

Analysis of Railway Transport Efficiency of the Baltic States

Lembo Tanning*

Marcelius Trade Limited Liability Company, Tallinn, Estonia

Abstract

The higher cost of transport is energy, fuel. Which mode of transport is more efficient for freight? When the cars are so easy to measure, then rail transport is much more complicated. Here is the deciding distance and also time, must be taken into account also the weight and dimensions of the goods, the location of the sender and the receiver. The decisive factor, however, is still money, the total expenditure. How is it better to transport goods from the Baltics to Western Europe, either by car or by train? Regarding the European Union's major financing opportunities, there is a chance to build a railway motorway. Next, we're doing SWOT analysis for railway key indicators, while also taking into account subjective factors. The goal of the publication is to analyse the Baltic countries rail freight transport key indicators, but also the contradictions of the Rail Baltica (RB) project. Consequently, we do a SWOT analysis of the RB. In recent years, volumes of rail freight traffic have shrunk considerably, especially in Latvia and Estonia. The trend in Europe is that rail freight is reduced almost everywhere. It should also, in the context of the UK leaving the EU from the EU budget is significantly reduced, which was to be the majority of the RB construction expenses. Hence the problem of whether it is a large project is economically viable at all, not to mention the environmental damage and social sphere. The RB is not an economically and financially reasonable project, but only a political decision.

Keywords

Energy Efficiency, SWOT Analysis for Railway, Goods Transport, Baltic States, Economy, Rail Baltica

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1. Introduction

The transport sector plays a central role in a modern economy. Transport is the movement of people, animals and goods from one place to another. The industry that the business of providing transport equipment, transport services or transport are important in most national economies and called the transport industries. Transport is important since it enables trade between people, which in turn establishes civilizations.

An efficient and well-functioning passenger and freight transport system is vital for the EU enterprises and inhabitants. The EU's transport policy aims to foster clean, safe and efficient travel throughout Europe, underpinning the

internal market for goods and the right of citizens to travel freely throughout the EU. [1-2]

Transport economic sector has a major impact on almost all of the rest of the industry and service sectors, and at the same time, these activities can severely affect transport. State transportation sector, thereby affecting both the local as well as other countries in the economic situation. Good level of transport system to the needs of today's life and an important part of the business environment. The existence of a proper transport promotes local entrepreneurship, as well as the increase of competitiveness of the national economy in general.

Modes of transport include air, rail, road, water, cable, pipeline and space.

* Corresponding author
E-mail address: lembo.tanning@gmail.com

Separate deal for freight. Are analyses the international and domestic transports, as well as transit transports.

2. Methodology and Theoretical Bases

2.1. Methodology

Here's an assessment, we will analyse country comparison on the basis of GDP, foreign trade and others key indicators of economy.

These data cover the *railway transport of goods* which relate in the Member States on its national territory. They may exclude railway undertakings which operate entirely or mainly within industrial and similar installations, including harbours. They are not covered in these statistics. [1-2]

The collection is based on the Regulation (EC) 91/2003 of the European Parliament and of the Council of 16 December 2002 on Rail transport statistics. [3]

The methodology is based on international organizations (Eurostat [3-4], CIA [5], and the authors books [2, 6-7], but also partly the authors of the methodology used in previous publications [8-18]. The techniques definitions used by the authors have been specified in Eurostat [3 - 4].

Freight saw both in tonnes and tonne-kilometres (tkm).

All figures are the authors' illustrations.

2.2. Theoretical Bases

The theoretical bases have been brought on international organizations [3-5], in more detail in the authors books [2, 6-7] and in authors' earlier publications [8-18].

3. Gross Domestic Product of the EU Countries

First look at the big EU countries gross domestic product (GDP) in the world rankings, whose economies depend on the economy of many small countries and the transport of goods by rail. Their analysis is in other publications [8, 9].

In global economy in recent years the EU's major powers states have lost their leading position no longer to the United States and Japan, but also to India, Russia, Brazil and Indonesia. At the same time, however, the UK was the second economic power in the EC. Think about, whether a fragmented Europe can stand alone against the new global economic powers? Presently the UK economy (GDP) is on the ninth place in the world. Spain was in 2017 17th. [8]

In 2017 GDP real growth rates were: USA - 2.20%, EU - 1.90%, Germany - 2.10%, UK - 1.70%, France - 1.60%, and Italy - 1.50%. [20]

The economic crisis was in both years 2008 - 2009. When Germany and France already exceeded the crisis level in 2010 and Italy in 2011, then the UK started to decline already a year earlier, the pre-crisis level was exceeded only in 2014. On the other countries after a crisis the economy continued to grow, but in 2016 the GDP of the UK decreased again by EUR 213 billion euro or 8.26%. While in the years 2008 - 2013 France was stronger than in the UK economy, with UK GDP accounted for only 75.5% from the Germany. In the years 2015 - 2016, the UK was firmly better than France. [8]

Largest GDP by current and by PPS prices was Germany. [21] Germany is by GDP (PPS) 1.5 times stronger than the UK. The UK percentage of EU28 total current prices was 13.8%. [19].

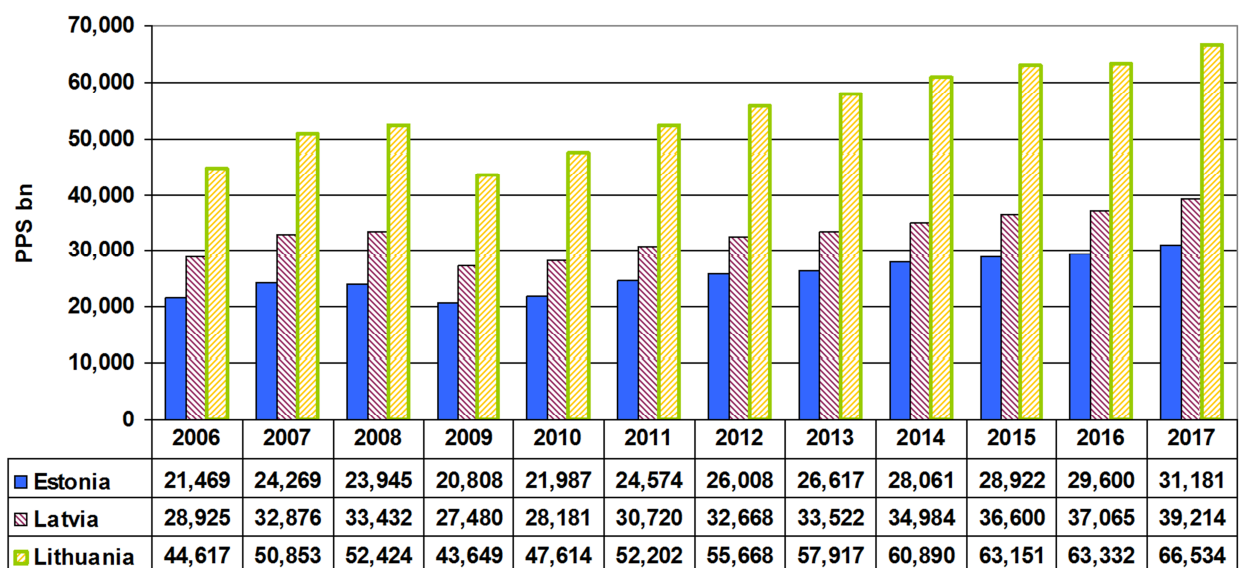


Figure 1. GDP at market prices, current prices, billion PPS [21].

Table 1. GDP at market prices, at current prices, million PPS [21].

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estonia	21,469	24,269	23,945	20,808	21,987	24,574	26,008	26,617	28,061	28,922	29,600	31,181
Latvia	28,925	32,876	33,432	27,480	28,181	30,720	32,668	33,522	34,984	36,600	37,065	39,214
Lithuania	44,617	50,853	52,424	43,649	47,614	52,202	55,668	57,917	60,890	63,151	63,332	66,534
Poland	478,054	527,437	551,624	558,441	612,705	656,074	685,470	690,660	717,536	763,209	766,239	804,378
Finland	149,791	164,339	167,814	153,603	158,974	165,354	166,171	164,962	166,927	174,078	175,712	180,113

In 2006 was GDP of Finland 149,791 and of Poland 478,054 billion PPS, but in 2017 respectively 180,113 and 804,378 billion PPS.

