



## ANALYSIS OF LITHUANIAN TRANSPORT SECTOR POSSIBILITIES IN THE CONTEXT OF EUROPEAN-ASIAN TRADE RELATIONS

Aidas Vasilis Vasiliauskas<sup>1</sup>, Jurgita Barysienė<sup>2</sup>

<sup>1</sup> Dept of Transport Management, Vilnius Gediminas Technical University,  
Plytinės g. 27, LT-10105 Vilnius, Lithuania  
E-mail: aidasv@ti.vgtu.lt

<sup>2</sup> Transport Research Institute, Vilnius Gediminas Technical University,  
Plytinės g. 27, LT-10105 Vilnius, Lithuania  
E-mail: bjurgita@ti.vgtu.lt

Received 16 November 2007; accepted 20 November 2007

**Abstract.** The fundamental importance of an integrated international multimodal transport system has been clearly recognised. The identification and development of well functioning transport relations on the basis of existing transport corridors and networks requires properly defined, formalised, and coordinated joint actions among the relevant countries, international institutions and organisations. The geographical position of Lithuania has determined that the country is crossed by the two European transport corridors approved at the Conferences of the European Transport Ministers in Crete and Helsinki, creating ability for Lithuania in trade between EU and Asia. Paper presents an overview of recent changes in world economy and international trade emphasizing the growing importance of European – Asian relations. Then analysis of existing transport links assuring possible ways for freight movements between these two regions are examined and method for the comparison of transportation alternatives based on corridor utility is presented. Finally, some key development trends towards the strengthening of Lithuanian transport system role in the context of European-Asian trade relations are discussed.

**Keywords:** transport corridors, economic relations, international trade, infrastructure development.

### 1. Introduction

The world economy is expanding rapidly for the fifth year in a row. Today's global economy driven by the liberalisation of trade in goods and services affects countries in different ways, generating changes in traditional trade and logistics patterns in order to cope with growing international competition. The strong global macro-economic situation in 2006 provided favourable framework for the expansion of international trade. Changes in manufacturing processes with just-in-time delivery, the ongoing revolution in information technology and electronic communications, and the phenomenal world trade growth require trade facilitation policy in all countries to pursue if they want to benefit from multilateral trade.

Statistics shows that trade between Europe and Asia has accelerated sharply in recent years, partly as a result of the development of East Asian countries, mainly China, but also as a result of the emergence of the economies of Russia and the countries of Central Asia, see World

Trade Report (2006). This has caused a wider geographical dispersal of trade flows, what is crucially important for defining the main routes for international trade between Asia and Europe not only for trade between the two continents, but also for trade between major centres in the interior of the continent of Eurasia.

There are two factors in Europe-Asia trade that militate against the diversification of routes and the opening up of new land routes between Europe and Asia or the revival of old trade routes such as the Silk Road and the Trans-Siberian route:

1. Maritime transport's monopoly on trade between Europe and Asia what causes increasing problems with land access to sea ports.

2. The growth in traffic between continental countries, particularly in Central Asia, all along the Europe-Asia land routes. Besides trade along all the Europe-Asia corridors, trade within the region itself is beginning to develop rapidly, strengthening the need to improve these corridors.

## 2. EU-Asian trading relations

At 13.5 %, Asia's real merchandise exports remained the most buoyant of all regions. Asia's imports grew faster than in the preceding year and faster than world trade but continued to lag behind its export growth. Most of the excess of Asia's export over import growth can be attributed to the region's major traders, China and Japan. Asia's merchandise exports and imports continued to expand faster than world trade in 2006. Among the six major Asian traders China continued to record the highest export and import growth, and as its export growth continued to exceed its import growth, the merchandise trade surplus rose sharply.

The review of world merchandise trade by leading exporters and importers reconfirms the outstanding trade performance of China and India. The process is likely to continue in the coming years. The developing countries increased their GDP per capita by almost 30 % between 2003 and 2007. China is continuing to dominate in trade with EU in comparison with other Asian countries (Table 1).

