UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE

EURO ASIAN TRANSPORT LINKS
INLAND VS. MARITIME TRANSPORT:
COMPARISON STUDY

This study was undertaken as part of the UNECE Expert Group on Euro-Asian Transport Links (EATL) under the EATL project Phase II. This draft cannot be quoted nor cited as it is the subject of approval by the governments of countries participating in the EATL EG.

Any comments about this study may be provided to Robert.Nowak@unece.org.

8 November 2010

DRAFT FOR COMMENTS ONLY
(Not to be cited or quoted)

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LIST OF ABBREVIATIONS

CIS	COMMONWEALTH OF INDEPENDENT STATES
ECMT	EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT
ECO	ECONOMIC COOPERATION ORGANIZATION
ECSA	EUROPEAN COMMUNITY SHIP OWNERS ASSOCIATION
FESCO	FAR EASTERN SHIPPING COMPANY
FOB	FREE-ON-BOARD
GDP	GROSS DOMESTIC PRODUCT

LNG	Liquified Natural Gas
SEMCs	Southern and Eastern Mediterranean Countries
SLB	Siberian Land Bridge
TEU	twenty foot equivalent UNIT
THC	Terminal Handling Charges
TSR	Trans Siberian Railway
UNCTAD	United Nations Conference And Trade Development
UNECE	United Nations Economic Commission for Europe
UNESCAP	United Nations Economic and Social Commission for Asia Pacific
v.v.	Vice Versa
WTO	World Trade Organization

EXECUTIVE SUMMARY

International trade and production processes are complex. Trade and logistics managers are constantly trying to minimize trading risk, secure delivery and maximize profits. Today, high production and logistics costs result in uncompetitive products. Products must also be placed in the timely manner. Products quality should also be high, compared to what is offered by competitors. Therefore, the decisions "where to produce", "how to transport", "how to distribute" and "which day to release/distribute the products", are not only crucial for the effectiveness of international trade, but also of paramount importance for business success

In efforts to remain competitive or to open new market opportunities, manufacturers are always looking how to minimize production cost, including logistics costs, while responding to customers needs to ensure high level of customers' satisfaction. Over the last decades, the need to reduce production cost has driven many production sites to Asia. This geographic production shift has generated two new management issues: production away from consumption and longer supply chains. It appears that, the higher costs of longer supply chains have been offset by the lower production cost.

To minimize the overall cost of products, manufactures are faced with a new challenge, i.e. how to shrink supply chains costs. Alternative transports solutions are constantly evaluated. Even a product with zero production cost but that with the requirement of three months to reach the market, may be uncompetitive. Therefore, companies are not striving to minimize costs but rather for the most favorable overall combination: t***he right product for the right market at the right time and at the right price***.

Today, maritime transport dominates transport of goods from Asia to Europe. The vast distance of Euro-Asian inland transport combined with political instability, hidden costs, lack of security, delays at borders and unpredictability discourage the use of inland transport. In addition, maritime transport rates are often incorrectly compared with the rates for inland transport modes.

For instance, by comparing only the cost and time required for a container to be moved from Shanghai port to Hamburg port by maritime vs. inland transport, wrong conclusions can be drawn. In reality, products carried by containers are not at ports waiting to be shipped as production and consumption areas are often far away from ports. As a result, logistics managers compare the costs for the entire route which includes truck costs of moving containers to/from the warehouse/port, terminal handling costs and documentation and other administrative costs.

More than 90 per cent of containers arriving at the port of Rotterdam are transported to other countries - many even to South-East Europe. Therefore, to compare maritime and rail transport of a container from some location "A" 1,500 kilometers away from Shanghai to the final destination in a South-East European country "B" via Rotterdam port, cost comparison cannot be limited to only transport cost between Shanghai and Rotterdam. One must compare the route from location "A" ie., the location where the container is loaded with cargo, and the location "B", where the container is delivered/unloaded. If this comparison appears in favor of the rail transport, both in terms of time and costs, then there is an excellent potential for developing alternative transport scenarios using inland and/or combined transport solutions. Trains could be more competitive in both time and cost when production areas are situated relatively far from China's and India's ports and production is destined to the South or East European countries. Needless to say, developing Euro-Asian inland transport would be of great significance to the landlocked countries of Central Asia.

The development of block trains along Euro-Asian inland transport routes could be considered for landlocked countries in Central Asia to what is the blood for the human body. Block trains can change landlocked countries into land-linked countries. This may happen if a neutral, stopover-free, regular rail service is established along the Euro-Asian links, operating under the management of a contemporary and flexible corridor management mechanism, offering similar services to those of the liner shipping companies (inland "shipping line"). The ultimate target is to develop a block train network in Central Asia and beyond, where one train feeds the other with cargo and where, they all together, constitute a modern and efficient transport system. Co-operation, and the principles of how to co-operate, is the main issue to be discussed and analyzed.

The aim of this study is to compare the existing Euro-Asian maritime routes with selected rail routes identified in the EATL project. The methodology used for the analysis strives to be simple and pragmatic. It compares Euro-Asian maritime and rail links from the perspective of a logistics manager of a company that produces in some location and needs to deliver the goods produced to some other location.

As part of this study, custom-made questionnaires for each participating country along its rail and maritime transportation systems were distributed. The response rate to these questionnaires was 14% per cent. This was considered insufficient and additional information had to be sought and used, including published research as well as the author's experience.

It was expected to receive relatively few replies to rail questionnaires. It was so because it is difficult for state rail companies to determine block train time schedules for specific routes and to specify tariff rates. The block train time schedule can be easily obtained as a result of the actual train run. Tariff rates per container or per container kilometer are result of complex calculations, which depend on many parameters and are subject to frequent changes. This complexity was reflected in answers from state rail companies.

Border crossing delays is not the focus of this study. The model used here is "neutral" and it crucially depends on the willingness of governments to minimize stopovers at borders. However, all other possible stopover factors were analyzed and were included in the calculation of the average speed of train. In this way, it was possible to develop realistic time schedules.

The response ration to maritime questionnaires was 5 per cent. There is also extensive published research on terminal handling costs, ocean freight rates and time schedules. Some forwarding companies contributed significantly by providing actual freight rates.

In five out of the nine scenarios analyzed rail transport bests the maritime transport for both cost and time. In all nine scenarios, rail transport performs better than maritime concerning the travel time.

Successful and competitive rail services along the Euro-Asian transport links are not a myth or a future alternative to maritime transport. The study showed that Euro-Asian rail transport and its combination with that of maritime and road transport is a feasible and competitive transport option. The establishment of efficient corridor management, governments' willingness to co-operate as well as rail companies effective responses to market needs are prerequisites that can guarantee regular and efficient rail services along the EATL routes.

The following table summarizes the findings of the study.

Scenarios	Route	Rail		Maritime		Best Transport Means	
		Cost ($)	Time (hrs)	Cost ($)	Time (hrs)	Cost	Time
Scenario 1: EATL Route 1	Khabarovsk (Russia) to Potsdam (Germany)]	6,967	341	6,533	589	Maritime	Rail
Scenario 2: EATL Route 2	Hangzhou (China) to Kaluga (Russia Fed.)	4,714.65	277	6,786	624	Rail	Rail
Scenario 3: EATL Route 3	Tashkent (Uzbekistan) to Varna (Bulgaria)	5,946	165	7,550	529	Rail	Rail
Scenario 4: EATL Route 4	Almaty (Kazakhstan) to Istanbul (Turkey)	5,881	250	4,970	672	Maritime	Rail
Scenario 5: EATL Route 5	Morvarid (Iran) to Pushkin (Russia)	6,390.5	256	3,310	374	Maritime	Rail
Scenario 6: EATL Route 6	Ussuriysk (Russia) to Kiev (Ukraine)	5,857	289	6,290	463	Rail	Rail
Scenario 7: EATL Route 7	Shanghai (China) to Warsaw (Poland)	8,937	446	6,300	569	Maritime	Rail
Scenario 8: EATL Route 8	Krasnodar (Russia) to Kalinigrad (Russia)	1,595	70	5,050	225.2	Rail	Rail
Case Study /Car Manufacturer	Vesoul (France) to Kaluga (Russia)	2,107	101	6,300	163	Rail	Rail

This study is divided into five chapters. The first two, chapters 1 and 2, illustrate and analyze the trade between Asia and Europe and the existing blocks trains in these areas. Chapter 3 presents the Euro-Asian maritime routes and offers a cost analysis with actual data for the complete maritime route, including terminals, administrative and road transport costs. Chapter 4 focuses on rail transport, analyzing the economics of rail transport and the cost structures for complete rail routes. It also presents a detailed analysis of rail routes for each participating country, including distance analysis, time schedule evaluation and tariff structure. In chapter 5 maritime and rail transport for the EATL routes are compared. Selected points of origins (locations A) and points of destination (locations B) across the EATL project routes are used to create different scenarios where maritime and rail transport are compared. The selection of the points of origin and destination was based on various criteria such as the importance of trade destinations, the importance for landlocked countries and the distance from much frequented ports. A case study for car manufacturers performing transport on Euro-Asian transport linkages is also analyzed.

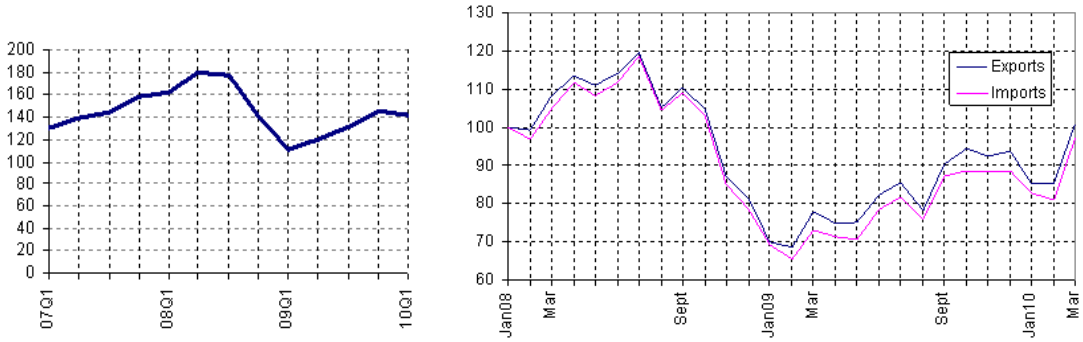
CHAPTER 1: TRADE BETWEEN ASIA AND EUROPE

After the sharpest decline in more than 70 years, world trade is set to rebound in 2010 by growing at 9.5% according to WTO economists (Figure 1). Exports from developed economies are expected to increase by 7.5% in volume terms over the course of the year, while shipments from the rest of the world (including developing economies and the Commonwealth of Independent States) should rise by around 11% as the world emerges from recession?

This strong expansion will help recover some, but by not all, of the ground lost in 2009 when the global economic crisis sparked a 12.2% contraction in the volume of global trade — the largest such decline since World War II.

The value of world merchandise trade was about 25% higher in the first three months of 2010, year-on-year (Figure 1). Global exports rose by 27% while imports slightly less.

Figure 1. World Exports – Imports the 1st Quarter of the year

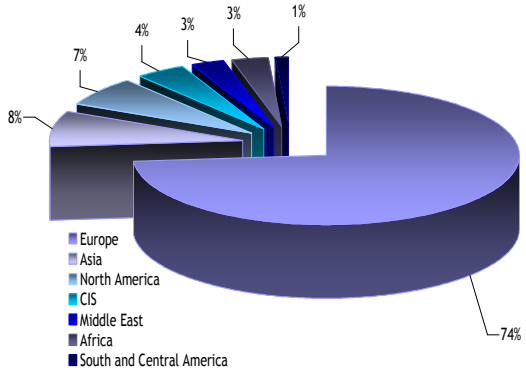


Source: WTO, 2010

Forty-three per cent of world exports originate in Europe, 25% in Asia, 17% in North America and 3% in CIS countries.

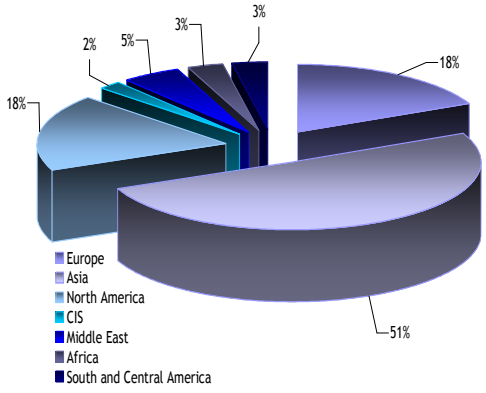
According to the World Trade Organization, 74% of Europe's exports are intra-European 8% are destined for Asia, 7% for North America and 4% for CIS countries (Figure 2). One-half of Asian countries' exports stays in Asia, 18% go to Europe, 18% to North America and 2% go to CIS countries (Figure 3 and 4).

Figure 2 . Exports of Europe



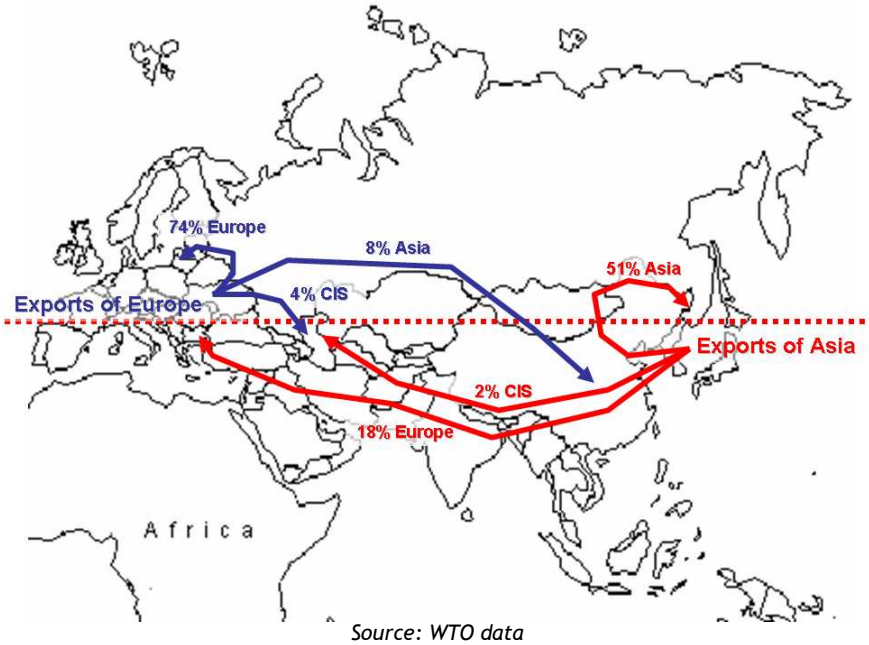
Source: WTO data

Figure 3. Exports of Asia



Source: WTO data

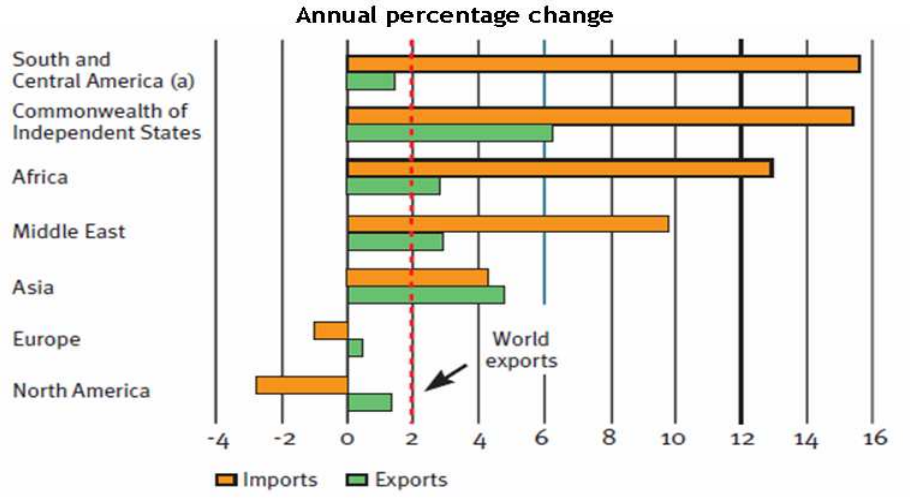
Figure 4. The Euro - Asian Trade



Source: WTO data

Sixty countries involved in Europe–Asia trade represent more than half of the world's GDP, more than 60% of the world's population and 70% of global trade[1]. Figure 5 illustrates the annual percentage change of imports and exports by region (2008 over 2007) - one year before the economic crisis. As indicated, Asia's exports and imports grew by more than 4%, while Europe's imports decreased by 1% and its exports increased by 0.5%.

Figure 5. Real merchandise trade growth by region, 2008 over 2007



Source: WTO/ECSA

Source: European Community Ship owners Association, Annual Report, 2008-9

[1] Asia-Europe Meeting (ASEM) Report, A European Commission foundation, www.aseminfoboard.org

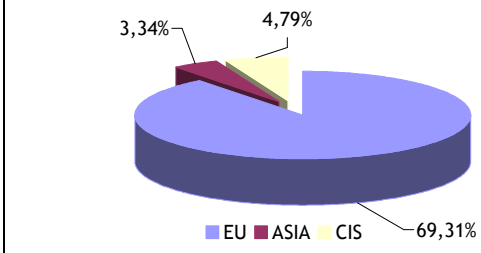
There are currently over 20 countries participating in the Euro-Asian Transport Links initiative. They are: Afghanistan, Armenia, Azerbaijan, Belarus, Bulgaria, China, Georgia, Germany, Greece, Iran, Kazakhstan, Kyrgyzstan, Latvia, Moldova, Romania, Russian Federation, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan.

The seven European countries involved in the EATL project export about 70% of goods to other European countries, 3% to Asian countries and 5% to CIS countries. They import 63% from other European countries, 7% from Asian countries and 9% from CIS countries (Figure 6).

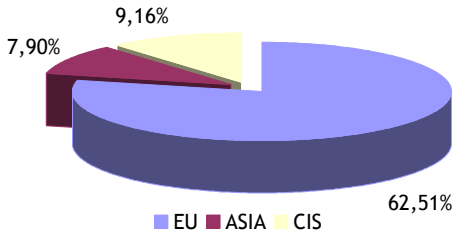
These countries' exports shares are: agricultural products 15%, fuel and mining products 16% and manufacturing products 68%. Imports shares are: agricultural products 10%, fuel and mining products 19% and manufacturing products 69%.

Figure 6. Exports and Imports of the European Countries of the EATL Project

Exports to



Imports from



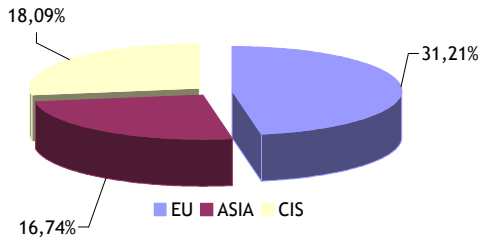
Source: WTO data

The 16 Asian countries of the EATL project export on average 31% of goods to European countries, 17% to other Asian countries and 18% to CIS countries. These countries import 21% from European countries, 18% from other Asian countries and 24% from CIS countries (Figure 7).

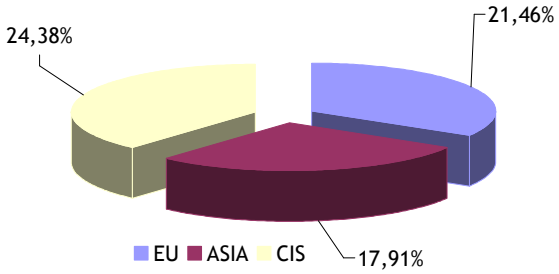
Exports of agricultural products represent 11%, fuel and mining products 40% and manufacturing products 34% while imports of agricultural products make up 10% and fuel and mining products 19%.

Figure 7. Asian Countries of the EATL Project

Exports to



Imports from



Source: WTO data

The European Conference of Ministers of Transport (ECMT) report on trends in trade between Europe and Asia and consequences for transport[2] shows that trade between the two continents has accelerated sharply in recent years. This is partly because of economic development of East Asian countries, chiefly China, but also as a result of the growth of the economies of Russia and Central Asia. This has caused a wider geographical dispersal of trade flows, a phenomenon that is crucially important for defining the main routes for international trade between Asia and Europe and not just between either extremity of the two continents.

One of the key features of world container trade is an imbalance of incoming/outgoing containers. The fact that more full containers leave Asia than come back has created a major challenge for international transport operators. The industry estimates of these imbalances vary significantly. However, for the three main intercontinental trade lanes: Asia-Pacific, Asia-Europe, and Trans-Atlantic, the imbalances have grown significantly with more than half of the containers on both the Asia-Pacific route and the Asia-Europe route going back to Asia empty. Similar imbalances also existed a decade ago but in the 20-30 per cent range.

Currently, maritime transport dominates cargo shipping between Asia and Europe. The maritime operators have significantly expanded capacity to meet the demand and this has been reflected in the sustained double-digit annual growth. For high value and time-sensitive cargo the use of air transport has seen a similar expansion.

