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Intermodal transport development within the New Silk Road

JEL code: R40

Keywords: intercontinental trade, new silk road, EATL, rail intermodal, container trains

Abstract: The growth of trade flows between Asia and Europe results in growing container traffic between continents involved. Maritime transport dominates in cargo transport between China and Europe, but due to congestions in Chinese and European sea ports there is a need to develop the alternative transport routes, mainly railroad ones. It is a main goal of the new Chinese project “One Belt, One Road” under the concept of New Silk Road. The purpose of the article is to analyze both the trade and transport flows between Asia, mainly China and Europe. In the article there are also presented the idea of the New Silk Road as well as the examples of container trains operated between China and Europe. Finally, author presents the role of Poland in development of rail connections under New Silk Road.

Introduction

The volume of trade between Europe and Asia has been growing sharply in recent years and it is mainly driven by the development and emergence of new economies in Asia, and economic expansion in China. Today, China and the EU form the second-largest economic cooperation in the world. In the long-run, China’s importance as a strategic trade partner of Europe will increase.

Intermodal transport plays increasing role in development of the world's trade and consequently in growth of global economy. In that context, transport of containers between continents is more and more important for growing the effectiveness of logistics supply chains.

Following the growing trade volumes between Asia and Europe there are a significant growth of container traffic flows between the main world economy centers, i.e. Asia and Europe. Drivers for Asia-Europe transport growth as a result of: fast pace of globalization, rapid technological developments, constant fall of transportation costs, growth of international supply chains, Asia and especially China became the global production hub.

Maritime transport is currently the dominant mode of cargo transport between Asia, mainly China and Europe. But the potential of Chinese and European sea ports is more and more limited and the growing sea transport results in congestion and delays in sea ports. In 2017 congestions in container terminals along the whole Chinese coastal resulted in delays of container ships handling up to 3 days an average, and even ten days in some terminals (Korki..., 2017).

Therefore there is a need for investments in alternative transport routes, mainly land ones.

The new and smooth transport links will provide a great potential for trade flows between Asia and Europe. The Europe-Asia Transport Links (EATL) are key of importance for China and Europe, because they should foster Asian countries' connection to European routes, as well as will enable EATL countries to enjoy lower transport costs, faster freight times, more reliable transit links and new trade opportunities (Viohl, 2015). In that context, the Chinese project "New Silk Road" is aiming at providing favorable conditions for development of the land transport routes, mainly rail ones, in servicing trade turnovers between China and Europe.

1. The trade turnovers between China and Europe

A high percentage of Asian exports goes to Europe, because China has a domination in Asia's trade with Europe as well as EU and China are key trading partners. Trade between Beijing and Brussels now exceeds 1 bln EUR a day and the volume is growing.

The imports from EU-28 to China have increased from about 52 bln EUR in 2004 to 177.9 bln EUR in 2014, and the exports from China to EU-28 increased from 138 bln EUR in 2004 to 270.8 bln EUR in 2014 (Kaplany, 2016). EU-28 is the first trade partner for China in imports (12.4% of the world's trade) and the second (after USA) in exports (15.8% of the world's trade).

Of all bilateral trade flows, the EU-28 and China have the strongest trade relation. It should be noted, that the Chinese exports to EU-28 are 4.5 times bigger than China's exports to those countries.

2. The new Chinese project “One Belt, One Road”

The project’s concept “One Belt, One Road” (OBOR) has been announced by Chinese Government in 2013. Under OBOR the “Silk Road Economic Belt” through Central Asia and “21st Century Maritime Silk Road” through Southeast and South Asia are being planned (*Jedwabne...*, 2015).

The concept of New Silk Road is a great geopolitical project of China’s foreign policy as well as is the largest infrastructural investment in history, covering connections of Asia with Europe by land transport routes from the coast of Pacific to Western Europe.

Both Economic Belt and Silk Road pass through three continents (Asia, Africa and Europe) connecting economic centers of East Asia and Europe, covering also countries with a great economic potential. The trade volumes between China and countries along “One Belt and One Road” amounted to 995 bln USD in 2015, which constitutes about one fourth of the total trade volume of China, and within a decade, China’s annual trade with countries involved in OBOR will exceed 2.5 bln USD (*China’s world...*, 2016).

The projects are strongly supported by both Chinese companies and the Chinese government, which work in tandem to achieve the overall goals of the Belt and Road initiative. Under OBOR, six economic corridors over 60 countries are being planned and at least 116 projects will be undertaken under OBOR of total worth of 225 bln USD.