Baltic States GDP by PPS in the 10 years increased respectively 1.34; 1.28 and 1.41 times, which means that there is a need for freight in this regard. Poland, the increase was as high as 1.60 and of high economic level of Finland 1.17 times.

Level of GDP per Capita

In the case of the EU's big powers, UK GDP per capita was

the largest in the years 2005 - 2008 and in 2015. In other years, Germany was superior to the great powers. In 2016 GDP per capita of UK (36,500) was larger than France, Italy and Spain, but less than Germany, other Central European and Nordic countries; 1.6 times smaller than Ireland. The average of the new EU member states is lower than the EU-28. In 2017 UK GDP per capita was barely larger than France. GDP per capita of the UK decreased compared to 2015 by 4800 euros or 12%. [21]

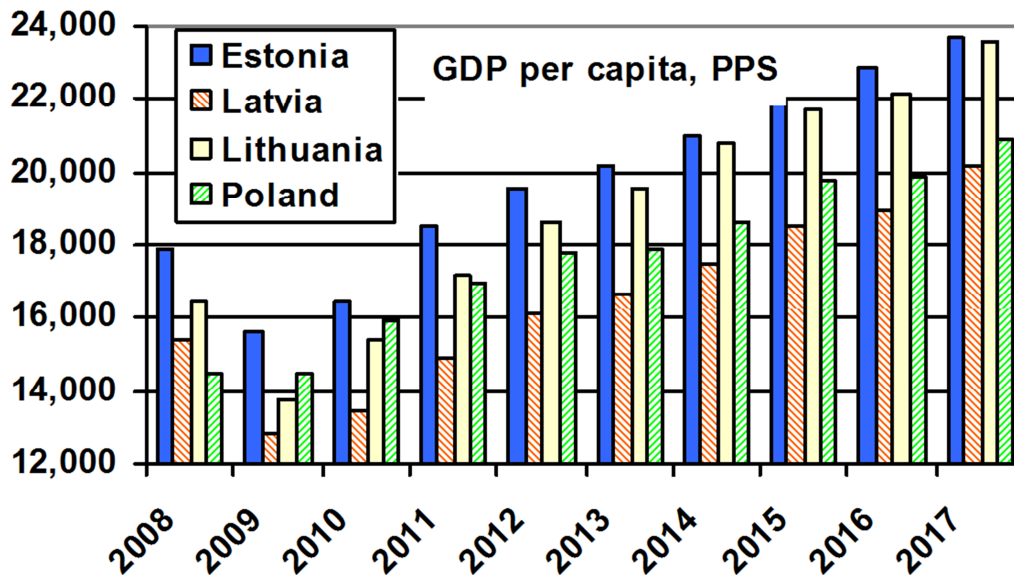


Figure 2. GDP at market prices. PPS per capita [23].

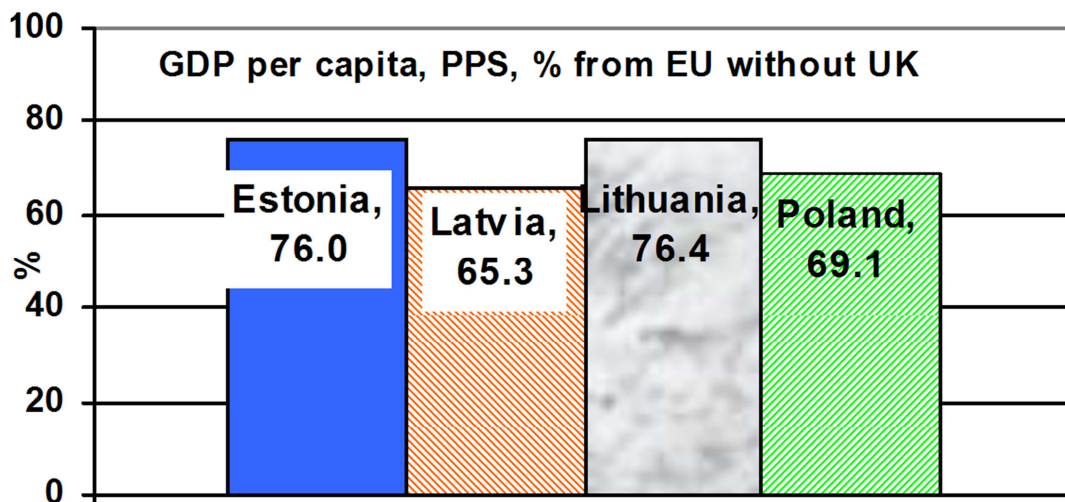


Figure 3. Percentage of EU without UK, 2016 [23].

Table 2. GDP at market prices. Current prices, euro per capita [9, 21, 23].

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU-28	24,700	26,100	26,100	24,500	25,500	26,200	26,600	26,800	27,600	29,100	29,200	30,000
Euro area (19)	27,000	28,400	28,900	27,800	28,500	29,200	29,200	29,500	30,000	31,100	31,800	32,900
Estonia	10,000	12,100	12,300	10,600	11,000	12,500	13,500	14,300	15,000	15,700	16,500	18,000
Latvia	7,800	10,300	11,200	8,800	8,500	9,800	10,800	11,300	11,800	12,300	12,800	13,900
Lithuania	7,400	9,000	10,200	8,500	9,000	10,300	11,200	11,800	12,500	12,900	13,500	14,900
Poland	7,200	8,200	9,600	8,200	9,400	9,900	10,100	10,300	10,700	11,200	11,100	12,200
Finland	32,800	35,300	36,500	33,900	34,900	36,500	36,900	37,400	37,600	38,200	39,300	40,600

Of the new EU Member States this region has it increased, but is less than Finland and most Western European (EU-15) countries.

If 2008 was the *current prices* euro per capita of Estonia 40.5% in the EU-28, then in 2017 it was already 58.5% and in the euro area (19) 53.5%. In 2017 were its shares in Latvia 46.5%, in Lithuania 49.5% and in Poland 40.5%. [20]

Table 3. GDP at market prices, current prices, purchasing power standard (PPS) per capita, [23].

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU (current composition)	26,100	24,500	25,500	26,200	26,600	26,800	27,600	29,100	29,200	-
Euro area (19)	28,400	26,600	27,500	28,200	28,500	28,600	29,500	30,900	31,100	31,900
Estonia	17,900	15,600	16,500	18,500	19,600	20,200	21,300	22,000	22,500	23,700
Latvia	15,400	12,800	13,400	14,900	16,100	16,700	17,500	18,500	18,900	20,200
Lithuania	16,400	13,800	15,400	17,200	18,600	19,600	20,800	21,700	22,100	23,600
Poland	14,500	14,500	15,900	17,000	17,800	17,900	18,600	19,800	19,900	20,900
Finland	31,600	28,800	29,600	30,700	30,700	30,300	30,600	31,800	32,000	32,700

From EU in 2016 by PPS were biggest in Luxembourg (75,100) and Ireland (53,300), and from EFTA countries Switzerland (47,000) and Norway (43,300). Germany was 36,000 PPS.

From the Baltic States are poorer by PPS: Romania (17,000); Croatia (17,500); Bulgaria (14,200).

