

# Influence of a Potential Railway Line Connecting the Caspian Sea with the Black Sea on the Development of Eurasian Trade

## *Utjecaj potencijalne željezničke pruge između Kaspijskog i Crnog mora na razvoj Euroazijske trgovine*

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### Summary

This article deals with the current state of the transport of goods on East - West routes. It presents currently available options of carriage with mentioning the barriers and problems associated with the increasing Eurasian trade of goods carried along these corridors. Special attention was focused on costs and time analysis of exemplary freight of 40-foot container from China to Poland using alternative routes. It is determined that there are alternative possibilities that also include waterways. The main aim of this article is to present the potential demand related to the TRACECA major traffic flows passing through a corridor formed on one hand, in Western and Central Europe, and on the other - in Central and East Asia. As one of these possibilities a TRACECA corridor with the railway Baku-Tbilisi-Kars is considered together with SWOT analysis based on experts' knowledge. The benefits of intermodal transport are obvious so the introduction of railway line connecting two seas, the Caspian Sea with the Black Sea, seems to be the crucial element in the cheapest solution.

### KEY WORDS

East - West routes  
traffic flows  
railway Baku-Tbilisi-Kars  
TRACECA

### Sažetak

*Članak govori o trenutnom stanju u prometu robe na rutama Istok-Zapad. Predstavljene su trenutno dostupne opcije prijevoza uzimajući u obzir prepreke i probleme vezane uz povećani euroazijski promet koji se odvija ovim koridorima. Posebna pozornost usmjerena je na analizu troškova i vremena za prejevoz tereta u kontejneru od 40 stopa iz Kine u Poljsku alternativnim koridorima. Utvrđeno je da postoje alternativne mogućnosti koje uključuju i plovne putove. Cilj rada je predstaviti moguću potražnju vezanu uz TRACECA glavne prometne tokove koji prolaze Zapadnom i Srednjom Europom i Srednjom i Istočnom Azijom. Kao jedna od mogućnosti razmatra se TRACECA željeznički koridor Baku-Tbilisi-Kars, kao i SWOT analiza temeljena na stručnom mišljenju. Prednosti intermodalnog prijevoza su očite, te se uvođenje željezničke pruge koja povezuje dva mora, Kaspijsko i Crno, čini ključnim elementom najjeftinijeg rješenja.*

### KLJUČNE RIJEČI

rute Istok - Zapad  
protok prometa  
željeznica Baku-Tbilisi-Kars  
TRACECA

## 1. INTRODUCTION / Uvod

It is now well known that the main production facilities in the world are located in South-East Asia. Accordingly, most of the goods are imported into Europe from this region. It is clear from Fig. 1, which is based on the statistics of trade turnover between Europe and the countries of East Asia [1], that the greatest amount of goods transferred between Europe and China, and in recent years the disproportion in between import and export is biggest in China.

Most of the cargo in East - West direction is transported by sea. In this case, the main technology used is container transportation. It is assumed that in case of such load there is a necessity of goods delivery by rail. The main aim of this article is to present the potential demand related to the TRACECA major traffic flows passing through a corridor formed on one hand, in Western and Central Europe, and on the other - in Central and South-East Asia.

