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VIKING TRAIN

- CASE STUDY -

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VIKING TRAIN

1. INTRODUCTION

In the late 90s, Lithuanian government started to develop a strategy with the aim to become a leading logistics centre in Europe. Lithuania is commonly known as a transit country because in its particular location it shares borders with other European Union (EU) members (Poland and Latvia), with a Commonwealth Independent States (CIS) country (Belarus) and even with the Russian Federation (Kaliningrad Oblast). Lithuanian's territory is traversed by multiple international transport corridors including access to the Baltic Sea through Klaipeda seaport and connections among Western Europe, Scandinavia, Russia and other CIS countries.

In this situation, Lithuanian governments have pursued long-term economic growth through a Transport System Development Strategy. This plan states that the country is heavily committed to comply with EU transport policy that aims to facilitate a modal shift of at least 30% of road freight over 300 km to other transport modes by 2030. In order to achieve such ambitious goal it was indicated that advantages of individual models of transport and efficient interoperability would be exploited to the maximum potential. In this sense, the long-term strategy on transport was clearly oriented to a dominant use of railway mode for freight transportation. However, competitive analysis between road and railway transport indicated that railway, besides its common drawbacks like being a slower option and not a door to door transport mode, was heavily penalized in terms of time when crossing international borders. Customs clearing and cargo checking related activities performed in border stations and also some out-dated infrastructure were creating bottlenecks that reduced Lithuania's likelihood to become an intermodal transport reference in Europe.

Despite these problems, the potential for developing Lithuania as a major logistics hub that linked European Union to Eurasia through railway connections was really large but the Lithuanian authorities were considering what steps to take in efficiently developing international railway connections. Such analysis and planning was essential in an scenario characterized by increasing freight flows on the link between Baltic Sea and Black Sea, bottlenecks caused by inadequate infrastructure and slow border crossing procedures.

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2. OVERVIEW OF LITHUANIA'S TRANSPORT SYSTEM BEFORE VIKING TRAIN

The transport sector, and especially freight transit is one of the most fundamental elements of Lithuania's economy representing 15% of Gross Value Added in the country. Lithuania's geographic location makes the country a crossroad of two main transport corridors fostering freight transit services. East/West corridor links Russia and other CIS countries via Belarus to the port of Klaipeda, and from there to Scandinavia and Western Europe. North/South corridor establishes a connection between Finland via Estonia and Latvia to Poland and Western Europe through the Via Baltica roads[1].

FIGURE 1. MAP OF LITHUANIA

[1] European route E67 links Warsaw and Tallinn, where the final stretch between this city and Helsinki is crossed by ferry.

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In the years preceding its acceptance in the EU in 2004, the competitive advantage provided by geographical location was vanishing due to lack of adequate infrastructure endowments, which was threatening the development plans of becoming an international logistics hub. In 2003, Lithuania did not have a very dense high quality road network, although there was a rather important network of secondary roads. However, still a large share of this network has got no asphalt pavement, which joined to a significant growth in road usage by private cars and freight vehicles yielding alarming figures in terms of road fatalities and injuries. In that year, Lithuania had the second highest road traffic accidents rate per 100,000 inhabitants (173) and per 1.000 cars (3.8) in the EU, which are 3 to 5 times higher to the number of deaths in Sweden or Finland[2]. In this sense, Lithuanian roads needed upgrading in order to cope with increasing volumes of traffic and congestion.

Lithuanian rail network also needed significant reorganization. In 2003, the rail network consisted in slightly more than 2.000 km of which a 40% needed exhaustive repairs and maintenance. More importantly, most sections of the network are of Russian standard gauge (1520 mm) that are not interoperable with Western European tracks (1,435 mm). In addition, only a 7% of the track was electrified and traffic speeds were low. For instance, near the Polish border some sections were restricted to maximum speeds between 40 and 60 km/h. Despite these problems, rail freight transport accounted for 38% over the total cargo transport, which was slight higher than the EU members' average.

The relatively flat terrain of Lithuania also allows for inland waterway transport, although its overall role in the transport system is still limited. Factors reducing the attractiveness of inland navigation included short navigation period, shallow waterways, seasonal change in water level, limited number of navigation routes, obsolete fleet of inland water vessels not adjusted to carry different types of cargo and passengers, and lack of modern infrastructure. On the other hand, maritime transit in Lithuania is led by Klaipeda seaport, a core element of freight transport system in Lithuania for long time. However, part of its infrastructure was not in line with modern requirements, which caused these intensive modernization works, starting in 1999.