It is planned to create several transport corridors to connect China with countries of European Union under concept of OBOR. The planned undertakings will focus on investment in rail and road infrastructure, land and sea terminals and air ports, as well as in energy, communication and industrial projects across Asia, the Middle East and Europe.

The New Silk Road (NSR) project will constitute several transport routes between China and Europe, within three land corridors: Northern – using Trans-Siberian Railway; Central – through Central Asia, connecting with Russian part of route from Kazakhstan and Southern – passing through Southern Asia, Near East and Southern Europe (Kaczmarek, 2015).

NSR is 9,977 km long, being much longer than Trans-Siberian Railway (9,289 km), up till now the longest rail route over the world. Apart from railroad connections, i.e. Iron New Silk Road, it is planned to create the Maritime Silk Road of the 21st Century, starting from south-eastern China and pass through coasts of south-eastern Asia, Indian Ocean and Suez Canal to Mediterranean Sea, and from here can break up for sea ports of Northern and Southern Europe, and in the last case to connect with land routes (Żurek, 2014).

All routes, both railroad and maritime ones, will constitute unified transport system and global infrastructure network covering the whole Asia with connections to Europe.

The Chinese government has created two main banks for financial support of infrastructural investment under New Silk Road, e.g. Asian’s Infrastructural-Investment Bank (AIIB) and the New Development Bank (NDB) with capital of 100 mln USD each. It is also announced to establish the special Fund of Silk Road with capital of 40 bln USD, to finance of the transport infrastructure development.

3. Intermodal rail transport on the routes China–Europe

Countries in the Euro-Asian region have become increasingly aware of the importance of Euro-Asian land transport links for the development and integration of the economy.

The EATL project is aimed at promoting development of transport infrastructure links and to develop and offer alternative transport choices to the maritime transport between Asia and Europe. The EATL project has identified rail, inland water and road transport linkages that are of key importance for connecting Europe with Asia. The nine rail and nine road routes constitute the core infrastructure network for the transport links between Europe and Asia across Central Asia and the Caucasus. The routes stretch over more than 10,000 km in the East-West direction, and cross over 15 countries.

Currently, the share of transport modes they handle trade flows between Asia, mainly China and Europe is as follows: maritime – 62.5%; air – 23.1%; road – 7.2%; rail – 3.5% and others – 3.7% (Kaplany, 2016). It means that maritime transport is the dominant mode of freight transports between Asia and Europe. However, distances by land connections between Europe and Asia are generally shorter than distances by sea. Transport time is also rail's primary advantage over maritime shipping and on some routes rail transport cuts travel time by half.

Transit time and cost of one container transport by sea, rail and air between Chongqing (China) and West Europe are as follows: transit time in days: maritime – 38–45; rail – 16–20 and air – 1–2; cost in USD: maritime – 1,500–3,000; rail – 3,500–5,500 and air – 20,000–25,000 (Kaplany, 2016). It means that rail transport is almost three times faster than maritime and nearly four times cheaper than air transport. Examples of transit times between Chinese and European cities are presented in Table 1.

Rail transport is profitable for transport of cargoes with high value and cargoes they require short delivery time, e.g. cars and automotive components, electronics, AGD, medicines, foods, etc., i.e. for which container freight trains can compete with maritime transport. Hence, rail freight transport increasingly emerges as an alternative choice of transport mode.

Table 1. Transit times for container trains between Chinese and European cities

Route	Transport duration (days)
Chengdu–Łódź	10–13
Suzhou–Warszawa	13
Chongqing–Duisburg	14–16
Zhengzhou–Hamburg	15
Wuhan–Pardubice	16
Yiwu–Madrid	21

Source: own elaboration on the basis of Bessonov (2016).

The importance of rail transport for movement of cargoes from Asia, namely China, and Europe is still very limited, but has constantly been growing in the past years. Nowadays, several regular freight rail trains are under operation, using the Trans-Siberian Railway (TSR) through Russia, and Kazakhstan Belarus, Poland and Germany.

Examples of rail transport advantages over maritime and air ones at the routes China–Europe are presented in Tables 2 and 3.

Table 2. Utilization of transshipment capacity in main seaports in China (%)

Seaports	Utilization of transshipment capacity
Shanghai	125
Guangzhou	122
Qingdao	107

Source: own elaboration on the basis of www.pkp-cargo.eu.