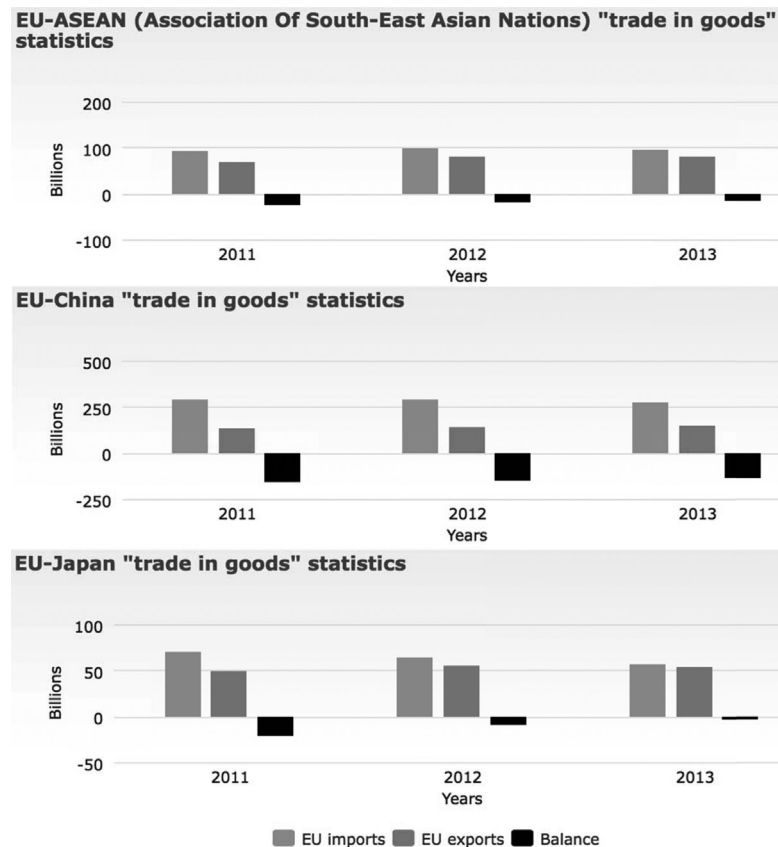


Figure 1 Turnover between the countries of South-East Asia and Europe in billion tons in the years 2011-2013  
 Slika 1. Promet između zemalja jugoistočne Azije i Europe u milijardi tona za period 2011-2013

## 2. TRANSCONTINENTAL RAILWAY TRANSPORTATION ANALYSIS / Analiza transkontinentalnog željezničkog prijevoza

### 2.1. Analytical studies on costs and time of east - west containers transportation by sea and alternative modes / Analitička studija troškova i vremena u kontejnerskom prijevozu istok-zapad morem i alternativnim rutama

Beginning with the debate on meaningfulness of opening potential transnational transport corridors the profitability of the various transport modes and transport duration should be analysed. The aim of the analytical study was to examine the paradigms mentioned in the literature and the time and cost comparison of containers transportation on selected routes. These are the basic factors to be taken into account when making optimal decisions on the carriage of goods by forwarders. The research methodology used was based on price lists analysis for the carriage and handling service of typical 40" containers on the route Shanghai-Suzhou (China) and Warsaw-Praga (Poland).

According to the article [2] published the author analysed the development of rail transport in Russia and has concluded that "the delivery of containers from the Far East to Europe in a week" is possible. However, he explained some reasons which can limit such shipments. One of the main reasons is certainly the price of such transportation. The author could not determine prices, but noted that the energy losses in the transportation of containers from the Far East to Europe by rail is 3 times bigger than when transported by sea which is a price increase factor.

Such energy losses will vary depending on which country in Europe it will be supplied. Besides, delivery price largely depend on the energy loss, while the price of energy is dependent on market conditions.

It should be noted that, indeed, it is quite difficult to assess the financial side of such shipments. Most of the Russian logistics operators do not indicate on their pages any prices or delivery times. Nevertheless, there is a possibility to assess it using data indicative by Chinese company JCC Int. Trade [3]. Shipping costs for 40" container from Shanghai-Suzhou to the Warsaw Praga station using the Trans-Siberian Railway costs about 7,500 USD which covers costs of transportation and loading and unloading service on marginal terminals as well as on transshipment terminals (due to the difference in track gauge in China, Russia and Europe). Customs costs are not taken into account, because they depend on the type of goods and the country's customs legislation. The delivery takes 14 days.

The same site allows us to estimate the delivery costs of containers by sea. There are two options for the delivery of the container from Shanghai to Warsaw with an overload on road transport in Hamburg or Gdynia. Approximate price of the first variant (Shanghai - Hamburg - Warsaw) is 3,001 USD (including USD 1,250 - sea freight, container handling in the port of Hamburg - 450 EUR; delivery by road to Warsaw - 1,100 EUR). Approximate price of the second variant (Shanghai - Gdynia - Warsaw) is 2,185 USD (including USD 1,600 sea freight, container handling at the port of Gdynia - 700 PLN; delivery with using of truck to Warsaw - 350 EUR [4]). There is a third option of delivery, using only rail. Approximate price of this option (Shanghai

- Hamburg - Warsaw) is 2,459 USD (including USD 1,250 sea freight, container handling at the port of Hamburg - 450 EUR; delivery by rail to Warsaw - 620 EUR). This option, however, is designed for containers with a maximum weight of 16 tons. For containers with a larger mass the price is slightly higher. Thus, it must be concluded that at present, the delivery charge for containers from China to Poland by sea is only 1/3 price of the similar delivery organized by rail. The delivery time claimed in the article [2], however, yet is not possible although the rail delivery is significantly faster than by sea.

Obviously, in case of urgent deliveries from the factory, located in the region of South-East Asia, there's the necessity to deliver containers by rail however 3 times more expensive according to the just-in-time delivery. But it is clear that such deliveries are usually extraordinary not regular. In the quoted material [2] editor cites the opinion of another well-known expert (Mikhail Bialinis), who believes that regular rail transportation on routes East - West could be competitive for maritime transport only if the price would not exceed the prices of similar maritime transport by more than 25 %.