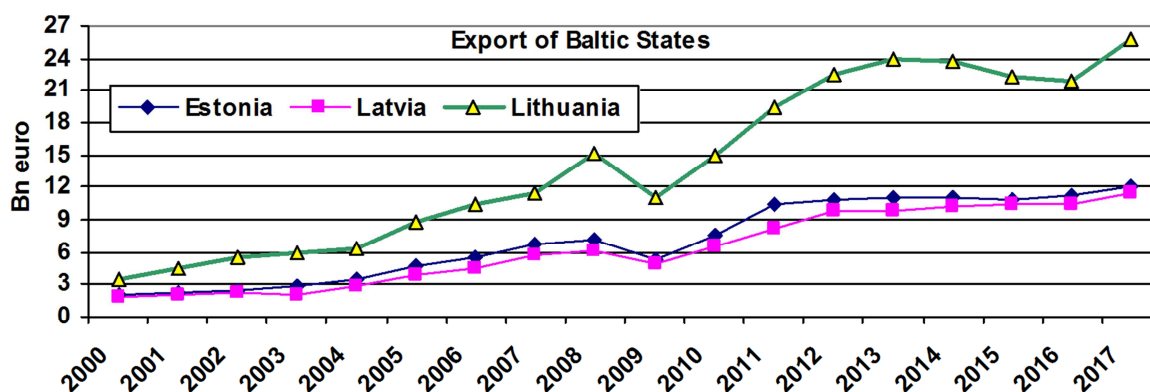
From Estonia (21,900) and Lithuania (22,000) are still poorer: Poland (19,900); Hungary (19,700) and of EU (15) Greece (19,700).

If 2008 was the per capita (PPS) of Estonia 69.4% in the EU

(without UK), then in 2016 it was already 76.0% and in the euro area (19) 70.6%. The shares by PPS of Latvia were 65.3%, of Lithuania 76.4% and of Poland 69.1% in the EU (without UK). In 2017, this share increased further, respectively to 79.0%, 67.3%, 78.7% and to 69.7%. [22]

This level also depends of EU subsidies. As the level of Estonia and Lithuania is already above 75% of the EU average, allocations to the new EU budget will come with larger cuts than Latvia and Poland.

4. Development of External Trade

**Figure 4.** Exports of goods, current prices, billion euro [22].**Table 4.** Exports of goods, current prices, million euro [22].

	2000	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estonia	2,0663	2,551	6,838	7,158	5,295	7,481	10,384	10,749	10,968	10,998	10,757	11,294	12,022
Latvia	1,8012	2,190	5,677	6,159	4,993	6,601	8,259	9,721	9,828	10,241	10,335	10,391	11,543
Lithuania	3,5074	5,452	11,534	15,235	11,055	14,891	19,422	22,427	23,997	23,749	22,309	21,921	25,752

	2000	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Poland	39,122	49,492	98,028	112,569	95,333	118,071	132,404	140,999	149,105	158,662	172,136	177,433	201,606
Finland	48,823	46,630	64,853	65,350	45,627	51,470	55,655	56,561	56,728	56,447	53,267	53,377	59,699

Exports of goods in 2000 - 2017 were grows in Estonia 5.7, in Latvia 6.3, in Lithuania 7.3, and in Poland 5.1 times. Better Finnish years were before the crisis, in 2007 and 2008.

Table 5. Imports of goods, current prices, million euro [22].

	2000	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estonia	3,029	3,905	9,393	9,253	6,020	7,887	10,735	12,029	11,893	12,019	11,571	12,055	12,839
Latvia	3,094	3,972	10,971	10,481	6,566	8,131	10,758	12,379	12,453	12,621	12,538	12,296	13,851
Lithuania	4,824	6,996	15,942	19,602	12,223	16,539	21,487	23,529	24,917	24,686	24,296	23,690	27,673
Poland	52,555	57,322	114,464	136,071	103,003	129,006	145,701	149,156	149,426	161,920	169,907	174,476	200,548
Finland	34,393	33,831	56,112	58,482	41,791	49,221	57,269	57,272	56,572	55,009	51,490	52,900	57,913

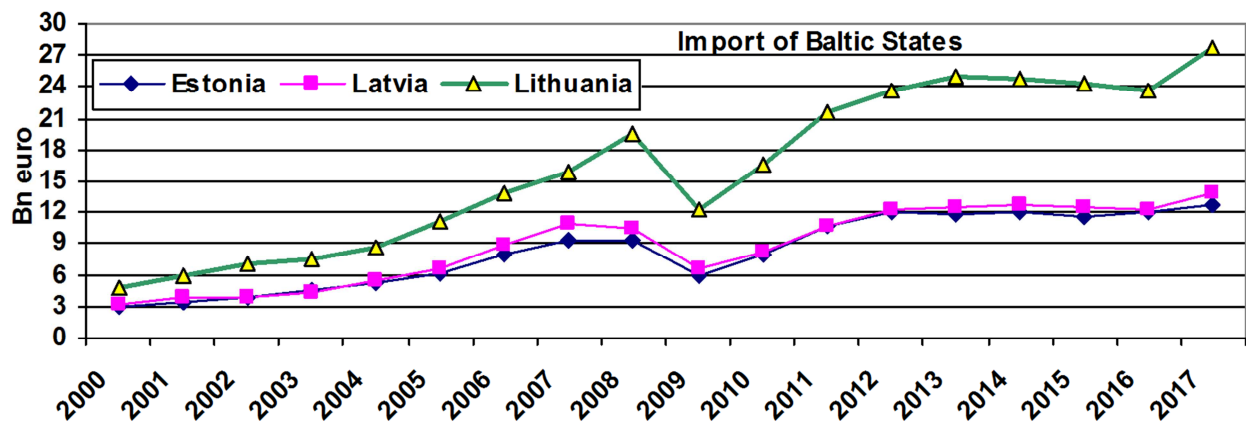


Figure 5. Imports of goods, current prices, billion euro [22].

Imports of goods in 2000 - 2017 were growing in Estonia 4.2, in Latvia 4.5, in Lithuania 5.8, and in Poland 3.8 times. Better Finnish years were also before the crisis, in 2007 and 2008.

Table 6. External balance – Goods, current prices, million euro [22].

	2000	2002	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estonia	-963	-1,354	-1,550	-2,554	-2,096	-725	-405	-351	-1,280	-925	-993	-882	-761	-816
Latvia	-1,293	-1,782	-2,713	-5,294	-4,321	-1,572	-1,529	-2,498	-2,657	-2,624	-2,379	-2,199	-1,884	-2,308
Lithuania	-1,316	-1,543	-2,296	-4,407	-4,366	-1,167	-1,648	-2,065	-1,102	-920	-936	-1,987	-1,768	-1,959
Poland	-13,433	-7,830	-4,465	-16,436	-23,501	-7,669	-10,934	-13,296	-8,156	-321	-3,258	2,229	2,957	1,058
Finland	14,430	12,799	7,104	8,741	12,961	9,593	7,433	2,307	2,420	2,360	1,438	1,777	477	1,786

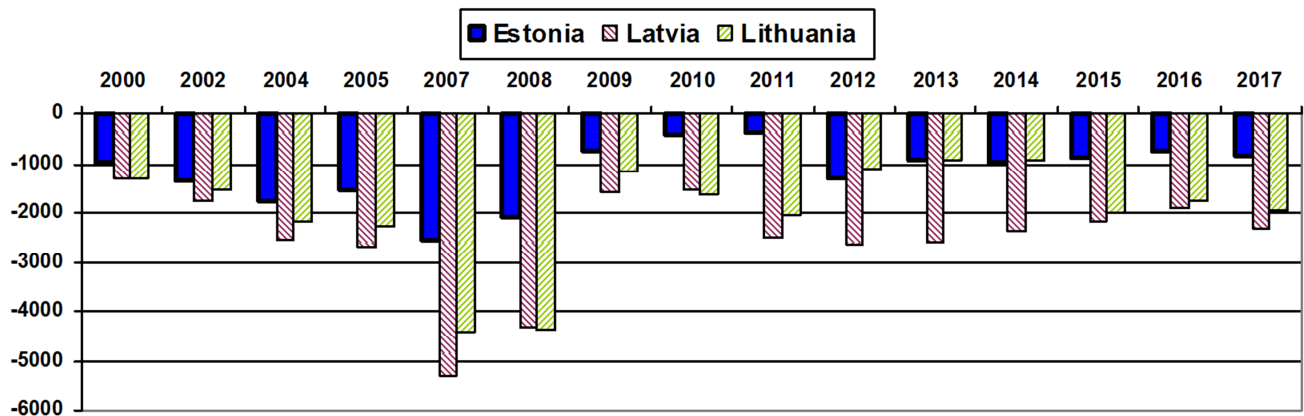


Figure 6. Trade balance of goods of Baltic States, million euro [22].