Based on the review of the transportation system, with a focus on cargo transport, the following strengths, weaknesses, opportunities and threats were identified (ECORYS, 2006):

[2] More information on road traffic accidents in Lithuania can be retrieved from http://www.lra.lt/en.php/traffic_safety/accident_rate_information/106

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TABLE 1. LITHUANIA TRANSPORT SYSTEM SWOT ANALYSIS

Strengths	Weaknesses
- Good geographical location, crossed by two EU transport corridors. - Deep water ice free port of Klaipeda. - High academic potential in the area of transport studies.	- Railway infrastructure outdated, using Russian gauge. - Reliance on Russian transit tariff policy. - Klaipeda sea port infrastructure underdeveloped to fully accommodate deep sea and passenger transport. - Limited access to other EU countries due to poor road condition in Poland. - Poor condition of public transportation fleet. - Airport terminals are not in compliance with Schengen requirements. - Lack of legal conditions for multimodal services to develop.
Opportunities	**Threats**
- Modernize road management control system to improve safety and traffic flows. - Expand and improve the capacity of Klaipeda sea port to serve EU and third countries transit needs. - Modernize road management control system. - Develop potential for intermodal logistics.	- Increased competition in neighbouring countries in sea transport (port, logistics centres, and motorways of the sea). - Imbalanced policy with neighbouring countries for the train tariffs.

Source: BV, E. N. (2006). Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion Funds for the Programming - Period 2007-2013. Rotterdam.

Given this situation, posterior strategic plans proposed by Lithuanian governments in the early 2000s were oriented to improve the overall quality of transport infrastructure[3]. The resulting transport projects were heavily supported by different grants and funding: In the period 2000-2003 transport infrastructure projects benefited from funds dedicated to candidate members of the EU ("Instrument for Structural Policies for Pre-accession"). In subsequent years national funds were complemented with Cohesion Funds (CF), European Regional Development Funds (ERDF) and support from other institutions like European Investment Bank (EIB) that helped Lithuania reducing the infrastructure gap with other EU members.

[3] An extensive review of Lithuania's National Transport Strategy can be found in ECORYS 2006).

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3. VIKING TRAIN: AN IMPULSE FOR LOGISTICS AND INTERNATIONAL RELATIONS

Lithuania's policy makers were aware of the importance of promoting the quality of transport infrastructure but they were also concerned about the demand levels for the transport services produced by this infrastructure. While infrastructure upgrading could boost freight transport and logistics demand, this by itself could not be enough to make logistics sector have a larger impact on the economy. A larger endowment of high quality infrastructure would likely enhance domestic trade, but as a transit country, Lithuania had to aim for increasing international shipments.

The East/West corridor running from Klaipeda port through Lithuanian cities of Vilnius and Kaunas to Belarus was an extraordinary opportunity to create a railway link between the Baltic and the Black Sea. The purpose of this project, known as Viking Train, was to extend the transcontinental connections of the Scandinavian countries and Black Sea countries using an international transport corridor. The main route connects Klaipeda port on the Baltic Sea with port Ilyichevsk on the Black Sea running through three capitals Vilnius, Minsk and Kiev (Figure 2).

FIGURE 2. VIKING TRAIN ROUTE

Source: http://www.ewtc2.eu/

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The idea of developing Viking Train connection came in 1999 when the Ministers of Transport of Lithuania and Ukraine signed Memorandum of Understanding (Vilnius, 5 March, 1999) and assumed obligations regarding development of transport connections in the Middle Section of Corridor IX. In the following year, Belarusian Railways also joined the project (see a timeline of the project in Appendix II). From that moment, governments of Lithuania, Belarus and Ukraine, together with port companies of Klaipeda, Odessa and Ilyichevsk initiated conversations to get the Viking train project started in February 2003. A particularly important role in the Viking Train is played by each National Railway company of these three countries, which are responsible for the implementation of the Viking shuttle train project within their respective borders.

Although all these actors involvement was a promising first step, in the initial stage multiple challenges emerged that needed to be addressed: out of date seaport infrastructure in Klaipeda and railways along the route, the need to establish Public logistics centres that integrated all transport systems, high congestion in the Lithuania/Belarus border station of Kena and uncoordinated procedures, different software used and documentation with eastern partnership countries which caused slow customs clearing.

Following the route from Baltic to Black Sea, the starting point of Viking train is Klaipeda Seaport, where cargo is received from Scandinavia and Western Europe by sea transport and also via the ferry line connecting Mukran in Deutschland and Klaipeda. Klaipeda is the only major seaport in Lithuania and also the northernmost ice-free port in Europe. Its warm waters guarantee uninterrupted navigation in the winter months, creating the perfect environment to convert the port in a hub of the transport transit industry. In fact, the port is the leader among the ports in the eastern Baltic in terms of container handling and diversification, operating a wide-range of cargo in specialized terminals[4].