The volumes of international containerised cargo shipped using rail or road transport between Asia (China) and Europe are currently very limited. Rail transport, in particular the Tran-Siberian Railway, accounts for 3-4 percent of the total volume. This volume originates mainly from Northern China and Korea. The exact quantities and type of cargo is unknown. Road transport accounts for less than 1 percent of the containerised Sino- European trade in volume terms[3].

Congestion in transhipment ports is also an issue. Transport operators can address it through the routing of a container and the trimming of their networks. Congestion in ports of origin and destination are much more complex and involve a wider range of factors, including port terminals, customs facilities and operators organizing the pre and onward inter-modal transport of the cargo by truck, rail or barges. Naturally, it does not matter much to the end-customer if a container is delayed because of an issue in a transhipment port or the port terminal at the origin/destination - or if it is caused by bottlenecks pertaining to parts of the inter-modal transport executed by rail or trucking companies[4].

Greater trade between Europe and Asia has resulted in the faster growth of maritime container traffic (6% per year). This phenomenon has been accompanied by the use of larger vessels and by shipping rates that have fallen to very low levels ($700 per TEU from Europe to Asia).

Overall, Europe-Asia trade points towards two factors in favour of diversification of routes and opening up of new inland routes:

- ☑ Maritime transport's virtual monopoly on trade between Europe and Asia is causing increasing problems in land access to sea ports (in addition, the push for productivity gains tends to reduce the number of such ports). Obligatory points of passage between maritime hubs concentrate shipping traffic. This may pose a serious safety problem (risk of accidental pollution) and a serious security problem (vulnerability to attack).

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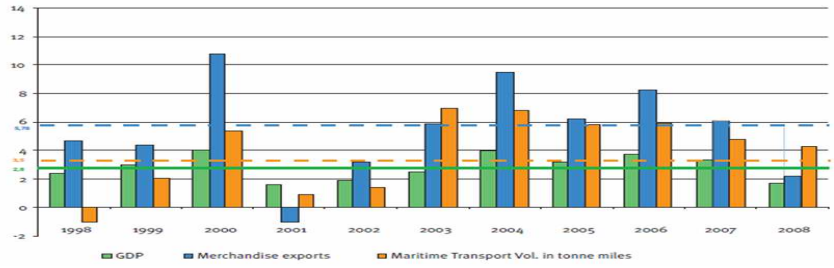
2 "Transport links between Europe and Asia", European Conference of Ministers of Transport and OECD, report, 2006.

3 "Land transport options between Europe and Asia: Commercial Feasibility study", 2006, Washington, The Chamber of Commerce of the United States.

4 European Community Ship owners Association, Annual Report 2008 - 2009

☑ The growth in traffic between continental countries, particularly in Central Asia, along the Europe-Asia land routes. Besides trade along the Europe-Asia corridors, trade within the region itself is developing, reinforcing the necessity to improve the corridors.

Figure 8. Annual percentage, in GDP, of world merchandise exports in real value, of Maritime Transport volume, 1998 – 2008



Source: European Community Ship owners Association, Annual Report, 2008-9

Despite efforts to develop efficient inland links, maritime transport will likely remain a dominant player in the Europe-Asia transport market. While shipping companies and ports may be able to cope with the expected increase in the maritime traffic, particularly container traffic (Figure 8), inland transport modes for hauls between ports and their hinterlands will not. The risk of saturation on road networks to these ports is high, while rail and inland waterways often have insufficient capacity. It is therefore important for governments to take the necessary action, particularly in the area of infrastructure, to improve land access to seaports. Developing appropriate rail or inland waterway links and facilitating inter-modal transfer between inland and waterway modes could be considered.

In 2010, UNECE Transport Division published a study about the Hinterland Connections of Seaports. The study examines the ways in which seaports and their hinterland connections can help to improve supply chain performance through the removal of bottlenecks and the improvement in the efficiency and sustainability of port hinterland links in the UNECE region.[5]

[5] http://www.unece.org/trans/publications/other_hinterland.html

CHAPTER 2 BLOCK TRAINS IN EUROPE AND ASIA

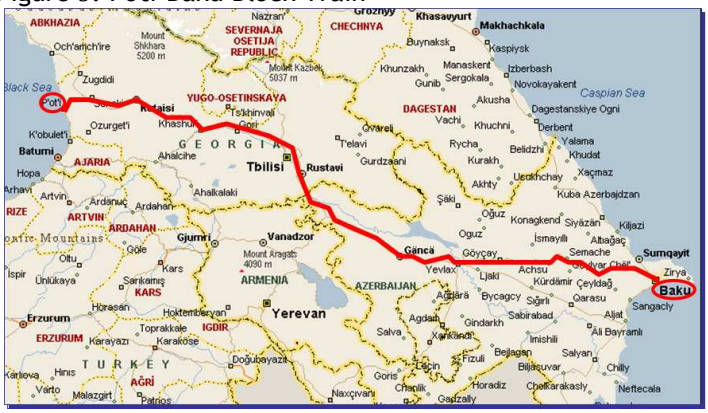
Existing Block Trains in Europe – Asia

This section describes block trains operating along the Euro-Asian links as well as provides a list of demonstration trains that have been recently performed. The major block trains operating with some regularity at present are of the "isolated clients" type. There have been some trials from forwarders as well, but they have not had great success.

Poti – Baku 6

A container block train between Poti (Georgia) and Baku (Azerbaijan) is operated by POLZUG Intermodal Group.

Figure 9. Poti-Baku Block Train



Source: POLZUG Intermodal Group

The service carries containers from the Black Sea to the Caspian Sea. The container trains are made up of cars of the same type. With no stopping for assembly and disassembly, the block train offers high-volume customers an economic alternative to rail freight operations or road transport. From Baku onwards, shipment is by feeder across the Caspian Sea to Aktau, Kazakhstan for rail transport to Central Asia.

Vostochny, Moscow, Novosibirsk, Taganrog (Hyundai), Izhevsk (KIA), Naberezhnye Chelny (Ssang Yong), Uzbekistan (GM Daewoo) and Ulyanovsk (Isuzu) [7]

Mitsui & Co. Ltd. has established a "T rans Siberian Route (TSR) Agent Team" which provides "Cargo Container Express Train Service" utilizing the Trans Siberian Railway to deliver cargo from Asian ports to Russia/CIS city terminals.

Features of these block trains:

- Special trains composed of minimum 31 and maximum 37 x 80-feet (24-meters) wagons (62-74 container capacity, based on 40-feet (12 meters) containers. The maximum formation length for one block train is 1,000 meters in accordance with Russian law.
- Routes predetermined in advance. In case of a conventional train, the train stops are determined by each railway controlling sections, a process which decreases ability to trace. With block trains stops are minimized and the transit station is predetermined. This feature improves ability to trace cargo.

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6 Based on Thomas L. Gallagher | Mar 8, 2009 *The Journal of Commerce Online - News Story*

7 Based on TRANS SIBERIAN RAILWAY, Block Train Service, Mitsui & Co Ltd, http://www.mitsui-tsr.com/en/service/index2.html

- Wagon formation changes not done resulting in shorter lead times and secured regularity. (Block train running lead time from Vladivostok to Moscow is 11 to 12 days. Efforts to shorten the lead time to seven days are ongoing).
- This service was started by customers in South Korea as a dedicated transport method to supply parts to an assembly factory in Russia.
- Main Block Train Operation Records (July 2007)

Destination	Point of Origin	Frequency per week	Training running days	Rail operator	Freight owner
Taganrog	Vostochny	3	11	**Russkaya Troyka**	Hyundai Motor Company
Izhevsk	Vostochny Nakhodka	7-8	9	**Russkaya Troyka** F.E.Trans	Kia Motors
Moscow	Vostochny	1	11-12	**Russkaya Troyka**	Various unspecified freight owners
Moscow	Vladiostok	1	11-12	**Russkaya Troyka**	Various unspecified freight owners
Saryagach, Uzbekistan	Vostochny	2	14	Trans Container Unico Logistics	GM Daewoo Motor Company
Chelny, Naberezhnye	Vostochny Nakhodka	3	9-10	F.E.Trans	Sangyong Motor Company

**Point of origin for Russkaya Troyka Block Train for various unspecified customers, has shifted to the Vladivostok port from Feb.'09.*

Photo: 80-feet wagon

Two security guards are placed in the locomotive. For 38 wagon formations, a convoy wagon is connected in the centre which normally has two security guards posted (this is compulsory in accordance with Russian law). In the unlikely event of disengaging the wagons, the train driver is made aware of it by a drop in brake pressure.

VW – SKODA AUTO

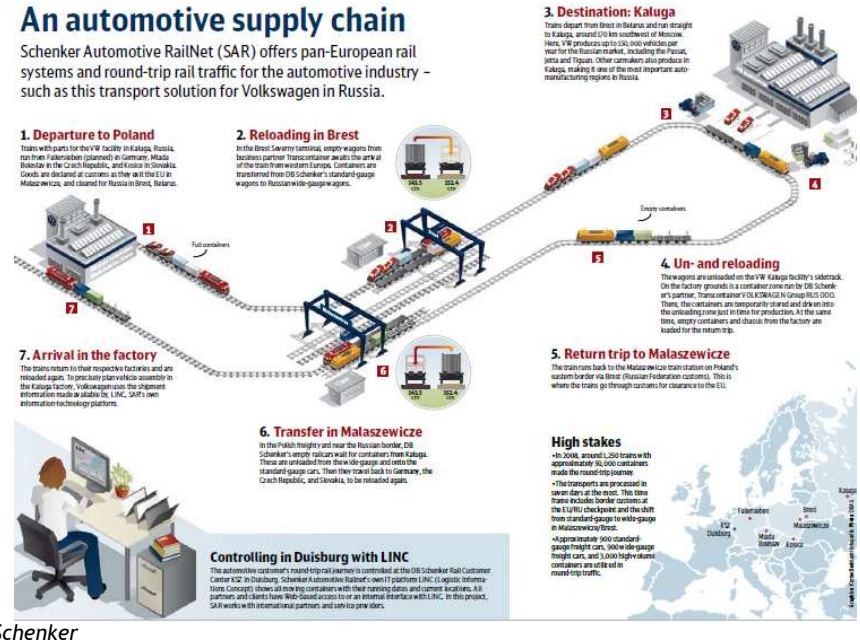
This project of integrated container trains was started in 2002. The route begins from the Czech Republic in the direction of Mladá Boleslav–Kaluga and from the Slovak Republic in the direction of Velká Ida–Kaluga through the border station Malaszewicze (Poland)–Brest (Belarus). It delivers disassembled cars of VW and ŠKODA AUTO brands to an assembly plant in Kaluze (Russia). The size and importance of the project makes it among the biggest in the European Union. There are 14 pairs of trains a week from Mladá Boleslav to Kaluga and 11 from Velká Ida to Kaluga.

Volkswagen (VW)

Volkswagen (VW) operates with Transcontainer (a Russian Railways' intermodal company), container block trains carrying on average 116 TEUs of components from Brest to Kaluga near Moscow.

Since 2008, the trains have brought auto parts made by Volkswagen from the Czech Republic via Brest to the automotive plant in Kaluga (Russia) on the route Brest-Kaluga. In the first half of 2008, 139 trains were launched on the route delivering 15,920 TEU.

Figure 10. The automotive supply chain



Source: DB Schenker

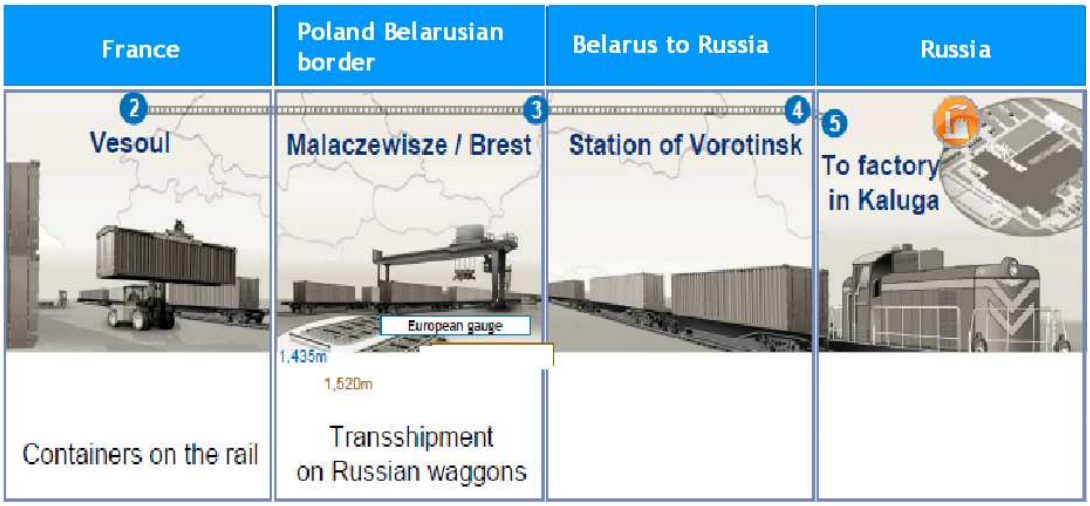
KIA Kazakhstan

Asia Auto's Kazakhstan plant was established in 2003. Currently, it produces models such as Lada Niva, Skoda Octavia and Superb, Chevrolet Captiva, Lacetti and Epica and Cadillac Escalade. An assembly of three new Kia models will begin in 2010. The company has undertaken some block trains from Bandar Abbas (Iran) to Kazakhstan.

PEUGEOT

Over 140 cars are transported per day (models 308 and C4) from Sochaux and Mulhouse and 60 from Zeebrugge (Belgium) to Vesoul for disassembling. Then the bloc train runs from France (Vesoul) to Russia (Kaluga) loaded with SKD (Semi Knocked Down) autoparts to be assembled in Kaluga (Figure 11).

Figure 11. Peugeot block train route

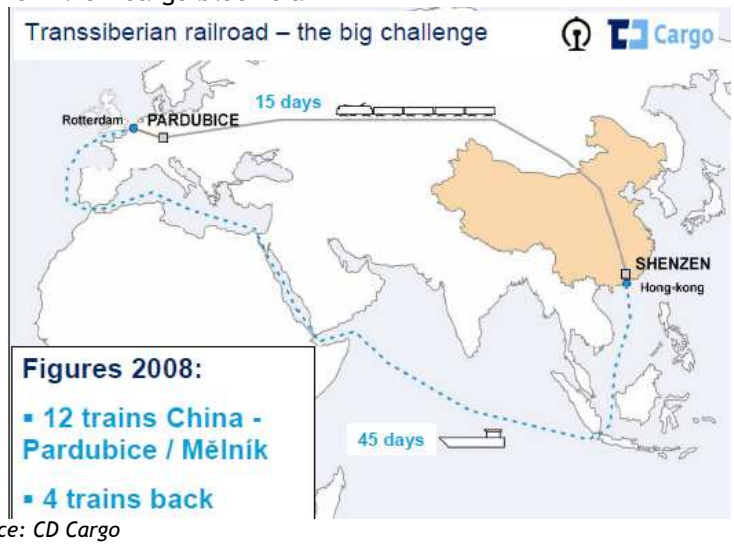


Source : Peugeot

This block train performs 6,000 km roundtrip, uses 400 dedicated wagons, 1,200 dedicated containers for roundtrip and 80 trucks for final deliveries.

CD Cargo Czech Republic

Figure 12. CD Cargo block train



Source: CD Cargo

In 2008, CD Cargo, a Czech Republic-based logistics and forwarding company performed 12 block trains from the Czech Republic to China (Pardubice/Melnik-Shenzen) and four of these trains returned back to Czech Republic.

Trains listed by the Organization for Railways Cooperation (OSJD) in 2008

Every year the OSJD publishes a list of all block/container trains that operate in its region. Following is the list of block trains operating across the Euro-Asia for 2008.

i.d.	Train description	Type of Train	Frequency
1208	Berlin – Kunzevo (Russia), "Ostwind"	Containers	3 times per week
1276	Brest – Ilijezk (Russia) – Arys (Kazakhstan) "Kasachischer Vektor"	Containers	2 times per week
1406	Brest – Nauschki (Russia) – Ulan Bator (Mongolia) – Huh Hoto (China)	Containers	2 times per week

1251 / 1252	Almaty (Kazakhstan) – Dostyk (Kazakhstan) / Alaschankou (China)	Containers	6 times per week
1402/ 1401	Lianyunggang (China)- Alaschankou (China) - / Dostyk Kazakhstan – Assake (Uzbekistan)	Containers	1 time per week
1401 / 1402	Tianjin (China) – Alaschankou (China) / Dostyk (Kazakhstan) – Almaty (Kazakhstan)	Containers	3 times per week

Demonstration train runs

Some international organizations and private companies have performed demonstration block train runs to evaluate their effectiveness. Some of them are presented below:

- ☑ From Tianjin (China) to Ulaanbaatar (Mongolia) in 3 days 3.5 hours over the 1,691 km distance (November 2003)
- ☑ From Lianyungang (China) to Almaty (Kazakhstan) in 7 days 6 hours over the 5,020 km distance (April 2004)
- ☑ From Brest (Belarus) to Ulaanbaatar (Mongolia) in 8 days 21 hours over the 7,180 km distance (June 2004)
- ☑ From Nakhodka (Russian Federation) to Malaszewicze (Poland) in 12 days and 8 hours over the 10,335 km distance (July 2004)[8]
- ☑ Beijing-Hamburg container train in January 2008. To demonstrate the potential of container service by rail, the Beijing - Hamburg train was launched from Beijing in January 2008. The train made the 9,780km route in 15 days. It passed through the territory of China, Mongolia, Russia, Belarus, Poland and Germany. On the same day a memorandum of understanding was signed and a joint working group was set up to arrange rail service on the route China - Western Europe9.
- ☑ ECO demonstration train in 2009, from Islamabad to Istanbul, 6,566 km in 11 days with many restrictions, mainly for night travel on the territory of Pakistan10.

8 http://www.unescap.org/ttdw/common/TIS/TAR/Container%20Block-trains.asp

9 DB SCHENKER, http://www.schenker-seino.co.jp/content/view/254/141/

10 ECO Secretariat, http://www.ecieco.org/Portals/

CHAPTER 3 EURO-ASIAN MARITIME ROUTES

Port management

The latest data available on world container port traffic, in 63 developing economies with an annual national throughput of over 100,000 TEUs, show that in 2007 there were 487.1 million TEU moves registered.
Singapore retained its lead as the world's busiest port in terms of the total number of TEU moves, growing by 7 per cent. Shanghai had the same growth rate and maintained its position in the second place. Hong Kong remained in the third place.

Congestion is one of the biggest port issues. There are certain vulnerabilities in global supply chains and when the goods move from one mode to another, as they do in the ports, the risk of encountering problems rises. Ideally, when a ship arrives in a port, there will be a berth waiting and the cargo handling facilities will swing smoothly into action. When there is no berth available, and the ship has to swing around its anchor waiting its turn, delays are caused right down the supply chain and costs are racked up.

Port congestion is caused by a number of different factors. Perhaps there has been a period of exceptionally bad weather making it difficult to work cargo with ships delayed both at sea and in port. An unexpected accident may reverberate right down the supply chain[11].

An increase in trade can also cause port congestion as ports have limited ability to quickly adjust to such increases. The extraordinary growth in international trade caused by the surge in Chinese exports has caught much of the port industry napping. Port investment in many countries has lagged behind while years of planning are often required before construction of new port facilities or the dredging of deeper channels for bigger and more productive ships, can even begin. It is not merely the non-availability of berths which causes congestion. The cargo has to be cleared away from a discharging berth before other ships can start to discharge, and there may be landside congestion that is hampering the delivery and on-carriage of goods. Inadequate roads or railways may be a long-standing problem - one that is perhaps even getting worse.

Maritime transport: cost and time

Maritime transport does not only include sea transport. By its nature, maritime transport is intermodal transport and, often, as many as three means of transport are involved: ship, truck and rail (Figure 13). The maritime transport cost structure is made up by five components: (1) the cost of moving cargo from the shipper to the port of origin (typically) by truck; (2) the terminal handling charges at the port of origin; (3) the freight rate from the port of origin to the port of destination; (4) the terminal handling charges at the port of destination and (5) the cost of transport from the port of destination to the final client (typically) by truck.

Figure 13. Maritime Transport Cost Structure

11 *In an Australian port, a bulk carrier damaged an iron ore loader. As a result, about half of the port capacity to unload was put out of action for months.*

Terminal Handling Charges (THC)

THC are charged by shipping lines to recover the payments to container terminals for loading and unloading cargo. Shippers at the port of origin are responsible for paying THC at the port of loading. This is defined as the origin THC. The consignees, or buyers, are responsible for paying the freight rate and THC on the discharge at the port of destination, known as the destination charge. This is consistent with the definition of the International Chamber of Shipping. Most shipping lines have introduced separate charges for freight rates and THC.