Another issue that must be added here is the development of maritime transport technology according to container ships construction. There are container ships of Triple E-Class and Post-Triple E-Class now available, which can transport more than 18,200 TEU. This has led to a significant reduction of shipping prices. For example, according to the same sources, transport of 40" container on the route Shanghai - Gdynia - Warsaw would have been 4,205 USD in 2011. The comparison shows that at present this price has fallen by half. The price of rail transportation remained practically unchanged.

It is obvious that the above prices are just one example. There is a large number of logistics operators who offer other prices. Nevertheless, the price level corresponds with the below given data. For example, according to website [19] 40" container can be delivered from Shanghai to Vladivostok by sea for 2,140 USD and then can be delivered to Moscow by railway for 3,465 - 3,635 USD. The delivery to Poland is not considered here, but if you take a town in Russia, which is at a similar distance as Warsaw, for example, Rostov, the price of delivery by rail will be 4,455 USD. Should be noted that these prices do not include: customs clearance, inspection system, preparing of the container for customs inspection, weighing, protection during transit at Russian Railways, radiation control, cargo insurance. Thus, despite the fact that the owners of the website [19] declare inexpensive delivery, the real cost of delivery exceeds the above price.

The comparison of prices of container delivery by sea to Europe (Poland) can be performed using the website [20], which shows examples of previous estimates. For example, 05.07.2015 considered delivery of container 40"HQ (65 m3) FCL from the port of Ningbo (China) to the port of Gdynia (Poland) (price 1,800 USD), and then by road to the city of Lublin (price 1,500 EUR). Thus, the total shipping cost was 3,459 USD.

A similar estimation was made on 04/03/2015. It was delivered container from the port of Qingdao (China) to the port of Gdynia (Poland) (price 1,800 USD), and then by road to the city of Łódź (price 1,750 PLN). Thus, the total shipping cost was 2,254 USD. It should be noted that the relatively low cost of delivery by road has been associated with the restriction to 22 tons weight.

## 2.2. Problems considering transcontinental railway transportation / *Problemi u transkontinentalnom željezničkom prijevozu*

To indicate the complexity of the issues discussed other factors should be emphasized in addition to cost and time factors affecting development of transcontinental trade. In article [5] some key reasons were identified, why the railway transportation of goods on the route East - West is not profitable, despite the strong statements of political leaders and heads of regional railways. As one of the main reasons noted was that the price is one of the determining factors but others are also mentioned.

It's worth to consider other problems of rail transportation in the specified direction such as the lack of platforms for transportation of containers, for example. One of the largest manufacturers of platforms for 1520 mm track in the former Soviet Union is Uralvagonzavod (Nizhny Tagil, Russia). This plant has been chosen as an example, because thanks to its given products Urals Federal District in 2014 was the leader in Russia (36,3% of wagon production) [23]. In O. Siyenko interview [6], the General Director admitted that "de facto there is no market of freight wagons in Russia" and this critical situation applies to other Russian manufacturers of wagons. Only the official reports of this manufacturer [7] indicate the intention to reduce the production of wagons by 20% compared with the previous year. This is explained by a small number of contracts signed. As it is known, a drop in production in Russia comparing to official statements can be much larger. Recent Russian forecasts presume the decrease in production of wagons in 2015 by 44,3% [22].

The situation with the production of wagons in Ukraine is even worse. For example, one of the main manufacturers of wagons, including platforms, Krukiv Wagon Factory reduced production in 2015 by 83%, and released only 8 wagons in January [8]. Thus, the situation with the mass transportation of containers on the East - West route is currently very problematic from the technical side.

There are other significant problems standing in the way of transportation on the East - West route specified in article [5] connected with inconsistency of legal frameworks of countries participants in the process of transportation. There are highly sophisticated customs rules, which are often interpreted subjectively. There is the lack of inter-state agreements on cross-cutting tariff rates. Debating the issue of setting a standard method for calculating the freight rates is yet not eliminated and rather increasing.

Significant political antagonisms between bordering countries is another problem. Economic sanctions that are imposed on Russia, and that have been taken by the Russian Federation, are not conducive for the development of Eurasian trade. Accordingly, there is a reduction in the volume of cargo transportation by rail, which is the basic of Russian transport. For example, the official data of the Ministry of Economic Development of the Russian Federation published statistics, that during January - April of 2014 the trade turnover with the EU countries was decreased by 3.4% comparing to the same period of previous year. In Ukraine in 2015 therefore further reduce of trade turnover and, accordingly, reduce of rail traffic expects further fall.