Klaipeda port infrastructure modernization was necessary to cope with the demanding cargo opportunities that were expected after the starting of the Viking train connection. The main infrastructure improvement works included the construction of quays, reconstruction and development of the railway network of the port, and the deepening of the seaport waters. During these works, the entrance channel to the Port was deepened to 15 metres (fairways 14.5 m) being able to accommodate vessels up to 315 m in length with a maximum draught of 13 m. As a result of the upgrades multiple facilities were built resulting in 33 specialized terminals able to handle all types of cargo. Further infrastructure developments in the

[4] See http://www.portofklaipeda.lt/

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period include improvements in port accessibility creating two railway bypasses not crossing the central part of the city and three new access routes.

Klaipeda seaport also developed an innovative IT system. KIPIS, as the port community system was labelled, allows port companies and state bodies manage multiple functions such as: providing information required by customs and other state authorities using Internet, data exchanging amongst system users concerning temporary storage and formalities related to import, export and transit, and data sharing with stevedoring companies for placing orders for handling operations. KIPIS also allows inspection authorities to receive preliminary data and documents that can be used for risk assessment and operative and that also provides real time information of cargo volumes at the port. Real time information helps to manage port infrastructure more efficiently reducing idle times and subsequent congestion. Additional, efficiency gains arise from the elimination of 30 paper documents between the ship agency, forwarding and stevedoring companies and state authorities. The elimination of paperwork had positive impacts in personal and technical resources that can be used for alternative purposes.

The strategic plan for Lithuanian railway development in the period 2011-2015 aims to build missing double axis rails in the corridor, electrification of railways from Vilnius to the border of Belarus, renew signalling systems and reconstruct Vilnius – Kaunas railway stretch for speeds up to 160km/h. The transport capacity from Kena to Klaipeda has been increased from 30 to 50 million tons a year by a corridor development program. Furthermore, the Rail Baltica[5] project is promoting connections to Poland using standard gauge allowing for a better integration of Lithuanian Railways and Western Europe. Freight transport in Lithuanian railways is carried out by powerful Siemens locomotives able to transport trains with weights up to 5000 t.

Complementing and supporting railway development, Lithuanian authorities have boosted the creation of Public Logistics Centres (PLCs) in order to integrate all transport systems. PLCs have helped creating efficient logistics chains able to ensure interoperability of different modes of transport and to regulate freight-transport flows. PLCs have been built in Vilnius, Kaunas (both facilities opened in 2015), Klaipeda and Siauliai and include intermodal terminals, logistics parks, storage yards, office buildings and other services such as vehicle

[5] Rail Baltica is one of the priority projects of the European Union: Trans-European Transport Networks (TEN-T) and aims to link Finland, the Baltic States and Poland and also improve the connection between Central and Northern Europe and Germany.

repair, accommodation and filling stations. According to the strategic plan, PLCs will enhance local economies and also attract foreign investors as companies are expected to relocate in these logistics centres providing value-added services of all kinds. PLCs in Kaunas, Klaipeda and Vilnius are expected to both compete and collaborate. While Klaipeda PLC is specialized in the cargo handled in the seaport, Kaunas is expected to become a logistics services centre for the countries in the Baltic Sea Region and is famous for distribution services. Vilnius PLC's intermodal terminal is located close to Vaidotai Railway station which is one of the biggest railway stations in the country and is specialized in warehousing services.

FIGURE 3. NORTH SEA BALTIC CORRIDOR

Source: Ministry of Transport and Communication of the Republic of Latvia

Once the Viking train has run over Lithuanian territory and got to the border with Belarus the convoy arrives at another critical point of the route, Kena border station. As the only rail gateway connecting Lithuania with Belarus it was really important to increase the capacity and technical operability of this potential bottleneck. Heavy investments completed in 2004 and 2005 were made to accelerate the customs clearance of trains by installing a wide

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railway network composed by two main railroads and eleven railroads constructed for entering and exiting the border station.

Kena station equipment was also upgraded to support faster cargo inspecting. In particular a dynamic scale was installed that permits to check the weight of cargo without stopping the train. Also, new X-ray gates aimed at screening cargo were installed at both sides of the railway along. With this equipment, it is easier to verify that the freight content corresponds to the declarations. Finally, radiation detectors were also installed for security reasons. Using Kena station, goods that are transported through East – West transport corridor can cross the EU border in 30 minutes, which is an impressive achievement. Currently, 68 trains are able to pass Kena while future developments will increase this figure to 76 trains per day in 2020 and up to 80 trains a day in 2030[6].