**Table 1.** Trade between EU-Far East Countries in 2005 (billion USD)

	China	Japan	Six East Asian Traders	Republic of Korea
EU Exports to:	68.4	59.9	119.6	25.0
EU Imports from:	211.2	99.9	165.6	41.4

Special attention should be paid to the trade structure. Manufactured goods are the main cargo transported to Europe, and non-balance in this sector continues to increase. In 2004 EU imports were 97 billion USD more and in 2005 the gap was already 131 billion USD more.

China exports to EU each year more and more machinery and transport equipment, and the non-balance for this sector rises. Since 2000, China has more than doubled its share in world merchandise exports and ranks as the third largest exporter and importer in merchandise trade. Despite its strong export expansion, China remained the third largest merchandise exporter in 2006.

China's export of manufactured goods to EU rose from 2004 to 2005 by 46.7 %. The growth of export of machinery and transport equipment, office and telecommunication and electronic data processing equipment to Europe in each year is considerable.

The structure of EU imports from China in 2005 was: agricultural products – 2.3 %, fuels and mining – 1.6 %, manufactures – 95.8 % (chemicals – 3.2 %, machinery and transport equipment – 46.7 %, EDP and office equipment – 16.2 %, telecommunications equipment – 13.7 %, clothing – 11.8 %, personal and household goods – 8.0 %, etc.).

Trade between EU and East Asian countries continues to develop dynamically. Manufactured goods dominate in EU-Asia trade what is not a new factor, and container transportation is rising.

## 3. EU and Central Asia trading relations

In 2004 and 2005 Kazakhstan was noted as the EU's largest trade partner in the Central Asian region. Bilateral trade in 2004 was a total of € 9.565 million (0.5 % of total EU trade). The EU had a trade deficit of € 3,106 million in 2004. Exports from Kazakhstan to the EU are mainly mineral products (fuel accounts for 85.4 % of total EU imports from Kazakhstan), other raw materials and heavy industrial goods (iron and steel, chemical products).

Bilateral trade in 2005 between the two sides exceeded € 10 billion (0.3 % of total EU trade) with the EU running a bilateral trade deficit of € 2.5 billion. This is greater than the combined bilateral trade that the EU enjoys with the other four central Asian countries and three southern Caucasian states together (Table 2).

**Table 2.** Merchandise Exports and Imports to/from Central Asian countries to/from EU countries in 2005 (in billion USD)

	Central Asia	Caucasus
EU Exports to:	5.8	2.9
EU Imports from:	1.0	3.9

Other EU trade partners from Central Asia and Caucasus are not so important at present.

## 4. EU and Russia trading relations

Russia is a trading partner number four for EU both in export and in import activities, while for Russia EU is a partner number one. Main Russian export items are gas and crude oil products.

In 2006 Russia's foreign trade developed quite well. The turnover (export/import) rose 29.2 % (2004/2005 increased by 32.1 %) and reached 439.5 billion USD. The main trade partner of Russia is Western Europe and in particular the European Union. The EU share in total Russian foreign trade reached 52.7 % (without Bulgaria and Romania).

Export of energy products as crude oil, gasoline, diesel fuel was very high in value because of the last year prices. The volume of crude delivery in 2006 was smaller (–2 %) than one year before. Also the volume of exported gas was smaller but the value was 36.5 % more than in 2005. Russia increased the coal export by 15.6 % (as volume).

The share of metals in a total of export was the same as the year before – 14.1 % but the value was 122.6 % more. Russia exported less steel plates (–16.3 %), scrap (–23.3 %), ferrous-alloys (–11.8%), copper (–13.3 %) and exported more aluminium (+22.6 %). The share of chemical products was 5.1 %, ammonium and fertilizers were exported more than the year before. Wood and paper products were exported also more.

## 5. Analysis of existing transport links between Europe and Asia

The aforementioned data shows, that trade between Europe and Asia has accelerated sharply in recent years,

partly as a result of the development of East Asian countries, mainly China, but also as a result of the emergence of the economies of Russia and the countries of Central Asia. This has caused a wider geographical dispersal of trade flows, what is crucially important for defining the main routes for international trade between Asia and Europe not only for trade between the two continents, but also for trade between major centres in the interior of the continent of Eurasia.