Figure 14. Split of THC Charges between Shipper and Ship Operator

	ACTIVITY	COVERED BY
01	Delivery MT and receiving full (+all associated clerical work and reporting)	THC
02	Inspection and reporting condition of container/ completion interchange	THC
03	Inspection and reporting of seals and wiring, removal invalid labels, re-sealing	THC
04	Movement of container on/from chassis, barge or wagon	THC
05	Internal transport of container to or from stack	THC
06	Handling container into or out of stack	THC
07	Reporting of chassis, barge and wagon activities in and or out of terminal	THC
08	Storage of full container within time limits defined by Conference	THC
09	Take laden box out of stack	THC
10	Internal transport from stack to ship's side under hook	THC
11	Move of container from ship's side to ship's rail	THC
12	Move of container from ship's rail into ship's cell	Freight rate
13	Opening and closing hatch covers	Freight rate
14	Lashing of container	Freight rate
15	Physical and clerical planning of vessel operation + reporting	Freight rate
16	Overtime	Freight rate
17	Wharfage	Freight rate

Source: PortStrategy, July 2005, Mercator Media.

Given the relative stability of THC, albeit at varying levels according to trade routes, the ratio of THC to sea freight rate varies depending on freight rates.

The following table illustrates THC by port for ten largest shipping operators.

Figure 15. THC by Port for Ten Largest Shipping Operators (April-June, 2009)

	Rotterdam	
	20ft	40ft
1 Maersk/SAF	€ 185	€ 185
2 MSC	€ 175	€ 175
3 CMA CGM	€ 160	€ 160
4 Evergreen	€ 160	€ 160
5 Hapag Lloyd	€ 200	€ 200
6 COSCO	€ 140	€ 140
7 APL	€ 190	€ 190
8 China Shipping	€ 170	€ 170
9 NYK	€ 160	€ 160
10 MOL	€ 200	€ 200

	Hamburg	
	20ft	40ft
1 Maersk/SAF	€ 190	€ 190
2 MSC	€ 180	€ 180
3 CMA CGM	€ 185	€ 185
4 Evergreen	€ 200	€ 200
5 Hapag Lloyd	€ 210	€ 210
6 COSCO	€ 180	€ 180
7 APL	€ 210	€ 210
8 China Shipping	€ 200	€ 200
9 NYK	€ 200	€ 200
10 MOL	€ 210	€ 210

	ST. Petersburg	
	20ft	40ft
1 Maersk/SAF	$ 290	$ 290
2 MSC		
3 CMA CGM	$ 370	$ 370
4 Evergreen	$ 250	$ 250
5 Hapag Lloyd	$ 220	$ 220
6 COSCO	$ 200	$ 200
7 APL	$ 300	$ 300
8 China Shipping	$ 300	$ 300
9 NYK	$ 250	$ 250
10 MOL	$ 220	$ 220

	Barcelona	
	20ft	40ft
1 Maersk/SAF	€ 155	€ 155
2 MSC		
3 CMA CGM	€ 170	€ 170
4 Evergreen	€ 160	
5 Hapag Lloyd	€ 120	€ 140
6 COSCO	€ 125	€ 125
7 APL	€ 255	€ 255
8 China Shipping	€ 150	€ 150
9 NYK	€ 210	€ 210
10 MOL	€ 160	€ 160

	Piraeus	
	20ft	40ft
1 Maersk/SAF		
2 MSC		
3 CMA CGM	Free in	Free in
4 Evergreen		
5 Hapag Lloyd	€ 112	€ 112
6 COSCO		
7 APL		
8 China Shipping	FIO	FIO
9 NYK		
10 MOL		

	Istanbul	
	20ft	40ft
1 Maersk/SAF		
2 MSC		
3 CMA CGM	Free in	Free in
4 Evergreen		
5 Hapag Lloyd	$ 219	$ 219
6 COSCO		
7 APL	$ 100	
8 China Shipping	FIO	FIO
9 NYK		
10 MOL	Free in	Free in

	Constanza	
	20ft	40ft
1 Maersk/SAF	$ 200	$ 245
2 MSC		
3 CMA CGM	$ 75	$ 130
4 Evergreen		
5 Hapag Lloyd	$ 345	$ 418
6 COSCO		
7 APL	$ 90	$ 130
8 China Shipping	$ 130	$ 130
9 NYK		
10 MOL	$ 40	$ 90

	Shanghai	
	20ft	40ft
1 Maersk/SAF	RMB 475	RMB 750
2 MSC	At cost	At cost
3 CMA CGM	RMB 1,297	RMB 1,297
4 Evergreen	RMB 370	RMB 560
5 Hapag Lloyd	RMB 460	RMB 720
6 COSCO	RMB 374	RMB 564
7 APL	RMB 476	RMB 750
8 China Shipping		
9 NYK	RMB 880	RMB 1,300
10 MOL	RMB 480	RMB 720

	Shenzen	
	20ft	40ft
1 Maersk/SAF	RMB 958	RMB 1,849
2 MSC		
3 CMA CGM	RMB 1,297	RMB 0
4 Evergreen	RMB 370	RMB 560
5 Hapag Lloyd	RMB 965	RMB 1,842
6 COSCO		
7 APL	RMB 476	RMB 750
8 China Shipping		
9 NYK	RMB 1,400	RMB 2,300
10 MOL	RMB 965	RMB 1,842

	Pusan	
	20ft	40ft
1 Maersk/SAF	100,000	135,000
2 MSC		
3 CMA CGM	101,000	137,000
4 Evergreen	100,000	136,000
5 Hapag Lloyd	101,000	137,000
6 COSCO		
7 APL	101,000	137,000
8 China Shipping		
9 NYK	150,000	210,000
10 MOL	100,000	136,000

		Hong Kong	
		20ft	40ft
1	Maersk/SAF	HK$2,050	HK$2,750
2	MSC		
3	CMA CGM	HK$2,065	HK$2,750
4	Evergreen	HK$2,065	HK$2,750
5	Hapag Lloyd	HK$2,065	HK$2,750
6	COSCO		
7	APL	HK$1,800	HK$2,650
8	China Shipping		
9	NYK	HK$1,400	HK$2,000
10	MOL	HK$2,065	HK$2,750

		Singapore	
		20ft	40ft
1	Maersk/SAF	SGD 190	SGD 270
2	MSC		
3	CMA CGM	SGD 182	SGD 270
4	Evergreen	SGD 182	SGD 270
5	Hapag Lloyd	SGD 182	SGD 270
6	COSCO		
7	APL	SGD 182	SGD 270
8	China Shipping		
9	NYK	SGD 170	SGD 170
10	MOL	SGD 182	SGD 270

Source: Terminal handling charges during and after the liner conference era, European Commission, 5 October 2009

The handling charges quoted by forwarders are slightly different as they include a profit margin (Figure 16). As indicated in Figure 16, THC costs are $175 and all the other costs are $**530**! Therefore, for this comparison study, THC costs will be increased by 250% to reflect "other costs".

Figure 16. Costanta port THC and other costs

Ports	Unloading of Containers ($)	Loading of Containers ($)	Customs Formalities ($)
Kostanta	70	75	55

Other Costs	P	($)
Entrance cost	☑	35
Parking cost	☑	20
Loading to truck cost	☑	65
Unloading from truck	☑	70
Other documents	☐	45
Other cost/ Specify	☐	
THC CONSTANTA	☑	175
DETENTION FEE	☑	45
DELIVERY ORDER	☑	50

Source: Romanian Forwarders Association 2010

Containers			20' FCL	20' MTY	40' FCL	40' MTY
1	Handling (from vessel or vice versa)	Unit	USD 85.00	USD 45.00	USD 105.00	USD 55.00
2	Lift on/of	-	USD 20.00	USD 10.00	USD 25.00	USD 15.00
3	Transportation from yard to vessel and vice versa	-	USD 15.00	USD 10.00	USD 25.00	USD 20.00
4	Shifting (hold-hold)	Unit	USD 35.00	USD 20.00	USD 40.00	USD 25.00
5	Shifting (hold-terminal-hold)	-	USD 65.00	USD 35.00	USD 80.00	USD 45.00
6	Lashing/unlashing of containers on vessel	-	USD 6.00			
7	Cleaning of containers	-	USD 6.00			
8	Removing labels (indicating -dangerous cargos) from containers	-	USD 20.00			
9	Bulk cargo loading-unloading into/from container	Ton	USD 9.00			
10	General cargo loading-unloading into/from container	-	USD 12.00			
11	Heavy cargo loading-unloading into/from container (>3 t.)	According to rates specified in the paragraph General Cargo, Item 7				
12	Loading-unloading the transport facilities into/from container	According to rates specified in the paragraph General Cargo, Item 11.2.1.				
13	Inspecting containers loaded with excise cargos	-	USD 85.00			
14	Unloading/Loading of lashing gear box	Unit	USD 130.00			
15	Storage	Unit/ per day	USD 3.00	USD 1.00	USD 5.00	USD 2.00
	Containers arrived by maritime transport	one day -free of charge				
	Containers arrived by land transport	two days- free of charge up to one month basic more than one month- basic increases by 50%				

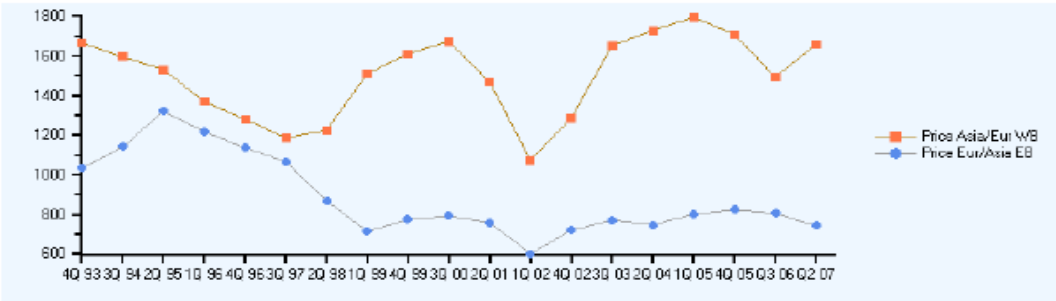
- Surcharge of 100% applied on containers loaded with oversize cargo (in case of using nonstandard spreaders);
- Surcharge of 25% applied on containers loaded with dangerous cargoes.

Source:Port of Poti

Freight Rates

Figure 17 illustrates the freight rates along the Asia-Europe route for 1993-2007. There are significant fluctuations in these freight rates resulting in similar fluctuations in the THC/freight rate ratio. The THC/freight ratio on average has been in the 10 – 15 percent range on the Asia to North Europe route on a destination basis.

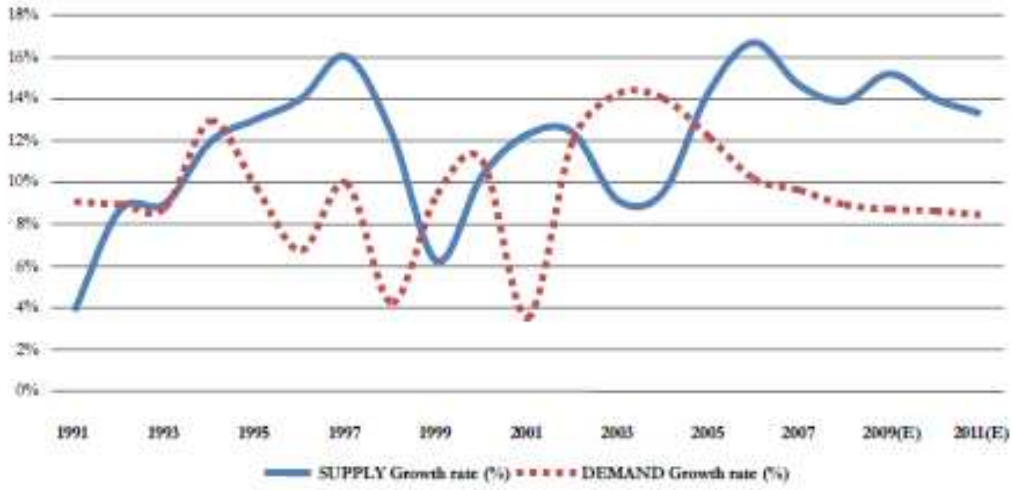
Figure 17. Freight rates for Asia/Europe/Asia



Source: Containerisation International Freight Facts

In the short term, freight rates are driven by the relationship of supply and demand for shipping. In the longer-term, the available capacity also influences freight rates. Figure 18 shows a relationship between demand and supply which translates into freight rate volatility. The 1991 and 2001 recessions with their consequent drop in cargo demand coinciding with excess shipping capacity supply resulted in declining freight rates. Equally, the end of the recession coincided with sharp increases in freight rates.

Figure 18. Supply versus Demand, 2011



Source: Drewry's Annual Container Market Review 2007-2008, supplemented by AXS Liner 2008

Increasingly shippers are negotiating "all-in" rates where the three elements of sea freight, surcharges and terminal handling charges are included. In the recession of 2008-9, freight rates collapsed with spot rates from Asia to North Europe as low as $100.

The following are maritime freight rates in US dollars for 20'' and 40'' containers from Shanghai, Costanta, Varna and Bandar Abbas ports to anywhere in the world, . T (data collected in May–June 2010).

FROM
Xingang / Qingdao / Dalian [China] (USD$)

TO			
Middle East	20` / 40/ 40`HC[12]		20` / 40/ 40`HC
DUBAI / JEBEL ALI	1,500/2,400/2,400	B.ABBAS	1,600/2,500/2,500
ABU DHABI	1,700/2,800/2,800	SHARJAH	1,700/2,800/2,800
DAMMAM	1,600/2,500/2,500	RIYADH	1,800/2,900/2,900
BAHRAIN	1,800/2,900/2,900	DOHA	1,900/3,100/3,100
KUWAIT	1,700/2,800/2,800	MUSCAT	1,800/2,900/2,900
UM QUASER	2,300/3,700/3,700		
India and Pakistan	20` / 40/ 40`HC		20` / 40/ 40`HC
KARACHI /QASIM	1,500/2,400/2400	NAHVA SHEVA	1,500/2,400/2,400
COLOMBO	1,400/2,300/2300	CHENNAI / MADRAS	1,450/2,400/2,400
CALCUTTA	1,700/2,700/2700	HALDIA	1,700/2,700/2,700
TUTICORIN	1,600/2,600/2600	COCHIN	1,600/2,600/2,600
Red Sea	20`/ 40/ 40`HC		20`/ 40/ 40`HC
JEDDAH	1,900/3,000/3000	ADEN	1,550/2,600/2,600
AQABA	2,000/3,200/3200	HODEIDAH	2,100/3,400/3,400
SOKHNA	2,000/3,200/3200	PORT SUDAN	2,300/3,800/3,800
Main ports of South East Asia			20`/ 40/ 40`HC
SINGAPORE/PORT KELANG/SURABAYA/ JAKARTA/PASIR GUDANG/PENANG/SAMARANG/SURABAYA/BALAWAN			700/900/900
Main ports of West Mediterranean			20`/ 40/ 40`HC
BARCELONA/FOS/VALENCIA/NAPLES/LA SPEZIA/GIOIA TAURO/LIVORNO(LEGHON)/VENICE/MARSEILLES			2,100/3,800/3,900
Main ports of East Mediterranean			20`/ 40/ 40`HC
ISTANBUL/PORT, SAID/GEMLIK/ HYDARPASA/ IZMIR/ MERSIN/ ALEXANDRIA/ DAMIETTA/ BEIRUT/ LATTAKIA			2,500/4,600/4,700
Main ports of Europe			20`/ 40/ 40`HC
ANTWERP/ HAMBURG/ ROTTERDAM/ LE HARVE /FELEXSTOWE/ SOUTH AMPTON/ BREMEN/BREMEN HARVEN / DUNKIRK			2,150/3,900/4,000

[12] "HC" denotes high cube.

Main ports of Black Sea	20`/ 40/ 40`HC
CONSTANTA/ODESSA/ILLICHEVSK/VARNA/ NOVOROSSIYSK/ POTI	2,400/4,300/4,300
Main ports of Japan and Korea	20`/ 40/ 40`HC
Japan and Korea	100/200/200

FROM			
Costanza Port [Romania] (USD$)			
TO			
	20`GP / 40GP/ 40`HC		20`GP / 40GP/ 40`HC
Kaliningrad	2500 / 3700 / -	Busan	900 / 1300 / -
Lianyungang	2600 / 4500 / -	Barcelona	1350 / 2050 / -
Rotterdam	1400 / 2100 / -	Odessa	750 / 1250 / -
Hamburg	1400 / 2100 / -		

FROM			
Varna Port [Bulgaria] (USD$)			
TO			
	20`GP / 40GP/ 40`HC		20`GP / 40GP/ 40`HC
Kaliningrad	1680 / 2769 / -	Busan	1660 / 2920 / -
Lianyungang	2170 / 3880 / -	Barcelona	995 / 1450 / -
Rotterdam	950 / 1590 / -	Odessa	1100 / 2200 / -
Hamburg	1120 / 1670 / -	Shanghai	2060 / 3650 / -
Vladivostok	3060 / 5460 / -		

FROM			
Bandar Abbas			
TO			
	20" / 40"		20" / 40"
Karachi	$400 / $600	Ezmir	$1000 / $1750
Istanbul	$1000 / $1650	Shanghai	$850 / $1550
Rotterdam	$650 / $980	Hamburg	$650 / $980

Time Schedule

A standard container ship speed is about 25 knots while "slow steaming" has container ships move at 20-22 knots. Recently, speeds have been further reduced with the introduction of "extra slow steaming", i.e. ships operating at speeds of 17-19 knots or less. In 2010, "extra slow steaming" absorbed 554,000 TEUs - about the magnitude of currently laid-up capacity[13].

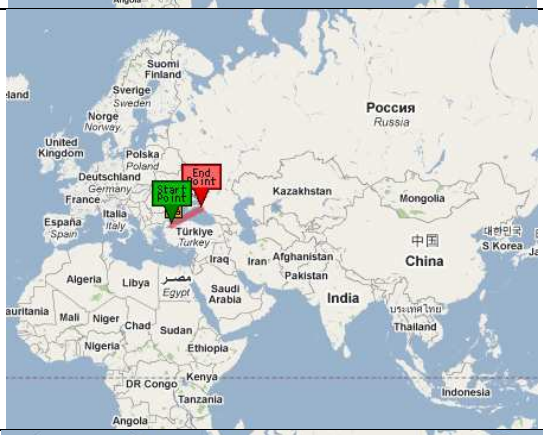
Figure 19 is the time schedule and distance analysis of the most common maritime routes[14].

Figure 19. Distance and time analysis, common maritime routes

Shanghai – Rotterdam Distance: 10,490 nm Duration: 43.71 days	
Shanghai – Istanbul Distance: 8,003 nm Duration: 33.35 days	
Bandar Abbas – Hamburg Distance: 6,368 nm Duration: 26.53 days	

13 *Dynamar: Dynaliners 11/2010, 4 June 2010, reporting data from AXS-Alphaliner.*

14 These routes have been calculated by using the online maritime calculator http://www.axsmarine.com/public

Vostochny – St.Petersburg Distance: 12,520 nm Duration: 52.17 days	
Vostochny – Murmansk Distance: 12,808 nm Duration: 53.37 days	
Istanbul – Novorossiysk Distance: 452 nm Duration: 1.88 days	
Shanghai – Bandar Abbas Distance: 5,581 nm Duration 23.25 days	
Rotterdam – St. Petersburg	

Distance: 1,245 nm Duration: 5.19 days	
Shanghai – Novorossiysk Distance: 8,454 nm Duration: 35.23 days	
Novorossiysk - Kaliningrad Distance: 4,444 nm Duration: 9.26 days	

Source: www.axsmarine.com/.

Road Transport Costs

Road transport costs are basic components of maritime shipping. Trucks move containers from the shipper to the port of origin and from the port of destination to the final client. Most of the time, road transport to these destinations is round trip as the truck picks up the empty containers from the storage place of the shipping lines/forwarders – normally close to the port – brings it to the shippers' warehouse, waits for the container to be loaded and finally, moves the loaded container to the port of origin. The same, albeit the other way around, happens in the port of destination/unloading station where the trucks picks up the loaded container from the container freight station of the port/station, brings it to the warehouse of the final client, waits until it is unloaded and then brings back the empty container to the storage place of the shipping line.

Figure 20. Road transport involvement in maritime transport

It is important to know how much it costs, in each country, for a truck to transport containers from the port to a final client or shipper in a 20 km radius of the port. That distance is normally the average distance from a port to logistics or manufacturing areas. Figure 21 provides the flat rates for a truck delivering a container (20'' or 40'') in a 20 km radius of the port (data collected in June 2010).

