territory is international transit transport [11]. Three companies are engaged in rail cargo transport in Latvia – "LDZ Cargo", Ltd, JSC "Baltijas Tranzita serviss" and JSC "Baltijas ekspresis". "LDZ Cargo", Ltd owns about 80% of market share. Based on this information, it can be estimated that revenues from international transit transport by rail is 245.9 million LVL.
- Sea transport (R_S). Latvian international transit corridor consists of 10 sea ports, which are connected to TENT-T road and rail. 3 large sea ports (Riga, Ventspils and Liepaja) and 7 smaller ports (Pavilosta, Roja, Mersrags, Lielupe, Skulte, Lielupe, Skulte, Salacgriva and Engure) are dealing with international sea transport. 89% of seaport freight is international transit cargo. The ports of Riga and Ventspils are operating as Freeport zones and the port of Liepaja is a part of special economic zone (SEZ) of Liepaja, which means that there is tax relief for companies that operate in these zones. 74 shipping agents and 60 stevedoring companies are working in the three largest Latvian sea ports (Riga, Ventspils and Liepaja). The cargo handling capacity of these three major sea ports are 100 million tons and in 2010 these ports handled 59.66 million tons cargo or 97.5% of the total sea transport cargo turnover in Latvia. In the port of Liepaja 4.38 million tons cargo was handled in 2010, in the port of Ventspils – 24.8 million tons and in the port of Riga – 30.5 million tons (Table 3).

Table 3. Cargo turnover at the three biggest seaports in Latvia in 2010(thousand tons)
(Source of data: Ministry of Economics of the Republic of Latvia, Report „The operation of Freeports and special economic zones in 2010 and in the first half of 2011." (In Latvian))

2010	Liepaja	Ventspils	Riga
Dry bulk	1 900	8 740	17 437
General cargo	1 920	2 000	6 453
Liquid bulk	560	14 060	6 584
Total	**4 380**	**24 800**	**30 475**

In 2010, the total turnover of companies operating in Liepaja SEZ was 60.4 million LVL [12]. The turnover of companies operating in Freeport of Riga was 282.5 million LVL in 2010 [13]. There is no data available about the total turnover of companies working in the Freeport of Ventspils therefore authors on the basis of official statistics of the Freeport of Ventspils for the 2011 performed assumptions for calculation of total turnover of Freeport of Ventspils in 2010. The two biggest terminals in Freeport of Ventspils are JSC „Ventspils Nafta" and JSC „Baltic Coal Terminal". These 6 companies account 84% of the total turnover of Freeport of Ventspils [10] [14] [15]:

1) „Nord Natie Ventspils Terminals”, Ltd;
2) JSC „Baltic Coal Terminal” (2010 data used in calculation);
3) JSC „Ventspils Tirdzniecības Osta”;
4) JSC „Kalija parks”;
5) JSC „Ventbunkers”;
6) JSC„Ventspils Nafta” (2010 data used in calculation).

The authors suggest calculating the turnover of these companies and the revenues from one ton cargo handled in these companies to apply to all the volume handled in the Freeport of Ventspils acquiring the total turnover of companies operating in the Freeport of Ventspils. The authors assume that the total turnover of 6 companies listed above was 151.14 million LVL in 2010. This means that the total turnover of companies operating in the Freeport of Ventspils was 179.93 million LVL in 2010.
The total turnover of the three major seaports (Riga, Ventspils and Liepaja) was 522.83 million LVL in 2010. These seaports handle 97.5% of the total sea transport cargo turnover in Latvian sea ports. It means that the total turnover of Latvian seaports was 53624 million LVL (522.83 million LVL / 0.975) in 2010. Each cargo ton handled in Latvian seaport gives 8.76 LVL revenues. As a result, the revenues from sea transit transport (R_S) was 477.25 million LVL in 2010 (536.24 million LVL*0.89; 89% of seaport freight is international transit cargo).