One of the main effects of the development of trade between Europe and Asia has been the faster growth of maritime container traffic (6 % per year on average). The growth in maritime transport is increasingly concentrated in both Europe and Asia on just a few major maritime hubs, partly because of the increase in vessel size. For the future, although experts are generally optimistic about the capacity of these ports to accommodate ships and about the development of associated services on the major maritime routes, they are concerned about the problems of congestion and saturation that are becoming steadily more apparent from land access to ports.

Economic analyses prove that the land haulage alternative is economically viable and could well offer significant capacity at competitive costs. Currently the investigations on trends in traffic between Europe and Asia, as well as on measures taken to remove physical and non-physical barriers to the provision of efficient transport services along the Europe-Asia corridors, are being carried out.

In the EU, strategic transport planning is being implemented through the two fundamental instruments: the Trans-European transport network first approved in 1996 (revised in 2001, 2003 and 2005), and the Pan-European Transport Corridors and Areas as agreed at Crete in 1994 and Helsinki in 1997. From the 1st of May 2004 the Pan-European transport networks of the new Member States are fully integrated into the TEN-T networks. The last revision of TEN-T networks added new priority projects to address the requirements of the enlarged EU and introduced the concept of Motorways of the Sea (MOS), see Trans-European Transport Network ... (2005).

The major transnational axes selected by the High Level Group chaired by Loyola de Palacio (HLG) contribute most to promoting international exchanges and traffic as well as to enabling regional cooperation and integration, see Networks for Peace ... (2005). The identification of these axes facilitates the ordering of priorities and the establishment of consistency between national plans.

Current and future international traffic volumes were one of the main criteria of the HLG identifying major transnational axes. Recent studies forecast that rapid growth in trade flows and freight transport will continue. Traffic volumes between the EU and the neighbouring countries are expected to grow by 100 % between 2000 and 2020, as investigated in 'Keep Europe Moving' (2006). International traffic by rail is particularly important for trade between the EU and its North-Eastern neighbours, Russia, Ukraine and Belarus.

Asian countries are deliberately developing their strategies and concepts for cargo transportation to Europe including inland transport routes. Many companies are analysing all the possibilities to transport cargoes from Far East countries to Europe via Trans-Siberian and Trans-Kazakhstan railways. In this case, thorough analyses of existing problems – border crossing, gauges, container availabilities, infrastructure developments etc. – are extremely important.

World tendencies towards improving the technologies of loads transportation are connected with concentration of transport flows and growth of container transportation. In the nearest future it is expected that the turnover of containerised cargo will increase most considerably.

Transportation costs, safety of goods, time and speed of delivery, development of ports in the eastern coast of China, increasing number of container ships, and aggressive behaviour of ship-owners while conducting container business – all of these factors have their influence on the development of container traffic by railway transport on transcontinental routes.

## 6. Method for the comparison of competitiveness of transport corridors

Supply of transport services cannot be performed without a proper infrastructure. Therefore we assume that certain type of infrastructure (i.e. link or corridor in wider sense) provides some kind of utility for its user.

Transport researchers and experts in various studies, for example, Baublys (2003) and Magnadi, Wong (1984), concerned with modal shift, state that there is certain number of indicators that should be evaluated when choosing mode of transport. These are: transit time  $T$ ; reliability  $R$ ; connectivity  $C$ ; safety  $S$ .

In this article we make an assumption that some of the indicators mentioned above can be associated (depend on) within infrastructure. And hence the common utility provided by certain link:

$$\bar{V} = V(T, R, C, S). \quad (1)$$

In this respect common utility of the corridor  $\bar{V}$  will depend on the local utility vectors  $\bar{V}_T, \bar{V}_R, \bar{V}_C, \bar{V}_S$ :

$$\bar{V}(T, R, C, S) \rightarrow \begin{pmatrix} h_T \\ h_R \\ h_C \\ h_S \end{pmatrix}, \begin{pmatrix} \bar{V}_T \\ \bar{V}_R \\ \bar{V}_C \\ \bar{V}_S \end{pmatrix}, \quad (2)$$

where  $h_T, h_R, h_C, h_S$  – value of the impact of local utility vectors on the common utility vector  $\bar{V}$ .