Figure 21. Road transport rates

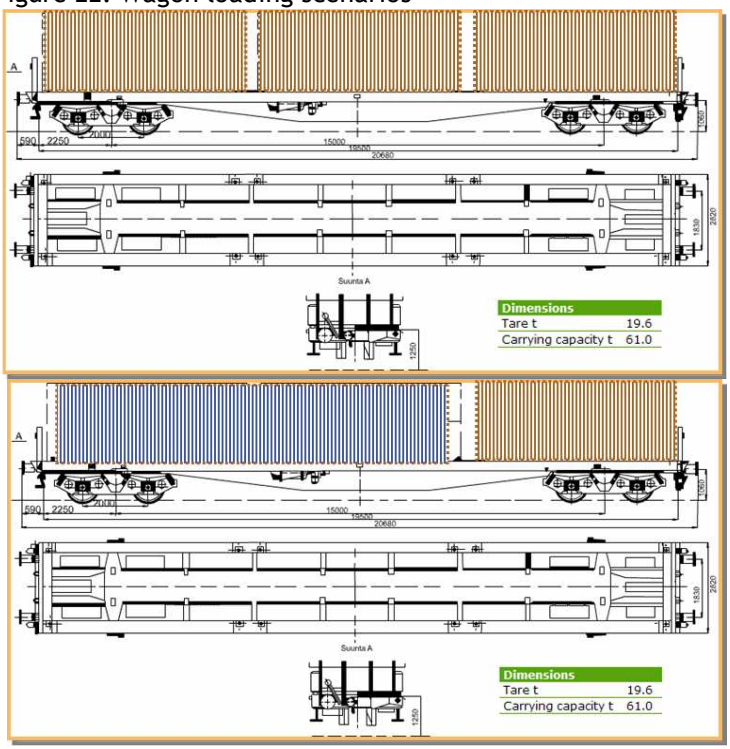
Country	Cost of road transport (in $)
Afghanistan	150
Armenia	140
Azerbaijan	160
Belarus	180
Bulgaria	195
China	100-200
Georgia	180
Germany	250-350
Greece	250
Iran	50-150
Kazakhstan	120-180
Kyrgyzstan	130
Latvia	230
Moldova	150
Mongolia	120
Poland	200-280
Romania	150-250
Russian Federation	80-200
Tajikistan	130
Turkey	180-300
Turkmenistan	130
Ukraine	150-250
Uzbekistan	100-150

In general, international road transport costs are quite similar. From Istanbul to Western Europe the rate is €0.82–0.92 per km and from Western Europe to Istanbul is €0.9–1. From Istanbul to Almaty Kazakhstan the rate is $1–1.4/km and the other way it is $0.8–1 per km. The rate of $1.4 per km for long distances appears to be the average tariff.

CHAPTER 4: RAIL TIME-COSTS ALONG EURO-ASIAN ROUTES

Comparing maritime and rail routes requires a thorough analysis of shipping time and cost per container. The cost per container analysis is easier to perform than the time analysis because railway tariffs are typically available.

Figure 22. Wagon loading scenarios



Source: Author's publications

The time schedule is more difficult to assess. Determining the time schedule of a block train is a complicated task and often requires a simulation or a demonstration run to identify all the issues and make appropriate calculations. (The majority of railways did not reply to questions relating to time in the UNECE questionnaire see Annex I).The maximum loading point, or optimal loading scenario, refers to the number of containers that we can load on a train (Figure 22). The train, including the locomotive's power to pull, and each wagon have weight and loading restrictions that should be respected. Theoretically, one ISO container wagon can hold three 20'' containers or one 40'' container and one 20'' container. Because of the weight restrictions, we normally load one 40'' container or one 20'' container. Sometimes, cargo permitting (cotton, for instance) or when we have empty containers to load, then we can also load two 20'' containers or less frequently one 40'' container and one 20''. These different "types" of containers – 40'', 20''- typically weigh less than 15 tonnes. Also the transport of empty 20'' or 40'' is charged differently.

The cost structure is the most difficult part of this analysis. Normally, rail organizations do not know the cost of their operations. This is mainly because of their organizational structure where investments in infrastructure and operations form part of the same company.

For this comparison study points of origin and points of destination of interest will be identified and these points will "compose" the block train time schedule and cost according to information analysis for each country participating on this route. Figure 27 illustrates the calculation of time–cost analysis for the block trains of the study. This includes three steps: (a) road transport from the shipper to the loading station, (b) rail service, (c) road transport to the final shipper.

Figure 23. Calculation of time and cost for a block train

1	Transport of container by truck from original shipper to main train station to be loaded on the train, loading/documentation expenses
2	Block Train Service: Rail transport of container from Berlin to Vostochny. Composition of time schedule and tariff costs.
3	Delivery of the container by truck from the final unloading station to the final shipper. Unloading / documentation expenses.

Source: Author's publications

Time schedule analysis

The formulation of an integrated time schedule for a block train is a complex task. The number of countries, operating conditions in these countries, stopovers and the reasons for these stopovers all directly influence the time schedule. Regional characteristics are also important and constitute significant factors. For instance, in CIS countries there are transshipment stopovers due to gauge changes and security. In West European countries, there are stopovers because of passenger train priority. All these reasons influence the final time schedule and time schedule operators should analyze all parameters in order to finalize the total traveling time, departure and arrival time.

The timetable of a block train is equally important as its operation. The timetable and its reliability are the most important marketing tools of train operators, even more so than tariffs, and track and trace services. The development of timetable and its reliable implementation is a particularly difficult and laborious task, not only because of the usual factors that influence transportation but also because of the particularities of a specific route.

The gauge issue

The standard gauge of 1,435 mm has been adopted in many parts of the world, across North America and most of Western Europe. It accounts for about 60% of the world's railways. Other gauges have been adopted as well such as the broad gauge (1,520 mm) in the former Soviet Union accounting for about 17% of railways. This makes integration of rail services difficult since both freight and passengers are required to change from one railway system to the other in France and Spain, Eastern and Western Europe, and between Russia and China. The potential of the Euro-Asian land bridge is limited in part by these gauge differences.

Field Experience

The author has extensive experience in running demonstration trains, mainly in Central Asia and in the Balkans. The following are actual data for traveling time in different countries.

The speed of the train will be calculated by using the following formula:

$$\text{Average traveling time (km/hr)} = \frac{\text{Total route kilometers}}{\text{Total traveling time (traveling + stopovers)}}$$

id	Country runs	Total km traveled	Total time (hrs)	Avg speed (km/hr)
1	Iran	2,345	112.2	21
2	Turkey	1,995	84	23
3	Turkmenistan	469	32.15	14
4	Kazakhstan	969	27.56	35
5	Bulgaria	174	11	16
6	Greece	170	8	21.25
7	Uzbekistan	670	40.18	17

Published Case Studies

id	Route runs	Total km traveled	Total time (days)	Avg speed
8	Peking - Hamburg[15]	9,992	15	27.75
9	Vesoul - Kaluga[16]	3,000	5	25
10	Tran Siberian [17]	9,349	11	35
11	Tianjin (China) to Ulaanbaatar (Mongolia)	1,691	3	22.4
12	Lianyungang (China) to Almaty (Kazakhstan)	5,020	7	28.8
13	Brest (Belarus) to Ulaanbaatar (Mongolia)	7,180	9	30,7
14	Nakhodka (Russian Federation) to Malaszewicze (Poland)[18]	10,335	12	35
15	Islamabad to Istanbul[19]	6,566	11	24.9

Figure 24 summarizes the average train speed in the three regions.

Figure 24. Average train speed

EU	Asia[20]	CIS
26 km/hour	21 km/hour	34 km/hour

Source: Author's analysis
*This is not the actual speed of the train but the speed of the total traveling time, meaning actual traveling time **and** stopovers.*

15 DB Block Train, Railway Market – GEE Review No 1, 2008
16 PEUGEOT BLOCK TRAIN, CIT Newsletter, February 2010
17 Tran Siberian Block Train, presentation of Russian Railways at UNECE
18 UNESCAP Demonstration Runs
19 ECO Demonstration Run
20 Asian countries excluding the ones including at CIS

These average train speeds will be applied to time schedules wherever actual data were unavailable[21]. It should be noted that waiting time at borders is not an important factor for this kind of services - block trains - mainly because these services are result of governments or state-owned railways agreements. In these cases, borders crossings are part of the common consensus concerning the operations of these trains which implies non-stop rail service.

Afghanistan

Afghanistan is a large, landlocked country with movements severely limited by rugged terrain. The country has less than 25 km of railroad track, which is used for shipping goods to/from Turkmenistan and Uzbekistan.

Armenia

Bagratashen – (Georgian border) – Akhuryan (Turkish Border)

id	Route	Distance (km)	Time (hours)
1	Bagratashen – Uzunla	48	
2	Uzunla – Tumanyan - Kirovakan	37.6	
3	Kirovakan – Spitak – Gyumri - Akhuryan	75.5	
	Total	**161**	**8**

Azerbaijan

Astara- (Iranian border) – Beyuk Kesik (Georgian Border)

id	Route	Distance (km)	Time (hours)
1	Astara – Lenkoran - Bal'yany - Quazimamad	235	
2	Quazimamad – Kyurdamir – Udzhary - Yevlakh	276	
3	Yevlakh – Dilmameldi – Tauz	88.2	
4	Tauz – Akstafa - Beyuk Kesik	67.8	
	Total	**667**	**32.25**

Belarus

Redki (Russian border) – Brest (Polish Border)

id	Route	Distance (km)	Time (hours)
1	Redki – Orsha	45.9	
2	Orsha – Minsk	221.3	
3	Minsk – Brest	346	
	Total	**613.2**	**18**

Novaya Guta – (Ukranian border) – Brest (Polish Border)

id	Route	Distance (km)	Time (hours)
1	Novaya Guta – Gomel	22	
2	Gomel – Minsk	298.1	
3	Minsk – Brest	346	
	Total	**666.1**	**20**

[21] When no actual data concerning distance in kilometers between stations or even for the whole length of one country's railroads were available, combined data from Google earth, Autoroute Microsoft GIS software and different maps was used.

Novaya Guta – (Ukranian border) – Godogay (Lithuanian Border)

id	Route	Distance (km)	Time (hours)
1	Novaya Guta – Gomel	22	
2	Gomel – Minsk	298.1	
3	Minsk – Gudogay	100	
4	Gudogay – Lithuanian borders	45	
	Total	**465**	**14**

Bulgaria

Kulata (Greek Border) – Ruse (Romanian Border)

id	Route	Distance (km)	Time (hours)
1	Kulata – Sofia	174	
2	Sofia – Mezdra	83.5	
3	Mezdra - Pleven	101	
4	Pleven – Gorna Orjahoviga	119.3	
5	Gorna Orjahoviga – Ruse	13	
	Total	**490.8**	**19.5**

China

Shanghai port (China) – Alataw Shankou (Kazakhstan Border)

id	Route	Distance (km)	Time (hours)
1	Shanghai – Nanjing	269.1	
2	Nanjing – Xuzhou	287.53	
3	Xuzhou – Xian	754.27	
4	Xian – Lanzhou	506.39	
5	Lanzhou – Shulehe	437.21	
6	Shulehe – Urumci	1,199.82	
7	Urumci – Alataw Shankou	430.19	
	Total	**3,884.51**	**185.5**

Georgia

Gardabani (Azerbaijan border) – Poti (Georgian Port)

id	Route	Distance (km)	Time (hours)
1	Gardabani – Vell	34.81	
2	Vell – Tbilisi	13.6	
3	Tbilisi – Kashuri	104.04	
4	Kashuri – Kutaisi	78.32	
5	Kutaisi – Samtredia	32.17	
6	Samtredia – Poti	54.69	
	Total	**317.63**	**9.5**

Germany

Oder (Polish Border) – Hamburg (German port)

id	Route	Distance (km)	Time (hours)
1	Oder – Berlin	114.5	
2	Berlin – Wittenberge	188.5	
3	Wittenberge – Ludwigslust	52.4	
4	Ludwigslud – Hamburg	118.4	

	Total	**473.8**	**18.3**

Greece

Athens - Pireaus (Greek capital) – Promachon (Bulgarian Border)

id	Route	Distance (km)	Time (hours)
1	Athens – Lianokladion	157.07	
2	Lianokladion – Paleofarsalos	45.13	
3	Paleofarsalos – Larissa	37.62	
4	Larissa – Thessalonica	300.18	
5	Thessalonica – Strimon	120	
6	Strimon – Promachon	50	
	Total	**710**	**27**

Iran

Zahedan (Pakistani border) to Kapikoy (Turkey)

id	Route	Distance (km)	Time (hours)
1	Zahedan - Bam	288	
2	Bam - Kerman	225	
3	Kerman- Bafgh	216	
4	Bafgh - Yazd	117	
5	Yazd - Kashan	363	
6	Kashan - Mohammadieh	81	
7	Mohammadieh - Aprin	123	
8	Aprin - Qazvin	144	
9	Qazvin - Zanjan	171	
10	Zanjan - Mianeh	124	
11	Mianeh - Maraqeh	168	
12	Maraqeh - Tabriz	129	
13	Tabriz - Samas	151	
14	Samas - Razi	40	
15	Razi - Kapikoy	5	
	Total	**2,345**	**112.2**

Bandar Abbas (Iranian Port) to Sarakhs (Turkmen Border)

id	Route	Distance (km)	Time (hours)
1	Bandar Abbas – Sirjan	359	
2	Sirjan – Mobarakeh	321	
3	Mobarakeh – Tabas	275	
4	Tabas – Torbat Heydarieh	334	
5	Torbat Heydarieh - Sarakhs	330	
	Total	**1,619**	**52**

Kapikoy (Turkish Border) to Sarakhs (Turkmen Border)

id	Route	Distance (km)	Time (hours)
1	Kapikoy – Razi	5	
2	Razi - Samas	40	
3	Samas – Tabriz	151	
4	Tabriz – Maraqeh	129	
5	Maraqeh – Mianeh	168	
6	Mianeh - Zanjan	124	

7	Zanjan – Qazvin	171	
8	Qazvin - Aprin	144	
9	Aprin – Semnan	223	
10	Semnan – Neyshabur	560	
11	Neyshabur - Sarakhs	257	
	Total	**1,972**	**63**

Kaliningrad

Kaliningrad (Russial) - (Lithuanian border)

id	Route	Distance (km)	Time (hours)
1	Lithuanian Borders - Kalinigrad	145	
	Total	**145**	**4.2**

Kazakhstan

Almaty (Kazakhstan) to Sary Agash (Uzbek Border)

id	Route	Distance (km)	Time (hours)
1	Almaty – Otar	156	
2	Otar – Shu	155	
3	Shu – Taraz	233	
4	Taraz - Tulkubas	31	
5	Tulkubas – Shymkent	187	
	Shymkent – Arys	79	
	Arys – Sary Agash	128	
	Total	**969**	**28**

Ucharal (Chinese border) to Petropavi (Russian Border)

id	Route	Distance (km)	Time (hours)
1	Ucharal – Moynly	494	
2	Moynly – Karaganda	946.23	
3	Karaganda – Astana	1,136.56	
4	Astana – Kokchetav	1,438	
5	Kokchetav - Petropavi	1,657	
	Total	**1,657**	**48**

(Uzbek border) to (Russian Border)

id	Route	Distance (km)	Time (hours)
1	U.B. - Beyneu	78.73	
2	Beyneu - Makat	293.93	
3	Makat – Atyrau	123.56	
4	Atyrau – Russian Borders	226.59	
	Total	**722.81**	**21.5**

Ucharal (Chinese border) to Sary Agash (Uzbek Border)

id	Route	Distance (km)	Time (hours)
1	Ucharal - Almaty	765.97	
2	Almaty – Otar	156	
3	Otar – Shu	155	
4	Shu – Taraz	233	
5	Taraz - Tulkubas	31	
6	Tulkubas – Shymkent	187	

7	Shymkent – Arys	79	
8	Arys – Sary Agash	128	
	Total	**1,734.97**	**53**

Kyrgyzstan

Bishkek (capital) to Batyr (Kazakh Border)

id	Route	Distance (km)	Time (hours)
1	Bishkek – Kara Balta	62	
2	Kara Balta – Batyr	53	
	Total	**115**	**7.5**

Latvia

Zilupe (Russian border) - Riga Port

id	Route	Distance (km)	Time (hours)
1	Zilupe – Rezekne	60,6	
2	Rezekne – Koknese	137,7	
3	Koknese – Aizkraukle	12,4	
4	Aizkraukle – Riga	87,8	
	Total	**298.5**	**12**

Lithuania

(Kaliningrad border) – Godogay (Ukrainian Border)

id	Route	Distance (km)	Time (hours)
1	Gudogay – Vilnious	31.75	
2	Vilnious – Prienai	84.77	
3	Prienai – Vilkaviskis	59.63	
4	Vilkaviskis - Borders	27	
	Total	**203.15**	**6**

Moldova

Ungheni (Romanian border) – Kuchurgan (Ukranian border)

id	Route	Distance (km)	Time (hours)
1	Ungheni – Chisinau	74.1	
2	Chisinau – Revaka	25.1	
3	Revaka – Bender	34.4	
4	Bender – Kuchurgan	43.1	
	Total	**176.7**	**8.67**

Mongolia

(Chinese Border) – (Russian Border)

id	Route	Distance (km)	Time (hours)
1	Chinese borders – Ulaan Bataar	636.35	
2	Ulaan Bataar – Russian borders	240.61	
	Total	**876.96**	**42.25**

Poland

Terespol (Belarussian border) - Rzepin (German border)

id	Route	Distance (km)	Time (hours)
1	Terespol - Warszawa	191.9	
2	Warszawa – Kutno	123	
3	Kutno – Poznan	183.7	
4	Poznan – Rzepin	163.7	
	Total	**662.3**	**25.8**

(Ukranian border) - Warsaw (capital)

id	Route	Distance (km)	Time (hours)
1	Medyka - Warsaw	373	
	Total	**373**	**14.34**

Romania

Constanta (Port) – Bucarest (capital)

id	Route	Distance (km)	Time (hours)
1	Constanta – Medgidia	37.1	
2	Medgidia – Fetesti	40.1	
3	Fetesti – Bucarest	145.4	
	Total Kilometers	**222.6**	**9**

Giurgiu (Bulgarian border) – Vicsani (Ukranian border)

id	Route	Distance (km)	Time (hours)
1	Giurgiu - Bucarest	62.6	
2	Bucarest – Ploiesti	58.9	
3	Ploiesti – Buzau	70.9	
4	Buzau – Focsani	70.5	
5	Focsani – Adjud	46.3	
6	Adjud – Roman	100	
7	Roman – Pascani	69.8	
8	Pascani – Suceava	69.8	
9	Suceava – Vicsani	20.7	
	Total	**569.5**	**22.5**

Giurgiu (Bulgarian border) – Jijia (Moldovian border)

id	Route	Distance (km)	Time (hours)
1	Giurgiu - Bucarest	62.6	
2	Bucarest – Ploiesti	58.9	
3	Ploiesti – Buzau	70.9	
4	Buzau – Focsani	70.5	
5	Focsani – Adjud	46.3	
6	Adjud – Roman	100	
7	Roman – Pascani	69.8	
8	Pascani – Iasi	21.8	
9	Iasi – Jijia	41.8	
	Total	**542.6**	**21.5**

Russian Federation

Moscow (Russia) to Vostochny (Russia)

id	Route	Distance (km)	Time (hours)
1	Moscow - Kirov	836	
2	Kirov – Yekaterinburg	238	
3	Yekaterinburg - Omsk	1,546	
4	Omsk - Novosibirsk	629	
5	Novosibirsk - Krasnoyarsk	778	
6	Krasnoyarsk - Irkutsk	1,056	
7	Irkutsk - Chita	1,018	
8	Chita – Belogorsk	1,679	
9	Belogorsk - Khabarovsk	661	
10	Khabarovsk - Vostochny	908	
	Total	**9,349**	**275.6**

St. Petersburg (Russian Port) to Moscow (capital)

id	Route	Distance (km)	Time (hours)
1	St. Petersburg – Moscow	860	
	Total	**860**	**25.5**

St. Petersburg (Russian Port) to (Kazakh border)

id	Route	Distance (km)	Time (hours)
1	St. Petersburg – Moscow	860	
2	Moscow – Ryazan	183.89	
3	Ryazan – Tambov	237.11	
4	Tambov – Saratov	344.23	
5	Saratov - Volgograd	330.54	
6	Volgograd – Aksarayskaya	373.78	
7	Aksarayskaya – Kazakhstan borders	85.37	
	Total	**2,415**	**71**

Solovey (Ukrainian Border) to Vladivostok (Russian Port)

id	Route	Distance (km)	Time (hours)
1	Solovey – Liski	135	
2	Liski -Penza	448.26	
3	Penza - Samara	344.44	
4	Samara – Kurgan	1,015.33	
5	Kurgan - Omsk	513.06	
6	Omsk - Novosibirsk	629	
7	Novosibirsk - Krasnoyarsk	778	
8	Krasnoyarsk - Irkutsk	1,056	
9	Irkutsk - Chita	1,018	
10	Chita – Belogorsk	1,679	
11	Belogorsk - Khabarovsk	661	
12	Khabarovsk - Vladivostok	908	
	Total	**9,185.09**	**270**

Gukovo (Ukrainian border) to (Kazakh border)

id	Route	Distance (km)	Time (hours)
1	Gukovo - Volgograd	390.4	
2	Volgograd – Aksarayskaya	373.78	
3	Aksarayskaya – Kazakhstan borders	85.37	
	Total	**849.55**	**25**

Novorossiysk (Russian Port) to Uspenskaya (Ukrainian border)

id	Route	Distance (km)	Time (hours)
1	Novorossiysk - Krasnodar	100.86	
2	Krasnodar - Rostov	250.60	
3	Rostov - Uspenskaya	86.73	
	Total	**438.20**	**13**