A negative trade balance (exports – imports) means a cash outflow from a country. It has always been negatives for all the Baltic States - the money flows from the country from with trade and it has decreased in recent years. Finland has the opposite, and Poland is also positive for the last three years. At the same time, their exports grew faster than imports. The trade balance

in Latvia and Lithuania from 2007 to 2008 was more than four billion euros. [22; 23]

5. Railway Transport of Goods of the EU

Freight by analyse tons and ton-kilometres of the Baltic Sea countries without Sweden. Freight is the main source of income for the railways.

Here, in addition to the Baltic Sea countries, are listed the EU countries with larger volumes freight.

Table 7. Railway transport - Goods transported, thousands of tonnes [1].

	2005	2007	2008	2009	2010	2012	2013	2014	2015	2016	2017
Czech Rep	85,613	99,777	95,073	76,715	82,900	82,968	83,957	91,564	97,280	98,034	
Denmark	7,706	6,901	7,198	6,163	8,121	7,982	7,956	8,082	8,652	9,252	
Germany	317,294	361,116	371,298	312,087	355,715	366,140	373,738	365,003	367,314	363,512	
Estonia	68,187	68,538	52,752	45,954	46,705	44,725	43,682	36,289	28,026	25,364	27,260
France	107,532	111,214	108,536	86,126	85,045	87,539	88,989	87,411	95,545	89,107	
Italy	89,755	105,314	95,810	76,336	84,435	88,505	87,960	90,862	92,273	92,949	
Latvia	54,861	52,164	56,061	53,679	49,164	60,601	55,831	57,039	55,645	47,819	43,785
Lithuania	49,287	53,503	54,970	42,669	48,061	49,377	48,028	49,000	48,053	47,651	52,638
Austria	101,829	115,526	121,579	98,887	107,670	100,452	95,449	98,281	97,642	99,784	
Poland	269,553	245,307	248,860	200,819	216,767	230,878	232,596	227,890	224,320	222,523	
Finland	40,722	40,288	41,937	32,860	35,795	35,267	36,433	37,008	33,392	36,162	
Sweden	63,198	67,809	65,632	56,466	68,329	65,789	67,047	68,035	64,999	67,479	
UK	103,263	104,383	103,180	87,666	89,241	115,225	117,769	108,531	96,821	78,549	

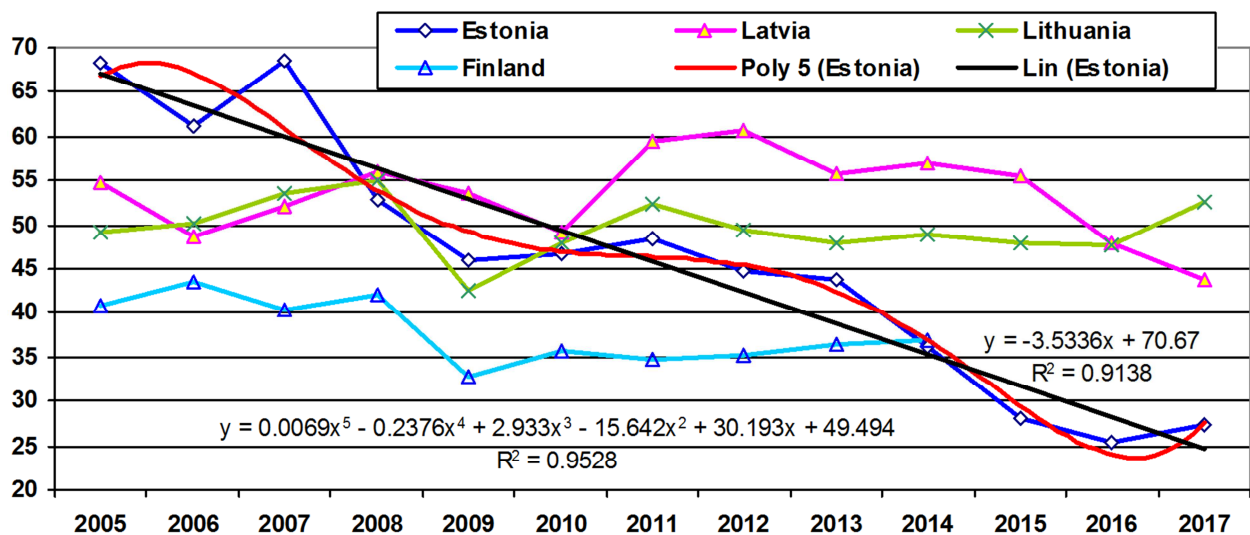


Figure 7. Baltic Sea countries railway transport of goods, millions of tonnes [1].

Table 8. Railway transport of goods, million tonne-kilometre (tkm) [1].

	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Czech Rep	14,866	16,304	15,437	12,791	13,770	14,316	14,267	13,965	14,575	15,261	15,619	
Denmark	1,976	1,779	1,866	1,700	2,239	2,614	2,278	2,449	2,453	2,603	2,575	
Germany	95,420	114,615	115,652	95,834	107,317	113,317	110,065	112,613	112,629	116,632	116,164	
Estonia	10,639	8,430	5,943	5,947	6,638	6,271	5,129	4,722	3,256	3,117	2,340	2,325
France	40,701	42,612	40,436	32,129	29,965	34,202	32,539	32,230	32,596	34,252	32,569	
Italy	22,761	25,285	23,831	17,791	18,616	19,787	20,244	19,037	20,157	20,781	22,712	
Latvia	19,779	18,313	19,581	18,725	17,179	21,410	21,867	19,532	19,441	18,906	15,873	15,014
Lithuania	12,457	14,373	14,748	11,888	13,431	15,088	14,172	13,344	14,307	14,036	13,790	15,413
Austria	18,957	21,371	21,915	17,767	19,833	20,345	19,499	19,278	20,494	20,266	20,856	
Poland	49,972	54,253	52,043	43,445	48,705	53,746	48,903	50,881	50,073	50,603	50,650	
Finland	9,706	10,434	10,777	8,872	9,750	9,395	9,275	9,470	9,597	8,468	9,456	
Sweden	21,675	23,250	22,924	20,389	23,464	22,864	22,043	20,970	21,296	20,699	21,406	
UK	21,427	21,265	21,077	19,171	18,576	20,974	21,444	22,401	22,143	19,342	17,053	