This of course reflects the prosperity of railway transportation in neighbouring countries. For example, in recent years the

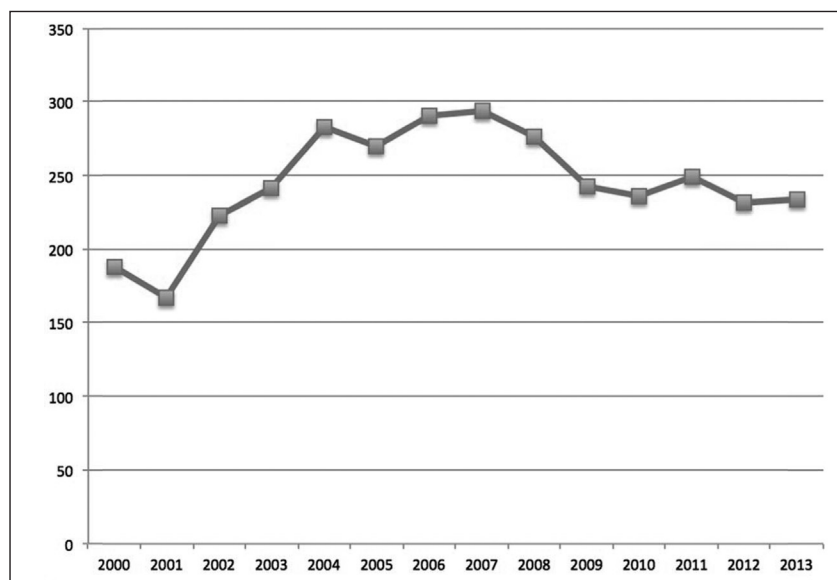


Figure 2 The volume of cargo in million tons on Polish railways  
 Slika 2. Zapremina tereta u milijun tona na Poljskim željeznicama

investment in railway infrastructure in Poland, as well as in the technical state of the railways in general has significantly increased. An increase in rail traffic flows should be expected, but the truth is opposite which is a real phenomenon. The graph shown in Fig. 2, built on the basis of official statistics of the Polish Railway Administration, shows that since 2007 there has been a steady decline of traffic volume from almost 300 million to 230 million tons. This decrease can be explained also by the fact of Poland's location that is treated as a transit country. Decrease in turnover between Russia and EU significantly affect the railway transportation. The situation is similar in other neighbouring countries (Czech Republic and Slovakia).

Considering the development of railway communication, and particularly freight transport between East and West, it is worth noting that in the existing political situation, this prospect seems vague. Against the background of optimistic statements of branch leaders in Russia and assurances that if not today, then tomorrow it will work, there are the numbers that stay exactly in the opposite. There are many examples of this, for example, the contradictory statements of the Russian [11] and Ukrainian [12] sides with respect to the recommendations for the logistics operators how to deliver the goods, bypassing Ukraine or not.

### 3. POSSIBLE ALTERNATIVES TO EXISTING EAST-WEST ROUTES / *Moguće alternative postojećim rutama Istok - Zapad*

There are alternative opportunities for delivery of goods on the East - West route, which are presented on map in Fig. 3 according to the TRACECA (Transport Corridor EU-Caucasus-Asia) project [13] were given. As shown in Fig. 3 there are three main road routes considered: Trans - Russian route (blue); Trans - Turkish route (brown) and Trans - Caucasian route (red). Rail routes could be identical with road routes, because in theory transport corridor should provide different modes of transport according to commodity paradigm.

Obviously, safety is one of the key factors in the assessment of the attractiveness of the given route. Unfortunately, current situation related to military activities in the Donetsk region, and

in general due to the political tensions between Ukraine and Russia do not allow to ensure the safety and attractiveness of traffic on the Trans - Russian routes. Trans - Turkish route in the part which could pass through the territory of Iran is also not sufficiently safe, so investments in infrastructure in this part of the route are practically impossible now.

The real alternative that seems possible is the expansion of project of the new rail link between the Caspian Sea and the Black Sea, which will run through the borders of two following countries: Azerbaijan and Georgia. The political situation in this region is currently stabilized. Military conflict between Russia and Georgia, which took place in 2008, remained in the past. The trade relations between the given countries are developing. There is, of course, the danger of armed conflict between Armenia and Azerbaijan. However, firstly the probability of conflict is small, and secondly it should not hinder the transportation by rail.

The idea, behind the creation of new infrastructure, is to create an alternative transport network for the Trans-Siberian Railway (TSR) and north and south trans-Asian corridors. Implementation of the initiatives is created under the central segment of TRACECA. Corridor is involved in gradually developing trends of trade and economic development between European and Asian global markets and integration of the corridor into the Trans-European Transport Networks (TENs).