Tajikistan

Dushanbe (capital) to Saryasiya (Uzbek border)

id	Route	Distance (km)	Time (hours)
1	Dushanbe – Pahtaabad	44	
2	Pahtaabad – Saryasiya	5	
	Total	**49**	**3.5**

Turkey

Kapikoy (Iranian Border) to Haydarpassa (Istanbul)

id	Route	Distance (km)	Time (hours)
1	Kapikoy - Van	113.961	
2	Van - Tatvan	-	
3	Tatvan - Elazig	335.09	
4	Elazig - Malatya	118.77	
5	Malatya - Bostankaya	223.21	
6	Bostankaya - Kayseri	197.39	
7	Kayseri - Ankara	379.94	
8	Ankara - Haydarpasa	576.61	
	Total	**1,944.97**	**84**

Turkmenistan

Sarakhs (Iranian Border) to Farap (Uzbek border)

id	Route	Distance (km)	Time (hours)
1	Farap – Turkmenabat	22	
2	Turkmenabat – Mary	243	
3	Mary – Sarakhs	204	
	Total	**469**	**32.25**

Ukraine

Krasnaya (Russian border) – Mostiska (Polish border)

id	Route	Distance (km)	Time (hours)
1	Krasnaya – Krasnoarmeysk	252.1	
2	Krasnoarmeysk – fastov	710.8	
3	Fastov – Zhmerinka	262.5	
4	Zhmerinka – Temopol	255.7	
5	Temopol – Mostiska	207	
	Total	**1,688.1**	**50**

Solovey (Russian border) – Kiev (capital)

id	Route	Distance (km)	Time (hours)
1	Solovey – Kharkov	152.41	

2	Kharkov – Poltava	123.57	
3	Poltava – Kiev	302.79	
	Total	**578.77**	**17,14 hrs ????**

Kvashino (Russian border) – Chernihiv (Belarussian Border)

id	Route	Distance (km)	Time (hours)
1	Kvashino – Donetsk	80.14	
2	Donetsk – Dnepropetrovsk	213.83	
3	Dnepropetrovsk - Fastov	410.53	
4	Fastov – Kiev	60.25	
5	Kiev - Nizhym	116	
6	Nizhym - Chernihiv	65.48	
7	Chernihiv- Belarussian borders	67.56	
	Total	**1,013.81**	**30**

Uzbekistan

Sary Agash (Kazakh Border) to Khodjadavlet (Turkmen border)

id	Route	Distance (km)	Time (hours)
1	Sary Agash - Tashkent	10	
2	Tashkent - Khavast	119	
3	Khavast - Marokand	202	
4	Marokand - Bukhara	249	
5	Bukhara - Khodjadavlet	90	
	Total	**670**	**40.3**

(Kazakh Border) to Khodjadavlet (Turkmen border)

id	Route	Distance (km)	Time (hours)
1	Kazakhstan borders - Nukus	395	
2	Nukus -Miskin	175.73	
3	Miskin – Uchkuduk	226.42	
4	Uchkuduk - Navoi	276.33	
5	Navoi - Bukhara	93	
6	Bukhara - Khodjadavlet	90	
	Total	**1,256.48**	**77.3**

Sary Agash (Kazakh Border) to (Kazakh border)

id	Route	Distance (km)	Time (hours)
1	Sary Agash - Tashkent	10	
2	Tashkent - Khavast	119	
3	Khavast - Marokand	202	
4	Marokand – Navoi	143	
5	Navoi - Uchkuduki	276.33	
6	Uchkuduki - Miskin	226.42	
7	Miskin - Nukus	175.73	
8	Nukus – Kazakhstan Borders	395	
	Total	**1,547.48**	**95**

Tariff rates and structure

There are many tariffs used in rail transport - even within the same country. Factors that typically influence tariff structure and their level are:

- ☑ Different tariffs for the same routes are quoted by forwarders and state rail organizations
- ☑ State rail organizations charge different clients differently. A forwarder, a shipper, a small trader with one container or a big manufacturer with 1000 containers per year pay different tariffs
- ☑ The actual – charged - tariffs are different than the published tariffs
- ☑ Tariffs differ depending whether:
    - o it is bulk or container cargo
    - o it is carried in wagons or by a block train
    - o the client is a forwarder or a shipper
    - o the amount cargo is large
    - o it is long term contract with a guarantee for the quantity
    - o terms of payment are favourable or not
    - o $/€ per train kilometer or per container, or container kilometers etc

Figure 25 provides tariff rates that are currently applied in some countries. All the actual tariffs have been provided through the questionnaires or directly to the consultant by the rail organizations (and not by forwarders or shippers). These are average rates which could be reduced through further negotiations but will be used here. In general, for the purposes of the project these tariffs are adequate to illustrate the average pricing. Wherever there was not any information about the tariffs in a country, the regional average was used.

Figure 25. Rail Tariffs

	20'' full container (per container)	**40'' full container** (per container)	**20'' full container** (per km)	**40'' full container** (per km)	**20'' empty container** (per km)	**40'' empty container** (per km)
Afghanistan			-	-		
Armenia			0.52	0.64		
Azerbaijan			0.52	0.64		
Belarus			0.48	0.55		
Bulgaria			0.75	0.85		
China			0.40	0.50		
Georgia			0.48	0.55		
Germany			0.75	0.85		
Greece			0.75	0.85		
Iran	747	1,093	0.46	0.68	0.23	0.34
Kazakhstan	614	989	0.64	1.03	0.31	0.48
Kyrgyzstan			0.48	0.55		
Latvia			0.75	0.85		
Moldova			0.48	0.55		
Mongolia			0.40	0,50		
Poland			0.75	0.85		
Romania			0.75	0.85		
Russian Federation			0.48	0.55		
Tajikistan			0.55	0.75		
Turkey	621	822	0.31	0.41	0.23	0.29
Turkmenistan	692	1,254.8	1.4	2.6		
Ukraine			0.48	0.55		
Uzbekistan	462.58	832.24	0.64	1.4	0.38	0.67

Note: Rates in US dollars

CHAPTER 5 COMPARISON OF RAIL AND MARITIME TRANSPORT ALONG EATL ROUTES

Trans Siberian Railway route[22]

A model has already been developed to compare two alternative transportation routes: the Trans Siberian rail route and the maritime routes. This model does not provide a comparison of the two transport options given same points of origins and destinations but determines the conditions under which the "watershed" or the final destination, should move further west or further east depending on the increase in tariffs of maritime transport or rail transport. Simulation scenarios are also studied to determine the exact location of the "watershed".

Figure 26. The Trans Siberian Railway case study

a = Maritime freight charges from Japan to Nakhodka (US$)
X = The distance from Nakhodka to the point of destination (km)
b = Railway fees (US$/km)
Y_R = Overall cost of the TSR route (US$)

c = Maritime freight charges from Japan to Saint Petersburg (US$)
K = The distance from Nakhodka to Saint Petersburg (9,713km)
$K - X$ = The distance from Saint Petersburg to the point of destination (km)
d = The truck haulage fees from Saint Petersburg to the point of destination (US$/km)
Y_D = Overall cost of the Deep Sea route (US$)

$$Y_R = a + bX$$
$$Y_D = c + d(K - X)$$

To find the point of destination, X, where $Y_R = Y_D$:

$$a + bX = c + dK - dX$$
$$X = \frac{c - a + dK}{b + d}$$ which gives the watershed.

To find the relationships between the parameters and the watershed:

$$\frac{\partial X}{\partial c} > 0$$

The more expensive the Deep Sea fees, the further the watershed moves to the west.

$$\frac{\partial X}{\partial a} < 0$$

The more expensive the Japan-Nakhodka maritime freight charges, the further the watershed moves to the east.

$$\frac{\partial X}{\partial b} < 0$$

The more expensive the Trans-Siberian Railway fees, the further the watershed moves to the east.

$$\frac{\partial X}{\partial d} = \frac{K(b+d) - (c - a + dK)}{(b+d)^2}$$
$$= \frac{bK - c + a}{(b+d)^2} > 0 \quad \text{If} \quad bK + a > c$$

As long as the cost of transportation via the TSR route to Saint Petersburg ($bK + a$) is higher than the cost of transportation via the Deep Sea route to Saint Petersburg (c), then a rise in truck haulage fees will move the watershed to the west. Hypothetically, regarding transportation bound for Saint Petersburg, if the TSR route were cheaper than the Deep Sea route, there would be a situation where the watershed ceased to be inside Russia, as it is thought all freight would use the TSR route.

22 Tsuji Hisako, The Global Financial Crisis and Trans Siberian Railway Transportation, ERINA REPORT, vol 89, September, 2009.

Case I (Basic Model): Assumes values of US$1,000 for the maritime freight charges from Japan to Nakhodka (a) and US$2,500 for the Deep Sea charges to Saint Petersburg (c). For the railway fees, the 9,314km between Nakhodka and Moscow is taken as costing $4,000, meaning that b= US$0.43/km. For truck haulage fees the 400km between Saint Petersburg and Moscow is taken as costing US$1,500, meaning that b= US$3.75/km. Under these assumptions X= 9,072km and the watershed lies 242km east of Moscow.

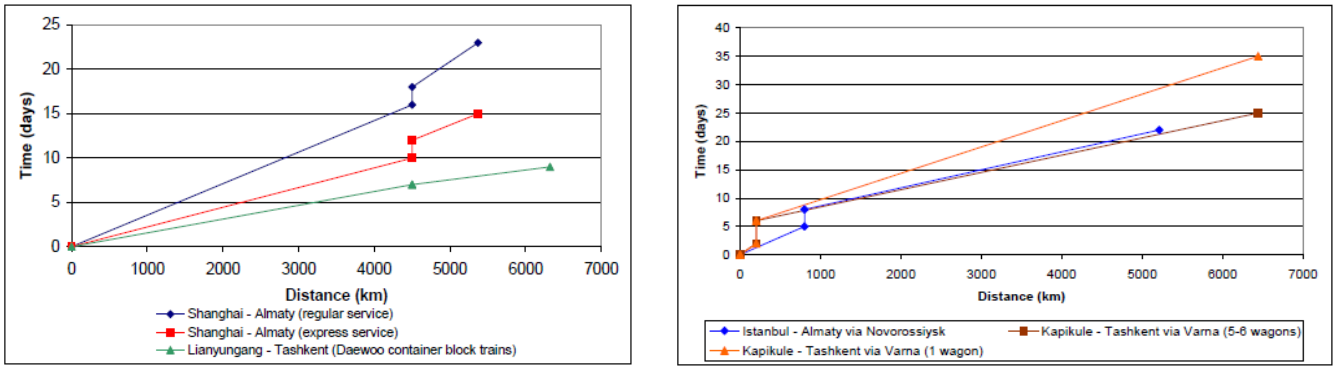
Case II: When the maritime freight charges from Japan to Nakhodka (a) are raised from US$1,000 to US$2,000, the watershed moves to a point 481km east of Moscow. Japan-Nakhodka maritime freight charges are widely held to be approximately US$1,000 more expensive than those between the ROK and Nakhodka, and if all other conditions are equal, it can be considered that the watershed for Japan lies further east than is the case for the ROK.

Source: Tsuji Hisako, The Global Financial Crisis and Trans Siberian Railway Transportation ERINA REPORT, vol. 89 2009

The UNESCAP block trains report [23]

United Nations ESCAP performed an analysis concerning the development of block trains for the region of Central Asia, specifically for Kazakhstan and Uzbekistan. This analysis produced the following results.

Figure 27. Time-Cost-Distance analysis, 2006



Source UNESCAP

Minimum and maximum transit times for regular and express rail services from ports in China to Kazakhstan are 15 and 23 days respectively (Figure 30). The significant difference of eight days is partly caused by the transfer time at the border between China and Kazakhstan, which includes break-of-gauge, transshipping and processing of customs documentation. Meanwhile, data on the container block trains established for shipments from Daewoo Corporation in the Republic of Korea via the Chinese port of Lianyungang reveal that a transit time of nine days is possible.

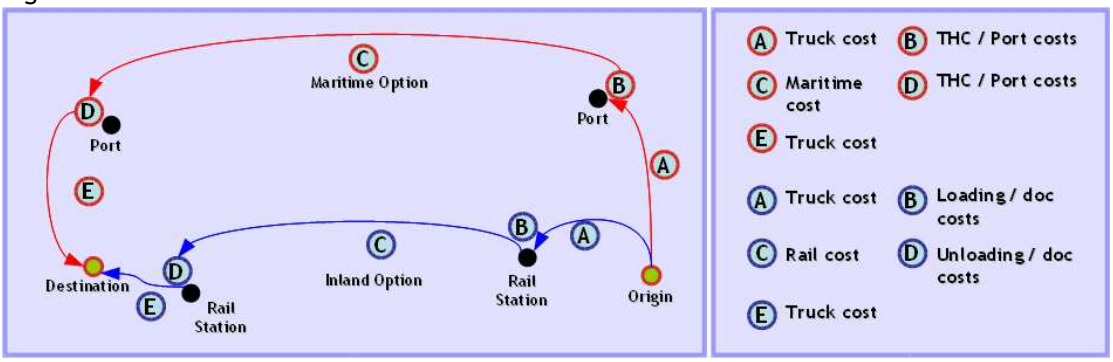
The existing break-of-gauge points at Drushba/Alashankou (China/Kazakhstan), Sarakhs (Turkmenistan/Islamic Republic of Iran) and Brest (Belarus/Poland) are operational hindrances, but do not cause exceptional delays compared with the existing institutional barriers which represent the main reasons for long waiting times and delays at border crossing points. Reported transit times for railway transport routes between destinations in Central Asia and various ports vary between 9 and 35 days.

[23] http://www.unescap.org/ttdw/common/TIS/TAR/operationalization.asp

Comparative analysis of EATL rail and maritime transport

The route and cost structure is determined in the way presented in Figure 28.

Figure 28. Route and cost structure



Source: Author's analysis -

- ☑ Identify the origin of the cargo/shipper ("Origin")
- ☑ Identify the final destination where the cargo is to be delivered ("Destination")
- ☑ Identify the maritime and inland route between "Origin" and "Destination"

Maritime transport option:

- ☑ Identify the closest port to "Origin" location
- ☑ Calculate the distance (km) for road transport (by truck) from the "Origin" location to the closest port; calculate the corresponding cost
- ☑ Calculate the port costs such as handling and other costs
- ☑ Identify the closest and most convenient port for the "Destination" location; calculate the traveling time and costs from one port to another
- ☑ Calculate the costs at the port of close to "Destination"
- ☑ Calculate the distance (km) for road transport (by truck) from that port to the "Destination" location B; calculate the corresponding costs

Inland transport option

- ☑ Calculate the distance (km) for road transport from the "Origin" location to the closest the train (loading) station
- ☑ calculate the costs at the loading station such as loading, documentation, customs
- ☑ Determine the time schedule for the rail service and the corresponding cost
- ☑ Calculate the costs at the unloading station
- ☑ Calculate the distance (km) and costs for road transport from the unloading station to the "Destination" location

EATL ROUTE 1: Khabarovsk (Russia -Origin) - Potsdam (Germany - Destination)

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

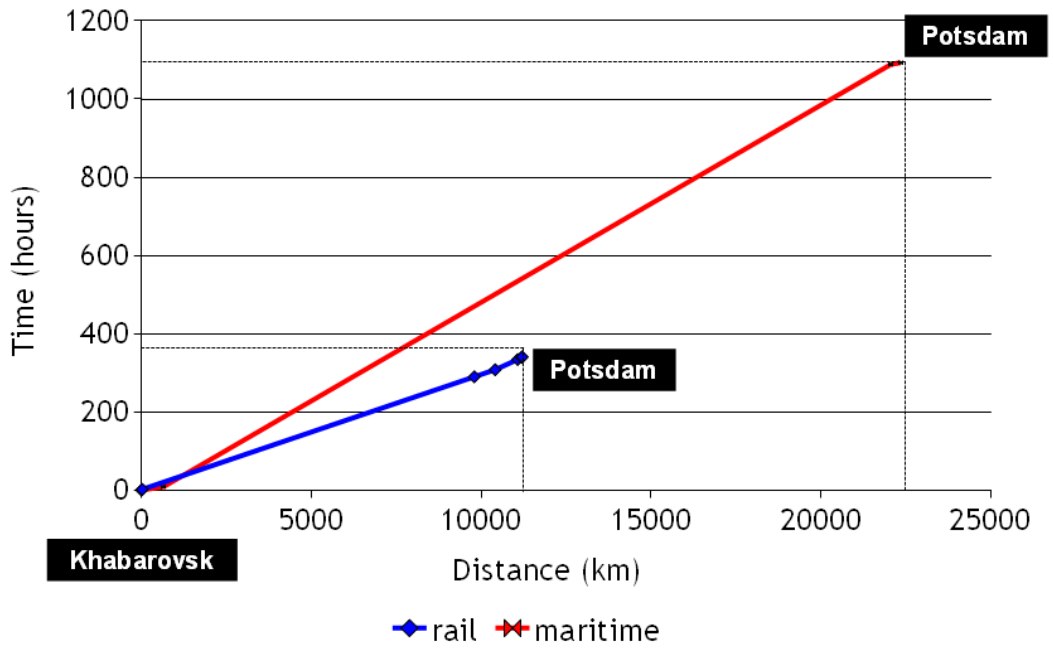
MARITIME TRANSPORT: Khabarovsk (via Vostochny Port) - Potsdam (via Hamburg Port)

Route	km	Cost($)	Time (hrs)
Khabarovsk – Vostochny port (by road)	653	783	9
Vostochny port THC costs	-	300	-
Vostochny port other costs	-	320	-
Vostochny port – Hamburg port (by sea)	21,414	4,200	1,080
Hamburg port THC costs	-	180	-
Hamburg port other costs	-	250	-
Hamburg port – Potsdam (by road)	282	500	4
Total maritime transport	21,414	5,250	1,080
Total road transport	935	1,283	13
TOTAL	**22,349**	**6,533**	**1,093**

INLAND TRANSPORT: Khabarovsk – Potsdam			
Route	**km**	**Cost($)**	**Time (hrs)**
Khabarovsk – Khabarovsk rail station by road	20	150	2
Khabarovsk rail station loading cost	-	30	-
Khabarovsk rail station other costs	-	40	-
Russia (Vostochny – Redki) by rail	9,779	5,378	288
Belarus (Redki – Brest) by rail	613	337	18
Poland (Terespol – Rzepin) by rail	662	562	26
Germany (Oder – Berlin) by rail	114	100	5
Potsdam rail station unloading cost	-	45	-
Potsdamrail station other costs	-	75	-
Potsdam rail station – Potsdam by road	20	250	2
Total rail transport	11,168	6,567	337
Total road transport	40	400	4
TOTAL	**11,208**	**6,967**	**341**

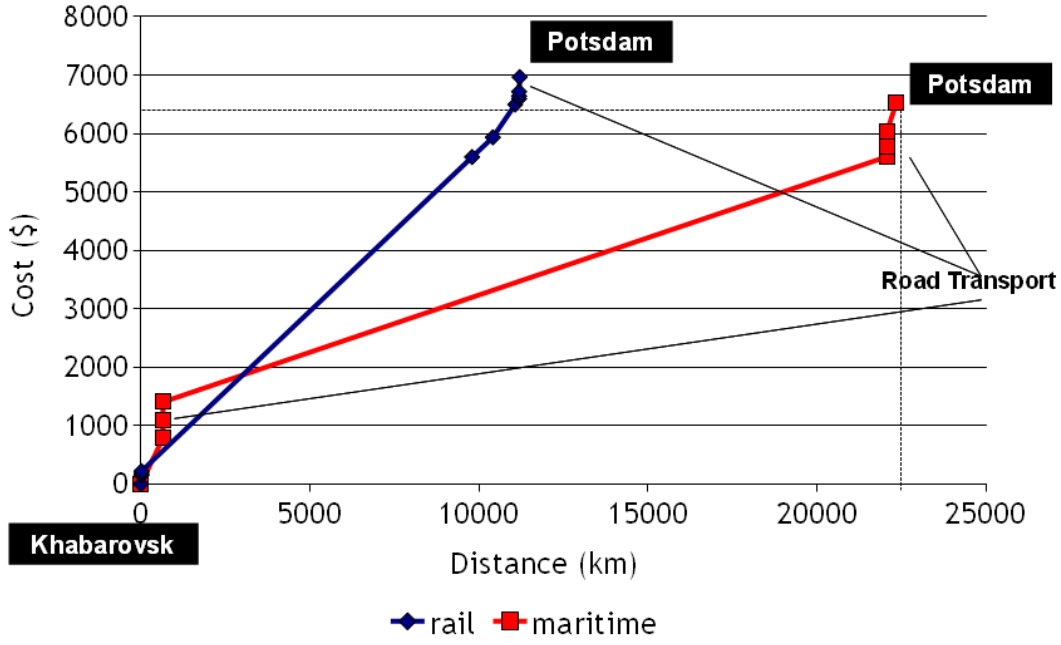
(b)Comparison study by using the Cost/Time/Distance methodology

Time Distance Plot



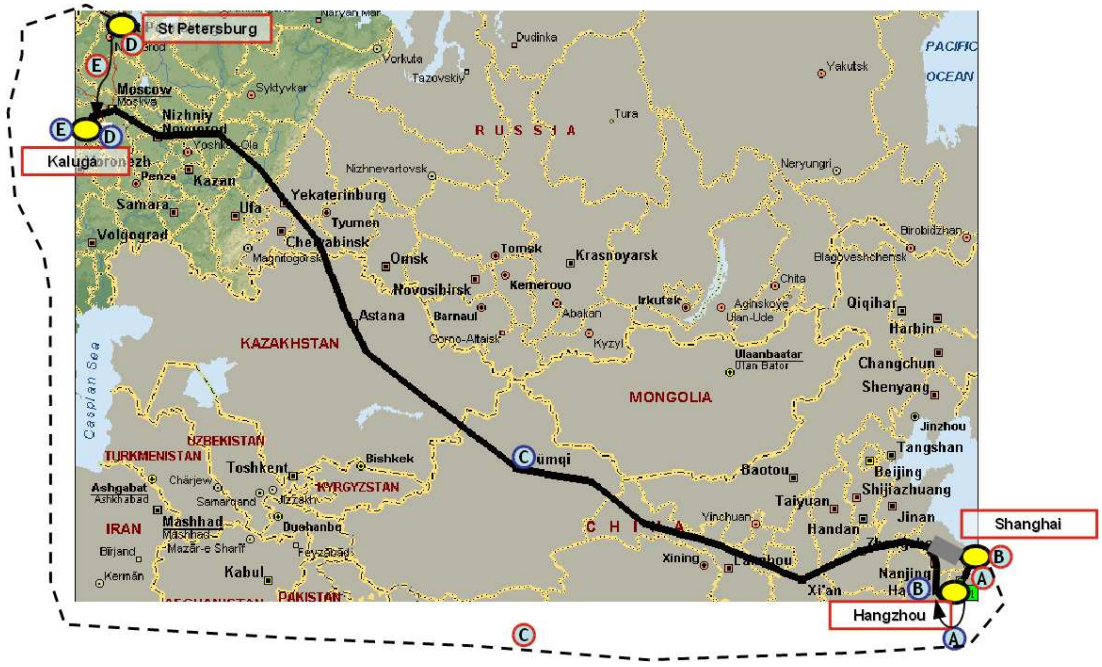
The total traveling time for the block train is 341 hours, which is 14 days and 5 hours of which 2 hours was the trip by truck in Russia, 2 hours the trip by truck in Germany (Potsdam) and the 14 day and 1 hour trip by train. The total traveling time with ocean transport was 1,093 hours (45 days and 13 hours) of which 9 hours was the road transport in Russia, 4 hours the road transport in Germany and 1,080 hours the maritime transport meaning (45 days). There is a difference of 31 days and 8 hours. It should be noted that the maritime transport traveling time has been calculated as absolute number of nautical miles multiplied by 22 knots (average speed of ship), but normally there are further delays as there are not direct connections among all the ports. The time difference can only be expected to be larger.