- Auto transport (R_A). 4880 Latvian companies are engaged in auto cargo transport (situation in January 2011). The authors assume that revenues from the services of international auto transit transport can be calculated from positions in statistics “to abroad”, “from abroad” and “abroad” that gives 7600 thousand tons or 16.2% from the total auto cargo transport volume in 2010 (Table 5).

Table 5. Auto cargo transport in Latvia (thousand tons)
(Source of data: the Central Statistical Bureau of the Republic of Latvia)

	2009	**2010**
Total	**37820**	**46809**
Inland transport	31595	39209
International transport	**6225**	**7600**
..to abroad	2587	3231
..from abroad	1517	1463
..abroad	2121	2906
Transport of cargo for own account	14019	16056
Commercial cargo	23801	30753

There are a lot of companies operating in auto transport and authors did not have opportunity to obtain data from each auto transport company about its export volume and total turnover. There is not data available for year 2010; therefore the calculation was made based on statistics in 2009. In 2009, the total volume of auto cargo transport was 37820 thousand tons of which 6225 thousand tons were international cargo that was 16.5% of the total auto cargo transport volume. According to the data of the Central Statistical Bureau of the Republic of Latvia, the revenues of auto freight transport was 504.9 million LVL in 2009, which means that international auto cargo transport was approximately 83.3 million LVL (504.9 million LVL * 0.165) or 13.38 LVL/ton (LVL/per ton). Extending this data for the year 2010 it can be calculated that revenues from auto transit transport (R_A) are 101.7 million LVL in 2010 (7600 thousand tons * 13.38LVL/ton).

- Air transport (R_{AIR}). It is not possible to get correct statistical data on air transport and revenues from air cargo transport in Latvia. The data that is available and can be used for calculation is the annual report of JSC „AIR BALTIC CORPORATION”. This airline is the biggest company in air transport in Latvia. The authors based their calculation on the annual report of JSC „AIR BALTIC CORPORATION” in 2010. The revenues of JSC „AIR BALTIC CORPORATION” from air cargo transport was 3.9 million LVL and this company considered that its market share was 74% in 2010 [16]. According to this information it could be calculated that volume of Latvian air cargo transport was 5.3 million LVL in 2010 (3.9 million LVL / 0.74). This volume of revenues from air cargo transport is an approximation but, as air cargo transport constitutes a relatively small proportion (0.01%) in the total volume of international transit transport in Latvia it insignificantly affects the final result.

Summarizing the above analysed modes of international transit transport in Latvia in 2010, the proportion of international transit transport in Latvian GDP can be calculated: R_C = (477.25 + 245.9 + 101.7 + + 9.9 + 5.3)/ 12 738.7 * 100% = **6.6 %.** Applying the developed and suggested methodology the contribution of international transit transport to Latvian GDP was 6.6% in 2010.

4. Conclusions

The contribution of international transit to GDP has not so far been sufficiently studied both in Latvia and abroad. Theoretical solutions that can be used for the assessment of international transit transport contribution to GDP are macroeconomic modelling, the approach of broader economic consequences of transport and specific international transit assessment models.

In this study, analysing the theoretical aspects of international transit transport and assessing the international transit transport sector in Latvia a formula was developed for the calculation of the proportion of international transit transport in Latvia's GDP. It is calculated by dividing the international transit component by the GDP and multiplying by 100%. In Latvia the component of international transit transport consists of rail transport, sea transport, auto transport, air transport and pipeline transport. Accordingly, it was estimated that the contribution of international transit transport to Latvia's GDP was 6.6% in 2010.

There are some restrictions for applying the suggested formula. Firstly, the credibility of the final result depends on the data that is obtained and used in the calculation because some necessary statistical data is not available. Secondly, it can be difficult to distinguish international transit cargo from total freight transport. In this study in calculating the proportion of international transit transport in Latvia's GDP in 2010 it can be concluded that in the similar studies in the future it is necessary to improve the reliability of data regarding sea transport, auto transport and air transport.

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