The basic characteristics that permitting the evaluation of selected route is the capacity of railway transport as well as utilization of this mode of transport in multimodal transport. In this case, the implementation of port handling operations must be taken into special consideration, performing the function of containers break-bulk points global logistics flows. The most important of these shipping points are: Baku port located on the Caspian Sea and Poti and Batumi ports located on the Black Sea. The container terminal located in Baku handles 15,000 containers annually. APM Terminals in Poti in 2014 handled 384,992 TEU and Batumi's annual throughput is similar: 400,000 TEU; see [16]. The new solution therefore will bring measurable benefits associated with an increased range of services to the



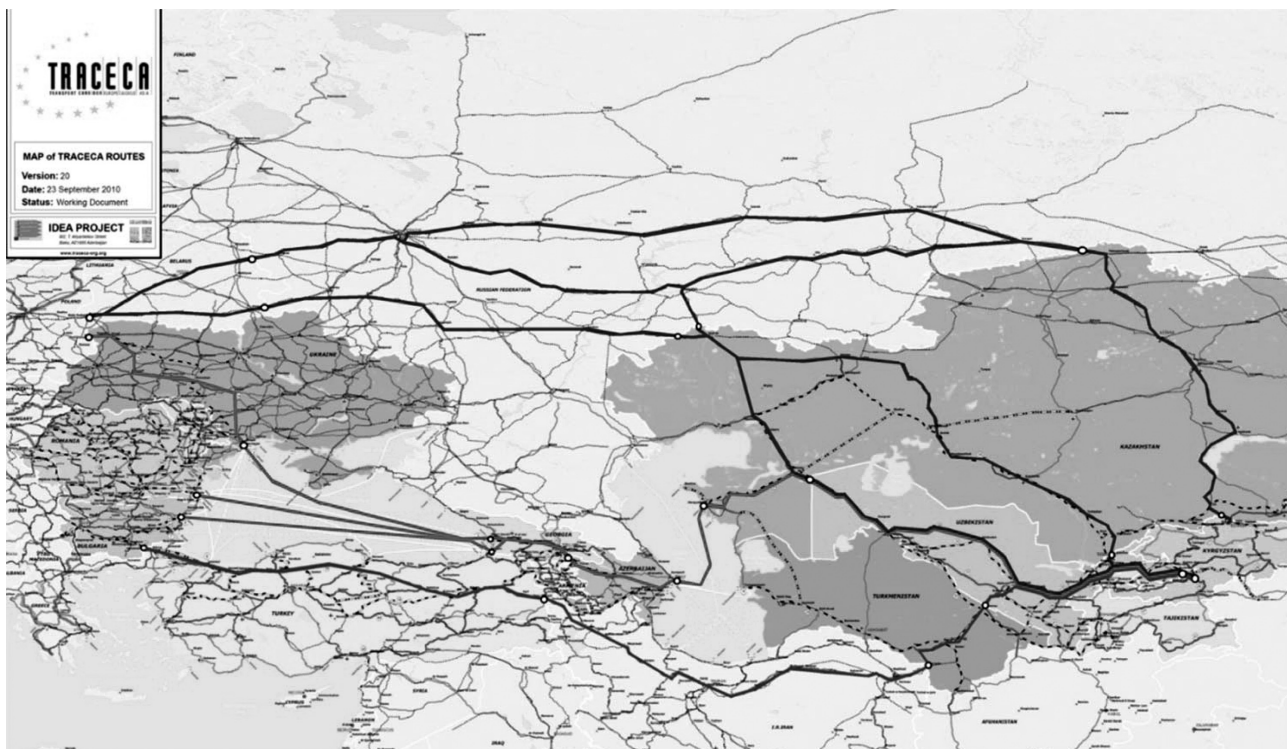


Figure 3 Alternative possibilities of delivery of goods between East and West by road  
 Slika 3. Alternativne mogućnosti za isporuku robe cestovnim prometom između Istoka i Zapada

client through the delivery of a “door-to-door” relation by a new route which will effectively lower prices of transportation and increasing the quality of customer service.

Being the most advantageous transit option and the short haul between the Caspian Sea and the Black Sea, the railway line will create an alternative at the intersection of both between West and East and between a number of northern and southern countries. The significance of the Azerbaijan and Georgian Railways will grow simultaneously. New stable route will allow to bring together the attitudes towards the development, harmonization and increase of effective use of transit-transport potential which will finally ensure further integration of transport systems and strengthening the communication between Europe and Asia. As such corridor is consisted of many different transport parts we have possibilities to optimize multi-commodity loading/unloading (transshipment) process in different ports, see [17] and [18]. The application of such expert systems could decrease transportation cost significantly.