Cost – Distance Plot



The train option costs $434 more than the maritime transport option.

EATL ROUTE 2 [from Hangzhou (China-Origin) to Kaluga (Russia-Destination)]



Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

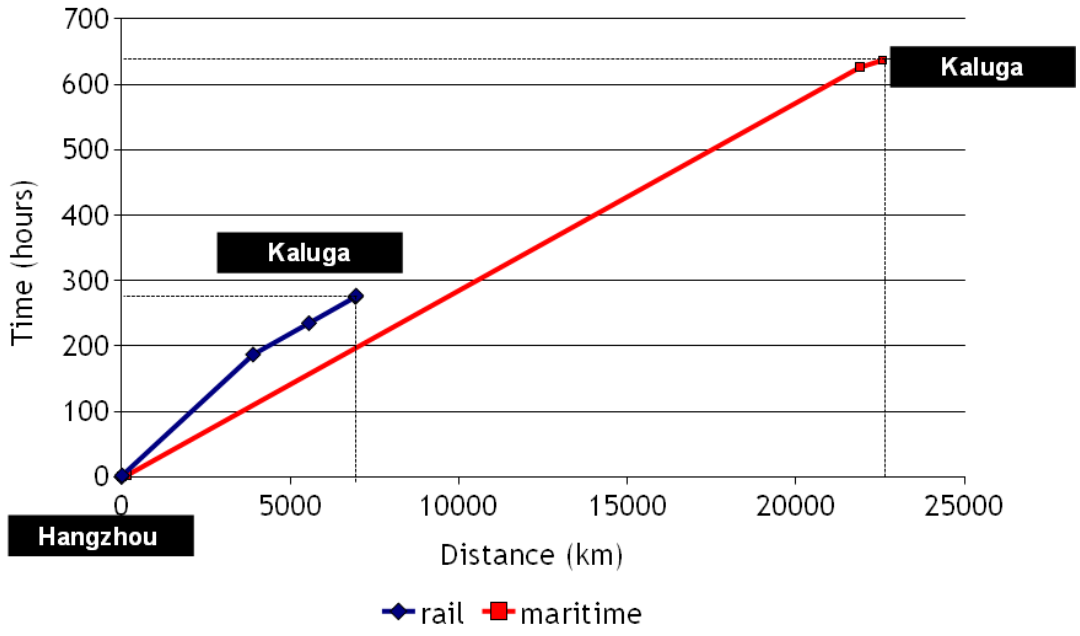
MARITIME TRANSPORT: Hangzhou (via Shanghai port) - Kaluga (via Saint Petersburg port)

Route	km	Cost($)	Time (hrs)
Hangzhou - Shanghai port by road	158	220	2
Shanghai port THC costs	-	100	-
Shanghai port other costs	-	150	-
Shanghai port - Saint Petersburg port by sea	21,733	5,000	624
Saint Petersburg port THC costs	-	250	-
Saint Petersburg port other costs	-	250	-
Saint Petersburg port - Kaluga by road	680	816	11 hrs
Total maritime transport	21,733	5,750	624

Total road transport	838	1,036	13
TOTAL	**22,571**	**6,786**	**637**
RAIL TRANSPORT: Hangzhou – Kaluga			
Route	**km**	**Cost($)**	**Time(hrs)**
Hangzhou – Hangzhou rail station by road	20	100	2
Hangzhou rail station loading cost	-	25	-
Hangzhou rail station other costs	-	30	-
China (Shanghai – Alataw) by rail	3,884.51	1,942.25	185
Kazakhstan (Ucharal – Petropavi) by rail	1657	1,706.7	48
Russia (Petropavi – Kaluga) by rail	1374	755.7	40
Kaluga rail station unloading cost	-	25	-
Kaluga rail station other costs	-	30	-
Kaluga rail station – Kaluga by road	20	100	2
Total rail transport	6,915.51	4,514.65	273
Total road transport	40	200	4
TOTAL	**6,955.51**	**4,714.65**	**277**

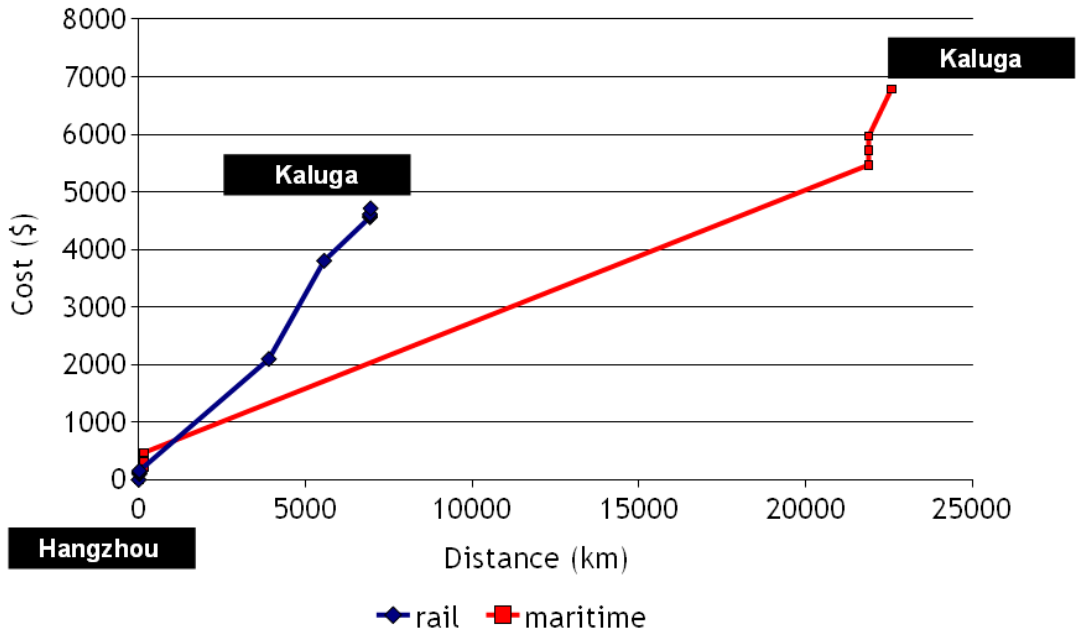
(b)Comparison study by using the Cost/Time, distance methodology

Time – Distance Plot



The ocean freight needs 26 days to reach Kaluga while the rail needs 11 days and 13 hours.

Cost – Distance Plot



The maritime transport is more expensive (by $2,071) compared to the rail transport.

EATL ROUTE 3 [from Tashkent (Uzbekistan -Origin) to Varna (Bulgaria - Destination)]

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

MARITIME TRANSPORT: Tashkent (via Shanghai port) – Varna (via Varna port)

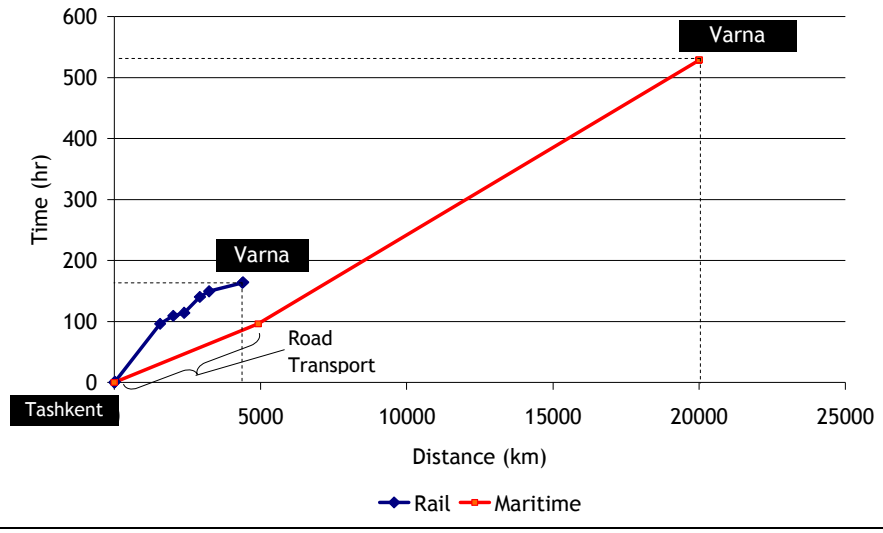
Route	km	Cost($)	Time(hrs)
Tashkent – Shanghai port by road	4,920	3,000	96
Shanghai port THC costs	-	100	-
Shanghai port other costs	-	150	-
Shanghai port – Varna port by sea	15,066	3,650	432
Varna port THC costs	-	250	-
Varna port other costs	-	250	-
Varna port – Varna by road	20	150	1
Total maritime transport	15,066	4,400	432
Total road transport	4,940	3,150	97
TOTAL	**20,006**	**7,550**	**529**

RAIL TRANSPORT: Tashkent - Varna

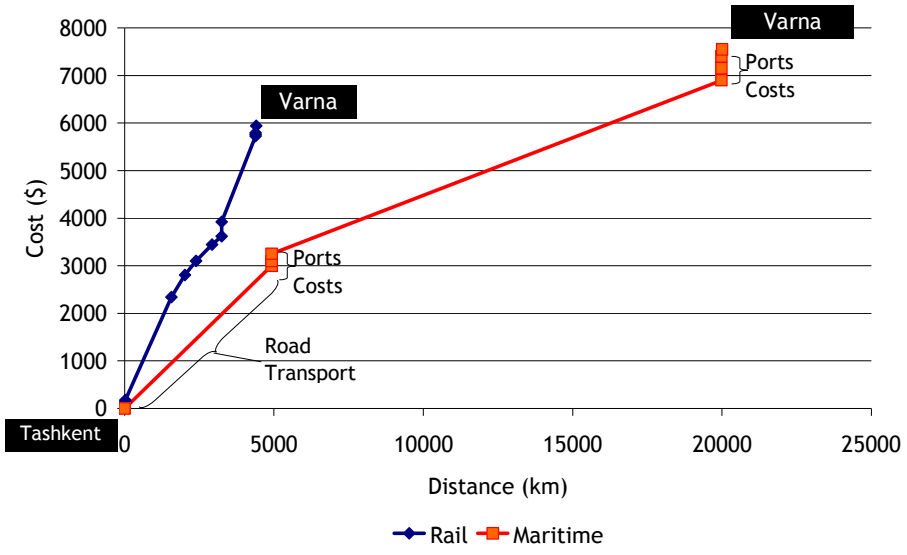
Route	km	Cost($)	Time(hrs)
Tashkent – Tashkent rail station by road	20	120	1
Tashkent rail station loading cost	-	25	-
Tashkent rail station other costs	-	30	-
Uzbekistan by rail	1,547.48	2,166.4	95
Kazakhstan by rail	450	464	13.26
Caspian sea by ferry	375	300	5
Azerbaijan by rail	535.86	343	25.83
Georgia by rail	317.63	175	9.30
Port Poti costs	-	300	-
Black sea by ferry	1135	1,800	14
Varna rail station unloading cost	-	35	-
Varna rail station other costs	-	35	-
Varna rail station – Varna by road	20	150	1
Total rail transport	2,850.97	3,275	144
Total sea transport	1,510	2,400	19
Total road transport	40	270	2
TOTAL	**4,400.97**	**$5,946**	**165**

(b)Comparison study by using the Cost/Time, distance methodology

Time – Distance Plot



Cost – Distance plot



EATL ROUTE 4 [from Almaty (Kazakhstan - Origin) to Istanbul (Turkey - Destination)]

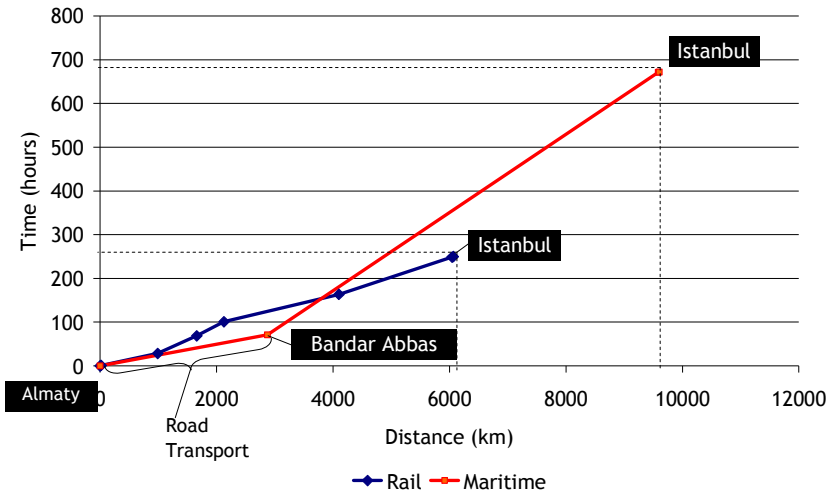
Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

MARITIME TRANSPORT: Almaty (via Bandar Abbas port) – Istanbul (via Istanbul port)

Route	km	Cost($)	Time(hrs)
Almaty – Bandar Abbas port by road	2873	2,300	71
Bandar Abbas port THC costs	-	150	-
Bandar Abbas port other costs	-	150	-
Bandar Abbas port – Istanbul port by sea	6,711	1,650	25 days
Istanbul port THC costs	-	220	-
Istanbul port other costs	-	220	-
Istanbul port – Istanbul by road	20	300	1

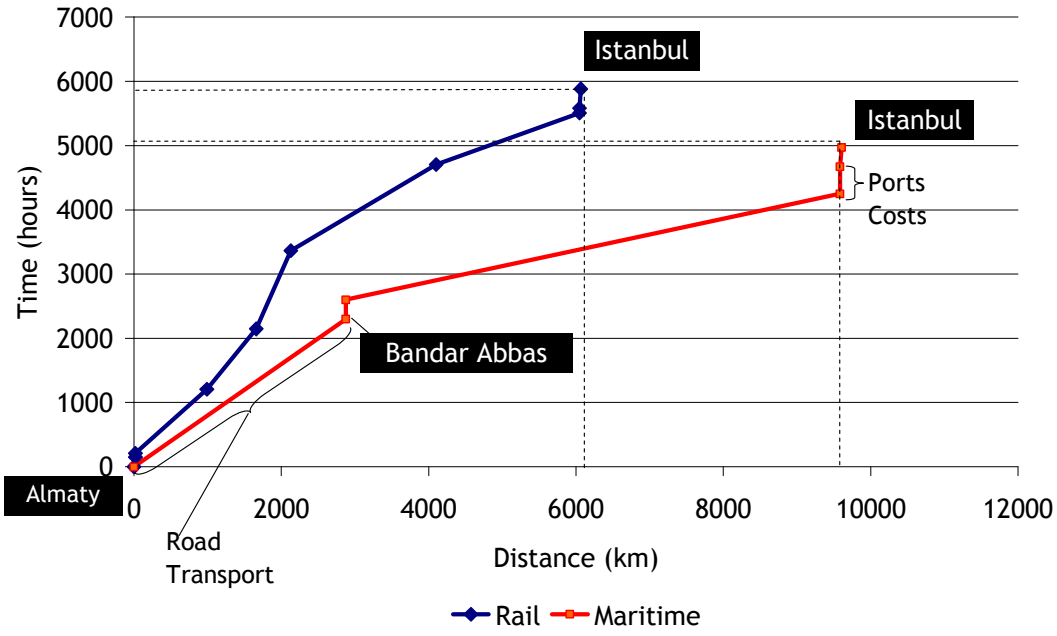
Total maritime transport	6,711	2,370	600
Total road transport	2,893	2,600	72
TOTAL	**9,604**	**4,970**	**672**
RAIL TRANSPORT: Almaty – Istanbul			
Route	**km**	**Cost($)**	**Time(hrs)**
Almaty – Almaty rail station by road	20	150	1
Almaty rail station loading cost	-	30	-
Almaty rail station other costs	-	30	-
Kazakhstan by rail	969	998	28
Uzbekistan by rail	670	938	40
Turkmenistan by rail	469	1,220	32
Iran by rail	1,972	1,340	63
Turkey by rail	1,945	800	85
Istanbul rail station unloading cost	-	30	-
Istanbul rail station other costs	-	45	-
Istanbul rail station – Istanbul by road	20	300	1
Total rail transport		5,431	
Total road transport	40	450	2
TOTAL	**6,065**	**5,881**	**250**

(b) Comparison study by using the Cost/Time, distance methodology
Time – Distance Plot



The ocean freight takes 28 days to reach location B and the rail needs 10 days; a difference of 18 days. This is acceptable as the distance from Almaty to the first port, Bandar Abbas, is long (2,873 km) - a distance that should also be served by train. Kazakhstan is a landlocked country and the location of Almaty makes the logistics challenging. Today, cargo from Istanbul to Almaty is served via Novorossiysk port in Russia and by train to Almaty. Looking at the map only, rail appears to be more competitive than maritime, but the cost analysis shows different results.

Cost – Distance Plot



The cost difference of the two routes is $911. The plot shows clearly the extremely high prices that rail is charged in Turkmenistan and Kazakhstan. Because of the long distance between Almaty and the port of Bandar Abbas in Iran and the high road rates, one would expect that maritime transport would be less competitive than rail, but this is not the case. On the contrary, it is actually cheaper. The non-existence of aligned tariffs in the countries of Central Asia, and the effect this has upon trade, is evident.