Table 3. Comparison on transit time and cost in container traffic on the routes China–Europe (sea, rail and air transport)

Modes of transport	Distance (thous km)	Transport duration (days)	Cost of transport (USD/TEU)
Sea transport	17–27	17–28	2
Rail transport	11	12–15	4–5
Air transport	–	1–2	15–20

Source: own elaboration on the basis of www.pkp-cargo.eu.

For the past few years the number of regular freight trains running between China and Western Europe has been steadily growing, and more and more consignors to perceive railways as a real transport alternative to the sea and air traffic.

The intermodal transport using container block trains combines the advantage of offering smaller loading quantities to its customers with the operational effectiveness of block trains, that are assembled at one point and sent directly to its destination point without intermediate handling, split up for adding and removing wagons.

It is almost impossible to make detailed assessment of the current transport flows in terms of volume and transport mode as well as to estimate the potential for cargo shifting from maritime to rail transport. Practically, there does not exist the comprehensive and unified data base on the total volume of rail freight transports between Asia (mainly China) and Europe. Some information on amount of the block trains are published by railway companies, operated at the routes concerned, as well as by operators and forwarding companies. Therefore, the present information on rail freight transports, including container trains, between Asia and Europe are incomplete (fragmentary) and estimative ones.

It is also difficult, or even impossible, to obtain statistical information on modal shift in EATL countries. Only the Organization for Co-Operation between Railways (OSJD) publishes detailed statistics on rail freight transportation for EATL (*Identification...*, 2015). But it is only a part of the rail market in transport flows between Asia and Europe. The rail links between CIS countries and China are currently limited to the Kazakhstan–China routes and the main railways used for freight traffic are the northern and southern legs of the Trans-Siberian Railway (TSR). By the information published by OSJD the rail freight volumes in 2014 amounted to 2,615 thousand TEU carried by 142 block trains over by the OSJD railways (OSJD, 2015).

By the information of the Chinese railways about 815 container block trains were organized in 2015 on the routes China–Europe–China, of which from China to Europe – 550 trains, and in the opposite direction – 265 trains (Report..., 2016).

The running frequency of container trains from China to Europe has already reached 4 times a week, and in the opposite direction – once a week. Travel time of container block trains through the Byelorussian Railway from the station Krasnoje to Brest is less than 12 hours.

Examples of freight rail services that operate regularly block trains on the routes between China and Europe (*Via container...*, 2015):

- “Tiger Train” regular weekly block train between Duisburg/Grossbeeren and Zenghou/ Chongqing,
- a regular weekly container block train from Zenghou to Hamburg, transported mainly electronics,
- a daily container train from Leipzig to Shenyang to carry automotive parts and components to the company’s factory there,
- a container block train between Yiwu and Madrid (the longest rail connection over the world – 13,000 km),
- a weekly train from Chengdu to Łódź in Poland that is specially equipped with temperature-controlled containers for sensitive products.

Following the results of work for 2015 positive dynamics of container traffic growth between China–Europe–China have been reached of up to 28.6 thous. TEU (growth by 1.9 times against the similar period of the previous year).

Nowadays 142 container block trains are organized and run on a regular basis on the railways of the OSJD member countries, i.e. on Trans-Siberian Railway (TSR). About 1,269 container trains proceeded in 2015 through the network of the Railway of Kazakhstan in the transit traffic; the number of container trains increased by 255 trains as compared to 2014 (growth by 25%), of which in communication China – Europe by 581 trains, grown by 327 trains (or by 2.2 times).

Container trains have proceeded in transit through Kazakhstan along the following main routes (OSJD, 2015): Chengdu–Łódź: 61 trains (since 2012); Zhengzhou–Hamburg: 49 trains (since 2013); Chongqing–Duisburg: 146 trains (since 2011); Wuhan–Hamburg: 62 trains (since 2014); Yiwu–Madrid: 17 trains (since 2014); Hefei–Hamburg: 3 trains

(a new route); Putyan–Terespol: 1 train (a new route); Duisburg–Chongqing: 118 trains (since 2013); Hamburg–Zhengzhou: 32 trains (since 2014); Hamburg–Wuhan: 15 trains (since 2014); Łódź–Chensyan: 26 trains (a new route); Madrid–Yiwu: 2 trains (organized in 2014); Hamburg–Lanzhou: 32 trains (a new route).