In the common case matrix of these impact values can be written in the following form:

$$\begin{pmatrix} h_{TT} & h_{TR} & h_{TC} & h_{TS} \\ h_{RT} & h_{RR} & h_{RC} & h_{RS} \\ h_{CT} & h_{CR} & h_{CC} & h_{CS} \\ h_{ST} & h_{SR} & h_{SC} & h_{SS} \end{pmatrix}. \quad (3)$$

Most of the experts come to the conclusion that the most important indicators determining mode and route of transportation is transit time  $T$  and reliability  $R$  of the service (route), since those two make a significant impact on transportation costs. Taking this note into account we express the transport corridor common utility in the following form:

$$\bar{V}(T, R) = h_{TT}\bar{V}_T + h_{TR}\bar{V}_T + h_{RR}\bar{V}_R + h_{RT}\bar{V}_R. \quad (4)$$

Knowing this value we can write down the ratio of competitive ability:

$$I_{CA} = \frac{\bar{V}}{S}, \quad (5)$$

which is equal to the proportion between the corridor common utility  $\bar{V}$  and cost of transport service generated by activities on that particular corridor.

Values of the competitive ability ratio calculated on different corridors can be useful when comparing different transportation alternatives as well as corridors between themselves.

Also the competitive ability ratio shows that the higher is reliability of infrastructure ( $\bar{V}$  depends on  $R$ ), the greater is a chance that user will choose that particular infrastructure (corridor). Reliability in turn depends on the level of infrastructure development.

## 7. Actions towards transport infrastructure development in Lithuania

The fundamental importance of an integrated international intermodal transport system has been clearly recognised. The identification and development of well functioning transport links on the basis of existing and potential transport corridors and networks requires properly defined, formalised, and coordinated joint actions among the relevant countries, international institutions and organisations.

Among the key Long-term (2005) goals of the Lithuanian transport system development it is foreseen to effectively cooperate with the transport systems of the neighbouring countries and to become an integral and important link of the transport system (East-West) of the Baltic Sea region. At the moment there are no common transport strategies for the Baltic Sea Region (BSR), several efforts have been made though. Despite this, the Baltic Sea Region is becoming one of the fastest growing economies in Europe with very good perspectives to attract Eurasian transport flows and develop logistics activities in the region.

Lithuanian transport network has favourable conditions to play an important role in the region and to become well-integrated part of major Trans-Asian corridors. Basis for achieving these goals relies on further development and modernisation of the Lithuanian transport network, especially its main elements of Trans-European (TEN-T) network, and creation of favourable conditions for transport and logistics operators.

Two key transport axes identified by the Commission cross the territory of Lithuania: i.e. Motorways of

the Sea (among which – the motorway of the Baltic Sea is a component) and the Northern axis, which contains a link Klaipėda/Kaliningrad – Vilnius – Minsk – Moscow. This link has very good perspectives in terms of creating fast transit route for cargo transport from Asian regions via Klaipėda Seaport westwards via the Baltic Sea motorway.

The Pan-European Corridor II along with the Trans-Siberian railway and the North-South corridor, which serves as a Eurasian extension of the Pan-European Transport Corridor IX, constitute main routes of transport in the Transport strategy of the Russian Federation. These routes are the main international transport corridors for Belarus as well. Hence the Northern axis contains the most important links of the trade route between the Eastern EU's countries and CIS.

Lithuanian transport network has been already serving for huge transport flows within Corridor IX. The vast majority is railway transit flows. It is foreseen to create network of multimodal logistics centres along the main transport arteries. This research is presented by Mačiulis, Jakubauskas (2007) and in Transport sector ... (2005).