What are the facts that speak in favour of such decisions? While trade turnover between Russia and European Union decreased, exports from Azerbaijan to the EU in 2014 increased by 2.24% compared with the year 2013. Thus import for the same period increased by 26.4% [14]. Georgia’s economic success also looks great. In particular, the foreign trade turnover of Georgia in 2014 increased by 10% compared with 2013 year. These facts allow to express the hope that if there will be no destabilization of the political situation, that took place in 2008, the development of transport infrastructure, and as a result the increasing of transportation along the corridor TRACECA can be a real opportunity to expand the delivery of goods between East and West.

It is obvious that there are currently a number of technical barriers for development of railway traffic on this route. This is a difference of track gauge on one side in China, Turkey and European Union (1435 mm) and on the other hand in Kazakhstan, Uzbekistan, Turkmenistan, Azerbaijan and Georgia (1520 mm). I.e. double container handling should be done. It should be noted that the northern route also suggest a double transfer.

Another barrier is the need for a ferry crossing the Caspian and Black Sea. However, in the latter case it was possible to find alternative solutions. In particular, on February 4, 2015 on the Georgian section of railway Baku-Tbilisi-Kars (Fig. 4 [13]) the first train was tested. Regular communication on this railway should be open by the end of 2015. Thus, after the transfer to road at the last station wagons with cargoes to Europe will be able to follow within the existing rail network.

### 3.1. SWOT analysis of the new possible route / SWOT analiza nove potencijalne rute

Assessment of the attractiveness and usability evaluation of a potential railway line Connecting the Caspian Sea with the Black Sea is very subjective, so we decided to use heuristic method based on expert knowledge (SWOT analysis) in order to present the key issues affecting development of possible route. SWOT analysis was preceded by pointing out the factors affecting the development of a railway line with STEEPLE method (acronym of Social, Technical/Technological, Economical, Ecological, Political, Legal and Ethic factors), according to the research methodology scheme shown in Figure 5.



Figure 4 Potential section of the railway Baku-Tbilisi-Kars introduced into operation tests  
 Slika 4. Potencijalni odjeljak željeznice Baku-Tbilisi-Kars u testnom radu

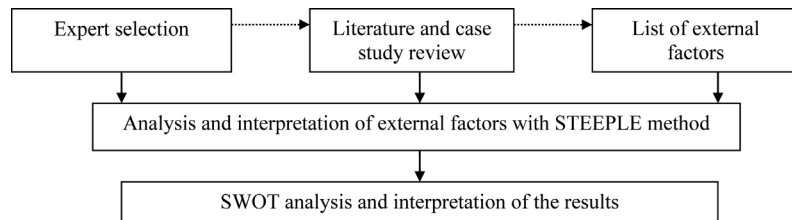


Figure 5 Qualitative research methodology of a potential railway line  
 Slika 5. Kvalitativna metodologija istraživanja potencijalne željezničke trase

For the determination of the STEEPLE external factors final list, each factor was defined by evaluating its validity in a 0 - 5 scale, which is the average rating the experts opinions together with indication of the positive or negative impact on the development of a potential railway line. In this way, on the basis of the resulting list of external factors opportunities and threats in the SWOT analysis were developed. On the basis of expert knowledge then opportunities and weaknesses were established and after experts evaluation a ranking list was formed as presented in Table 1. There were nine experts familiar with the topic: scientists from two universities, participant representing research and development center as well as practical entrepreneur dealing with the practical aspects of rail transport. Research on the analysis of the factors influencing the development of a new railway line was one part of a large project connected with future-oriented solutions in transport. All internal and external factors as well as positive and negative as indicated in Table 1 are sorted by the weighted rating in each group indicated by the experts and presented in brackets for each factor individually.

The study basing on weighted evaluation method was conducted in two stages. In the first stage, the brainstorming stage, experts were asked to submit their ideas related to the individual elements of the analysis. Followed by consensus hierarchy of importance of each of the four SWOT elements was established in such a way that the sum of each of the weights was 1. After a predetermined agreement as to the validity of elements within the scope of the factors considered, second stage of the research was carried out. It consisted of individual and subjective assessment in the scale of 0-5 of each factor in each group by every expert. Then from the experts scorecard received the averaged was counted and multiplied by the weight of each factor. According to the SWOT analysis, the overall weighted rating can be concluded that the positive internal factors (3.40) are bigger than the negative internal factors (-3.09), and similarly the total positive external factors (3.74) are higher than the negative external factors (-3.24) in terms of possible rail connection between the Caspian Sea and the Black Sea.