In 2016 about 3,557 container block trains were organized between China and Europe, connecting 27 Chinese cities (industry-trade centres) with 28 cities in 11 European countries.

The number of container trains carried out in 2016 between China and Europe increased more than 30% in comparison to 2015, and according of UN estimations the number of containers carried out by rail will reach about 1 mln TEU in 2030 (Data for trade flows..., 2015).

Eight container trains have been running in the traffic China–Western Europe–China through the Byelorussian Railway in the direction of Germany, Poland and Czech Republic along the routes: Chengdu–Łódź; Zhengzhou–Hamburg; “New Silk Way” Chongqing–Duisburg; Leipzig–Shenyang; Wuhan–Hamburg.

Nowadays, container transports between EU and China are imbalance, with more containers leaving Asia full than those coming back. Therefore intermodal rail transport is relatively expensive because the trains on the route from Asia to Europe are full loaded but in return travel they are half loaded at least.

It is worth mentioning that the Chinese provinces, like Zhengzhou, Wuhan, Chongqing, Chengdu, subsidize the freight trains up to of 4–5 thous. USD on average to each train, therefore the rail trains running currently from China to Europe are profitable. If the trains are fully loaded in each direction they can be profitable without subsidies any longer.

It should be stressed, that Poland has never been the main sending or destination country for Chinese trade flows, but due to its favorable geographical location it can be the logistics platform (hub) in Central-Eastern Europe for handling the freight transports from China to Europe. Poland, can play important role in development of the rail connections within New Silk Road as the transit zone and entrance at the West European markets (Żurek, 2014).

The containers trains from China to Europe mainly transit through Poland, and only a few of them have a final destination in Poland, e.g. regular block trains operated between Chengdu and Łódź. It is worth mentioning that the shortest variant of rail transports from China to Germany leads in transit through Poland.

It should be noted that PKP Cargo Group has taken a lot of activities aiming at development of cooperation between Poland and China in order to increase rail intermodal transports within New Silk Road. PKP Cargo SA being the natural partner for China in co-operation within “One Belt, One Road” has signed in 2015 a letter of intense with Zhengzhou International Hub (Chinese Logistics Group) on the mutual cooperation (*Grupa PKP Cargo...*, 2015). Both partners will create joint venture company, which takes over the rail container transports between China and Europe, they will also elaborate the business plan

for common investments in logistics centre in Malaszewicze. Due to planned investments, logistics centre in Malaszewicze can be a main hub on the western part of New Silk Road in handling the block container trains operated between China and Europe.

In 2015, PKP Cargo Group has acquired the new contracts for logistic handling of container rail transports from Chinese provinces (Henan, Syczuan and Yunnan) to Germany and the Netherlands – seven rail connections a week with perspective up to ten (*Nowe kontrakty...*, 2015). The Group of PKP Cargo is responsible for performance of rail connections from China at the part of railway section from border of Poland/Belarus to the final destinations, including first of all transport operations as well as delivery the wagons and making terminal operations (transshipments).

In 2016, the representatives of PKP Cargo and Chinese province Xinjiang signed the Memorandum on mutual cooperation (*Memorandum...*, 2016). The signed Memorandum is fully in line with the project of the Dry International Port development in Urumqui (capital of Xinjiang province). The Chinese party declares investment in Urumqui's dry port, which shall take cargoes flows from significant parts of China before their sending to Poland, and PKP Cargo shall provide railway transports in Europe. In the meantime the new railway line China-Europe under the name "China Railway Express" has been launched at the PKP Cargo terminal in Warsaw.

In 2017, presidents of PKP Cargo and Worldwide Logistics Group in China signed a letter of intent on the close cooperation, which enables to launch PKP Cargo's structures in China (*Chińska ekspansja...*, 2017). It is an important step in building a much closer cooperation between Polish and Chinese partners at the New Silk Road.

In 2014, PKP Cargo co-operated about 12 block container trains on the routes China-Europe, and in 2016 the number of those trains increased up to about 25 trains, which means about 1,200 trains a year. Currently, there are three regular rail intermodal connections between China and Poland.