EATL ROUTE 5 [from Morvarid Town (Iran) to Pushkin (Russia)]

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

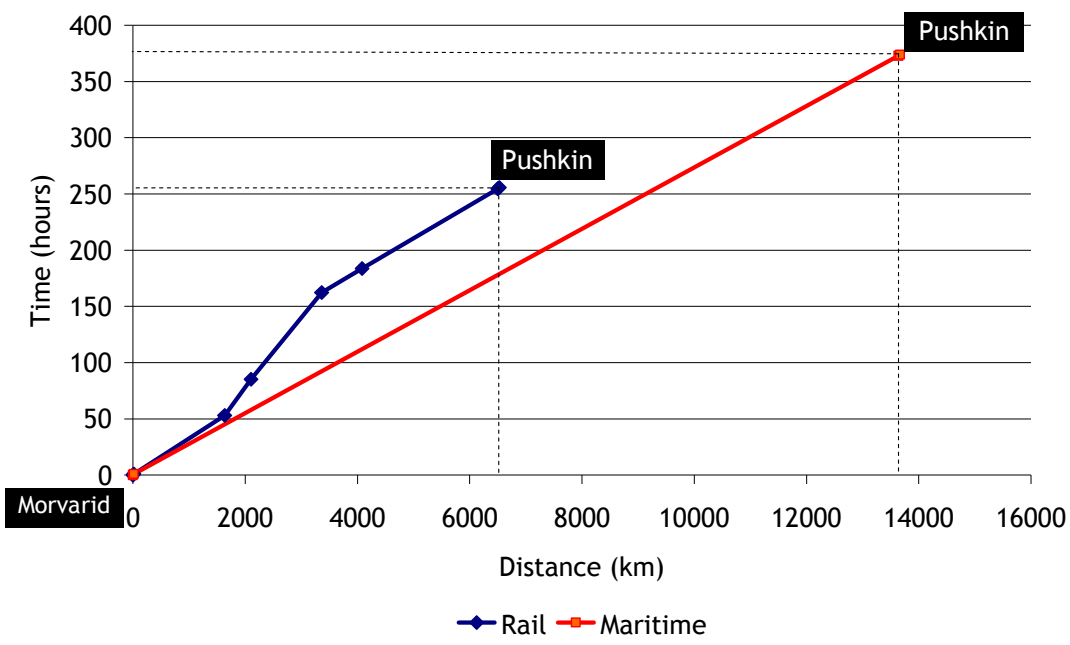
MARITIME TRANSPORT: Morvarid (via Bandar Abbas port) - Pushkin (via Saint Petersburg port)

Route	km	Cost($)	Time(hrs)
Morvarid town – Bandar Abbas port by road	16.7	50	1
Bandar Abbas port THC costs	-	150	-
Bandar Abbas port other costs	-	150	-
Bandar Abbas port – Saint Petersburg port by sea	13,621	2,400	372

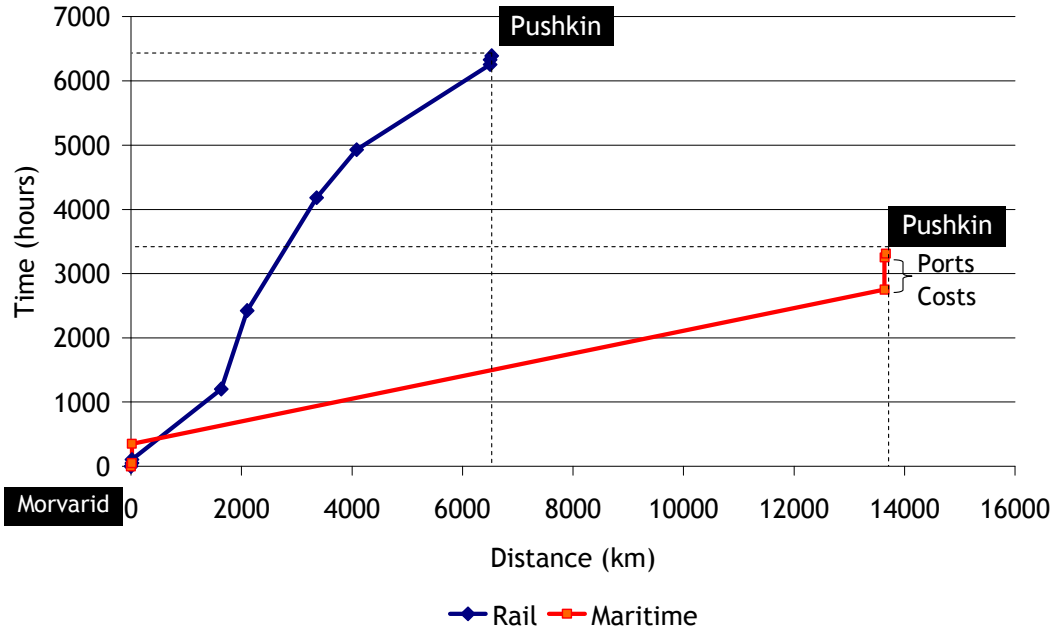
Saint Petersburg port THC costs	-	250	-
Saint Petersburg port other costs	-	250	-
Saint Petersburg port – Pushkin by road	27.3	60	1
Total maritime transport	13,621	3,200	372
Total road transport	44	110	2
TOTAL	**13,665**	**3,310**	**374**
RAIL TRANSPORT: Morvarid – Pushkin			
Route	**km**	**Cost($)**	**Time(hr)**
Morvarid to Morvarid rail station by road	16.7	50	1
Morvarid rail station loading cost	-	25	-
Morvarid rail station other costs	-	30	-
Iran by rail	1,619	1,100	52
Turkmenistan by rail	469	1,219	32n
Uzbekistan by rail	1,256.5	1759	77.5
Kazakhstan by rail	722.8	744.5	21.5
Russia by rail	2,415	1,328	71
Pushkin rail station unloading cost	-	30	-
Pushkin rail station other costs	-	45	-
Pushkin rail station – Pushkin by road	20	60	1
Total rail transport	6482,29	6,280.5	254s
Total road transport	36.7	110	2
TOTAL	**6,519**	**6,390.5**	**256**

(b) Comparison study by using the Cost/Time/Distance methodology

Time – Distance plot



Cost Distance Plot



EATL ROUTE 6 [from Ussuriysk (Russia Federation -Origin) to Kiev (Ukraine Destination)]

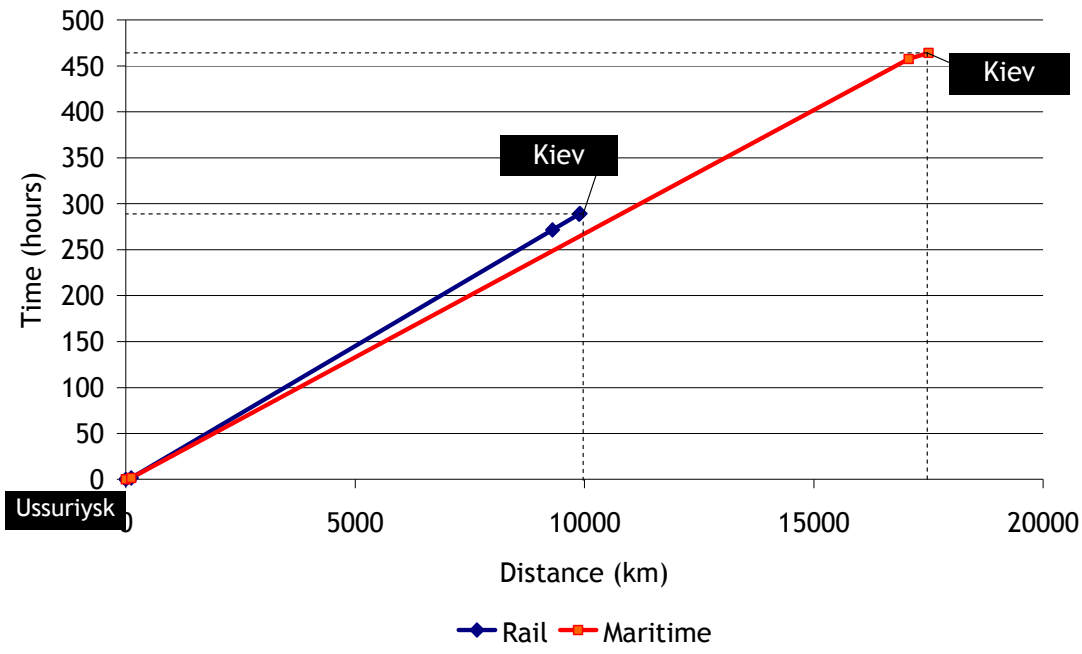
Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

MARITIME TRANSPORT: Vladivostok port - Odessa port			
Route	**km**	**Cost($)**	**Time(hrs)**
Ussuriysk – Vladivostok port by road	118	140	1.5
Vladivostok port THC costs	-	250	-
Vladivostok port other costs	-	250	-
Vladivostok port – Odessa port by sea	16,947	4,900	456
Odessa port THC costs	-	200	-
Odessa port other costs	-	200	-
Odessa port – Kiev by road	436.25	350	6.5
Total maritime transport	16,947	5,800	456
Total road transport	554.25	490	8
TOTAL	**17,501.25**	**6,290**	**463**
RAIL TRANSPORT: Vladivostok rail station - Kiev rail station			

Route	km	Cost($)	Time(hrs)
Ussuriysk – Ussuriysk rail station by road	20	140	1.5
Ussuriysk rail station loading cost	-	35	-
Ussuriysk rail station other costs	-	35	-
Russia by rail	9,185	5,052	270
Ukraine by rail	579	320	17
Kiev rail station unloading cost	-	30	-
Kiev rail station other costs	-	45	-
Kiev rail station – Kiev by road	20	200	1
Total rail transport	9,764	5,517	287
Total road transport	40	$340	2.5
TOTAL	**9,804**	**$5,857**	**289**

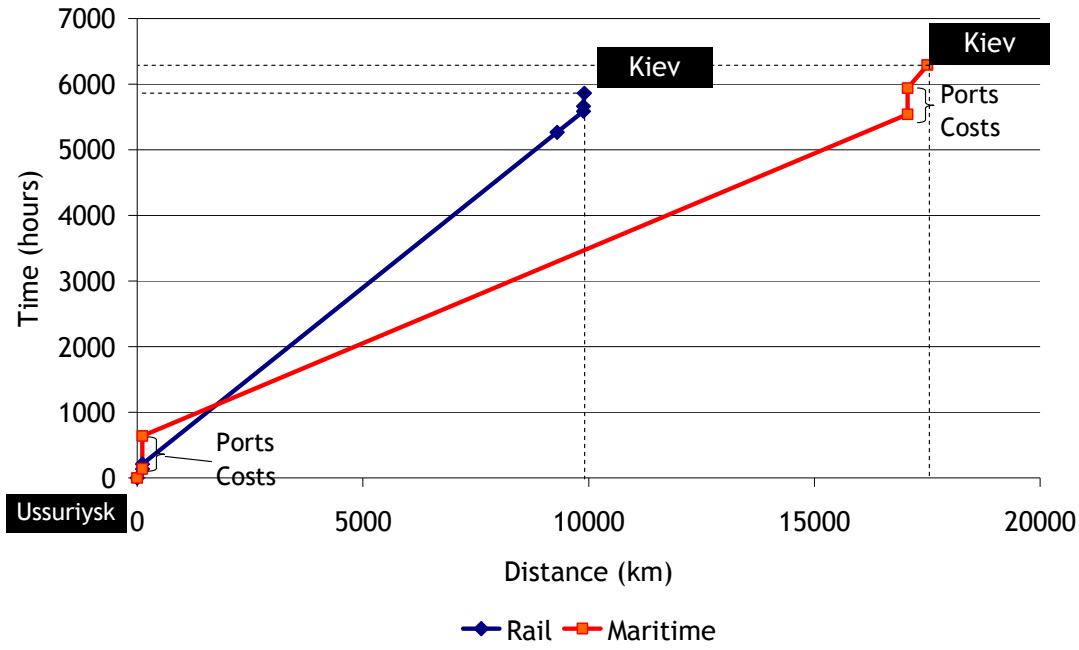
(b) Comparison study by using the Cost/Time, distance methodology

Time – Distance Plot



The time difference between the transportation means is more or less 7 days. In combination with the cost difference, the time difference becomes an advantage. The benefit of this route is that trains have to cross only two countries, both with great railway traditions, with the highest average total traveling speed of 34 kilometers per hour. These conditions make railways in this case study more competitive than maritime transport.

Cost – Distance Plot



The cost difference of $433 is not large, but it is enough to make railways more competitive than maritime transport.

EATL ROUTE 7 [from Shanghai (China - Origin) to Warsaw (Poland - Destination)]

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

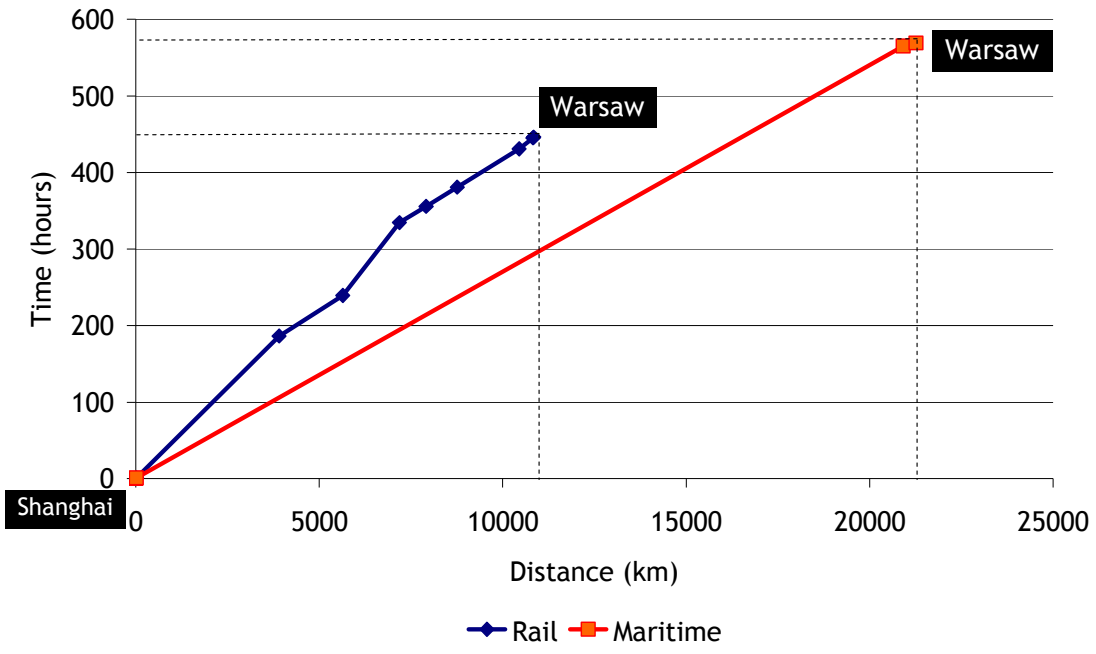
MARITIME TRANSPORT: Shanghai port - Gdansk port

Route	km	Cost($)	Time(hrs)
Shanghai – Shanghai port by road	20	$200	1
Shanghai port THC costs	-	$100	-
Shanghai port other costs	-	150	-
Shanghai port – Gdansk port by sea	20,888	4,900	564
Gdansk port THC costs	-	250	-
Gdansk port other costs	-	250	-
Gdansk port – Warsaw by road	330	450	4
Total maritime transport	20,888	5,650	564
Total road transport	350	650	5 hrs
TOTAL	**21,238**	**6,300**	**569**

RAIL TRANSPORT: Shanghai rail station - Warsaw rail station

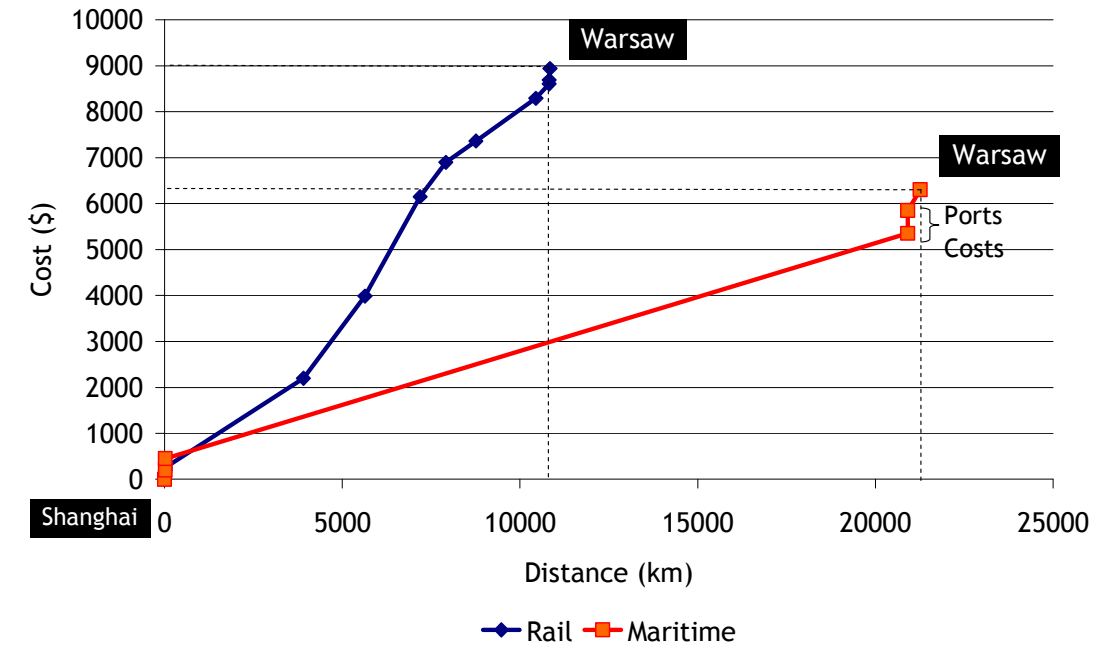
Route	km	Cost($)	Time(hrs)
Shanghai – Shanghai rail station by road	20	200	1
Shanghai rail station loading cost	-	25	-
Shanghai rail station other costs	-	30	-
China by rail	3,884.5	1,942.25	185.5
Kazakhstan by rail	1,735	2532 (total)	53
Uzbekistan by rail	1,547.5	2,166	95
Kazakhstan by rail	723	-	21.5
Russia by rail	849.5	467	25
Ukraine by rail	1,688	928	50
Poland by rail	373	317	14.5
Warsaw rail station unloading cost	-	35	-
Warsaw rail station other costs	-	45	-
Warsaw rail station – Warsaw by road	20	250	1
Total rail transport		8,487	444
Total road transport	40	450	2
TOTAL	**10,800**	**8,937**	**446**

(b)Comparison study by using Cost/Time, distance methodology
Time – Distance Plot



Connecting China with Poland via the countries of Central Asia does not appear competitive for railways. The time difference is only 5 days less for the railways. A block train that operates according to normal conditions (not supported by governments) is likely to waste five days due to the delays at border crossings.

Cost – Distance Plot



The cost difference is large: $2,637. The railway passes through 7 countries (twice in Kazakhstan) and there is 10,840 total rail kilometers, greater distance than connecting China with Germany.