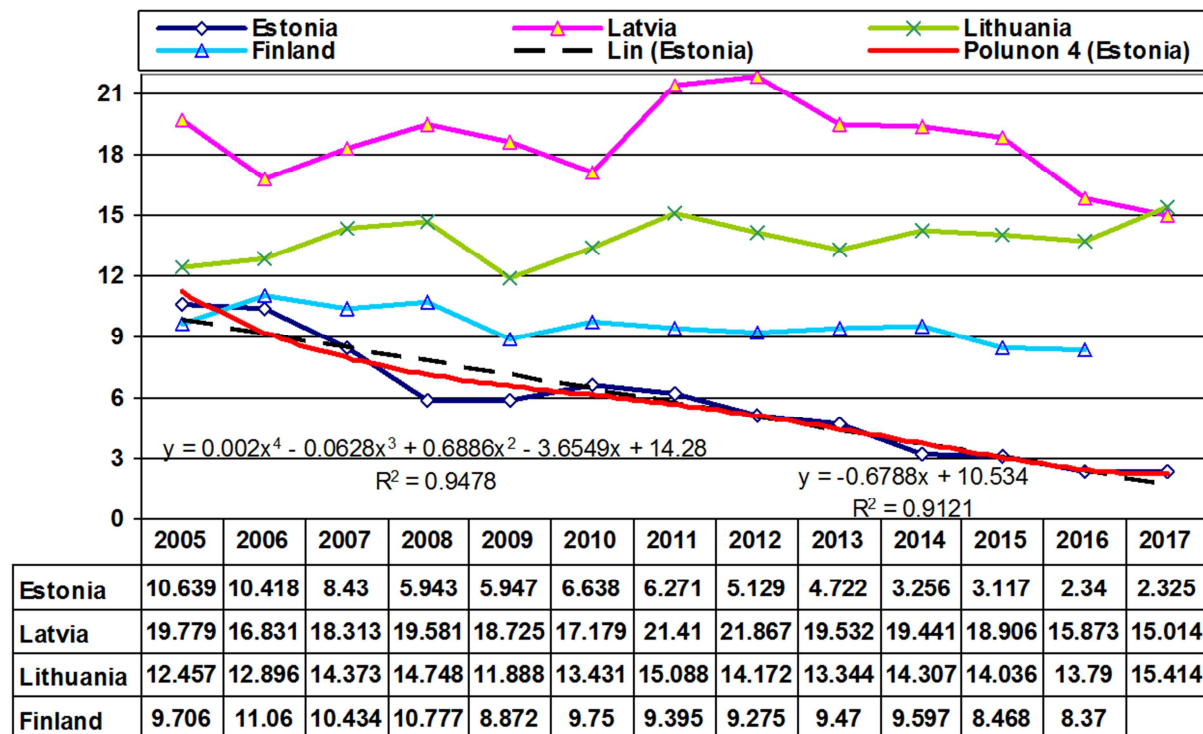


Figure 8. Baltic Sea countries freight by railway, billion tkm (tonne-kilometre) [1].

Here also, in addition to the Baltic Sea countries, are listed the EU countries with larger volumes freight by tkm.

The largest are Germany and Poland. The largest freight country in the Baltic region Latvia was by ton-km 7.7 times smaller than Germany and 3.4 times smaller than Poland. Since Estonia is in turn 6.5 times smaller than Latvia and 5.9 times smaller than Lithuania, then Estonia's right to vote should be the smallest.

The big problem of European railway transport of goods: Estonia great fall (!), by tonnes 2.7 times and by ton-km 4.6 times. In Latvia on period 2012 – 2017 fall freight by tonnes 1.384 times (27.7%) and by ton-km 1.456 times (31.3%) or nearly a third. Poland by tonnes decreased 1.2 times or 47 million tonnes and by ton-km 3.6 bn. Finland in 2008 = 41,937, but in 2015 = 33,392 and in 2016 = 36,162 thousand tonnes. Since 2013 has been steadily decreasing freight railways in Germany - 10.2 million tons. However, by ton-km is stabilized. In France, Italy and, in particular, the UK have also fallen from 2013 to over 39 million tonnes or 1.5 times. The trend in Europe is that rail freight is reduced almost everywhere.

The Estonian theoretical trend lines (Linear and 5-polynom), where R^2 is very high, are characterized by a high probability of continuously declining and stopping the freight by rail by two billion-tkm to borders. Both theoretical trend lines indicate Estonian railway transport of goods in tonnes and in tkm big drop.

Latvia, as well as of Estonia, decline is related to West sanctions against Russia, with a significant decrease in shipping with Russia.

6. Project Rail Baltica

Rail Baltica (RB) is a railway infrastructure project to link Finland, Estonia, Latvia, Lithuania and Poland with a European standard gauge (1435 mm) rail line, providing passenger and freight service between the countries and improving rail connections between Central and Northern Europe. It will connect Estonia with Central and Western Europe and its neighbours. RB is one of the priority projects of the EU: Trans-European Transport Networks. RB in three Baltic States will be built as a new, fast conventional double-track electrified and ERTMS-equipped railway line with maximum design speed are 249 km/h for passenger trains and 120 km/h for freight trains.

The length of the railway between Tallinn and Warsaw will be at least 950 km. Total length of the Baltic railway part is 870 km.

In addition, it is planned to build an underwater railway tunnel between Tallinn and Helsinki. The project "Rail Baltica-2" is under construction, which provides for laying by 2024-2030. speed European gauge directly (and not by the old wide track) from northern Italy to Tallinn.

Negative impact on the project implementation was

significantly reduced passenger traffic on the railway transport, and increase - by road and air.

On January 31, 2017, the Prime Ministers of the three Baltic States signed the international agreement "Rail Baltica", which fixed the obligations of the states that are necessary for the establishment of a rail link with the Central Europe through the Baltic States in a document of law. The agreement is one of the prerequisites for the construction of the RB railway connection. Its aim is, inter alia, to increase the mutual trust of the Contracting Parties to the RB on the establishment of a railway connection. The agreement defined both the general technical parameters of RB as well as the route and deadline for setting up. [24 - 26]

The construction of the RB infrastructure is planned to start in 2019 and should be completed in 2026. [24]

6.1. What will Be Transported

How many people and of goods will be transported on the railway? According to the forecasts prepared in the launch stage of the project, the railway should be self-sufficient if 9 million tons of goods are serviced over the entire length of the route every year and a total of ca 3,000 people travel by train e.g. between Tallinn and Riga every day. Finnish

companies are already interested in creating warehouse complexes and factories in Estonia if it becomes possible to transport the goods to Europe via railway. [24 - 26]

The big problem of European railway transport of goods: Estonia great fall (!), by tonnes 2.7 times and by ton-km 4.6 times. [1; 27]

In Latvia on period 2012 – 2017 fall freight by tonnes 1.384 times and by ton-km 1.456 times [28].

Mainly used in Latvia international rail freight transport for import, in 2017 freight 2998 thousand tons [29]. Cargo turnover by road grew slowly to 15 bn tkm [30]. The same trend is in Estonia: international road freight transport grows and freight rail traffic decreases [31].

In international freight transport contracts deadlines are important, non-compliance with them will bring great contractual penalties to the exporter. With road transport, it is easy to ensure. However, there is no rail transport, because it is not certain, when the cargo is to be transported from the railway terminal. In particular, in small quantities, it is necessary to wait for the wagon to be full and then travel to the required place.

Table 9. Goods transport by road [33].

Thousand tonnes

	2006	2009	2013	2015	2017
Germany	2,919,819	2,769,201	2,938,702	3,035,329	3,161,837
Estonia	33,780	30,088	31,080	28,162	28,969
Latvia	54,640	37,819	60,610	62,569	68,013
Lithuania	56,026	44,697	52,346	58,601	76,980
Poland	897,414	1,170,478	1,300,608	1,264,960	1,501,811
Finland	396,800	350,588	274,637	271,912	280,744

Million tonne-kilometre (TKM)

	2006	2009	2013	2015	2017
Germany	330,016	307,547	305,744	314,816	313,149
Estonia	5,548	5,340	5,986	6,263	6,189
Latvia	10,753	8,115	12,816	14,690	14,972
Lithuania	18,134	17,757	26,338	26,485	39,099
Poland	128,315	180,742	247,594	260,713	335,220
Finland	29,715	27,805	24,429	24,488	27,966

Goods transport by *road in tonnes* of EU-28 decreased until 2013 and has continued to increase steadily. The share of the European economy leader Germany in the EU-28 was 22%. Basically, it was the same trend as the EU-28, with 2010 - 2017, growth has been 427.232 thousand tonnes, or a sixth (15.6%). Based on this analysis of the Baltic Sea countries. Latvia, Lithuania and Poland were the same trends.

Goods transport by *road in tonne-kilometre* of EU-28 was the same trend as in tonnes. Strongly it has grown by 2006 - 2017 in Poland (2.6 times), by 2009 – 2017 in Estonia (16%), in Latvia (1.85 times) and in Lithuania (2.2 times). In Finland, it has been relatively stable, such as trade with Russia.

In conclusion, the road transport in the new EU Member States is progressing well, thanks to EU funds, that allowed the modernization of road infrastructure.