Lithuanian Railways information systems uses the waybill for customs declaration formalization and instantly sends the inspection information collected in Kena to all border stations and railways of Belarus making the process of border crossing easy and precise. For Viking project, Lithuanian Railways created KROVINYS, a new IT system that assists the transportation process by executing and recording all necessary documents and also by exchanging data with IT systems of other logistics actors involved in the project. KROVINYS and KIPIS, the port community system in Klaipeda, were integrated through an automatic data exchange interface.

It is important to note that smooth freight movement at border gates really depends on avoiding congestion caused by excess of demand of infrastructure services which is likely to be caused, among other reasons, when there are complex customs procedures and lack of coordination. Depending on the territory, carriage by rail is regulated by two different organizational structures: OTIF (EU) and OSJD (Russia and Asia) resulting in two different regimes CIM and SMGS, respectively (Table 2):

[6] ACROSSEE Project provides very interesting capacity analysis at border stations: http://www.acrossee.net/downloads/work-package-5/acrossee_5-1_final-pdf.raw

TABLE 2. COMPARISON OF CIM AND SMGS REGIMES

CIM (Uniform Rules concerning the Contract of International Carriage of Goods by Rail - Appendix B to COTIF)	SMGS (Agreement on International Goods Transport by Rail)
Consensual contract	Formal contract
Contractual freedom	Obligation to set and publish tariffs and to carry
Consignment note design within the competence of Railway Under- takings	Consignment note defined in SMGS itself
Joint and several liability	Individual liability

Source: Dr. Th. Leimgruber, Presentation: Common CIM-SMGS consignment note for international rail transport, 27-29 April 2009. OTIF

The lack of policy and economic integration between an EU member (Lithuania) and non-EU states (Belarus and Ukraine) was threatening the success of the project. Before simplification of customs procedure in the framework of Viking Train, the consignment note at border crossings between Lithuania (regulated by CIM) and Belarus (regulated by SMGS) had to be rewritten from one format to the other. The Viking Train project promoted the use of the new CIM/SMGS consignment note that does not require rewriting documents, and the whole transport can be done using only one consignment note. In addition, other features of consignment note include: the possibility to be issued electronically, both contracts of carriage can be shown on a single sheet of paper, it is recognized as a banking document if a letter of credit is used and export formalities may be completed at the time the traffic is consigned. Unifications of CIM/SMGS procedures gave birth to New Customs Transit System (NCTS) leading to a reduction in border crossing times, elimination of extra costs of activities with no added value, errors avoidance by eliminating the transcription of consignment notes when traffic is re-consigned and higher levels of legal certainty for all participants.

Once the trains have crossed border gates they start running through the well-developed Belarusian railway network. The 1520 mm gauge railways in this country runs for over 5500 km joining central regions of Russia with Western Europe through Poland and also the North-West Region of Russia and the Baltic Sea states with Black Sea regions. Double path

lines are installed in almost every corridor and the lines are under electrification works. The railway system in Belarus is clearly oriented to freight transport making goods flows run smoothly across the territory.

Ukrainian railway infrastructure is similar to Belarus' as both are clearly oriented to freight transportation, are well developed and has a 1520 mm gauge. In the case of Viking Train, this is not a problem since the trains run over this sort of tracks since they depart from Klaipeda port in Lithuania. The most important corridors with more than 22,000 km rail connect Kiev towards Moscow and also towards the final destination of Viking Train in Ukraine, seaports of Odessa and Ilyichevsk.

From Ilyichevsk cargo can continue to Near East, Caucasus using the two ferry lines from this port to Poti or Batumi (Georgia) and Derince (Turkey), while from Odessa it is possible to reach these and additional ports, too (Fig. 4). In Odessa and Ilyichevsk ports, there is still much to do to reduce times spent in long customs and border crossing procedures since these inefficiencies make the shuttle train less attractive. In order to overcome this problem, Viking train consortium agreed to send some Lithuanian experts from the port of Klaipeda in order to try to make procedures easier.

FIGURE 4. VIKING TRAIN FERRY CONNECTIONS IN BLACK SEA

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The Viking Train, as an intermodal chain involving sea-rail (road)-sea, was designed as a Ro-Ro (Roll-on/Roll-off) and a Lo–Lo (Lift-on/Lift-off) transport solution. In this regard, cargo handling in both seaports of Klaipeda and Ilyichevsk requires special techniques. Container handling is solved using new technologies in the multi modal terminals that allow port operators quick loading and unloading. In the new railway platforms pneumo wheeled auto cranes are able to lift up to 50 tonnes, while other solution includes the use of reach stackers that can lift up to 37 tons. As the train is also transporting trailers, tractor-trailers and semi-trailers, the ports of Klaipeda and Ilyichevsk built pre-fabricated rear ramps that assist driving on and off these vehicles. For this purpose, it was also necessary to use special wagon-platforms that were only available in Ukraine where road transport carriers blocked these services. Related to Ro-Ro cargo, it is important to note that part of the cargo is accompanied, so some vehicles travel together with their drivers, which makes necessary to include some passenger wagons attached to the freight train.