Table 1 Ranking list of factors influencing potential rail line according to SWOT analysis  
*Tablica 1. Rang lista čimbenika koji utječu na potencijalnu željezničku trasu prema SWOT analizi*

<p><b>Opportunities (total: 3.74)</b></p> <ol style="list-style-type: none"> <li>1. Increase in expenditure on rail transport (0.72)</li> <li>2. Development of new technologies in the European and global transport (eg. handling automation) (0.68)</li> <li>3. Economic growth of the region and incomes of the population (0.4)</li> <li>4. International conventions in transport, harmonizing the conditions of carriage and documentation (0.4)</li> <li>5. High density of railways including those belonging to the TEN-T (0.25)</li> <li>6. Emphasis on the development of intermodal infrastructure points (0.2)</li> <li>7. Standardization of intermodal transport units on a global scale (0.2)</li> <li>8. Uniform rules of international trade (0.15)</li> <li>9. Existing market structures taking into account the liberalization of the transport market (0.12)</li> <li>10. Increase in the use of environmentally friendly technologies in transport (0.12)</li> <li>11. Possibility of using private capital and public funds (especially from EU) (0.12)</li> <li>12. Availability of land for the construction of a modern transport infrastructure (0.09)</li> <li>13. Increasing environmental awareness in the society (0.09)</li> <li>14. Demographic potential: a large number of residents in the region, age structure, level of education (0.08)</li> <li>15. Growing importance of intermodal transport in policy and strategy development in the countries (0.06)</li> <li>16. Stimulating innovation in transport through political lobbying (0.04)</li> <li>17. Conscientiousness and the liability of carriers in transport (0.02)</li> </ol>	<p><b>Threats (total: -3.24)</b></p> <ol style="list-style-type: none"> <li>1. Capital intensity of new transport technologies (-0.50)</li> <li>2. Differences in gauge, infrastructure, access to technological progress of countries (-0.45)</li> <li>3. Insufficient number of platforms and wagons in relation to the transport potential (0.40)</li> <li>4. Military conflicts politically or religiously motivated (-0.36)</li> <li>5. Necessity of introducing a system of waste utilization derived from transport activities (-0.21)</li> <li>6. Diversity of countries in terms of tax rates and duties (-0.15)</li> <li>7. Contraband smuggling (-0.12)</li> <li>8. High level of corruption (-0.12)</li> <li>9. Different conditions of the time, speed, axle loads (-0.10)</li> <li>10. Further development of the road transportation with a decrease in intermodal transport (-0.08)</li> <li>11. Cultural linguistic and religious differences between countries along the railway connection (-0.06)</li> <li>12. Diversity of countries' economic policies (-0.06)</li> <li>13. Ageing of the population (-0.03)</li> </ol>
<p><b>Strengths (total: 3.40)</b></p> <ol style="list-style-type: none"> <li>1. Research potential in the field of intermodal transport and transshipment (0.75)</li> <li>2. Educated human resources in the field of rail and intermodal transport (0.40)</li> <li>3. Enormous potential for transport from China to Europe (0.30)</li> <li>4. Financing the development of transport from the national and the European Union funds (0.30)</li> <li>5. Possibility of using good practices for national and international promotion of a new railway line (0.25)</li> <li>6. Enterprise interest of new technologies in transport implementation (0.20)</li> <li>7. Research development of Automatic Track Gauge Changeover Systems (0.20)</li> <li>8. Formation of an integrated transport structure of the transcontinental scale (0.16)</li> <li>9. Research development in the field of energy-efficient technologies in transport solutions (0.16)</li> <li>10. Active manufacturing capabilities of modern intermodal transport technologies (0.15)</li> <li>11. Higher education development related to railway and intermodal transport (0.12)</li> <li>12. Large volume of trade in the transport sector (0.12)</li> <li>13. Demand for transport services, resulting from the import and export volume between Europe and Asia (0.10)</li> <li>14. Gradual launch of innovative potential in the rail transport sector (0.09)</li> <li>15. Large number of scientific conferences with scope of transport container for popularizing issues of container transportation (0.09)</li> <li>16. Popularization of container for the transport of goods (0.09)</li> </ol>	<p><b>Weaknesses (total: -3.09)</b></p> <ol style="list-style-type: none"> <li>1. Decapitalisation of infrastructure fragments (-0.60)</li> <li>2. Weak position of intermodal transport in acquiring the EU and national funds (-0.50)</li> <li>3. Little interest in business enterprises for cooperation and research funding (-0.40)</li> <li>4. Demand for workers with appropriate qualifications (-0.30)</li> <li>5. Property decapitalisation of transport operators (-0.30)</li> <li>6. Small initiative in the development of public-private partnerships for the construction of new transshipment points (-0.20)</li> <li>7. Weak activity associated with the promotion of intermodal transport (-0.20)</li> <li>8. Unfavourable cost structure of intermodal transport (-0.24)</li> <li>9. Small number of innovative transport projects (-0.15)</li> <li>10. Research funding from different sources, different decision-making centres, lack of concentration of resources in the implementation of projects (-0.10)</li> <li>11. Low level of potential use of the R&amp;D and academic institutions dealing with transport (-0.10)</li> </ol>