Table 10. Cargo traffic and cargo turnover by mode of transport of Latvia [27].

	Cargo traffic by mode of transport (thsd t)				Cargo turnover by mode of transport (mln tonne-kilometres)			
	Total	Rail transport	Road transport	Air transport	Total	Rail transport	Road transport	Air transport
2011	113,334	59,385	53,936	13	33,554	21,410	12,131	13
2012	113,241	60,601	52,621	19	34,58	21,867	12,178	13
2013	116,454	55,831	60,609	14	32,359	19,532	12,816	11
2014	119,293	57,039	62,239	15	33,124	19,441	13,670	13
2015	118,227	55,645	62,569	13	33,605	18,906	14,690	9
2016	111,220	47,819	63,389	12	30,111	15,873	14,227	11
2017	111,811	43,785	68,012	14	29,999	15,014	14,972	13

Table 11. International rail freight transport by country, thsd tons of Latvia [29].

		2010	2011	2012	2013	2014	2015	2016	2017
Export freight transport	Total	3,206.4	4,931.9	4,886.2	4,356.4	4,520.9	2,848.9	2,383.5	1,838.6
	Belarus	407.1	493.6	332.7	305.4	397.8	110.0	103.5	173.4
	Estonia	1,032.7	1,012.4	856.6	1,619.0	1,705.3	459.4	223.2	94.3
	Kazakhstan	219.9	304.4	305.4	294.5	288.2	238.4	161.4	137.6
	Russia	902.7	2,127.8	2,187.8	1,268.3	1,296.9	1,062.0	893.7	1,003.2
	Lithuania	128.8	164.2	243.6	258.7	383.0	646.1	699.4	132.0
	Uzbekistan	178.9	487.3	604.7	415.3	237.0	160.8	156.8	166.8
Import freight transport	Total	40,973.0	48,437.8	49,727.9	47,668.6	49,408.1	48,276.7	42,036.3	36,583.8
	Belarus	7,132.9	9,357.0	10,326.0	5,205.2	5,588.3	8,831.7	6,389.0	6,208.1
	Estonia	149.9	112.9	143.9	140.7	140.0	104.5	92.1	190.2
	Kazakhstan	1,813.8	1,783.7	2,190.6	2,402.0	1,401.3	506.4	89.8	121.4
	Russia	30,275.2	35,570.1	35,456.3	38,417.6	40,999.0	37,563.8	34,206.6	28,604.3
	Lithuania	1,070.1	1,101.8	1,265.8	1,129.9	861.1	1,022.3	969.6	1,055.6
	Ukraine	374.7	333.4	240.9	313.0	327.8	185.6	216.9	261.1
	Uzbekistan	124.6	130.7	62.1	40.5	73.6	25.8	64.4	132.5

The key of international rail freight transport are imports, which is almost 20 times larger than exports. Of this, 78% are Russia, 17% Belarus, 3% Lithuania and 0.7% Ukraine. Of the small export volumes, 55% are to Russia. West direction is practically no. What is needed for Latvia Europe rail track width?

Table 12. Goods transport by rail Lithuania [30].

2017	Goods transport, thousand tonnes	Tonne-kilometres, thousand tonne-km
Goods carried, total	52,638.2	15,413,521
National transport	15,539.5	3,772,317
Entered the country	20,780.6	7,585,544
Left the country	4,664.8	1,235,100
Transit	11,653.4	2,820,560

Almost the same trends as Estonia and Latvia, but not so much counterattacks. Lithuanian rail freight transport in ton-kilometres is half entered the country (import) and 18% transit. Left the country (export) by rail is 6 times smaller than entered the country (import). The largest business centres of Lithuania are located in Vilnius. Whether there is easier to transport goods to Kaunas to RB-line or in directly to the Polish border, and then to Western Europe? When the goods arrive to Kaunas, it must first be loaded into the terminal. Then wait for the wagon received driving direction and reload again from the terminal to the wagon. For the business these costs are considerably higher. How big is Lithuanian export in Western Europe?

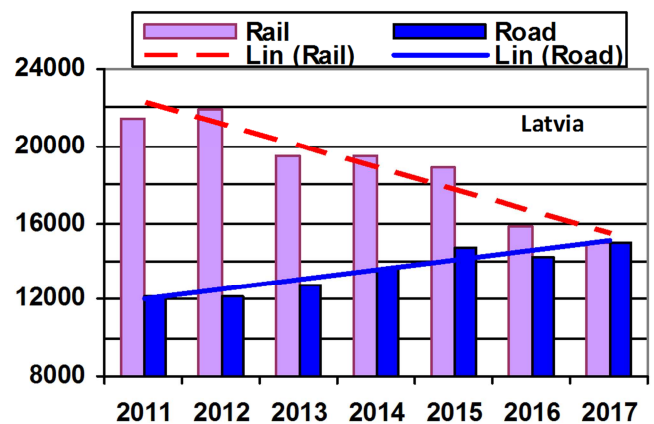


Figure 9. Cargo traffic (million tkm) in Latvia [28].

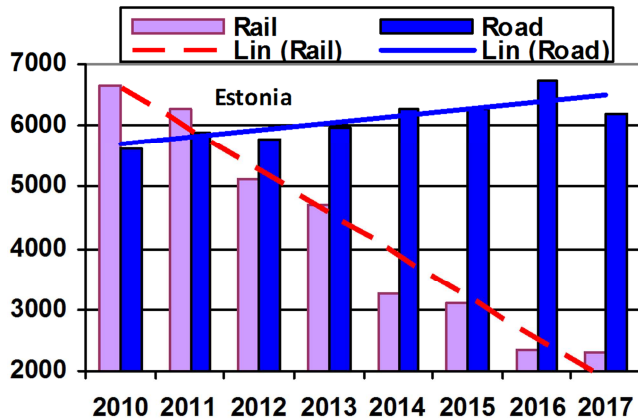


Figure 10. Cargo traffic (million tkm) in Estonia [27].

The Baltic railway leader country Latvia the freight transport trend: rail transport is decreasing and road transport is increasing. The share of air transport is small. This trend is also in Estonia: international road freight transport is increasing and rail freight transport is decreasing.

Has the growth of Russian transport decreased for both political and economic reasons? Despite the Western trade restrictions, Russia's rail transport of goods has steadily increased: from 2009 = 1108 million tons to 2017 = 1266 million tons or +158 million tons or 14.3% and from 2010 = 2011 billion tonne-km to 2016 = 2344 billion ton-km or +333 billion ton-km or 16.6%. [34]

On 2017 by railways Estonia-Russia total (loading + unloading) international freight was 421 thousand tonnes and transit freight 5,994 thousand tonnes; by turnover 69.5 million tonne-km and transit 878 million tonne-km. On 2017 by railways Estonia-Russia total (loading + unloading) international freight was 421 thousand tonnes and transit freight 5,994 thousand tonnes; by turnover 69.5 million tonne-km and 878 million tonne-km. 78.9% Estonian transit freight and 66.5% international freight turnover were with Russia. Shares of total freight were 26.7% and 21.0%. [34]

Consequently, the Baltic states cannot count on increasing the volume of Russian goods and transit.

Table 13. Freight traffic by rail by group of goods of Latvia [29].

	2008			2012		
	tons	ton-km	%	tons	ton-km	%
Total	56,061	19,581	100	60,601	21,867	100
Products of agriculture, fish, forestry	1,786	549	3.2	2,882	1,077	4.8
Coal and lignite; crude petroleum, natural gas	,	6,408	33.1	22,454	8,064	37.0
Metal ores; peat	297	67	0.5	1,549	550	2.6
Food products, beverages	1,413	552	2.5	1,644	656	2.7
Wood, products of wood; paper, paper products	1,036	316	1.8	966	320	1.6
Coke and refined petroleum products	19,706	7,215	35.2	18,372	7,310	30.3
Chemicals, chemical and plastic products	3,050	1,527	5.4	10,052	2,978	16.6
Basic metals; fabricated metal products, except machinery, equipment	2,734	929	4.9	1,763	532	2.9

Table 13. Continued.