FIGURE 5. PNEUMO WHEELED

Source: Kusch, Thomas; Prause, Gunnar; Hunke, K. W. (2011). The East-West Transport Corridor and the shuttle train “VIKING” (No. 13/2011).

FIGURE 6. REACH STAKER

Source: Joost J. Bakker

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4. VIKING TRAIN SERVICES DESCRIPTION AND PERFORMANCE

Since the 8th of February of 2003, when a freight train delivered cargo from Odessa to Klaipeda the Viking train has been operating. The main route of this shuttle train connects Ilyichevsk, Odessa, Usatovo, Kotovsk, Zhmerinka, Kazatin, Berdichev, Korosten, Berezhest, Slovechno, Kalinkovichy, Zhlobino, Osipovichy, Kaliadichy, Molodechno, Gudogaj/ Kena, Vaidotai, Radvilishkis and Klaipėda (Draugystė station). The train covers the 1734 km separating both extremes of the line in 54 hours.

The train currently runs daily in both directions carrying goods in platforms dedicated to high-capacity containers 20, 40 and 45 universal and special containers. Lo-Lo cargo offers a link between short sea and deep sea shipping on the Baltic and Black Sea and to the Eastern European hinterland, while it is also an opportunity to inexpensively relocate empty containers between Northern and Southern European regions. It is also possible to load trucks and trailers in specialized platforms and carry their corresponding drivers and consigners in passengers' wagons. In the case of this Ro-Ro cargo, Viking Train is an attractive alternative to long distance truck drivers that might be concerned with insufficient development of transport infrastructures to tackle congestion and also because of security.

The price for transportation depends on the route, cargo unit and added value services. In Appendix I, a table summarizes tariffs for different routes including rail consignment note and transit declaration insurance. Viking train website implements a calculator for different routes and containers and also offers the possibility to send a budget request to operators including further services such as freight forwarding in ports, door-to-door delivery, stuffing, financial guarantee and custom declaration insurances.

These rates are really competitive in comparison with alternatives offered by truck companies as it can be demonstrated by the continuous growth experienced by the freight volume transported each year (Figure 7). Since 2003, transportation of containers shows a clear upward trend that was broken in 2008 when the world crisis affected freight transportation demands worldwide. In 2009, the consortium composed by railway administrations of Lithuania, Belarus and Ukraine decided to reduce the Viking tariffs by 15% and bringing them down to last year's level. With this decision, directives in the companies were trying to keep sufficient volumes to make the project profitable and competitive. In the following years, freight volumes started rising again and the positive trend was confirmed.

Despite the good performance of Viking Train in the past years carrying containers between Baltic Sea and Black Sea regions there are still some worrying figures. For instance, some

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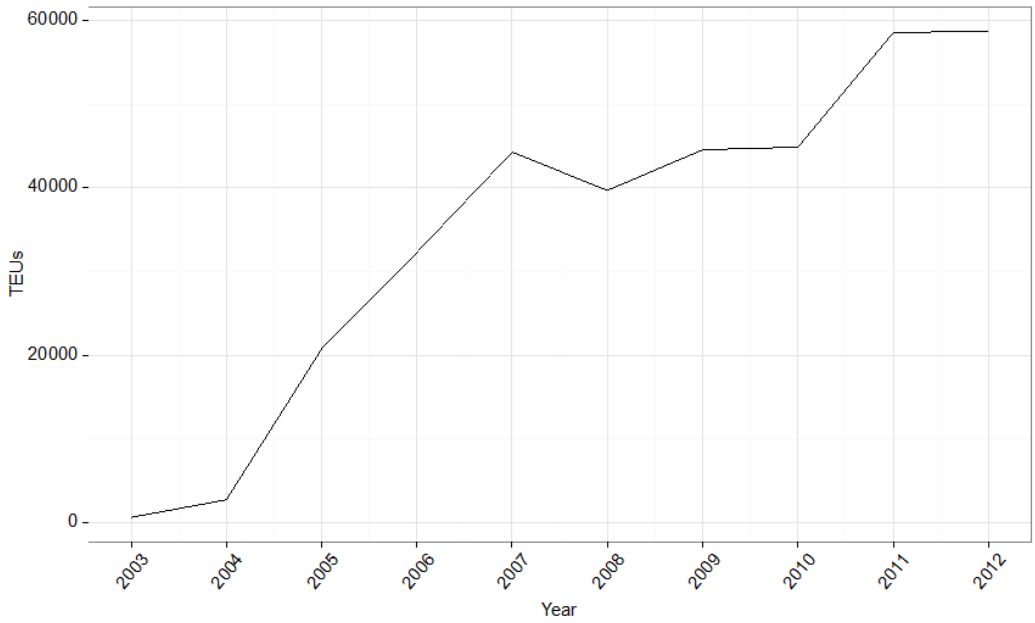
analysts have indicated that a large number of containers still travel more than 500 km on alternative routes instead of being transported along the route of the Viking train.