Based on the SWOT analysis, further matrix can be elaborated with actionable strategies with multiple solutions:

- SO (Strengths-Opportunities) – maxi-maxi strategy: strategies that use strengths to maximize opportunities.,
- ST (Strengths-Threats) – maxi-mini strategy: strategies that use strengths to minimize threats.,
- WO (Weaknesses-Opportunities) – mini-maxi strategy: strategies that minimize weaknesses by taking advantage of opportunities,

- WT (Weaknesses-Threats) – mini-mini strategy: strategies that minimize weaknesses and avoid threats.

Based on the results gained with the weighted evaluation method based on expert opinions several strategies can be developed, which are presented in Table 2. The table shows only the most important suggestions and possibilities of strategies because of the enormous number of factors generated during research on the SWOT analysis.

Table 2 TOWS strategic alternatives matrix of the potential rail line  
 Tablica 2. TOWS matrica strateških alternativa potencijanoj željezničkoj trasi

	External Opportunities (O)	External Threats(T)
Internal Strengths (S)	<p><b>SO</b></p> <ol style="list-style-type: none"> <li>1. Increasing number of research projects associated with rail transport (<math>O_1, S_1, S_6, S_4</math>).</li> <li>2. Developing research projects on new handling possibilities (<math>O_2, S_1, S_4, S_6, S_7, S_9</math>).</li> <li>3. Developing TEN-T railway corridors especially on East - West routes (<math>O_3, O_3, S_3</math>).</li> <li>4. Integrating transport structure by further standardization (<math>O_7, S_8</math>).</li> <li>5. Developing good practice policy among partners involved in transport chains (<math>O_8, S_3</math>).</li> <li>6. Developing environmental awareness among transport systems (<math>O_{10}, O_{13}, S_{11}, S_{15}</math>).</li> <li>7. Increasing higher education potential among intermodal transport (<math>O_{14}, S_{11}</math>).</li> <li>8. Popularization of containers for carriage harmonization <math>O_4, S_{16}</math>.</li> </ol>	<p><b>ST</b></p> <ol style="list-style-type: none"> <li>1. Increasing number of research projects associated with cheap transport methods (<math>T_1, S_1</math>).</li> <li>2. Coping with integrated transport systems according to rail gauge etc. (<math>T_2, S_8, S_{10}</math>).</li> <li>3. Building interest potential for rail platforms manufacturing (<math>T_3, S_6</math>).</li> <li>4. Building integrated wastes utilization for transport chains (<math>T_5, S_8</math>).</li> </ol>
Internal Weaknesses (W)	<p><b>WO</b></p> <ol style="list-style-type: none"> <li>1. Developing model of prices for different price levels according to infrastructure owner (<math>O_1, W_1, W_5, W_8</math>).</li> <li>2. Introduction of business enterprises in research projects seeking to uniform transport (<math>O_7, O_8, W_3</math>).</li> <li>3. Increasing expenditures on public-private initiatives among transshipment points of railway corridors (<math>O_1, W_6, W_8</math>).</li> <li>4. Increasing different funding sources for innovative transport projects (<math>O_1, W_9, W_{10}</math>).</li> <li>5. Increasing usage of academics potential for innovations in transport (<math>O_2, O_{13}, W_{11}</math>).</li> </ol>	<p><b>WT</b></p> <ol style="list-style-type: none"> <li>1. Strengthening position of intermodal transport by minimalizing differences in gauge and infrastructure (<math>T_2, W_2</math>).</li> <li>2. Employees and users education on corruption and contraband smuggling (<math>T_7, T_8, W_4</math>).</li> <li>3. Strengthening activities associated with intermodal transport promotion and development (<math>T_{11}, W_7</math>).</li> </ol>

It's worth adding that the table shows only the most important suggestions and possibilities of strategies because of the enormous number of factors generated during research on the SWOT analysis.

#### 4. CONCLUSION / Zaključak

In conclusion it should be noted, that the alternative for northern route of goods delivery between countries of South-East Asia and European Union exists. It is obvious that many more should be done in terms of infrastructure development of corridor TRACECA, that will take time and considerable investments. The container ships crossing the Caspian Sea and the Black Sea don't need extra infrastructure. The most radical solution would be to build an electrified railway track with gauge of 1435 mm in parallel with the existing broad gauge. It would be possible to significantly reduce the time required for transshipment. Significant financial costs could be recouped while reducing the price of delivery of containers and, respectively, with a significant increase in the amount of shipments.

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