	2014			2016			2017		
	tons	ton-km	%	tons	ton-km	%	tons	ton-km	%
Total	57,039	19,441	100	47,819	15,873	100	43,785	15,014	100
Products of agriculture, fish, forestry	2,091	774	3.7	2,235	844	4.7	2,227	818	5.1
Coal and lignite; crude petroleum, natural gas	20,134	7,014	35.3	15,911	5,212	33.3	17,689	6,097	40.4
Metal ores; peat	1,135	296	2.0	1,295	610	2.7	993	388	2.3
Food products, beverages	1,862	741	3.3	1,810	727	3.8	1,418	567	3.3
Wood, products of wood; paper, paper products	1,015	305	1.8	1,607	445	3.4	1,112	309	2.6
Coke and refined petroleum products	21,293	7,080	37.3	16,624	5,503	34.8	13,014	4,587	29.7
Chemicals, chemical and plastic products	6,724	2,248	11.8	5,517	1,661	11.5	4,878	1,486	11.1
Basic metals; fabricated metal products, except machinery, equipment	1,652	481	2.9	1,799	610	3.7	1,839	613	4.2

Notes: Freight transported, thousand tons. Freight turnover, million ton-km. Percentage of total freight transported, %

Nearly 70% have been at all times Latvia's main commodity groups come from Russia coal and lignite; crude petroleum; natural gas; and coke and refined petroleum products. In addition, there are other raw materials. However, the volumes of exports sent to Western Europe are very small, and it is very voluminous and cumbersome to complete the train and even the wagon.

Table 14. Cargo traffic by rail (thousand tonnes) of Latvia [29].

	1993	1996	1999	2002	2004	2005	2008	2010	2012	2014	2015	2016	2017
Total	30,574	35,264	33,208	40,100	5,058	54,861	56,061	49,164	60,601	57,039	55,645	47,819	43,785
In domestic transportation	2,736	2,565	1,938	2,314	2,428	2,633	1,687	1,263	1,429	1,256	1,671	1,482	1,649

	1993	1996	1999	2002	2004	2005	2008	2010	2012	2014	2015	2016	2017
Total	30,574	35,264	33,208	40,100	5, 058	54,861	56,061	49,164	60,601	57,039	55,645	47,819	43,785
In international transportation	27,838	32,699	31,270	37,786	48,630	52,228	54,374	47,901	59,172	55,783	53,974	46,337	42,136
...in exports transportation	1,427	1,510	1,663	662	2,167	1,992	2,652	3,206	4,886	4,521	2,849	2,384	1,839
...in imports transportation	3,433	3,667	3,577	3,492	41,895	44,532	47,116	40,973	49,728	49,408	48,277	42,036	36,584
...in transit transportation	22,978	27,522	26,030	33,632	4,568	5,704	4,606	3,722	4,558	1,854	2,848	1,917	3,713
...from international transportation - via Latvian ports	13,466	22,755	23,884	29,603	38,667	40,600	43,871	39,056	49,035	47,041	45,439	39,480	35,038

The main part of cargo traffic by rail is import transport (83.5%) and, in turn, the main transport from Latvian ports (80.0%). Once again, the question: What is the need for European railways?

Table 15. Freight traffic on railways in Estonia, thousand tonnes, 2017 [35].

	Freight	Domestic freight	Outgoing goods	Incoming goods	Transit goods
Goods total	27,257.4	18,089.6	258.5	1,315.7	7,593.6
01 Products of agriculture, hunting, and forestry; fish and other fishing products	102.9	78.5	1.0	23.3	0.1
02 Coal and lignite, crude petroleum and natural gas, oil shale	15,659.1	15,599.4	0.0	7.4	52.3
03 Metal ores and other mining and quarrying products; peat; uranium and thorium	808.1	770.2	18.3	7.5	12.1
04 Food products, beverages and tobacco	163.8	0.5	7.3	22.6	133.4
07 Coke and refined petroleum products	3,458.4	795.5	98.0	905.6	1,659.3
08 Chemicals, chemical products and artificial fibres; rubber and plastic products	5,514.8	4.0	11.7	222.5	5,276.6
09 Other non-metallic mineral products	989.9	709.3	107.3	4.2	169.1
10 Basic metals; fabricated metal products, except machinery and equipment	210.4	83.9	1.0	109.8	15.7
11 Machinery, computers, communication, medical, optical and other equipment	55.9	5.4	7.3	8.3	34.9
17 Removal goods; baggage; motor vehicles being moved for repair; non-market goods	214.2	0.4	5.7	0.7	207.4

From total freight traffic on railways accounted domestic freight 66% and transit goods 28% or in total of 94%.

In 2017, there were three main groups of goods in Estonia (gr. 02; 07 and 08), but they are domestic freight. Outgoing and incoming goods (excl. transit) were only 1574.2 thousand tonnes, including gr. 07, what was 905.6 thousand tonnes. Transit goods were two main groups 07 and 08. [35]

What their arrival is so important in a few hours times savings? Is the expense of doing so expedient?

If one wagon can hold 60 tons and train has 50 wagons, then one train will be 3000 tons. Each year, one train will carry one million tons.

Several trains are needed in order to carry out these transports? We add that in the future gr. 07 need to decrease considerably in EU [6].

Rail Baltica is considered the main advantage of the speed of delivery of goods and passengers. We will analyse it. As the planned railway track runs practically straightforward, then Tallinn-Pärnu-Riga and the other sections will be shorter when compared to the highway. At speeds of 120 km/h this

distance (Tallinn-Riga) is expected to take less than two hours. But here it is not taken into account that cities do not drive at full speed. Secondly, in Pärnu, Riga and other cities, there are also intermediate stops for loading additional goods or for picking up wagons, but also for passengers. However, it will take time!

However, if we look at the Estonian railways freight traffic a commodity outgoing and incoming goods groups, then a few hours of time will not justify these tremendous costs for RB. But in the case of gr 11, it will be enough for a year only three trains and gr 01 for eight trains do these trains!

How long will it take from the point of departure of the goods a railway freight terminal and, later, the destination point of the railway terminal of the place of arrival?

Let's see the distances Tallinn-Tartu; Tallinn-Narva, Riga-Daugavpils, Kaunas-Vilnius and others. If we take the goods from the truck starting from the point of departure, then it will take no time for trans-shipment, nor for the terminal charging expectations. For example, the bus route Tallinn-Vilnius with intermediate stops takes 6 hours, from Tallinn to German border should arrive in two days.

According to railway specialists and the owner of the company Oleg Ossinovski, the time for Estonian transit operations will soon be completed. Estonian transit must turn a new page, the flow of Russian is history. [37]

The main causes doubts about the future profitability of the railway estimate because the exact volume of freight and passenger transport is quite difficult to predict.

6.2. Rail Baltica Cost

How much will Rail Baltica cost?

Based on the current planning data as of November 2014, constructing the Estonian part of the RB route will cost approximately 1.3 billion euro. Estonian self-financing in the project will be approximately 500 million euro divided over ten years.

By the start of 2018, the three Baltic States and RB RAIL AS have received two grants designed under the CEF for the construction of the Rail Baltica railway, having signed Grant Agreements with a total value of 765 million euros. [25]

The total cost of the rail link from Tallinn to Poland-Lithuania border is estimated at 5.8 billion euros, of which up to 85% should be covered by EU funds. The share of Estonia is 1.35 billion euros, of which Estonian self-financing is 239 million euros.

In Estonia on 2015 income statement of rail transport were 94 million and of freight transport by road 1162 million euro. On 2017 income (revenue) of rail transport enterprises were carriage of passengers 1.74 million and carriage of goods 49.98 million euro, in the 4th quarter was a difference of 40 times. [38]

Let's think about the cost-effectiveness of Rail Baltica!