FIGURE 7. FREIGHT VOLUME TRANSPORTED ANNUALLY BY VIKING TRAIN



Source: Ponomaireva

Shippers using Viking Train are able to send cargo in containers and contrailers not only to the origin and destination of the route (Klaipeda and Odessa/Ilyichevsk), but also to other railway stations on the route which are equipped for receiving and handling cargo in containers such as those located close to the capital cities of the countries Paneriai (Vilnius, Lithuania), Kaliadichy (Minsk, Belarus) and Kyiv- Liski (Kyiv, Ukraine). International shipments are also facilitated by containers' and Ro-Ro lines that connect Klaipeda, Odessa and Ilyichevsk with important harbours such as: Imingham, Rotterdam, Antwerpen, Hamburg, Bremerhaven, Kiel, Mukran, Aabenraa, Aarchus, Karlshamn, Gdynia, Kaliningrad, Riga, Poti, Istanbul, Pireas, Varna and Constantza.

5. VIKING TRAIN EASTWARDS EXPANSION

After a few years operating, Viking Train has been acknowledged as a best practice project making many countries and freight operators willing to participate. Gained experience in the implementation of the project became an asset for project participants, who also aim to expand the project by integrating new countries. In May 2012, Turkey was incorporated to the Viking railway connection after the General Manager of Bati Anadolu Logistics Organizations (BALO) signed the Memorandum of Understanding with the Director General of Lithuanian Railways. With this new cooperation, Viking aims to increase the volume of freight by incorporating those flows with origin and destination in Middle East.

In January 2015, the integration of Turkey in the Viking project received strong impetus when GEFCO Turkey and Lithuanian Railways signed freight forwarding services agreements. This cooperation aimed to increase freight traffic between Turkey and Scandinavia, as well as between the Baltic Sea region and the Middle East. For GEFCO, the agreement fits into its strategy of growth into the multimodal business while it also allows the company to fulfil its plans to link the while Middle East region with the North of Europe.

Viking train connection with Turkey is performed using two different routes. The first involves loading railway vehicles to a railway ferry line connecting with Turkish port of Derince. In the second route, transport operations are entirely carried by rail, which requires that the train runs through Moldova, Romania and Bulgaria before reaching Turkey. Development of this alternative route would not have been possible without the participation of these countries, which were incorporated in different moments. This second route is making Viking train more competitive serving the Turkish market as the first alternative involving the use of Short Sea Shipping still faces multiple challenges to be solved.

The organization in ports of Odessa and Ilyichevsk is still struggling with long customs and inefficient border crossing procedures. Delivery times are also negatively affected by insufficient frequency and unreliability of ferries connecting Ukraine and Turkey, which usually makes train schedule coordination with ferry schedules a difficult task. In addition, UkrFerry, the Ukranian line operating the railway ferry that connects Ilyichevsk with Derince has a high tariffs policy for its services that is threatening the success of this intermodal linkage. Test pilots have been done recently (mid 2015) so it is still early to draw conclusions about how successful the expansion to Turkey has been.

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UkrFerry ships railway cargo between ports in Ukraine and Turkey and also with Georgia and Bulgaria. Both countries joined Viking train project recently although the project is performing poorly in Georgia. The freight flows volumes in the direction of Caucasus are quite low, being negatively affected by the already mentioned UkrFerry high service tariffs. Viking train partners are negotiating with UkrFerry lower tariffs because Georgia is the gate for Viking to the Caucasus region.

Further extensions of the Viking train have their origins in the Caucasus from where it is planned to keep developing cross-border railway connections in order to reach Central Asia. In order to empower Viking train in container transport studies are considering the extension of the route to Central Asia following two main routes.

The first route departs from the South Baltic Sea Region crosses Lithuania, Belarus, Russia, and Kazakhstan to China using the Eurasian railway mainline. This route, usually known as the New Silk Road, crosses the Viking route in Minsk and Kiev from where containers might be shifted from Viking to Euro-Asian trains, or vice versa. The Easternmost point of the route is Lianyungan port in Jiangsu Province of China, a hub for sea transport routes from Japan and South Korea.