EATL ROUTE 8 [from Krasnodar (Russia -Orogin) to Kaliningrad (Russia - Destination)]

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

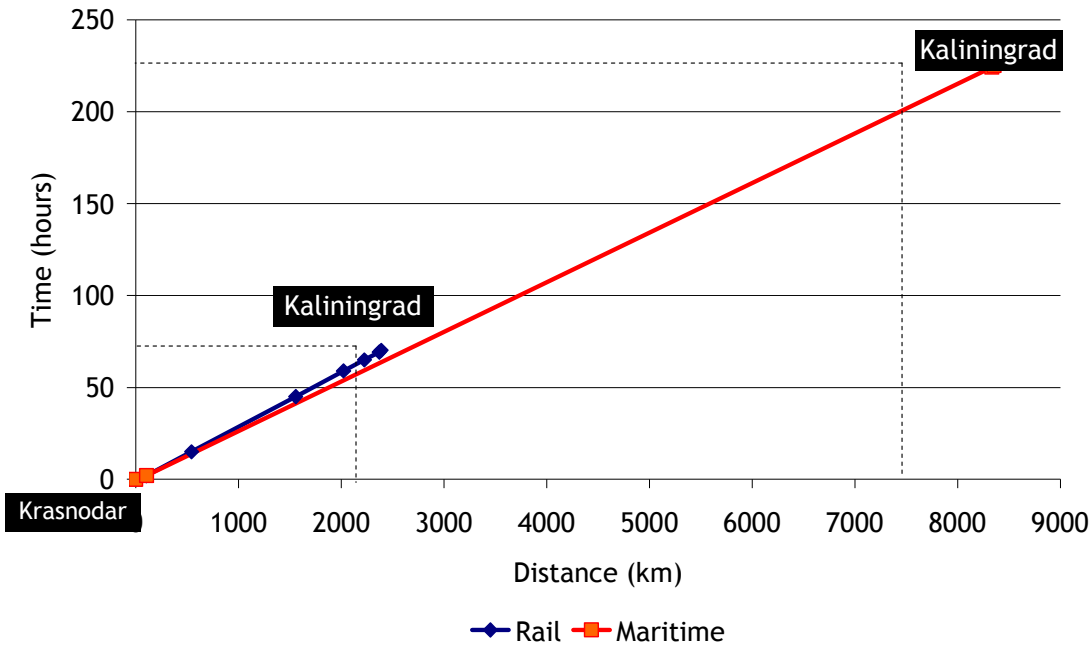
MARITIME TRANSPORT: Novorossiysk port – Kaliningrad port

Route	km	Cost($)	Time(hrs)
Krasnodar – Novorossiysk port by road	105	150	2
Novorossiysk port THC costs	-	250	-
Novorossiysk port other costs	-	250	-
Novorossiysk port – Kaliningrad port by sea	8,230	3,900	222
Kaliningrad port THC costs	-	150	-
Kaliningrad port other costs	-	250	-
Kaliningrad port – Kaliningrad by road	20	100	1
Total maritime transport	8,230	4,800	222
Total road transport	125	250	3
TOTAL	**8,355**	**5,050**	**225**

RAIL TRANSPORT: Novorossiysk rail station - Kaliningrad rail station			
Route	**km**	**Cost($)**	**Time(hrs)**
Krasnodar - Krasnodar rail station by road	20	150	2
Krasnodar rail station loading cost	-	25	-
Krasnodar rail station other costs	-	30	-
Russia by rail	438	241	13
Ukraine by rail	1014	558	30
Belarus by rail	465	256	14
Lithuania by rail	203	112	6
Kalinigrad by rail	145	78	4
Kalinigrad rail station unloading cost	-	20	-
Kalinigrad rail station other costs	-	25	-
Kalinigrad rail station - Kalinigrad by road	20	100	1
Total rail transport	2,265	1,345	67
Total road transport	40	$250	3
TOTAL	**2,305**	**1,595**	**70**

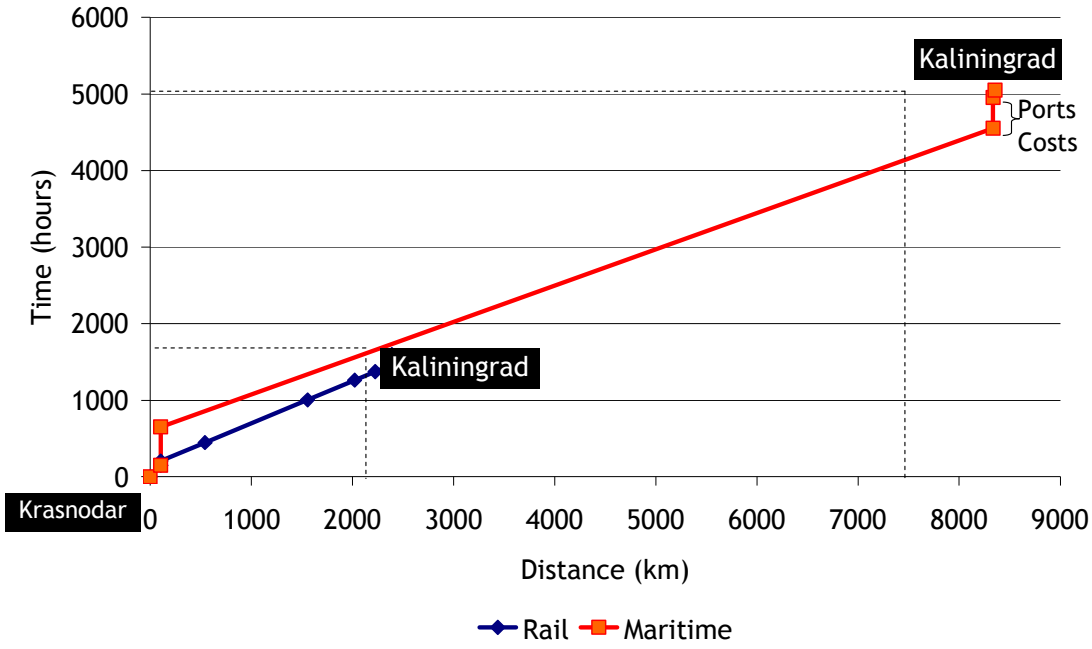
(b)Comparison study by using the Cost/Time, distance methodology

Time - Distance Plot



This case study is dominated by railways. Rail is very competitive in connecting these 5 countries which are all CIS. The time difference is 7 days.

Cost – Distance Plot



The cost difference is the biggest in all scenarios as railways are $3,455 cheaper than the maritime transport.

Case Study: Car manufacturers along Euro Asia Transport Links

Peugeot – Citroen – Mitsubishi Automobiles – Kaluga Russia

A Multimodal Project

This multimodal and logistics project includes **6,000 km roundtrip**, **400 dedicated wagons**, **1,200 dedicated containers** and **80 trucks**

. It is used for transport of parts from eastern France to Russia to be assembled in Kaluga.

***Step 1**: Transport of 144 cars (308 & C4) per day from Sochaux (France) and Mulhouse (France) and 60 from Zeebrugge (Belgium) to Vesoul (France) for disassembling.*

***Step 2**: In Vesoul the containers are loaded on the block train and start their trip to Russia.*
***Step 3**: At the Polish-Belarussian border the containers are transhipped onto wide-gauge trains.*
***Step 4**: The train passes from Belarus to the Russian station of Vorotinsk.*
***Step 5**: The train arrives at the factory in Kaluga.*
***Step 6**: Transport of finished cars from Kaluga to the GEFCO car compound in Bykovo (Moscow).*

Analysis of alternative options:

PCMA RUS LLC – Case Study [from Vesoul (France) to Kaluga (Russia)]

Maritime Transport		Rail Transport	
A Truck cost	D THC / Port costs	A Truck cost	D Unloading / other costs
B THC / Port costs	E Truck cost	B Loading / other costs	E Truck cost
C Maritime cost		C Rail cost	

MARITIME TRANSPORT: Vesoul (via Marselle port) – to Kaluga (via SaintPetersburg port)

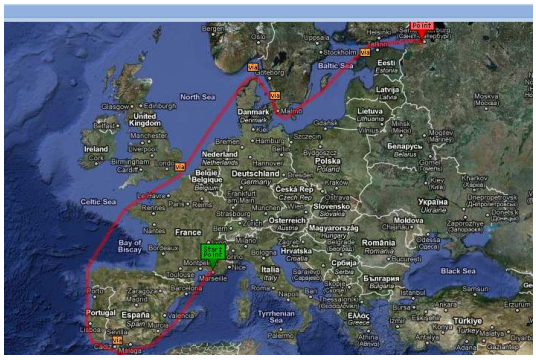
Route	km	Cost($)	Time(hrs)
Vesoul – Marseille port by road	608	750	9
Marseille port THC costs	-	200	-
Marseille port other costs	-	200	-
Marseille port – Saint Petersburg port by sea	6,098	3,900	163
Saint Petersburg port THC costs	-	250	-
Saint Petersburg port other costs	-	250	-
Saint Petersburg port – Kaluga by road	873	750	36
Total maritime transport	6,098	3,900	163
Total road transport	1,481	1,500	45
TOTAL	**7,579**	**5,400**	**208**

MARITIME TRANSPORT: Vesoul (via Hamburg port) – to Kaluga (via SaintPetersburg port)

Route	km	Cost($)	Time(hrs)

Vesoul – Hamburg port by road	913	1000	12
Hamburg port THC costs	-	200	-
Hamburg port other costs	-	200	-
Hamburg port – Saint Petersburg port by sea	1,150	1,200	120
Saint Petersburg port THC costs	-	250	-
Saint Petersburg port other costs	-	250	-
Saint Petersburg port – Kaluga by road	873	750	36
Total maritime transport	1,150	2,100	120
Total road transport	1,786	1,750	48
TOTAL	**2,936**	**3,850**	**168**

6,8 days or 163,2 hours (3293 nm = 6098km)



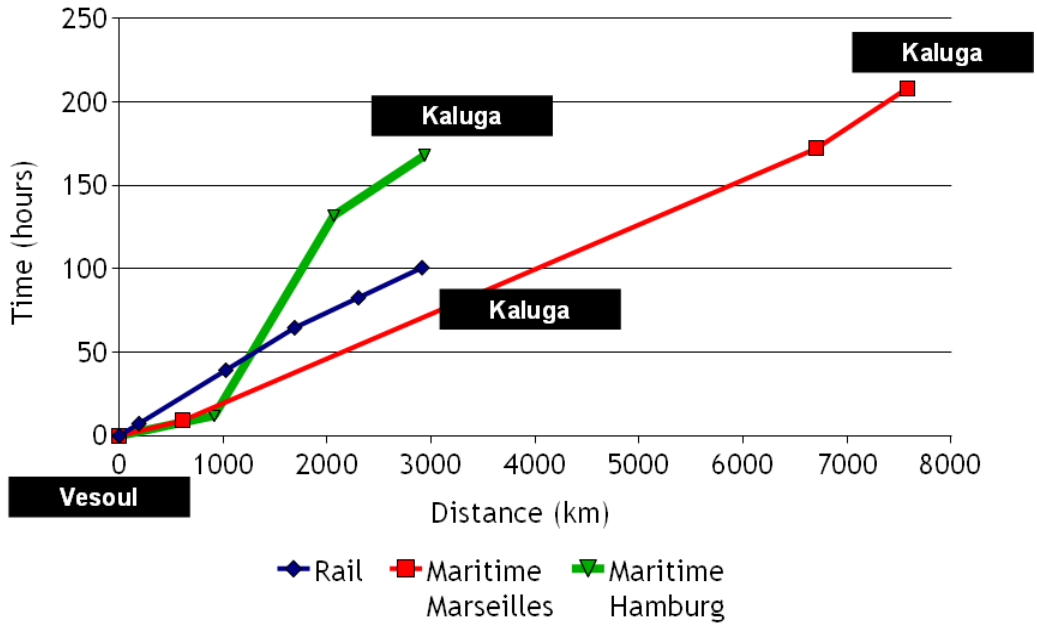
608km (9 hours) + 873,8km (1 day & 12 hours)

RAIL TRANSPORT: Vesoul rail station – Kaluga rail station

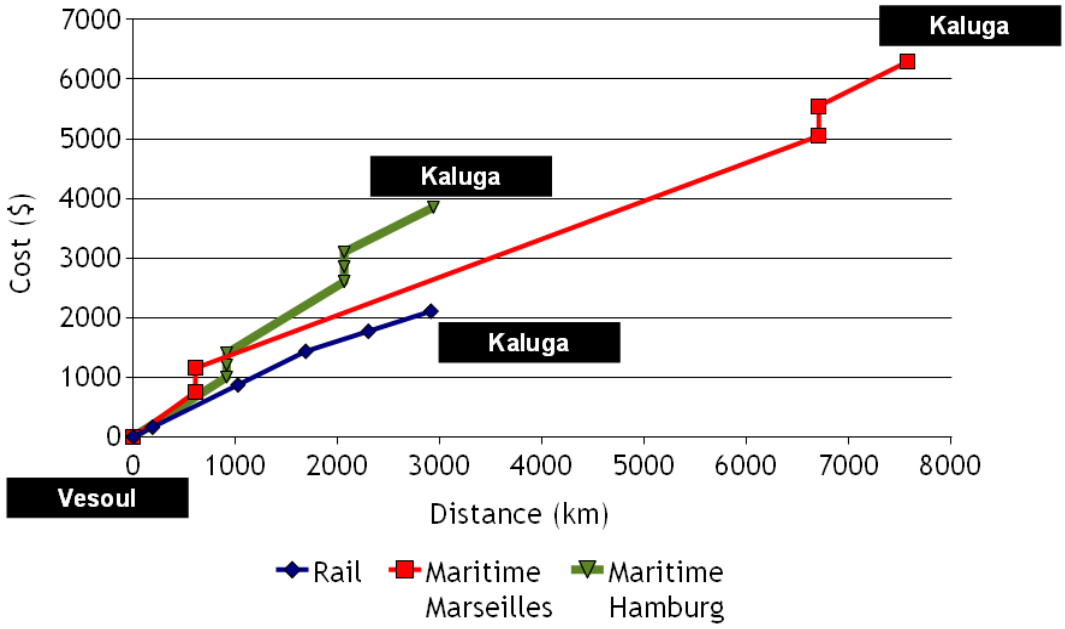
Route	km	Cost($)	Time(hrs)
France: Vesoul – Belfort (*53,88km*) / Belfort – Mulhouse(*37,84km*) / Mulhouse – Strasbourg (*97,30km*) = total 189,02 km, total 7,27 hours;	189	161	7
Germany: Strasbourg – Karlsruhe (*67,85km*) / Karlsruhe – Stuttgart (*85,6km*) / Stuttgart – Nurnberg (*157,55km*) / Nurnberg – Dresden (*259,63km*) / Dresden – Berlin (*165,87km*) / Berlin – Rzepin (*99,17km*) = total 835,67 km, total 32 hours;	836	710	32
Poland: Rzepin (German borders) - Terespol (Belarussian borders) = total 662,3 km, total 25 hours & 47 min ;	662	563	25.5
Belarus : Brest (Polish Borders) - Redki- (Russian borders) = total 613,2 km, total 18 hours;	613	337	18
Russia: Redki – Kaluga = total 611,57 km, total 18 hours;	612	336	18
Total rail transport	2,912	2,107	101
Total road transport	-	-	-
TOTAL	**2,912**	**2,107**	**101**

(b)Comparison study by using the Cost/Time, distance methodology

Time – Distance Plot



Cost – Distance Plot



The results illustrate that the selected transport route for this case study appears to be the optimal one. The train used 5 days less and costs $3,293 less (Marseille) or $1,743 less (Hamburg).

ANNEX I

Survey

As part of the study tailor-made questionnaires (see below) for rail and road and for every participating country were developed and distributed to rail organisations and freight forwarding associations. Forty-four custom-made questionnaires were sent. Six completed questionnaires were received. In addition five unofficial responses were received.

Forwarders Questionnaire.

Questionnaire

UNECE Expert Group on Euro Asian Transport Links (EATL)

Personal Information

Country: Date:

Organization:

The respondent

Name & Surname:

Organization: Position:

Tel: Fax: Email:

Deadline: ***Please reply before before the end of March 2010 by e-mail (port@unece.org) or by fax (+41-22-917 0039)***

The information that you provide will be considered as strictly confidential

Objective of the Questionnaire

This Questionnaire aims to compare the performance of EATL (time-cost) routes with relevant maritime-based routes (port to port plus inland sections) and identify conditions under which EATL options would be competitive.

1. Cost / Time analysis of specific maritime routes

Ref	Maritime Route	Time (Days)	Cost ($) (in the parenthesis please indicate the cost for the opposite direction)	
			TEU	FEU
1	Busan - Bandar Abbas		( )	( )
2	Shanghai - Bandar Abbas		( )	( )
3	Vladivostok - Bandar Abbas		( )	( )
4	Bandar Abbas - Rotterdam		( )	( )
5	Bandar Abbas - Hamburg		( )	( )
6	Bandar Abbas - Barcelona		( )	( )
7	Bandar Abbas -Antwerp		( )	( )
8	Bandar Abbas - Riga		( )	( )
9	Bandar Abbas - Tallinn		( )	( )
10	Bandar Abbas - Klaipeda		( )	( )
11	Bandar Abbas -Yokohama		( )	( )
12	Bandar Abbas - Murmansk		( )	( )
13	Bandar Abbas - St. Petersburg		( )	( )
14	Bandar Abbas - Odessa		( )	( )
15	Bandar Abbas - Kaliningrad		( )	( )
16	Bandar Abbas - Thessalonica		( )	( )
17	Bandar Abbas - Varna		( )	( )
18	Bandar Abbas - Costanta		( )	( )
19	Bandar Abbas - Novorossiysk		( )	( )
20	Bandar Abbas - Kavkaz		( )	( )
21	St.Petersburg - Shanghai		( )	( )
22	St.Petersburg - Rotterdam		( )	( )
23	St.Petersburg - Barcelona		( )	( )
24	St.Petersburg - Vladivostok		( )	( )

2. Cost of Delivery to final destinations and to ports by trucks.

(Transportation of empty cntr to shipper, loading and return full cntr back to port of origin and transportation of full container to final shipper, unloading and return of empty container back to port of destination)

Country	30 km radius		100 km radius		Trip per km ($)
	TEU($)	FEU($)	TEU($)	FEU($)	
Kazakhstan					

3. Cost of value added services in ports

Ports	Unloading of Containers ($)	Loading of Containers ($)	Customs Formalities ($)
Bandar Abbas			
St. Petersburg			

Other Costs	P	($)
Entrance cost		
Parking cost		
Loading to truck cost		
Unloading from truck		
Other documents		
Other cost/ Specify		

4. Please provide information for the following train services that operate on Euro-Asian routes.

Train	Train Services	Cost per container TEU (FEU)		Total time (days / hours)	Total Km	Capacity in Containers
1406	Brest (Belarus) - Nauschki (Russia), Ulan Bator (Mongolia) - Huh Hoto (China)		( )			
1208	Berlin (Germany) - Kunzevo (Russia) "Ostwind"		( )			
1251/ 1252	Almaty (Kazakhstan) - Dostyk (Kazakhstan) - Alaschankou (China)		( )			
1402/ 1401	Lianyungang (China)- Alaschankou - Dostyk - Saryagasch (Kazakhstan) - Assake (Uzbekistan)		( )			
1401/ 1402	Tianjin (China) - Alaschankou (China)/ Dostyk (Kazakhstan) - Almaty (Kazakhstan)		( )			
	Shenzhen, Alaschankou (China) - Dostyk (Kazakhstan) - Llezk, Susemka (Russia) - Zernovo, Cop (Ukraine) - Hungary		( )			
1418/ 1417	Klaipeda (Lithuania) - Radviliskis - Eglaine (Latvia) - Posinj (Russia) - Sebesh (Russia) - Ozinki (Russia) - Aktobe, Almaty (Kazakhstan)		( )			
1407	Shenzhen (China) - Ulan Bator (Mongolia) - Nauschki (Russia) - Brest (Belarus) - Maleszewicze (Poland)		( )			
1409	Beijing (China) - Ulan Bator (Mongolia) - Nauschki (Russia) - Brest (Belarus) - Maleszewicze (Poland) - Hamburg (Germany)		( )			

6. Specify reasons for delays or high costs in central Asia when cargoes are being transported by trucks or by trains.

Reasons for delays or high costs	by truck	by rail
Border crossing: technical operations		
Border crossing: customs procedures		
Border crossing: police controls		
other controls		
Unofficial stopovers		
Safety - Cannot travel during the night		
Unnecessary inspections (provide examples)		
Hidden costs (please specify)		
Documents (CMR - TIR - CIM - SMGS etc)		
Visa procedures		
Other factors (specify)		

Please note any other comment you would like concerning the Euro Asian Transport Linkages.

Questionnaire

UNECE Expert Group on Euro Asian Transport Links (EATL)

Personal Information

Country: Date:

Organization:

The respondent

Name & Surname:

Organization: Position:

Tel: Fax: Email:

Deadline: ***Please reply before before the end of April 2010 by e-mail (port@unece.org) or by fax (+41-22-917 0039)***
The information that you provide will be considered as strictly confidential.

Objective of the Questionnaire

The overall objective is to compare the (time-cost) performance of EATL routes with relevant maritime-based routes (port to port plus inland sections) and identify conditions under which EATL options would be competitive.

This survey focuses on the information necessary to estimate and compare the duration and costs of the EATL routes using container block trains and competing routes based on deep-sea shipping in combination with road transport to final destination.

These questions aim to collect the following data on operations of block trains: **(1)** time schedule of the specific route (km analysis, stopover analysis, time analysis), **(2)**, main tariffs and any additional charges, **(3)** train capacity (number of wagons), **(4)** information on consignment notes, and **(5)** investment projects that would improve the operation of trains.

1. Give a detailed time schedule for each EATL Route - Block Train that passes from your country.

Time Schedule for EATL Route 2 and 3

Stop Points	Arrival Time	Departure Time	Staying Time	Kilometers among stopovers
Dostyk	0			
Ucharal				
Aktogal				
Sayaq				
Moyynty				
Uspenskly				
Karaganda				
Astana				
Makinsk				
Petropavl				
Chistoye				
or				
Aktogat				
Sary Ozek				
Almaty				
Otar				
Shu				
Lugovaya				
Tashkent				
SUBTOTAL		0	0	
TOTAL TIME		0		0

Reasons for stopovers:

Time Schedule for EATL Route 9

Stop Points	Arrival Time	Departure Time	Staying Time	Kilometers among stopovers
Tashkent	0			
Arys				
Turkestan				
Kyzylorda				
Dzhusaly				
Novokazalinsk				
Aralsk				
Oktyabrsk				
Aktyubinsk				
SUBTOTAL		0	0	
TOTAL TIME		0		0

Reasons for stopovers:

2. Tariffs. Please indicate the tariffs and additional charges for the operations of the block train.

Use of railroads, wagons and locomotives		euros per kilometer
Loading of containers to the train		euros per movement
Unloading of containers from the train		euros per movement
Fill in of the appropriate papers		euros per paper
Ferry Transportation Costs		euros per container or wagon
Ferry Loading Costs		euros per container or wagon
Ferry Unloading costs		euros per container or wagon
Other Expenses		

3. Train Capacity

How many container wagons can one locomotive of your rail organization pull?

Please indicate the maximum length of a train

Please indicate the maximum gross weight of the train (including cargo)

4. Consignment Notes

What kind of consignment notes do you use?	
CIM	
SMGS	
Common CIM/SMGS	
Local	
Other	

5. Investment Projects

Indicate any kind of investments (incl. border stations, marshalling yards, etc) that would facilitate the operations of the block train and could improve its safety, time schedule, tariffs etc.

Description of the project	Budjet	Why will improve operations