Without the UK, the EU budget would face a permanent funding gap. British departure leaves a hole size of 10 to 15 billion euros per year. To cover this, it is planned to increase the contribution from the current 1% to 1.2-1.3% of GDP. We are considering extending the tax base, for example, to harmonize corporate tax rates. Particularly affected by the EC budget reduction new the EU Member States, the net recipients. The lesson for the EU is, that both Brussels and the Member States must radically change their spending. The EU needs radical innovations!?

According to preliminary data, the share of Lithuania and Estonia in the EU budget is reduced by 24%. Are there then the money for the RB? Need financing other areas like agriculture. [39]

The Financial Times wrote that the budget plan anticipates a drastic redistribution of funds to the southern countries at the expense of Central and Eastern European countries, and is

significantly more redistributable than initially planned at 10%: Hungary, the Czech Republic, Estonia and Lithuania are likely to accept a 24% cut. The EU budget plan 2021-2027, announced yesterday, provides for a drastic redistribution of funds to the southern countries at the expense of Central and Eastern European countries. [40]

Brussels intends to channel more than 30 bn euros from Central and Eastern Europe to Greece, Italy and Spain. Hungary, the Czech Republic, Estonia and Lithuania are likely to accept a 24% cut. In total, the Baltic States and the four Central European countries known as the Visegrad Group will lose 37 bn euros in the next budget period. [41]

The Chinese can come to build Rail Baltic. RB construction can bring a lot of foreign workers to Estonia, including Chinese builders with their container houses, canteens and kindergartens, Kaspars Rokens, RB Raili coordinating Rail Baltic. He referred to delegations from China, Japan and Turkey who are actively involved in the development of the RB project kept up to date. [42]

In October 2018, the RB project has reached a design phase, which follows the design guidelines approved in all three Baltic States. [43]

6.3. Criticism and Opposition of Rail Baltica

Rail Baltica is the subject of much criticism and opposition.

According to experts [44], the RB Feasibility Study has several significant mistakes that take into account RB's total revenues of 4.1 bn euros and, therefore, RB is not even economically viable for the social economy but is harmful to the Baltic States and meet EU co-financing requirements. Priit Humal presented a 73-page document to the public at the press conference held on January 16, 2018, claiming that by manipulating emission standards and fuel consumption of trucks, the socio-economic benefits of artificially increased RBs have been raised. The critics also point out that the feasibility study for EY does not address the external costs of environmental impacts generated during railway construction or rail endurance.

There are several significant errors in the RB Feasibility Study, which will account for RB's total revenue of EUR 16 bn, down by EUR 4.1 bn.

The socio-economic benefits of RB have been artificially increased by manipulating emission standards and fuel consumption of lorries.

The feasibility study for EY does not address the external costs of environmental impacts generated during railway construction or railroad endurance, as required by the Feasibility Study Guide.

Most of the road transport takes place directly from customer

to customer. From RB Rail's and EY's replies, replacing such road transport with RB would not be cost-effective as the delivery of goods (the so-called last mile) is so costly.

The rest of the road transport, which includes the transport of goods through terminals, is compared with rail terminals from rail to another rail terminal, without taking into account the additional costs of delivering goods from the rail terminal to the central road terminal.

According to the PSP, "all data and sources used in the feasibility study" should be readily available, but despite frequent requests, no study used in the study has been made public and many of the sources mentioned are not public.

After the correction of these errors, it turns out that the Rail Baltic is not socio-economically feasible, it is detrimental to the Baltic States and does not meet EU co-financing requirements. [44]

Add here more "Major mistakes in Rail Baltica Cost-Benefit Analysis" [45].

400 public letters of intellectuals: Rail Baltic Act, adopted on the basis of false information it should be annulled. [46]

At the same time continue to Baltic Rail-related lawsuits. [47]

Estonia has sad experiences. 10 years ago, despite the strong opposition of the environment and nature protectors, the deep seaport of Saaremaa was built. It was then hoped that this would make wonderful things for the Estonian economy. Now it stands empty and depletes. What is the analogy of Rail Baltica? Who is responsible? [48]

Estonia launched the RB. At first, it supported 2/3, now only 48% of the population.

In mid-October 2008, it turned out unexpectedly that RB Estonia's share rose by 18%, it is expected that it will increase even more.

Three years ago, formed a joint venture RB Rail Ltd., whose goal is to design, build and market the RB. RB maturing by 2026 faced great danger down, because countries satisfy their narrow interests.

Suddenly, from one day left Baiba A. Rubesa, RB Rail Ltd. CEO and Chairwoman of the Board. She said, that cost-benefit analysis of RB proves that the project is economically viable and viable. 2017 was ratified by the Estonian, Latvian and Lithuanian parliaments RB project development agreement. Infrastructure management model suitability must approve the governments of the Baltic states by the middle of 2019. The final phase is also the completion of a long-term business plan and action plan. According to Rubesa, RB will not be able to implement properly, the parties will not be able to cooperate normally, and the transnational management is poor, cubic conflicts of interest.

There are still many problems to be solved, including transnational cooperation.

There is a danger, that the RB project may not be able to claim 0.8-1 billion euros by 2020. [43; 49]

- a) Let's look at part of the numerous commentaries from Estonia on the RB. [43, comments on RB]
- b) Freight is needed spare parts, charging stations, new logistics centres etc. So far, there are used branches with an old track width, the infrastructure of which was built in the century. In the last couple of years there has been a large expansion of logistics centres for road transport, they do not coincide with the planned RB. Who and who and for what kind of money will the ready-made freight carriage be built?
- c) There are speed limits for freight, there is no need for any RB. Moreover, the existing route can be converted into a European-wide railway, which would make sense...
- d) RB's profitability and need have been proven only on paper, based on your desire for dreams. Most of the goods are from Russia according to the plan. The only ones who will benefit will be builders. Estonia falls into the debt ladder because overtaking has to be paid on its own, in addition to the hackers of the foreign builders...
- e) Firstly, the profitability has not been proven, but it is literally full of air; secondly, the entire route is completely planned, thirdly, it cannot compete with car and shipping in any way. What are we going to do?
- f) RB is not required for the carriage of goods, since the carriage of goods has its own rules, there is no need for a high-speed connection. Helping to reconstruct the existing railway.
- g) To build a railway that is not needed by anyone, it would be necessary to make all major roads three-way and two-way, and obviously no one will use this superb rail.
- h) The entire project builds on poetry, assumptions and derivatives that have little in common with reality. Everyone is doing their tiny and useful projects so that later you can spread your hand and wonder how it all went now? Already, part of the material of this important project has been classified, alarm clocks should be put into operation!
- i) Who they will be missed when you capture cost?
- j) I would like the wise men from specialists even a short list of goods which are transported RB had somewhere to Tallinn and back or forward.
- k) The necessary part of Poland, however, does not want it on its surface, as it is becoming the last part of the

"Silk Road" that passes through China through Russia. Poland has so far not allowed RB to build its territory...

- l) The model's suitability must be approved by the governments of the Baltic States by mid-2019.
- m) Nobody knows how much cargo will come and how much; The number of RB passengers is marginal. There are no adequate cost-benefit calculations, and one can also calculate how much RB will pay annual maintenance. What if RB funding, for example, is falling dramatically due to the economic crisis and construction is underway? Then let's move on from Estonian budget? [43, comments on RB]

EU Transport Commissioner Violeta Bulc invited the Ministers of Finance and Infrastructure of Estonia, Latvia and Lithuania by the end of October 2008 within the framework of the crisis meeting, as the project would be stretched and enveloped in the risk of losing EU money. [50]

The main problems are next to the environment, is there still something to do with transport, and whether the EU still finances it.

This will help clarify this controversial issue. However, work has already begun.

Taking into account this publication and the previous work of the authors [2; 6 - 18], we can make the following conclusions.

7. Conclusions

In conclusion, analysis demonstrates, that *the Rail Baltica is not socio-economically feasible*, it is detrimental to the Baltic States and does not meet EU co-financing requirements. The Rail Baltica is *not an economically and financially reasonable project*, but only a political decision.

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