The second option to extend the Viking route is to cross the Black Sea by ferry to Georgian ports of Poti and Batumi or using the land connection across Turkey. If the cargo's final destination is further to the east then it is possible to make use of the European – Caucasian – Asian railway corridor (TRACECA[7]) that goes through Georgia and Azerbaijan to the Caspian Sea port of Baku.

This seaport is connected to Aktau (Kazakhstan) and Turkmenbashi (Turkmenistan). From any of these Central Asian States is possible to connect with the railway networks of Uzbekistan, Kyrgyzstan, Tajikistan, and reach the borders of China and Afghanistan (Figure 8).

The transport services offered by Viking Train in the TRACECA corridor might increase container traffic between EU and Asia. The opportunity to ship containers over the Black Sea using ferries connecting Ukraine and Georgia is a much faster alternative than sending the containers all the way by rail. However, the freight rates charged to customers are also higher, so in this situation customers must decide between a trade-off between an inexpensive service and a fast shipment. For instance, sending goods between Klaipeda and Tibilisi or between Klaipeda and Baku have characteristics displayed in Table 3.

[7] For further information about the TRACECA program initiated in 1993 visit http://www.traceca-org.org/

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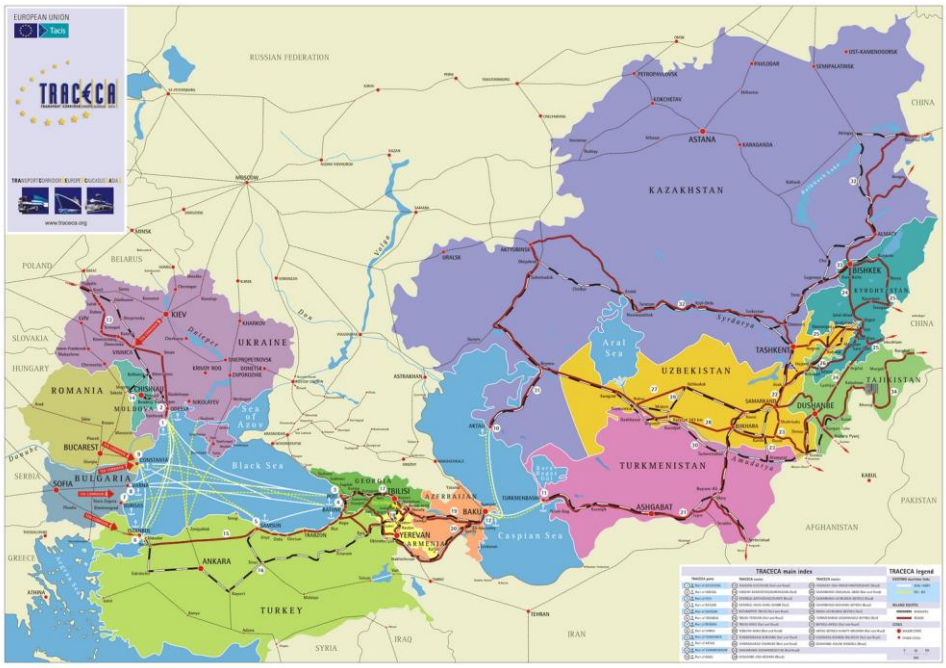
FIGURE 8. CAUCASIAN – ASIAN RAILWAY CORRIDOR



Source: http://www.traceca-org.org/

TABLE 3. MODE COMPARISONS

Mode	Route	Distance (km.)	Transit time (Days)	Price 20' USD	Price 40' USD
Railways	Klaipeda - Tbilisi	4,055	20	1,800	3,250
	Klaipeda - Baku	3,532	18	1,330	2,400
Viking + Ferry	Klaipeda - Tbilisi	3,241	9	2,320	4,448
	Klaipeda - Baku	3,792	13	2,884	5,445

Source: Kusch, Thomas; Prause, Gunnar; Hunke, K. W. (2011). The East-West Transport Corridor and the shuttle train "VIKING" (No. 13/2011).

Although this possibility of sending goods from Klaipeda to Central Asia and China has the potential to become commercially more advantageous than the coastal route to China its development is still in early stages and multiple challenges have to be addressed. Traffic in the TRACECA corridor is heavily unbalanced, with containers carrying imported cargo and returning mostly empty. In order to form a successful line it is important to ensure that