But the potential growth of freight transports between China and Poland is still limited by Poland's trade deficit with China, e.g. the value of Polish export is ten times less than import from China to Poland. It should be noted, that China is the biggest trade partner of Poland in Asia, both in terms of the total trade volumes and the imports (*PKP Cargo...*, 2016). In 2015, the exports from Poland to China amounted to 1.8 bln EUR (growth by 8%), and the imports from China to Poland amounted to 20.3 bln EUR (growth by 16%). It means that imports from China to Poland decide about trade deficit of Poland with China, which amounted to 18.5 bln EUR, i.e. more than 2.6 bln EUR in comparison to 2014. The exports from Poland to China have constituted about 1% of the total volumes of Polish exports in 2015.

It can indicate that the growth of intermodal rail transports between Poland and China will strongly depend on the increase of the mutual trade, especially the growth of the Polish exports to China and China's investments in Poland and improvements of rail operations at the routes involved within New Silk Road.

The growth of Polish exports to China will create opportunities for increasing the rail intermodal transports from Poland to China and consequently to decrease imbalance between full loaded and empty containers trains.

Conclusion

Rail freight transport increasingly emerges as an alternative choice of transport mode. The term “New Silk Road” is commonly used to reflect the growing dynamic around the overland transport links between Europe and Asia. Rail freight transport can be a competitive transport alternative to maritime transport because it substantially reduces travel times on long distance routes. Its attractiveness is, however, impacted by persistent barriers, such as long border crossing delays, break of gauge, and the existence of the legal rail regimes (Chinese, Russian and European) applying to freight rail transport on the EATL routes.

Non-physical barriers cause significant delays, increase transport and logistics costs, and have a negative impact on visibility and reliability of the transport chain. Traders, shippers, and transport operators face various non-physical barriers of different types and causes, the main one being the long waiting times and queues at border crossing. These non-physical barriers are the result of complex national legislation and regulations, lack of cross-border harmonization and collaboration, organizational inefficiencies, non-application of trade facilitation standards and practices, insufficient investment in modern infrastructure and IT equipment for processing and data exchange (Viohl, 2015).

It should be noted that custom procedures will not be a barrier in rail traffic any longer, because all railway companies operated at the routes China-Europe have signed Custom Agreement, according to that the cargoes carried out in transit will not be a subject of clearance at each border. It will result in substantial shortening the transit times on the routes involved.

The main infrastructural barrier in rail transports on the routes China-Europe are two rail gauges: Eastern – 1,520 mm and European – 1,435 mm, they result in increase of travel time, due to transshipment of containers at places of changing gauges. Therefore, it is difficult to provide full interoperability on the railway routes involved.

Nowadays, a lack of cargoes which can be transported from Europe to China is a big challenge, and therefore the trains on that direction are almost empty. In spite of that, several regular freight rail services now exist, using the Trans-Siberian Railway (TSR) through Russia, and Kazakhstan, Belarus, Poland and Germany.

In 2017, the managers of railway companies from China, Belarus, Kazakhstan, Russia, Poland and Germany signed an agreement on improvement of rail freight transports from China to Europe. It is planned to create the logistic platform for information exchange and ITS technology development. The main goal of the agreement is to increase the share of rail transport on the market of freight traffic between Asia and Europe.

If the planned investments in transport infrastructure along the New Silk Road (One Belt, One Road) are performed, the share of rail transport in servicing the trade volumes between China and Europe will amount to 15% of transport market at least.

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ROZWÓJ TRANSPORTU INTERMODALNEGO W RAMACH NOWEGO JEDWABNEGO SZLAKU

Słowa kluczowe: handel, Chiny–Europa, Nowy Jedwabny Szlak, EATL, kontenery, kolejowy transport intermodalny

Streszczenie: Dynamiczny rozwój handlu między Azją i Europą przekłada się na wzrost przewozów kontenerów między tymi kontynentami, w tym przede wszystkim drogą morską. Z uwagi na rosnącą kongestię w chińskich i europejskich portach morskich, zaistniała potrzeba rozwoju alternatywnych tras, głównie kolejowych, w przewozach kontenerów między Chinami i Europą. Celem artykułu jest analiza obrotów handlowych i przewozów ładunków transportem kolejowym między Chinami i Europą w ramach Nowego Jedwabnego Szlaku. W artykule zaprezentowano przykładowe pociągi kontenerowe eksploatowane na trasach Chiny–Europa w latach 2014–2016. Ponadto, autor omówił miejsce i rolę Polski w przewozach kolejowych między Chinami i Europą w ramach realizacji koncepcji Nowego Jedwabnego Szlaku.

Cytowanie

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