Bearing in mind that the EU is the main trade partner for the Russian Federation and the most significant cargo flows between the Russian Federation and the EU are directed through the central ports of the Baltic Sea (the Gulf of Finland and the Baltic states) a need for further modernisation of Lithuanian land transport infrastructure and port facilities is obvious. As a transit state, Lithuania plays an important role for the reason that the land transport route to the EU via Belarus and Poland has a very modest role. The further development of the combined transport lines and their extension should become an important task for Lithuania to serve the growing demand for Trans-Asian cargo flows.

## 8. Conclusions

1. The world economy is expanding rapidly for the fifth year in a row. The strong global macro-economic situation in 2006 provided favourable framework for the expansion of international trade.
2. Collected data shows, that trade between Europe and Asia has accelerated sharply in recent years, partly as a result of the development of East Asian countries, mainly China, but also as a result of the emergence of the economies of Russia and the countries of Central Asia.
3. The most significant transport flows between Russia and the EU are directed through the central ports of the Baltic Sea. The ground transport route through Belarus, Poland and Germany has a very modest role. The significance of this route will not be great in the future either, due to barriers caused by the infrastructure and public authority activities in Belarus. The West-East Corridor II together with the Trans-Siberian railway and the North-South corridor, which serves as a Eurasian extension of the Pan-European Transport Corridor IX, may

- be defined as the main routes of transport in the transport strategy of the Russian Federation.
4. Transit traffic to Russia and the CIS-countries is one of the most important and most profitable sources of income for the Baltic countries. Due to the growth of the freight flows of Russian foreign trade, the use of the Baltic ports will be necessary for Russian international transport also in the future.
  5. Certain type of infrastructure (i.e. link or corridor) provides some kind of utility for its user. Common utility of the corridor  $\bar{V}$  will depend on the local utility vectors  $\bar{V}_T, \bar{V}_R, \bar{V}_C, \bar{V}_S$  of separate links the corridor consists of. Knowing the common utility of the corridor the ratio of competitive ability of this corridor can be calculated as a proportion between common utility  $\bar{V}$  and cost of transport service generated by activities on that particular corridor. Values of the competitive ability ratio calculated on different corridors can be useful when comparing corridors between themselves.
  6. The Lithuanian transport sector can remarkably strengthen its market position. In order to achieve this, Lithuania continues the implementation of tasks set by the National long-term development strategy of the Lithuanian transport system. Great attention will be further focused on land transport links with the transport networks of neighbouring countries on the East-West transport axes (multimodal transport Corridor IX and Klaipėda state seaport).

## References

- Baublys, A. 2003. *Transport system: models of development and forecast*: monograph. Vilnius: Technika. 208 p.
- Keep Europe moving – sustainable mobility for our continent. 2006. Mid-term review of the European Commission's 2001 Transport White paper, Communication from the Commission to the Council and Parliament. 48 p.
- Long-term (until 2025) development strategy of the Lithuanian transport system. Government of the Republic of Lithuania. Resolution No. 692 of June 23, 2005. 38 p.
- Mačiulis, A.; Jakubauskas, G. 2007. Challenges and opportunities for Lithuanian transport sector to become an integrated part of Trans-Asian connections, in *Proceedings of the 11th International Conference „Transport means“*, 95–98.
- Magnadi, T. L.; Wong, R. T. 1984. Network design and transportation planning models and algorithms, *Transport Science* 18 (1): 3–55.
- Networks for peace and development: Extension of the major Trans-European transport axes to the neighbouring countries and regions. 2005. Report from the high level group chaired by Loyola de Palacio. 81 p.
- Trans-European transport Network: TEN-T priority axes and projects 2005. 2005. Luxembourg: Office for official publications of the European Communities. 73 p.
- Transport sector restructuring in the Baltic States as members of the European Union, in *Proceedings of the 3<sup>rd</sup> Seminar*. 2005. The Turku School of Economics and Business Administration, Finland. 224 p.
- World Trade Report 2006: Subsidies, Trade and the WTO. 2007. World Trade Organization, Switzerland. 266 p.