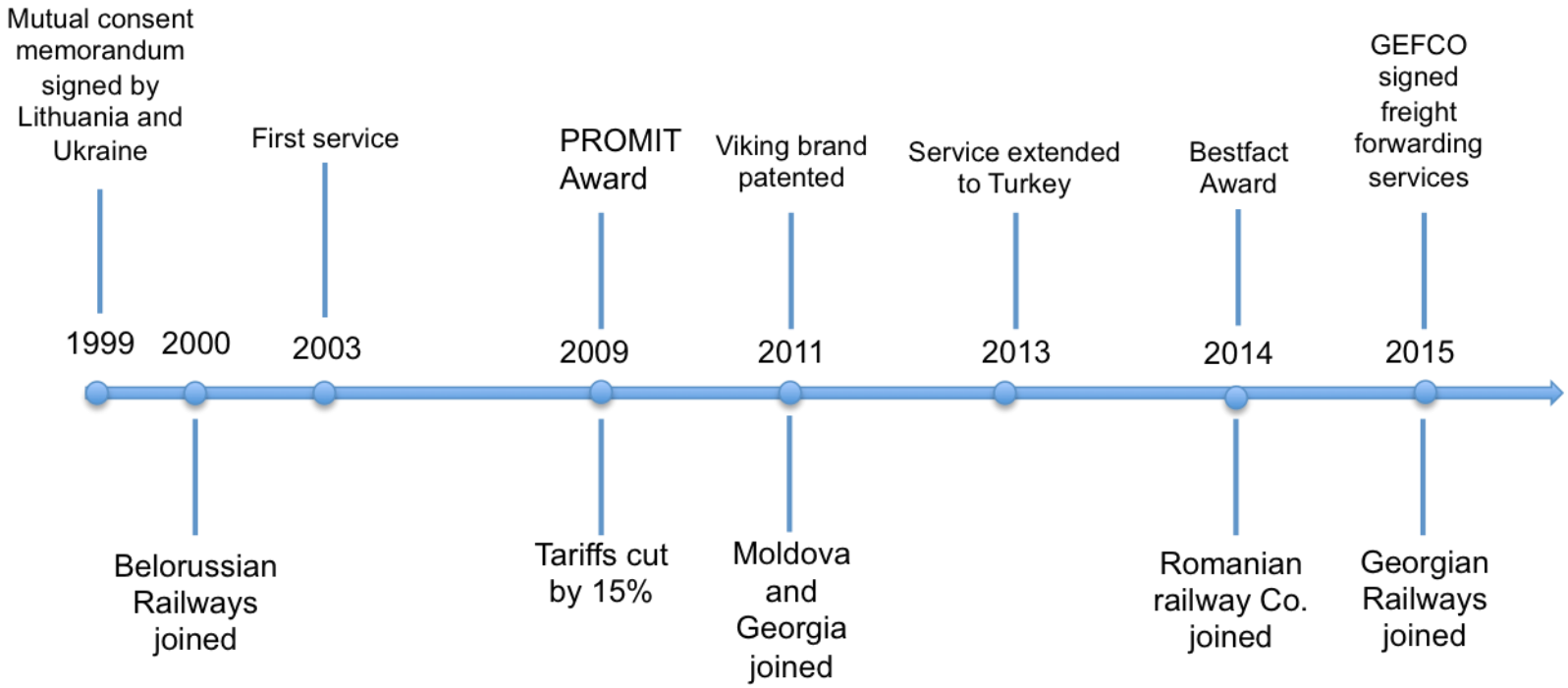
containers are full both ways. This is particularly difficult to obtain because of geographical patterns of trade. Other obstacles include complicated border crossing procedures and long waiting times in customs, which joined to high not harmonized transport tariffs in Caucasus and Central Asia regions reduce railway competitiveness. Finally, it is important to notice that the political tension in the Caucasus region make the TRACECA route less attractive because of the higher risk levels.

APPENDIX I. FREIGHT RATES IN US DOLLARS BY ROUTE AND CARGO UNIT (2015)

	Container						Tank container				Refrigerated				
	20 f		40 f		45 f		20 f		40 f		20 f		40 f		Contrailer
Route	Load	Empty	Load	Empty	Load	Empty	Load	Empty	Load	Empty	Load	Empty	Load	Empty	
Odessa/ Ilyichevsk -Berezhest	315	230	470	305	545	350	360	255	535	340	350	245	515	330	540
Odessa/ Ilyichevsk - Gudogai	485	300	750	425	875	500	560	345	860	485	545	325	825	465	770
Odessa/ Ilyichevsk - Klaipeda	610	360	965	525	1130	625	610	420	1110	605	690	395	1060	580	960
Odessa/ Ilyichevsk - Koliadichi	570	355	790	460	920	530	-	-	-	-	-	-	-	-	-
Koliadichi – Odessa/ Ilyichevsk	550	355	775	460	905	530	-	-	-	-	-	-	-	-	-

Source: http://www.vikingtrain.com/

APPENDIX II. VIKING TRAIN TIMELINE



Source: http://www.vikingtrain.com/